# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### First Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 1101** | Architectural Design Project–1 | Theory (6 Hrs) | 2 | - | - | 6 | 8 | 10 |
| **ARC 1102** | Building Materials & Construction – 1 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC 1103** | Architectural Drawing – 1 | Theory | 2 | 4 | - | - | 6 | 4 |
| **ARC 1104** | History of Art & Culture | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 1105** | Environment & Ecology | Theory | 2 | - | - | - | 2 | 2 |
| **ARC 1106** | Computer Applications – 1 | Viva | 1 | - | 3 | - | 4 | 3 |
| **SPR 1107 ARC** | Sports/ Digital India Program | - | - | - | 2 | - | 2 | 0 |
| **TOTAL HOURS: 30<br>Total Credits (Cumulative): 28** | | | **9** | **6** | **5** | **10** | **30** | **28** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## First Semester(2020/2021/2024/2025)

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| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **Architectural Design Project–1** | |
| Course Code: | **ARC 1101 / ARC 101 / ARC 24 101 / AP AR 1101** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce the student to architecture as a discipline. |
| 2. | Make students aware of basic vocabulary and various facets of design. |
| 3. | Familiarize the students with human scale, basic ergonomics; develop perception and comprehension of space and form. |
| **Description of Contents in brief:** | |
| 1. | Defining and introducing architecture as a profession. Skills and traits for architects. |
| 2. | Introducing elements and principles of Basic Design. Colour theory and application in design. Exercises on two dimensional compositions. |
| 3. | Parameters of design, human activity, use of spaces and users. Interrelationship of architectural space to form, structure, materials and to a context. Concepts of space and form. Exercises based on freehand sketching and observation studies. |
| 4. | Anthropometrics and ergonomics: Human body as a basis of measurement. Relating space and self. Human scale, basic ergonomics; measurement and perception of movement, activity, and spaces. Different methods and systems (Local, traditional and modern) of measurement based on Human body and proportions. Exercises on anthropometric studies for postures, single/multiple persons and activities. |
| 5. | Study of a given space through elementary measured drawings, sketching and photography. Application of knowledge of anthropometry can be incorporated in the design of furniture items, building elements, door, window, ventilators, main gate, railings, boundary etc. |
| 6. | Design of basic shelter with creative use of form(s) for specific function(s). Design exercise may include single/multi activity spaces like hostel room, exhibition stall, drinking water fountain, information kiosk, food stall etc. |
| 7. | Study Tour- A study tour/site visits should be conducted during the semester as per the requirement of design studio/project. |
| 8. | Keywords: Design elements and Principles, Human scale, Anthropometrics, Ergonomics, Space and form |
| **Course Outcomes:** Students will | |
| 1. | Understand basic vocabulary of design. |
| 2. | Design basic furniture items and their spatial layout keeping optimum utilization of space and human comfort in mind. |
| 3. | Formulate a design process for architectural design of single activity space for users and demonstrate the same in the form of design proposal. |
| **Lecture Schedule:** | |
| 1. | Design and architecture ( General information/Introduction) |
| 2. | Studio: Interactive session on design and architecture. (Small exercises) |
| 3. | Different tools /mediums and methods documentation in architecture |
| 4. | Observation and perception |
| 5. | Studio: Visit to surrounding areas. Observation study |
| 6. | Studio: Working on the assignment/Demonstration by instructor/teacher |
| 7. | Studio: Discussion/presentation/Feedback |
| 8. | Drawing: a language, skill, technique and art. Basic terminology |

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| 9. | Studio: Freehand Sketching (memory sketches, objects, building, monuments, building elements, street furniture, trees etc.) |
| 10. | Studio: Working on the assignment/Demonstration by instructor/teacher |
| 11. | Studio: Presentation/review |
| 12. | Design principles and elements |
| 13. | Studio: Study of basic elements of space making and their characteristics/ qualities |
| 14. | Colour theory and colour for design and architecture |
| 15. | Studio: Design of two dimensional compositions/Exercises based on colour theory |
| 16. | Studio: Presentation/review |
| 17. | Human scale & understanding proportions: Different systems/methods of measurement |
| 18. | Studio: Study of different examples from familiar areas/ Buildings/ making models |
| 19. | Introduction of Anthropometry and ergonomics |
| 20. | Studio: Studies based on proportions, human body, postures and activities |
| 21. | Studio: Presentation/review |
| 22. | Understanding user, comfort, activities and space |
| 23. | Studio: Documentation of activities performed by single/multiple persons |
| 24. | Studio: Interactive group activity in the class |
| 25. | Design and human comfort: introducing importance of function |
| 26. | Studio: Study of existing examples: own space, public facility, stall, bus shelter etc. |
| 27. | Studio: Presentation/review |
| 28. | Form, function and creative visualization of forms |
| 29. | Studio: Study of simple forms, analysis of qualities and compositions(2D and 3D) |
| 30. | Design Process: important contributors ( Interactive session and discussion) |
| 31. | Studio: Examples/study of a defined function/Object/building element/Furniture i.e. shelf, chair, door handle etc. |
| 32. | Studio: study and analysis/discussion |
| 33. | Studio: Working on different solutions/ alternatives |
| 34. | Studio: Presentation/review |
| 35. | Design of a small shelter (Application and integration of above all) |
| 36. | Studio: Small shelter( Kiosk /stall/bus stop) for a defined context and user set |
| 37. | Site visit for understanding context and users (case study) |
| 38. | Documentation of study |
| 39. | Studio: Working on understanding function and development of form |
| 40. | Studio: Model making techniques and mediums and different techniques of presentation |
| 41. | Studio: Discussion/presentation/Feedback |
| 42. | Studio: Model making/Demonstration |
| 43. | Studio: Presentation/review |
| 44. | Studio: Presentation/review |
| 45. | Studio: Preparation of final drawings and model |
| **Book References:** | |
| 1. | Architecture, Form, Space & Order: Francis D.K. Ching, |
| 2. | Visual Dictionary of Architecture: Francis D. K Ching. |
| 3. | Neufert Architects' Data |
| 4. | Time Saver Standards for Building Types: Joseph De Chiara & John Hancock Callender |
| 5. | Understanding Architecture through drawings: Brian Edwards |
| 6. | How To Paint And Draw: Bodo W. Jaxtheimer |
| **Web References:** | |
| 1. | Web references shall be recommended by the instructor depending on the nature of design assignments |

## First Semester(2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **Building Materials & Construction - 1** | |
| Course Code: | **ARC 1102 / ARC 102 / ARC 24 102 / AP AR 1102** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To have a knowledge of building materials and basic structural systems, their properties and applications, and their intrinsic relationship to structural systems and environmental performance. | |
| 2. | Application of Basic Building Materials in simple situations | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to importance of building construction and knowledge of materials in architectural practice. | |
| 2. | Understanding materials for construction like bricks, stones, aggregates, cementing materials. | |
| 3. | Brick masonry. | |
| 4. | Rubble Masonry. | |
| 5. | Creating openings in walls using lintels and arches. | |
| **Course Outcomes:** | | |
| 1. | Identify and differentiate types of bricks, stones etc. | |
| 2. | Type of foundation and load bearing masonry | |
| 3. | Principles behind lintels and arches and their application | |
| 4. | Analyse a design decision situation and come up with correct material choice and construction specification. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to importance of building construction and knowledge of materials in architectural practice | |
| 2. | Manufacturing of brick, its sizes over times and in current use | |
| 3. | Parts of brick, various modules which help in wall construction | |
| 4. | Manufacturing of Cementing materials, Aggregates and their properties and use | |
| 5. | Plain cement concrete | |
| 6. | Mortars and plasters | |
| 7. | Foundation and its role in buildings | |
| 8. | Continuous Footing for load bearing walls for various wall thicknesses. Damp proof course and their use in brick walls | |
| 9. | Bonds | |
| 10. | English bond and its rules | |
| 11. | 1, 1 ½ 2, etc. brick thick wall stopped end | |
| 12. | L junction for various thickness of walls and various combination of thicknesses in the L junction | |
| 13. | T junction for various thickness of walls and various combination of thicknesses in the T junction | |
| 14. | Piers and their usage in walls. Attached piers for various thickness of walls and various combination of thicknesses between the wall and piers | |
| 15. | Detached piers for various thicknesses and shapes in English bond | |
| 16. | Flemish bond and its rules | |
| 17. | 1, 1 ½ 2, etc. brick thick wall stopped end | |

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| 18. | L junction for various thickness of walls and various combination of thicknesses in the L junction |
| 19. | T junction for various thickness of walls and various combination of thicknesses in the T junction |
| 20. | Piers and their usage in walls. Attached piers for various thickness of walls and various combination of thicknesses between the wall and piers |
| 21. | Detached piers for various thicknesses and shapes in Flemish bond |
| 22. | Specialized bonds |
| 23. | Specialized bonds |
| 24. | Understanding cavity wall construction |
| 25. | Creating jali work in bricks |
| 26. | Rubble masonry, type of stones suitable for rubble masonry |
| 27. | Continuous Footing for load bearing walls for various wall thicknesses |
| 28. | Random rubble masonry in various wall thicknesses |
| 29. | Built to course rubble masonry in various wall thicknesses |
| 30. | Coursed rubble masonry in various wall thicknesses |
| 31. | Ashlars Masonry in various wall thicknesses |
| 32. | Creating openings in wall: role of lintels, types of lintels |
| 33. | Masonry arches and their parts; types of masonry arches. |
| 34. | Semicircular and segmental arch |
| 35. | Jack arch |
| 36. | Other specialized arches |
| **Book References:** | |
| 1. | W.B. Mc Kay, Building Construction Volume 1 to 4 |
| 2. | R. Barry, Building Construction Volume 1 to 5 |
| 3. | Francis Ching D.K., Building Construction Illustrated |
| 4. | S.K. Sharma, Civil Engineering construction Materials |
| 5. | Sushil Kumar, Building Construction |
| 6. | BIS IS: 2212. 1991 |
| 7. | BIS IS: 1077.1992 |
| **Web References:** | |
| 1. | |

## First Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **Architectural Drawing -1** | |
| Course Code: | **ARC 1103 / ARC 103 / ARC 24103 / AP AR 1103** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce and familiarize with the drafting tools and accessories and provide basic knowledge and skill to draft a drawing manually. The various skill from drawing different types of line, its intensity and its interpretation, scale of drawing, dimensioning, lettering techniques, and layout of sheets are developed by various assignments. |
| 2. | Visualizing and drawing the geometric forms in different position using orthographic projections will help the student to understand and develop drawings for various design proposals. |
| 3. | Introduction to 3 Dimension drawing in metric projections, its type and its application will enhance for communicating the design idea. The idea of development of surfaces will further give the understanding of 2 Dimension drawings and 3 Dimension models. |
| **Description of Contents in brief:** | |
| 1. | Introduction to drafting procedures, graphic codes, symbols and architectural lettering. |
| 2. | Construction of architectural scales and their application to real objects and drawings (plain scale, diagonal scale, isometric scale), construction of basic and complex geometrical shapes. |
| 3. | Orthographic projections of simple regular two dimensional shapes, Orthographic projection of simple, complex solids and hollow objects and sections. Study of interpenetration of solids and development of surfaces. Isometric, axonometric and oblique projections. |
| 4. | Visual study of the city - artefacts and the urban arts: Understanding of urban form through study of landmarks and elements of visual interest in the city through interactive learning process. |
| **Course Outcomes:** | |
| 1. | Clear understanding about plan, elevation and section, as these orthographic projections are formal language of drawing. |
| 2. | To develop the sense of ratio, scale and proportion. |
| 3. | To understand drawing system of representing three-dimensional form on paper |
| 4. | To understand know-how of drafting instruments and drafting fundamentals A preliminary introduction to three-dimensional drawing systems (Orthographic projections and Isometric views) and its application in Architectural drawings. |
| 5. | Understanding of urban form through study of landmarks and elements of visual interest in the city through interactive learning processes. |
| 6. | To envisage the conceptual and technical framework of geometry as an effective tool for stimulating creative design thinking in design and technology. To develop interpretive skill in three-dimensional design related to buildings and their surroundings. |
| **Lecture Schedule:** | |
| 1. | Introduction of syllabus. Association of this subject with architectural prospects. Introduction about use of instruments. |
| 2. | Free hand Line practice as per different angles, as per grades, as per distance, as per strata and curvilinear nature |

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| 3. | Using of parallel bars and set squares Line practice as per different angles, as per grades, as per distance, as per strata and curvilinear nature. Writing work, use of guide lines, dimension lines, hierarchy of writing styles in sheet composition. |
| 4. | Geometric construction .i.e bisecting a line, methods to construct regular polygons, special methods of drawing. Construction of basic and complex geometrical shapes. |
| 5. | Introduction of architectural scales and their application to real objects and drawings (plain scale, diagonal scale, isometric scale). |
| 6. | Introduction about plain scales, their uses and method of construction. |
| 7. | Some problems associated with Plain scales solved in class. |
| 8. | Introduction about diagonal scales, their uses and method of construction. |
| 9. | Some problems associated with Diagonal scales solved in class. |
| 10. | Architectural Codes and symbols |
| 11. | Exercise on codes and symbols |
| 12. | Architectural Lettering. |
| 13. | Exercise on Architectural lettering |
| 14. | Orthographic projections, principle of projections, methods of projections their uses, different angles perception i.e. four quadrants system, introduction to horizontal planes and vertical planes. |
| 15. | Projections of points |
| 16. | Class exercises on projection of points. |
| 17. | Projections of straight lines. |
| 18. | Class exercises on projection of straight lines |
| 19. | Orthographic projections of planes and auxiliary planes |
| 20. | Class exercises on projections of planes and auxiliary planes |
| 21. | Orthographic projections of simple three dimensional solids . |
| 22. | Class exercises on projections of simple three dimensional solids |
| 23. | Orthographic projections of combination of solids and hollow solids. |
| 24. | Class exercises on projections of combination of solids. |
| 25. | Some complex problems of orthographic projection of solids. |
| 26. | Introduction to Development of surfaces, model preparation |
| 27. | Class exercises on development of solids. |
| 28. | Sections of solids, true shapes |
| 29. | Class exercises on Sections of solids |
| 30. | Class exercises on Sections of solids continued |
| 31. | Development of solids and their sections |
| 32. | Class exercises on Development of solids |
| 33. | Isometrics views |
| 34. | Class exercises on Isometrics views of solids |
| 35. | Axonometric views |
| 36. | Class exercises on Axonometric views of solids |
| 37. | Oblique views of solids |
| 38. | Class exercises on Oblique views of solids |
| 39. | Study of interpenetration of solids. |
| 40. | Class exercises on interpenetration of solids |
| 41. | Visual study of the city - Artefacts and the urban arts: Understanding of urban form through study of landmarks and elements of visual interest in the city through interactive learning processes. |
| 42. | Exercise on landmarks and various elements of city. |

| Book References: | |
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| 1. | Engineering Drawing & Graphics by K. Venugopal. |
| 2. | Basic Engineering Drawing by RS Rhodes & LB Cook. |
| 3. | Engineering Drawing by ND Bhatt. |
| 4. | Engineering Drawing by Basant Agrawal & C M Agrawal. |
| 5. | Engineering Drawing by P S Gill. |
| **Web References:** | |
| 1. | Web.iitd.ac.in |
| 2. | www.nitt.edu |
| 3. | www.nptel.ac.in |
| 4. | https://swayam.gov.in |

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## First Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **History of Art & Culture** | |
| Course Code: | **ARC 1104 / ARC 104 / ARC 24104 / AP AR 1104** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

| **Course Objectives:** | |
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| 1. | To learn about the various art forms evolved in different socio cultural and geographical environment in Indian context. |
| 2. | To understand in depth the Influence of socio-economic, demographic, political, cultural and regional influences on the evolution of various styles of art. |
| 3. | To discuss the dynamic relationship between society, culture and art. |
| **Description of Contents in brief:** | |
| 1. | Prehistoric age - Introducing concepts and beginning of culture and civilization. Introduction to art and culture of pre-historic ages along with classification under Paleolithic age, Mesolithic age, Neolithic age and the age of metals. |
| 2. | Early Civilizations - Introduction to various art forms such as artifacts, mural, sculptures, paintings etc. of Harappan, Egyptian, Mesopotamian, Greek, Roman and Pre-Columbian American cultures. |
| 3. | Indian civilisation - Introduction to art & culture of ancient Indian Vedic, Buddhist and Jain culture. Art and culture of Medieval India such as Rajput and Islamic art and culture. Spread of Indian culture other parts of the world. |
| 4. | Medieval Period and Renaissance - Work of various artists like Vinci, Picasso, Husain and others. Paintings of different eras like Mughal, Rajput etc. Impact of renaissance on art and culture. |
| 5. | Industrial revolution to modern age - Impact of industrial revolution; mass production, imperialism, colonization, on art and culture of the world. Modern art and culture movements; art nouveau, art deco and other. |
| **Course Outcomes:** | |
| 1. | To understand the concept society, culture and civilization. |
| 2. | To gain an understanding of anthropological theory and its lateral application. |
| 3. | To develop an appreciation for and understanding of cultural difference. |
| 4. | To appraise the dynamic relationship between these three attributes. |
| **Lecture Schedule:** | |
| 1. | Introduction to Sociology and its relationship to architecture |
| 2. | Different theories about culture and social identity with reference to architecture<br>Socio-economic systems<br>Political systems<br>Forms of social organization |
| 3. | Examples from social life to understand society and sociology |
| 4. | Introduction to Prehistoric Age |
| 5. | Introducing concepts and beginning of culture and civilization. |
| 6. | Introduction to art and culture of pre-historic ages along with classification under Paleolithic age, Mesolithic age, Neolithic age and the age of metals |
| 7. | Introduction to early civilizations |
| 8. | Introduction to various art forms such as artifacts, mural, sculptures, paintings etc. of Harappan, Egyptian, Mesopotamian |
| 9. | Introduction to various art forms such as artifacts, mural, sculptures, paintings etc. Greek, Roman and Pre-Columbian American cultures. |

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| 10. | Introduction to various art forms such as artifacts, mural, sculptures, paintings etc. Greek, Roman and Pre-Columbian American cultures. |
| 11. | Introduction to Indian Civilization |
| 12. | Introduction to art & culture of ancient Indian Vedic, Buddhist and Jain culture.<br>Spread of Indian culture other<br>parts of the world. |
| 13. | Introduction to art & culture of Buddhist |
| 14. | Introduction to art & culture of Jainism |
| 15. | Art and culture of Medieval India |
| 16. | Art and culture of Medieval India |
| 17. | Art and culture of Medieval India |
| 18. | Art and culture of Medieval India |
| 19. | Islamic art and culture. |
| 20. | Islamic art and culture. |
| 21. | Islamic art and culture. |
| 22. | Spread of Indian culture other parts of the world |
| 23. | Spread of Indian culture other parts of the world |
| 24. | Spread of Indian culture other parts of the world |
| 25. | Introduction to Eastern Medieval Period |
| 26. | Work of various artists |
| 27. | Paintings of different eras like Mughal, Rajput etc |
| 28. | Paintings of different eras like Mughal, Rajput etc |
| 29. | Paintings of different eras like Mughal, Rajput etc |
| 30. | Introduction to Western Medieval Period |
| 31. | Work of various artists like Donatello<br>Leon Battista Alberti<br>Cimabue<br>Filippo Brunelleschi<br>Fra Angelico<br>Lorenzo Ghiberti<br>Medieval Women Artists<br>Hildegard of Bingen |
| 32. | Work of various artists |
| 33. | Work of various artists |
| 34. | Work of various artists |
| 35. | Introduction to Indian Renaissance period |
| 36. | Various styles like Bengali Renaissance, British Romantic Art etc. |
| 37. | Various styles like Bengali Renaissance, British Romantic Art etc. |
| 38. | Various styles like Bengali Renaissance, British Romantic Art etc. |
| 39. | Introduction to Mughal Architecture and different periods |
| 40. | Introduction to Mughal Architecture and different periods |
| 41. | Introduction to Industrial revolution to modern age |
| 42. | Impact of industrial revolution of historic art forms and neoclassical style |
| 43. | Impact of industrial revolution of historic art forms and neoclassical style Great Mosque (1650–56; Jami Masjid) |
| 44. | Works of various artist of neoclassical period |
| 45. | Modern art and culture movements; art nouveau, art deco and others |
| 46. | Modern art and culture movements; art nouveau, art deco and others |
| 47. | Discussion |

| Book References: | |
|---|---|
| 1. | Gill Robert, Rendering with Pen and ink |
| 2. | David, Architecture in Cultural Change: Essays in Built Form and Culture Research |
| 3. | Jaxtheimer, How to Paint & Draw |
| 4. | Ching Francis D.K., Architecture Graphics |
| 5. | Hermione de Almeida and George H. Gilpin, Indian Renaissance: British Romantic Art and the Prospect of India |
| 6. | Said Edward, Orientalism |
| 7. | Clark, Kenneth, The Romantic Rebellion: Romantic versus Classic Art |
| 8. | Husband, Timothy ,The wild man: medieval myth and symbolism |
| 9. | Fletcher, B. A History of Architecture on comparative method. London: CBS. |
| 10. | Nutgens, P. The Story of Architecture Phaidon Press, Massachusetts, United States, London, United Kingdom |
| 11. | Giedion, Sigfreid. Space, Time and Architecture |
| **Web References:** | |
| 1. | www.archdaily.com |
| 2. | www.coursera.org |
| 3. | www.edx.org |
| 4. | ocw.mit.edu |
| 5. | www.my-mooc.com |
| 6. | Oxford Art Online |
| 7. | Avery Index to Architectural Periodicals |

## First Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **Environment and Ecology** | |
| Course Code: | **ARC 1105 / ARC 105 / ARC 24105 / AP AR 1105** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To have an understanding of fundamental knowledge about natural and built environment. |
| 2. | Fundamental concepts to understand environmental processes. |
| **Description of Contents in brief:** | |
| 1. | Fundamentals of Environment & Ecology:<br>Definitions and concepts; environment, environmental segments, ecosystem, ecology etc. Introduction to types, characteristic features, structure and function of different ecosystems (forest, grassland, desert and aquatic ecosystem). Effects of human activities such as agriculture, housing, industry, mining and transportation activities on environment. Threats to India's and the world's biological diversity. |
| 2. | India's Bio-Geographic Regions:<br>India's biological diversity in relation to the physio-geographic regions. Identification of principal bio-geographic zones of India and their description. Eco-regions of India (floristic and physiographic). Distinction on the basis of flora and fauna differences in an eco-region. Evaluation of the importance of biological diversity to all life interconnections between biological diversity and human life – sustenance. |
| 3. | Environmental Degradation and Human Impacts:<br>Environmental Pollution; definition, causes, effects and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear pollution. Role of an individual in prevention of pollution. Disaster management; floods, earthquake, cyclone and landslides. Cause-and-effect relationships between various human, natural and climatic factors that impinge upon ecological systems and their linkages. Understanding of global climate change and impacts with respect to rural/urban communities; increased risk/ vulnerabilities. |
| 4. | Techniques and Details:<br>Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. To understand implementation of ecological architecture at unit level. Rain water harvesting (contour bunds, wells, bunds, etc.). Techniques of waste water management (house level, bio swales etc.). Ecological planting (planting for wildlife, land improvement etc.) |
| 5. | Environmental Acts and Movements:<br>To understand history of environmental movements. Environment movements in world and in India (Chipko movement etc). Environmental activists and their contribution (water conservation movements). Environmental ethics. Environmental protection Act. |
| **Course Outcomes:** | |
| 1. | To develop awareness and sensitivity to environment and ecology. |
| **Lecture Schedule:** | |
| 1. | Introduction and importance of the subject |
| 2. | Understanding concepts of environment, environmental segments, ecosystem, ecology etc. |
| 3. | Different kinds of eco system - 1 |

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| 4. | Different kinds of eco system - 2 |
| 5. | Effects of human activities on environment – 1 |
| 6. | Effects of human activities on environment – 2 |
| 7. | Threats to India's and the world's biological diversity |
| 8. | Threats to India's and the world's biological diversity |
| 9. | Literature case studies |
| 10. | Literature case studies |
| 11. | Biological diversity in relation to the physio-geographic regions of India. |
| 12. | Principal bio-geographic zones of India and their description |
| 13. | Principal bio-geographic zones of India and their description |
| 14. | Eco-regions of India 1 |
| 15. | Eco-regions of India 2 |
| 16. | Distinction on the basis of flora and fauna differences in an eco-region |
| 17. | Evaluation of the importance of biological diversity to all life interconnections 1 |
| 18. | Evaluation of the importance of biological diversity to all life interconnections 2 |
| 19. | Introduction to environmental Pollution |
| 20. | Effects and control measures for air pollution |
| 21. | Effects and control measures for water pollution |
| 22. | Effects and control measures for soil pollution |
| 23. | Effects and control measures for marine pollution |
| 24. | Effects and control measures for noise pollution |
| 25. | Effects and control measures for thermal pollution |
| 26. | Effects and control measures for nuclear pollution |
| 27. | Role of an individual in prevention of pollution |
| 28. | Introduction to disaster management |
| 29. | Understanding disaster management with reference to floods |
| 30. | Understanding disaster management with reference to earthquake |
| 31. | Understanding disaster management with reference to cyclone |
| 32. | Understanding disaster management with reference to landslides |
| 33. | Cause-and-effect relationships between various human, natural and climatic factors that impinge upon ecological systems and their linkages |
| 34. | Understanding of global climate change and impacts with respect to rural/urban communities |
| 35. | Understanding concepts of Sustainable development |
| 36. | Urban problems related to energy |
| 37. | Water conservation, rain water harvesting, watershed management |
| 38. | Resettlement and rehabilitation of people |
| 39. | Understanding implementation of ecological architecture at unit level |
| 40. | Techniques of waste water management |
| 41. | Ecological planting |
| 42. | History of environmental movements |
| 43. | Major environment movements in world |
| 44. | Major environment movements in India |
| 45. | Environmental ethics |
| 46. | Environmental protection Act |
| **Book References:** | |
| 1. | Miller T.G Jr., Environmental Sciences, |
| 2. | SC Sharma & MP Poonia, Environmental Studies |
| 3. | OP Gupta, Elements of Environmental Pollution Control |

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|---|---|
| 4. | SC Sharma, Disaster Management |
| 5. | Cunningham, W.P. Cooper, T.H. Gorhani, E &Hepworth, Environmental Encyclopedia |
| 6. | E.P. Odum, Ecology |
| 7. | Keshav Kant & Rajni Kant, Air Pollution and Control |
| **Web References:** | |
| 1. | |

## First Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **I** | Year: **I** |
| Name of Course: | **Computer Applications - 1** | |
| Course Code: | **ARC 1106 / ARC 106 / ARC 24106 / AP AR 1106** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce to the students the basic software on for word processing, presentation and worksheets. |
| **Description of Contents in brief:** | |
| 1. | Word processing software like MS word, Open Office, etc for creating documents and reports. |
| 2. | Use of software like MS Excel for creating sheets with numbers and their role as tool for analysis and data processing. |
| 3. | Understand making of presentations through MS Powerpoint. |
| 4. | Understanding of graphics software like Adobe Photoshop. |
| **Course Outcomes:** Students will | |
| 1. | Become familiar with digital medium as means for presentation. |
| 2. | Apply the learning in this subject for assignments in the higher classes. |
| **Lecture Schedule:** | |
| 1. | Introduction to text and visual presentation softwares like MS Office, Open Office, Adobe Photoshop |
| 2. | MS word screen interface. |
| 3. | Basic commands like typing, fonts, paragraphs, margins, tabs, copy-paste etc. |
| 4. | Use of styles in a document. Editing styles |
| 5. | Page layout and Insert options |
| 6. | Referencing |
| 7. | Specialized functions like super scripts, sub scripts, water mark, find replace, mail merge, format painter, paste special, etc. |
| 8. | Print, export, save as, import, etc. |
| 9. | Use of the software in various stages of architectural education |
| 10. | MS Excel screen interface. |
| 11. | Creating a sheet with numbers |
| 12. | Basic formula assignment |
| 13. | Cell formatting, conditional formatting |
| 14. | Sorting of data |
| 15. | Page layout and Insert options |
| 16. | Advanced formulas |
| 17. | Understanding view options |
| 18. | Specialized functions |
| 19. | Use of the software in various stages of architectural education |
| 20. | Print, export, save as, import, etc. |
| 21. | MS PowerPoint screen interface. |
| 22. | Layout of slides |
| 23. | Insert option |
| 24. | Animating slide information |
| 25. | Page setup and design options |
| 26. | Setting up slide show |

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| 27. | Utility of notes in slide show |
| 28. | Specialized functions |
| 29. | Print, export, save as, import, etc. |
| 30. | Use of the software in various stages of architectural education |
| 31. | Adobe Photoshop screen interface |
| 32. | Basic commands of drawing |
| 33. | Basic commands of drawing-1 |
| 34. | Basic commands of drawing-2 |
| 35. | Working on layers |
| 36. | Text writing, editing and formatting |
| 37. | Important short keys |
| 38. | Use of the software in various stages of architectural education |
| **Book References:** | |
| 1. | MS Office, Dr. S.S. Srivastava |
| 2. | Adobe Photoshop CC for Photographers, By Martin Evening |
| **Web References:** | |
| 1. | www.microsoft.com |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Second Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 1201** | Architectural Design Project–2 | Theory (6 Hrs) | 2 | - | - | 6 | 8 | 10 |
| **ARC 1202** | Building Materials & Construction – 2 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC 1203** | Architectural Drawing – 2 | Theory | 2 | 4 | - | - | 6 | 4 |
| **ARC 1204** | History of Architecture – 1 | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 1205** | Workshop & Model-Making | Viva | - | - | 4 | - | 4 | 2 |
| **CIV 1206 ARC** | Structural Mechanics | Theory | 1 | 2 | - | - | 3 | 2 |
| **SPR 1207ARC** | Yoga/ Swatchha Bharat Abhiyan | - | - | - | 2 | - | 2 | 0 |
| | **TOTAL HOURS: 30**<br>**Total Credits (Cumulative): 55** | | **6** | **8** | **6** | **10** | **30** | **27** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Second Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **II** | Year: **I** |
| Name of Course: | **Architectural Design Project - 2** | |
| Course Code: | **ARC 1201 / ARC 201 / ARC 24201/ AP AR 1201** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To learn to draw insights from personal experience of surrounding environment. |
| 2. | Get familiarized with individual activity space, group activity space their functional characteristics and role of form. |
| 3. | Arrange activity spaces to create a unit fulfilling the desired needs. |
| 4. | Learn different techniques of analysis and presentation. |
| **Description of Contents in brief:** | |
| 1. | Understanding human activities and interactions of a small group of users. Study of lifestyle of individuals and groups and its influence in shaping of architecture for design of a simple building in the immediate or observable environment. |
| 2. | Exercises relating personal experiences to behavioral needs and translating them into documented information that can be used as a basis for design. |
| 3. | Systematic introduction to issues related with the design of human habitat, its components and space standards. Norms/customs/principles associate with different activity spaces in a residence i.e. design of kitchen, toilet, living room etc. Learning to use design tools and technique. |
| 4. | Introduction to various methods of representation of ideas and concepts in architectural design. Exercises on form development, rendering two dimensional building drawings, i.e. plans, sections, elevations, site plans, etc. |
| 5. | Methods of rendering and designing formats, selection of lettering styles etc. Use of photography, perspective, sciograph and, model making for architectural presentation. |
| 6. | The design exercises may include small shelters like residence, cottage, weekend house, etc. |
| 7. | Keywords: Activities, User, Form, Lifestyle and Spatial Design. |
| **Course Outcomes:** | |
| 1. | Ability to comprehend the influence of lifestyle, socio cultural and contextual factors on design. |
| 2. | Formulate a design process for architectural design of a small residential unit. Use of Architectural elements and space standards with presentation of concepts. |
| 3. | Develop conceptualizing skills, use techniques and vocabulary to explain representation of ideas and proposals. |
| 4. | Draw and present design proposal, sketches, diagrams and architectural drawings. |
| **Lecture Schedule:** | |
| 1. | Introduction to building typology .Residential architecture its importance and different classifications (General information, Presentation on basic definitions, terms, types, historic developments, factors etc.) |
| 2. | Studio: Interactive session identifying characteristic features buildings designed for different activities(Exercise based on exterior of buildings and internal use) |
| 3. | Studio: Visiting the neighborhood and observation study of residential architecture and other activities. Understanding scale and spatial relationship of various activities. |
| 4. | Studio: Presentation/review |
| 5. | Design of house/shelter and contribution of user's choices/constraints/aspirations. Discussion on Architecture without architects. |

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| 6. | Studio: Study of a house which is not designed by an architect/or a selected house |
| 7. | Studio: Documenting space use, layout and form, interaction with users |
| 8. | Studio: Introduction to Architectural elements and space standards |
| 9. | Analyzing relation of house, built form and culture (Life style/change in requirements) |
| 10. | Studio: Preparation of inventory of influences on design of a house (own family) |
| 11. | Techniques of documentation of a design project(measure drawing, photographs and sketches) |
| 12. | Studio: Study of own house/a case assigned/selected(Sketches, plans, Photographs, furniture layout write-up, interviews of family members) |
| 13. | Studio: Working on the assignment/Demonstration by instructor/teacher learning to draft plan, elevation, section, (line thickness, scale, dimensions, labeling, furniture etc.) |
| 14. | Studio: Drawing site plan, roof plan, exterior and interior views |
| 15. | Studio: Presentation/review |
| 16. | Techniques and analytical tools applied in architecture(Time activity, bubble diagrams, proximity chart etc.) |
| 17. | Circulation, natural, lighting, ventilation, orientation etc. in design |
| 18. | Studio: Working on analysis of the selected case (Methods and demonstration) |
| 19. | Studio: Working on analysis of the selected case(different aspects) |
| 20. | Studio: Presentation/review |
| 21. | Introducing a house design exercise related to examples specified in the syllabus. (Multiple aspects associated to design of a small residence, space, form, function, user, site and approaches etc. to be incorporated) |
| 22. | Defining house from different perspectives, part to whole, whole to part |
| 23. | Studio: discussion on users and activities in a residence and Design of important areas in a house: Kitchen, Bed room, living, services, parking, Staircase etc. |
| 24. | Studio: Information collection and study of standards and space assessment for different activities |
| 25. | Introducing functional aspects of house design. Design process, conceptual sketches, bubble diagrams, time activity, proximity matrices etc |
| 26. | Concept of personal space, shared spaces, family space, utility space, aesthetics in house design |
| 27. | Studio: Activities in enclosed, semi enclosed areas and open space in a residence, garage, porch, verandah, courtyard, terrace, terrace garden, |
| 28. | Integrating landscape with house design |
| 29. | Studio: Site visit |
| 30. | Studio: Design concept and development of conceptual diagrams and creative ideas |
| 31. | Studio: Discussion and critical evaluation of approaches and ideas |
| 32. | Studio: Discussion on form, structure and functional parameters |
| 33. | Studio: Drawings and sketches showing evolution and decision making in design |
| 34. | Studio: Comprehensive understanding of design. Detailing and solving issues related to design of building elements, structure, staircase etc. |
| 35. | Studio: Presentation/review |
| 36. | Studio: Single line plans and sketches describing volume of built form |
| 37. | Studio: Plans with furniture and other details |
| 38. | Studio: Presentation/review |
| 39. | Studio: site plan, perspective views. |
| 40. | Model making techniques and mediums and different techniques of presentation |
| 41. | Studio: Discussion/presentation/Feedback |
| 42. | Studio: Discussion/presentation/Feedback |

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| 43. | Studio: Preparation of final drawings and model |
| 44. | Studio: Final review |
| 45. | Studio: Final review |
| **Book References:** | |
| 8. | Architecture, Form, Space & Order: D.K. Ching, |
| 9. | Visual Dictionary of Architecture: Francis D. K Ching. |
| 10. | Neufert Architects' Data |
| 11. | Time Saver Standards for Building Types: Joseph De Chiara & John Hancock Callender |
| 12. | Understanding Architecture through drawings: Brian Edwards |
| 13. | Rendering with Pen and Ink: Robert W.Gill |
| 14. | House form and culture: Amos Rappaport |
| 15. | Architectural Graphics: Francis D.K.Ching |
| **Web References:** | |
| 1. | Web references shall be recommended by the instructor depending on the nature of design assignments |

## Second Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | | Semester: **II** | Year: **I** |
| Name of Course: | | **Building Materials and Construction - 2** | |
| Course Code: | | **ARC 1202 / ARC 202 / ARC 24202/ AP AR 1202** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** to enable students to understand | | | |
| 1. | Aspects of materials and construction components/elements for building envelop and interiors. | | |
| **Description of Contents in brief:** | | | |
| 1. | Timber as a building material, its physical properties and uses, defects, seasoning, decay and preservation. Industrial timbers such as ply wood, hard board, block board, particle board, etc. with their properties and uses. Study of types, properties, specifications, manufacturing process, techniques of preserving and finishing, quality tests, and uses of ferrous and non-ferrous metals and glass. | | |
| 2. | Paints and surface finishes, their composition, properties and methods of application of different types of paints such as Cement based, oil, synthetic enamels, acrylic and other plastic emulsions and formulations for exteriors and interiors. | | |
| 3. | Carpentry and joinery: Terms defined, mitring, ploughing, grooving, rebating, veneering, various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc. Jamb-casing. Timber joints as described in Indian architectural treatises. | | |
| 4. | Types of doors based on operation such as swing door, revolving door, sliding door, sliding-folding door. Details of Wooden Doors their definition of terms, types of doors such as ledged, ledged and braced, paneled, flush doors, glazed doors etc. Hinged, single and double shutters.<br>Z section doors, pressed steel and box section doors. Rolling shutters, collapsible gates. Complete aluminum swing, Sliding, sliding folding, and revolving doors. PVC / UPC Doors | | |
| 5. | Types of windows based operation and location – fixed window, Casement window, Sliding window, pivoted window, louvered window, bay window, clerestory window, corner window – gable and dormer window, etc. Details of Timber, Z section, pressed steel, box section, Aluminum, PVC / UPC casement and sliding windows | | |
| **Course Outcomes:** Students will be able to | | | |
| 1. | Identify and differentiate types of timber, their joinery, finishes, etc. | | |
| 2. | Understand the properties and uses of manmade and natural materials. | | |
| 3. | Understand and differentiate between various types of openings | | |
| 4. | Analyze a design decision situation and come up with correct material choice and construction specification. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to the subject and its scope, Timber as building Material and its use | | |
| 2. | Physical properties of timber | | |
| 3. | Defects in timber | | |
| 4. | Seasoning of timber | | |
| 5. | Preservation of timber | | |
| 6. | Introduction to Industrial timbers such as ply wood, hard board, block board, particle board, etc. with their properties and uses – 1 | | |
| 7. | Introduction to Industrial timbers such as ply wood, hard board, block board, particle board, etc. with their properties and uses – 2 | | |
| 8. | Use of Iron in building industry, Properties and use of metals in building industry. | | |

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| 9. | Steel as building material, its definition, properties. |
| 10. | Manufacturing of Steel. |
| 11. | Treatment of steel |
| 12. | Introduction to Aluminum and aluminum alloys their manufacturing, properties, durability, and uses. |
| 13. | Study of aluminum products and other non-ferrous metals. |
| 14. | Study of protection to non-ferrous metals and products such as anodizing, powder coating, painting, chromium plating, varnishing, melamine treatments, etc. |
| 15. | Introduction to Paints and surface finishes their composition, properties and methods of application of different types of paints such as oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Cement based paints. |
| 16. | Continued lecture 15 |
| 17. | Hands on Painting - 1 |
| 18. | Hands on Painting - 2 |
| 19. | Introduction to Carpentry and joinery |
| 20. | Details of various timer joints – 1 |
| 21. | Details of various timer joints – 2 |
| 22. | Details of various timer joints – 3 |
| 23. | Jamb Casing – 1 |
| 24. | Jamb Casing – 2 |
| 25. | Introduction to types of doors based on operation. |
| 26. | Ledged and braced Door |
| 27. | Ledged, braced and batten door -1 |
| 28. | Ledged, braced and batten door -1 |
| 29. | Paneled Door – 1 |
| 30. | Paneled Door – 2 |
| 31. | flush doors |
| 32. | Glazed doors |
| 33. | Z-section doors |
| 34. | pressed steel and box section doors |
| 35. | Rolling shutters and collapsible gates - 1 |
| 36. | Rolling shutters and collapsible gates - 2 |
| 37. | Introduction to aluminum swing, Sliding, sliding folding, and revolving doors. |
| 38. | Introduction to types of windows based operation and location |
| 39. | Details of fixed window -1 |
| 40. | Details of fixed window -2 |
| 41. | Details of Casement window – 1 |
| 42. | Details of Casement window – 2 |
| 43. | Details of Sliding window – 1 |
| 44. | Details of Sliding window – 2 |
| 45. | Details of pivoted window, louvered window – 1 |
| 46. | Details of pivoted window, louvered window – 2 |
| 47. | Introduction to details of other types of windows such as bay window, clerestory window, corner window – gable and dormer window, etc. |
| 48. | Z section window pressed steel and box section windows |
| 49. | Aluminum casement and sliding windows. |
| **Book References:** | |
| 1. | Building Construction Volume 1 to 4, W.B. Mc Kay |

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| 2. | Building Construction Volume 1 to 5, R. Barry |
| 3. | Building construction illustrated, Francis Ching D.K. |
| 4. | Building Construction, Sushil Kumar |
| **Web References:** | |
| 1. | |

## Second Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **II** | Year: **I** |
| Name of Course: | **Architectural Drawing - 2** | |
| Course Code: | **ARC 1203 / ARC 203 / ARC 24203 / AP AR 1203** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Architectural Drawing-II intends to develop essential manual skills such as proficiency in drawing, largely used as primary mode of communication of ideas in architectural design. Students will be introduced to a variety of tools and techniques for visual expression with emphasis on manual drawing. |
| 2. | The course would help students identify suitable methods of representation and methods in different built environment scenarios. |
| 3. | Architectural Drawing -II introduces advanced techniques for architectural drawing such as perspective projection, mix-media renderings etc. |
| **Description of Contents in brief:** | |
| 1. | SCIOGRAPHY: Introduction of basic principles of sciography and its application to the field of architecture. Sciography of two dimensional objects in plan and elevation. Sciography of three dimensional objects in plan and elevation and views (isometric, axonometric and perspective). Sciography of simple building elements. |
| 2. | PERSPECTIVE: Introduction to basic terms, principles, types and techniques of perspective drawing. One, two and three point perspective of simple objects, (drafted and free hand) presentation of interior and exterior views (drafted and free hand). |
| **Course Outcomes:** | |
| 1. | To develop the sense of Ratio, Scale and Proportion. |
| 2. | To understand drawing system of representing three-dimensional form on paper. |
| 3. | Understanding the development skills of One-Point and Two-Point Perspectives. |
| 4. | Use of Perspective and Sciography,for realistic image generation process by human eyes. |
| 5. | To envisage the conceptual framework of Perspective as an effective tool for stimulating creative design thinking. |
| 6. | To develop interpretive skill in three-dimensional design related to buildings and their surroundings. |
| **Lecture Schedule:** | |
| 1. | Introduction of syllabus. Association of this subject with architectural prospects. |
| 2. | Perspective by Measuring Point Method |
| 3. | Exercise based on lecture. |
| 4. | Introduction to basic terms. principles, types and techniques of Perspective drawing |
| 5. | Centre of Vision, Vanishing Point, selection of View Point |
| 6. | Change in Picture Plane |
| 7. | Exercise of simple solids. |
| 8. | Changes in Horizon Level |
| 9. | Exercise of simple solids. |
| 10. | Change in station point |
| 11. | Exercises based on small objects |
| 12. | Complex object exercises |
| 13. | Three point perspective views method |
| 14. | Other techniques of two point perspective drawing Grid method, thread methods |
| 15. | Exercises of two point perspective views –complex objects, |
| 16. | Techniques of Two Point Perspective drawing(drafted and free hand) |

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| 17. | Two Point Perspective for buildings and environment. |
| 18. | Exercises based on realistic views, generation of exterior parts of building & adjacent areas. |
| 19. | Techniques of One Point Perspective drawing |
| 20. | Change in Picture plane |
| 21. | Exercise of simple solids. |
| 22. | Changes in Horizon level |
| 23. | Exercise of simple solids. |
| 24. | Changes in station points |
| 25. | Exercises based on small objects |
| 26. | Complex object exercises |
| 27. | Techniques of One Point Perspective drawing – presentation of interior views (drafted and free hand) |
| 28. | Other techniques of One Point Perspective drawing Grid method, thread method. |
| 29. | Exercises of One Point Perspective views – complex objects, |
| 30. | One Point Perspective views – practical exercises based on interior views of rooms and buildings |
| 31. | Exercises based on realistic views of Interior parts of various types of buildings. |
| 32. | Introduction of basic principles of Sciography. |
| 33. | Techniques of Sciography for simple objects with reference to plan and elevation |
| 34. | Class exercise in solving problems of sciography. |
| 35. | Shade and Shadows, Conventional direction of light, shadow of a Point |
| 36. | Shadow of Planes,. |
| 37. | Class exercise in solving problems |
| 38. | Shadow of Solid and Sphere |
| 39. | Class exercise in solving problems |
| 40. | Shadow of objects ie Shadow in Niches, |
| 41. | Shadows on Sloping Edges, Shadow on Steps |
| 42. | Shadows on building elements |
| 43. | Shadow on elevation of of solids. |
| 44. | Sciography of three dimensional objects in plan and elevation and views (Isometric and Axonometric). |
| 45. | Class exercise in solving problems |
| 46. | Sciography of simple building elements |
| 47. | Class exercise in solving problems |
| 48. | Sciography directly on Perspective views |
| 49. | Practice in drawing sciography on simple perspectives. |
| **Book References:** | |
| 1. | Perspective and Sciography by Shankar Mulik |
| 2. | Engineering Drawing by S C Rangawala |
| 3. | Architectural Graphics, 4th Edition by Francis D.K. Ching |
| 4. | Lorraine Farrelly Nicola Crowson, Representational Techniques for Architecture (Basics Architecture), Bloombury ,2nd Revised edition (18 Dec. 2014) |
| 5. | David Dernie , Architectural Drawing, Laurence King; 2 edition (6 Oct. 2014) |
| **Web References:** | |
| 1. | www.nitt.edu |
| 2. | www.nptel.ac.in |
| 3. | https://swayam.gov.in |

## Second Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **II** | Year: **I** |
| Name of Course: | **History of Architecture - 1** | |
| Course Code: | **ARC 1204 / ARC 204 / ARC 24204 / AP AR 1204** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To learn about the various architectural forms evolved in different sociocultural and geographical environment. |
| 2. | To understand in depth the evolution of classical architecture in the west, and its various stylistic modes characterized by technology, ornamentation and planning practices. |
| 3. | To compare and discuss architectural styles of classical architecture of the west. |
| **Description of Contents in brief:** | |
| 1. | Ancient River Valley Civilizations - Introduction to architecture and planning of river valley civilizations of ancient Egypt, Mesopotamia and China. Study of palace, hypostyle hall, temple, tomb architecture. |
| 2. | Classical Architecture - Introduction to architecture and planning of ancient Greece and Rome. Study of principles of design, proportion, optical corrections and classical orders. Building types viz., temples, amphitheaters, circus, aqueducts etc. |
| 3. | Early Christian and Romanesque Architecture - Study of architectural character, evolution of Church form, building typologies, and building elements, polymath architecture, baptisteries, early basilicas, churches; Development of early Christian Church from Roman Basilica. Settlement planning and fortification systems. Development of Romanesque architecture from early Christian architecture. |
| 4. | Byzantine and Gothic architecture - Contribution of Byzantine architecture in the development of structural system dome construction over square plan. Adoption of Greek cross in church layout. Use of mosaic and mural in interiors. Development of Gothic church and its new elements: pointed arch window, cluster column and intersecting vault roof, clerestory window, flying buttress, glazed window, stone and metal trellis, flamboyant window and rose window. |
| 5. | Renaissance to Contemporary architecture - Introduction to Renaissance, Baroque and Rococo architecture. Contribution in structural system, e.g., ribbed dome, lantern dome, etc. Revival of classical order, Neo-Classicism. Modern architects and their works. |
| **Course Outcomes:** | |
| 1. | Identify different styles of historic architecture. |
| 2. | Identify prominent / important historic buildings by their components/style of design. |
| 3. | Describe prominent / important historic buildings. |
| 4. | Analyze the contributing factors for the design development of different styles. |
| 5. | Compare and Analyze the various styles on the basis of the contributing factors responsible for their development. |
| **Lecture Schedule:** | |
| 1. | Introduction to Prehistoric era: Barbaric period |
| 2. | Introduction to Mesopotamian Architecture |
| 3. | Socio cultural and political aspects of Mesopotamian Architecture |
| 4. | Salient feature of Mesopotamian Architecture |
| 5. | Introduction to Egyptian Architecture |
| 6. | Socio cultural and political aspects of Egyptian Architecture |
| 7. | Salient feature of Egyptian Architecture |

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| 8. | Discussion on Mesopotamian and Egyptian Architecture |
| 9. | Discussion on Mesopotamian and Egyptian Architecture |
| 10. | Introduction to Greek Architecture |
| 11. | Socio cultural and political aspects of Greek Architecture |
| 12. | Salient feature of Greek Architecture |
| 13. | Salient feature of Greek Architecture |
| 14. | Salient feature of Greek Town planning |
| 15. | Salient feature of Greek Town planning |
| 16. | Introduction to Roman Architecture |
| 17. | Socio cultural and political aspects of Greek Architecture |
| 18. | Salient feature of Roman Architecture |
| 19. | Salient feature of Roman Architecture |
| 20. | Salient feature of Roman Town planning |
| 21. | Salient feature of Roman Town planning |
| 22. | Discussion on Greek and Roman Architecture |
| 23. | Discussion on Greek and Roman Architecture |
| 24. | Introduction to Early Christian |
| 25. | Socio cultural and political aspects of Early Christian |
| 26. | Salient feature of Early Christian |
| 27. | Introduction to Byzantine Architecture |
| 28. | Socio cultural and political aspects of Byzantine Architecture |
| 29. | Salient feature of Byzantine Architecture |
| 30. | Salient feature of Byzantine Architecture |
| 31. | Salient feature of Medieval Town planning |
| 32. | Salient feature of Medieval Town planning |
| 33. | Introduction to Romanesque Architecture |
| 34. | Socio cultural and political aspects of Romanesque Architecture |
| 35. | Salient feature of Romanesque Architecture |
| 36. | Salient feature of Romanesque Architecture |
| 37. | Salient feature of Romanesque Architecture |
| 38. | Discussion on Early Christian, Byzantine and Romanesque Architecture |
| 39. | Discussion on Early Christian, Byzantine and Romanesque Architecture |
| 40. | Introduction to Gothic Architecture |
| 41. | Socio cultural and political aspects of Gothic Architecture |
| 42. | Salient feature of Gothic Architecture |
| 43. | Introduction to Renaissance Architecture |
| 44. | Socio cultural and political aspects of Renaissance Architecture |
| 45. | Salient feature of Renaissance Architecture |
| 46. | Discussion on Gothic and Renaissance Architecture |
| 47. | Discussion on Gothic and Renaissance Architecture |
| 48. | Introduction to Classical Revivalism / Neo Classical |
| 49. | Salient features of Classical Revivalism / Neo Classical |
| 50. | Introduction to Late 18$^{th}$ and early 19$^{th}$ century style in architecture |
| **Book References:** | |
| 1. | Cruickshank.D (ed) (1996). Cruickshank, Dan (editor), Banister Fletcher's A History of Architecture, Architectural Press, Newyork, USA. |

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| 2. | Tadgell. C. Antiquity:,(2007),Origins, Classicism and The New Rome., Taylor & Francis, Routledge,Newyork, USA. |
| 3. | Tzonis. A (et.al.),(2004) Classical Greek Architecture: The Construction of the Modern, Random House Incorporated, the University of Michigan,USA |
| 4. | Fletcher, B. (2002). A History of Architecture on comparative method. London: CBS. |
| 5. | Kostof, S. (2012). History Of Architecture: Settings And Rituals. England: Oxford University Press. |
| 6. | Tomlinson, R. A. (1995). Greek and Roman Architecture. London: British Museum Press. |
| 7. | Nutgens, P. (1997). The Story of Architecture Phaidon Press, Massachusetts, United States, London, United Kingdom |
| **Web References:** | |
| 1. | www.archdaily.com |
| 2. | www.coursera.org |
| 3. | www.edx.org |
| 4. | ocw.mit.edu |
| 5. | www.my-mooc.com |
| 6. | Oxford Art Online |
| 7. | Avery Index to Architectural Periodicals |

## Second Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **II** | Year: **I** |
| Name of Course: | **Workshop and Model making** | |
| Course Code: | **ARC 1205 / ARC 205 / ARC 24205 / AP AR 1205** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Identify and differentiate types of timber, their joinery, finishes, use etc. |
| 2. | Understand the properties and uses of manmade and natural materials. |
| 3. | Review various tools and techniques for model making and design model for real life situation. |
| **Description of Contents in brief:** | |
| 1. | Importance of use of physical model in architecture for understanding and evaluating spaces. Role of scale-models in design. |
| 2. | Understanding various materials for making physical models for its composition, strengths and weaknesses; cutting and moulding of material; joinery; tools, adhesives, fixing materials etc. |
| 3. | Introduction to the use of different types of tools and machines in model making. |
| 4. | Introduction to 3D printing and 3D cutter as means to make architectural model. |
| 5. | All this will be taught to instill a skill for understanding materials and working with them. Model making exercise shall be given in materials like cloth, paper, card board, mount board, forex sheet, wood, Plaster of Paris, plastics, films, acrylic, Styrofoam, wax, metals, glass, GI wire etc. for exploring their potential. |
| 6. | Introduction to timber as a building material, its physical properties and uses. Industrial timbers such as ply wood, hard board block board, particle board, etc. with their properties and uses. |
| 7. | Fundamental of Carpentry and Joinery, Terms defined, mitring, ploughing, grooving, rebating, veneering, various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc. |
| 8. | Introduction to various machines used in timber construction. Short introduction to types of furniture. |
| **Course Outcomes:** | |
| 1. | Understand the importance of model making using various materials and use it for their design projects afterwards. |
| 2. | Broadening of knowledge base and pragmatic understanding of timber its properties and use in building construction. |
| **Lecture Schedule:** | |
| 1. | Importance of use of physical model in architecture for understanding, visualising and evaluating spaces |
| 2. | Introduction to various materials available for model making |
| 3. | Introduction to Essentials tools of model making |
| 4. | Conceptualization exercise in model making |
| 5. | Exercises on Papers, Mount boards, Films, and Styrofoam, etc. |
| 6. | Exercises on Forex, Plastics and Acrylic etc. |
| 7. | Exercises on Plaster of Paris, Softwood and Wax etc. |
| 8. | Exercises on Metals, Wires and Glass etc. |
| 9. | Exercise on special tools and techniques in model making |
| 10. | Introduction to 3D printing and 3D cutter as means to make architectural model |
| 11. | Exercise on timber's physical properties and uses |

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| 12. | Introduction to Industrial timbers such as Ply wood, Hard board, Block board, Particle board, etc. for their properties and uses |
| 13. | Hands on carpentry tools |
| 14. | Exercise on carpentry and joinery |
| 15. | Introduction of special tools and machines employed |
| 16. | Exercise on various machines used in woodworking |
| 17. | Short introduction to types of furniture used for different purposes and locations |
| **Book References:** | |
| 1. | Professional Modelmaking: A Handbook of Techniques and Materials for Architects and Designers By Norma Trudeau |
| 2. | Basics: Fundamentals of Presentation Model building By Alexander Schilling |
| 3. | Architectural Modelmaking (Portfolios Skills: Architecture) By Nick Dunn |
| 4. | Collins Complete Woodworker's Manual Book by Albert Jackson and David Day |
| 5. | Carpentry for beginners: how to use tools, basic joints, workshop practice, designs for things to make by Charles Harold Hayward |
| **Web References:** | |
| 1. | http://www.survivorlibrary.com/library/the-complete-guide-to-home-carpentry.pdf |
| 2. | https://www.youtube.com/watch?v=SxCYtRfCm8o |
| 3. | https://www.youtube.com/watch?v=itD5U_WIqao |

## Second Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **II** | Year: **I** |
| Name of Course: | **Structural Mechanics** | |
| Course Code: | **CIV 1206 ARC / CE 115 / CE 24115 / CE 1215** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | General Concept of conditions of static equilibrium. Basic knowledge of Engineering mathematics involving differentiation and integration, matrix algebra etc. | |

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| **Course Objectives:** | |
| 1. | To understand the principles of structural mechanics. |
| 2. | To understand the behavior of engineering materials subjected to different types of forces. |
| **Description of Contents in brief:** | |
| 1. | Force systems and concept of equilibrium |
| 2. | Simple stresses and strains |
| 3. | Centroid and moment of Inertia of plane sections |
| 4. | Shear force and Bending moment in Beams |
| 5. | Analysis of statically determinate trusses |
| **Course Outcomes:** | |
| 1. | Learn how a solid body (rigid body/elastic body) behaves when it is subjected to static loads. |
| 2. | The concept of elastic structure subjected to various types of forces or their combination and response developed in the structure. |
| **Lecture Schedule:** | |
| 1. | Basics of Structural Engineering |
| 2. | Different types of loads acting on structure |
| 3. | Types of supports |
| 4. | Conditions of equilibrium |
| 5. | Free body diagram |
| 6. | Axial stresses and strain |
| 7. | Bending stresses and strain |
| 8. | Shear stresses and strain |
| 9. | Elastic constants and their relationships |
| 10. | Centroid of plane areas |
| 11. | Concept of Moment of inertia |
| 12. | Parallel axis theorem |
| 13. | Perpendicular axis theorem |
| 14. | Concept and types of beams |
| 15. | Shear force and bending moment diagrams for simply supported beams |
| 16. | Shear force and bending moment diagrams for cantilever beams |
| 17. | Shear force and bending moment diagrams for overhang beams |
| 18. | Concept of Truss member, Assumptions in truss analysis |
| 19. | Analysis of plane truss by method of joints |
| 20. | Analysis of plane truss by method of section |
| **Book References:** | |
| 1. | Introduction to Solid Mechanics: I H Shames |
| 2. | Schaum's Outline of Engineering Mechanics: E Nelson |
| 3. | Engineering Mechanics Statics and Dynamics: A Nelson |

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| 4. | Engineering Mechanics: S.S. Bhavikatti |
| 5. | Engineering Mechanics: R.K.Rajput |
| 6. | Mechanics of Materials: E.J. Hearn |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/112106286/ |
| 2. | https://nptel.ac.in/courses/112103109/ |
| 3. | https://nptel.ac.in/courses/122104014/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Third Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 2101** | Architectural Design Project – 3 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC 2102** | Building Materials & Construction – 3 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC 2103** | History Architecture – 2 | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 2104** | Climatology | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 2105** | Architectural Communication Skill | Viva | 1 | - | 3 | - | 4 | 3 |
| **CIV 2106 ARC** | Structure – 1 | Theory | 1 | 2 | - | - | 3 | 2 |
| **CIV 2107 ARC** | Surveying | Theory | 1 | - | 4 | - | 5 | 3 |
| | **TOTAL HOURS: 30**<br>**Total Credits (Cumulative): 84** | | **7** | **6** | **7** | **10** | **30** | **29** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Third Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|---|
| Name of Program: **B.Arch.** | | Semester: **III** | Year: **II** |
| Name of Course: | | **Architectural Design Project 3** | |
| Course Code: | | **ARC 2101/ ARC 211 / ARC 24211 / AP AR 2101** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** to make students understand concepts of: | | | |
| 1. | Principles of grouping of units or buildings. | | |
| 2. | Role of built (mass) and open spaces (void) in the overall design configuration | | |
| **Description of Contents in brief:** | | | |
| 1. | Understanding user generated factors for grouping; security, segregation, convenience, privacy, sharing, user-density etc. | | |
| 2. | Introduction to concepts of clustering, shared open space, community, aggregation and economy in the context of space utilization. | | |
| 3. | Study of mass and space within a cluster; length: width: height ratios of built mass and open spaces and their relationship. | | |
| 4. | Design of a group of residential and ancillary buildings set in a given context. Design exercises may include facilities like housing for elderly, SOS village, transit housing, housing for training institute or similar projects based on community living and shared facilities. | | |
| **Course Outcomes:** Students will have capability to | | | |
| 1. | Comprehend when and how the analysis of a design brief would result in clustering of buildings and creation of open spaces. | | |
| 2. | Formulate a design process for architectural design for a specific use by a group | | |
| 3. | Demonstrate the same in the form of a design proposal. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to the subject, assessments and sessionals | | |
| 2. | Discussion on attributes for design for group of users | | |
| 3. | Individual activities, small group activities and whole group activities. | | |
| 4. | cont.. | | |
| 5. | Spaces for above activities; indoor as well as outdoor | | |
| 6. | cont.. | | |
| 7. | Write-up and visuals on comprehension of the scale and its increase in complexity over previous designs | | |
| 8. | Exercise on understanding spatial configuration of clusters; length: width: height ratios of built mass and open spaces and their inter-relationship, hierarchy etc. | | |
| 9. | cont.. | | |
| 10. | cont.. | | |
| 11. | cont.. | | |
| 12. | case study | | |
| 13. | case study | | |
| 14. | case study | | |
| 15. | case study | | |
| 16. | case study | | |
| 17. | case study | | |
| 18. | case study | | |
| 19. | case study presentation | | |
| 20. | case study presentation | | |
| 21. | Introducing the design brief | | |
| 22. | design brief development | | |

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| 23. | cont.. |
| 24. | cont.. |
| 25. | Problem solving ;Concept design and design development |
| 26. | cont.. |
| 27. | cont.. |
| 28. | cont.. |
| 29. | cont.. |
| 30. | Design proposal finalization |
| 31. | cont.. |
| 32. | cont.. |
| 33. | cont.. |
| 34. | cont.. |
| 35. | cont.. |
| 36. | cont.. |
| 37. | Discussion and freezing design |
| 38. | Discussion and freezing design |
| 39. | Final drawings, views, models |
| 40. | cont.. |
| 41. | cont.. |
| 42. | cont.. |
| 43. | cont.. |
| 44. | cont.. |
| 45. | cont.. |
| 46. | cont.. |
| 47. | Presentation |
| 48. | Presentation |
| 49. | Presentation |
| **Book References:** | |
| 1. | Form, Space and Order by Francis D. K. Ching |
| 2. | Francis D. K. Ching , Architectural Graphics |
| 3. | Analysing Architecture, Simon Unwin, Routledge, London. |
| 4. | Housing & Urbanisation, Charles Correa |
| **Web References:** | |
| 1. | https://architexturez.net/ |

## Third Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **Building Materials and Construction - 3** | |
| Course Code: | **ARC 2102 / ARC 212 / ARC 24212 / AP AR 2102** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** to enable students to understand | | |
| 1. | PCC and RCC material components and construction specifications and steps. | |
| 2. | Indian standards for RCC work, reinforcement detailing etc. | |
| **Description of Contents in brief:** | | |
| 1. | Concrete; types, grades, mixing and setting process, workability and other tests, admixtures and additives. Plain and reinforced. Steel section, steel bars, properties, manufacturing process Indian standards, strength, joining, fabricating. | |
| 2. | Reinforcement and details of R.C.C. pad foundations, combined foundation, eccentric foundations. Reinforcement details of R.C.C. square, rectangular and circular columns. | |
| 3. | Reinforcement and details for lintels and projections (*Chajja*). Reinforcement and details of R.C.C. beams: simply supported, rigid, continuous and cantilevered. Reinforcement and details for one-way and two-way slabs with fixed continuous and cantilever end conditions. | |
| 4. | Types of staircases, calculations for riser and treads, reinforcement and details for various types of staircases. | |
| 5. | Formwork for square, rectangular and circular columns. Scaffolding. Shuttering and centering beams, slabs and staircase. Shoring such as raking shores, flying shores and dead shores. Underpinning. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Understand what type of details would be needed for a particular RCC/PCC work and make drawings for the same. | |
| 2. | Understand planning and execution of staircases | |
| 3. | Understanding the method of executing of framework, shuttering and scaffolding. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to Concrete | |
| 2. | Constituents of concrete and their properties – 1 | |
| 3. | Constituents of concrete and their properties – 2 | |
| 4. | Types and Grades of grades of concrete | |
| 5. | Mixing and setting process of concrete | |
| 6. | Tests for concrete – 1 | |
| 7. | Tests for concrete – 2 | |
| 8. | Admixtures and additives used in concrete | |
| 9. | Introduction to reinforced cement concrete | |
| 10. | Introduction to Steel section, steel bars and their properties etc. | |
| 11. | Introduction to RCC foundations | |
| 12. | Reinforcement and details of R.C.C. pad foundations – 1 | |
| 13. | Reinforcement and details of R.C.C. pad foundations – 2 | |
| 14. | Reinforcement and details of R.C.C. combined footings | |
| 15. | Reinforcement and details of R.C.C. eccentric foundations | |
| 16. | Reinforcement details of R.C.C. square and rectangular columns – 1 | |
| 17. | Reinforcement details of R.C.C. square and rectangular columns - 2 | |
| 18. | Reinforcement details of R.C.C. circularcolumns. | |
| 19. | Reinforcement and details for lintels and projections (*Chajja*) | |

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| 20. | Reinforcement and details of simply supported R.C.C. beams – 1 |
| 21. | Reinforcement and details of simply supported R.C.C. beams - 2 |
| 22. | Reinforcement and details of rigid beams |
| 23. | Reinforcement and details of continuous beams |
| 24. | Reinforcement and details of cantilevered beams |
| 25. | Reinforcement and details for one-way slab – 1 |
| 26. | Reinforcement and details for one-way slab – 2 |
| 27. | Reinforcement and details of two-way slabs |
| 28. | Reinforcement and details of cantilever slabs. |
| 29. | Introduction to staircase and calculation for riser, tread etc. |
| 30. | Introduction to types of staircases |
| 31. | Reinforcement and details for Straight flight staircase – 1 |
| 32. | Reinforcement and details for Straight flight staircase – 2 |
| 33. | Reinforcement and details for Dog leg flight staircase – 1 |
| 34. | Reinforcement and details for Dog leg flight staircase – 2 |
| 35. | Reinforcement and details for Dog leg flight staircase – 3 |
| 36. | Formwork for square columns – 1 |
| 37. | Formwork for square columns – 2 |
| 38. | Formwork for rectangular columns – 1 |
| 39. | Formwork for rectangular columns – 1 |
| 40. | Formwork for circular columns – 1 |
| 41. | Formwork for circular columns – 2 |
| 42. | Scaffolding |
| 43. | Shuttering and centering beams and slabs -1 |
| 44. | Shuttering and centering beams and slabs -2 |
| 45. | Shuttering and centering of staircase |
| 46. | Raking shores |
| 47. | Flying shores |
| 48. | Dead shores and underpinning. |
| **Book References:** | |
| 1. | Building Construction Volume 1 to 4, W.B. Mc Kay |
| 2. | Building Construction Volume 1 to 5, R. Barry |
| 3. | Building construction illustrated, Francis Ching D.K. |
| 4. | Building Construction, Sushil Kumar |
| **Web References:** | |
| 1. | |

## Third Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **History of Architecture - 2** | |
| Course Code: | **ARC 2103 / ARC 213 / ARC 24213 / AP AR 2103** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To learn about the various architectural forms evolved in different socio cultural and geographical environment in Indian context. |
| 2. | To understand in depth the evolution of architecture in India and its various stylistic modes characterized by technology, ornamentation and planning practices. |
| 3. | To compare and discuss various architectural styles of Indian temple architecture. |
| **Description of Contents in brief:** | |
| 1. | Harappan and Vedic Architecture: Architecture and town planning of Harappan civilization such as towns of Lothal, Mohenjo-Daro, Dholavira, Kalibanga etc. Understanding of Vedic architecture, and settlements. |
| 2. | Buddhist and Jain Architecture: Architectural examples of Mahayana and Hinayana Buddhism; Rock-cut and free standing. Study of caves, stupas, and viharas of places like Sanchi, Amravati, Karle, Ajanta etc. Medieval Jain temple architecture of western India. |
| 3. | Hindu Architecture: Study of chronological development of religious and secular Hindu architecture and settlement planning; Early examples of monolithic and rock-cut architecture of South India. Development of Nagara and Dravidian temple architecture under different dynasties; such as like Cholas, Vijaynagar, Chandels, Hampi, Tanjavur, Khajuraho. Characteristic features of East, South, Central, West, and North Indian temple architecture for plan, shikhara, pillars, decoration, sculpture, etc. Theoretical base of Indian Architecture; examples from treatises like Mayamatam, Manasara, Samarangana Sutradhara etc. |
| 4. | Islamic Architecture: Introduction early Islamic architecture in India. Characteristic features of Islamic architecture; minarets, domes, gardens, geometrical and calligraphic decorations. The buildings of different dynasties of Delhi, Agra, Deccan, Gujarat etc. |
| 5. | Colonial to Contemporary Architecture: English, French, Dutch and Portuguese Colonial architecture in Indian subcontinent. Architectural literary research work of scholars like Ram Raz, P.K. Acharyaetc.Post- Independence architecture and planning; New city planning: Chandigarh, Gandhinagar etc. Modern foreign and Indian architects and their works in India. |
| **Course Outcomes:** | |
| 1. | Identify different styles of historic architecture. |
| 2. | Identify prominent / important historic buildings by their components / style of design. |
| 3. | Describe prominent / important historic buildings. |
| 4. | Analyze the contributing factors for the design development of different styles. |
| 5. | Compare and Analyze the various styles on the basis of the contributing factors responsible for their development. |
| **Lecture Schedule:** | |
| 1. | Introduction to vedic era, Society and culture, later vedic era:, Janapadas, Rise of mahajanapadas, Magadha, |
| 2. | Vedas, Upanishads, Brahmanas, Aranyakas, Mahabaharata, Ramayana |
| 3. | Architectural features of Vedic Period |
| 4. | Architectural features of Vedic Period |
| 5. | Study of Prominent Sites: |

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| | • Inamgaon in MAharashtra<br>• Vajji in Bihar<br>• Study of Vedic panels of gatewayNo2 Sanchi and Beirut |
| 6. | Study of Prominent Sites:<br>• Inamgaon in Mharashtra<br>• Vajji in Bihar<br>• Study of Vedic panels of gatewayNo2 Sanchi and Beirut |
| 7. | Introduction to Buddhism religion and ideas |
| 8. | Digha Nikaya, Lotus sutra of Mahayana, Angas and upangas |
| 9. | Architectural features: Sanghas and Viharas, temporary shelter |
| 10. | Prominent Sites:<br>Karle caves Maharashtra<br>Nalanda and Taxila |
| 11. | Introduction to Temple Style |
| 12. | Evolution of temple architecture |
| 13. | Introduction to North, Central and South Indian Temple Architecture |
| 14. | Different groups of North, Central and South Indian Temple Architecture: Orissa, Khajaraho etc. |
| 15. | Introduction to Mauryan Empire |
| 16. | Introduction to Mauryan empire, life and culture, important rulers |
| 17. | Architectural Treaties and Writings : Indika, Arthashastra, Buddhacharita, Sangam literature, Jatakas |
| 18. | Architectural features: stupas, rock edicts, pillar edicts, |
| 19. | Prominent Sites:<br>Sanchi stupa<br>Rock edicts: Maski, Kaushambi, Jaugada, Dhauli etc |
| 20. | Prominent Sites:<br>Pillar edicts:Lauriya, Rummindei,Rampurva etc<br>Ancient towns: Girnar, Sarnath etc |
| 21. | Introduction to Gupta empire, life and culture, important rulers, life and culture |
| 22. | Salient features of Gupta empire Architecture |
| 23. | Prominent Sites:<br>Ajanta caves<br>Iron pillar in Mehrauli |
| 24. | Prominent Sites:<br>Bhitragaon temple and Deogarh temple<br>Hindu and Buddhist temples at Sarnath |
| 25. | Introduction to Harshavardhana era |
| 26. | Introduction to new religion and ideas |
| 27. | Architectural Treaties and Writings : Harshacharita |
| 28. | Architectural features: Gandhara and Mathura school of art, temples, cave temples and shelters |
| 29. | Prominent Sites:<br>Durga Temple Aihole<br>Ratha Temple Mahabalipuram |
| 30. | Prominent Sites:<br>Kailashnath temple Kanchipuram<br>Virupaksha temple Pattadakal |
| 31. | Introduction to Bengal Temple Architecture |

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| 32. | Architectural Feature: Indo islamic roof style, carvings, arches , terracotta arrchtiecture etc. |
| 33. | Prominent Sites : Bishnupur temple group etc. |
| 34. | Introduction to Islamic culture worldwide; early Islamic architecture in India beginnings under the slave kings (cir. A.D. 1200 to 1290), The Sayyid (1414-51) and the lodi (1451-1526) dynasties, Provincial styles (Bengal, Gujrat, Malwa, Deccan, Sasaram |
| 35. | Architectural Treaties and Writings: al-Bīrūnī (d. 1048) - Kitab fi Tahqiq ma li'l-Hind (Researches on India), Fazl, Abu'l (1877). Akbarnamah (Persian), Vol. 1. Asiatic Society, Calcutta. (Online book), Fazl, Abu'l (1879). Akbarnamah (Persian), Vol. 2. Asiatic Society, Calcutta, Akbar nama by Abul Fazl, Travel in the Mughal empire, Travels of Pietro Della Valle in India |
| 36. | Architectural features: Minars, minarets, towers and turrets, domes, The buildings of the Khalji dynasty, the Delhi or imperial style The Tughlaq dynasty (1320 to 1413), Lodhi, Sayyid |
| 37. | Architectural features: Minars, minarets, towers and turrets, domes, The buildings of the Khalji dynasty, the Delhi or imperial style The Tughlaq dynasty (1320 to 1413), Lodhi, Sayyid |
| 38. | Prominent Sites:<br>• Tomb of ghiyias ud din Tughlaq, three cities of Tughlaq<br>• Khirki Masjid |
| 39. | Prominent Sites:<br>• Stepped well Bai Hari, Rauza, Sayed mosque Ahmedabad<br>• Qutub complex |
| 40. | Prominent Sites:<br>• Jaunpur mosques<br>• Jami masjid (1470) |
| 41. | Prominent Sites:<br>• Atala masjid (1408)<br>• Cambay : jami masjid (1325)<br>• Ahmedabad: tin darwaza (c. 1425), Ahmedabad : jami masjid (1423)<br>• Bijapur : Ibrahim rauza (c. 1615) |
| 42. | Introduction to Mughal Architecture and different periods |
| 43. | Architectural features: Balconies supported on carved brackets, pillared kiosks crowned by domes, arcades of sunk arches, foliated arches, latticed screens, curved Bengal roofs and flat domes |
| 44. | Prominent Sites:<br>• Tomb of the emperor Humāyūn (begun 1564) at Delhi<br>• New capital city of Fatehpur Sikri.<br>• The Great Mosque (1571; Jami Masjid)<br>• Victory Gate (Buland Darzawa)<br>• The great fort at Agra (1565–74)<br>• The tomb of Akbar at Sikandra, near Agra |
| 45. | • Emperor Shah Jahān (1628–58), Taj Mahal.<br>• Double dome, a recessed archway<br>• Taj Mahal<br>• Red-sandstone-pillared Diwan-i-ʿAm (“Hall of Public Audience”) and Diwan-i-Khas (“Hall of Private Audience”)<br>• Great Mosque (1650–56; Jami Masjid) |
| 46. | • Aurangzeb (reigned 1658–1707) |

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| | • Bādshāhī mosque in Lahore, 18th century.<br>• The balance and coherence characteristic of mature Mughal architecture |
| 47. | Mughal Gardens: Concept of Charbagh<br>• Shalimar Bagh<br>• Bagh at Rashtrapati Bhavan<br>• Chashma Shahi<br>• Nishat Bagh |
| 48. | Pakistan<br>• Chauburji<br>• Gulabi Bagh<br>• Hazuri Bagh<br>• Shahdara Bagh<br>• Shalimar Gardens (Lahore)<br>• Tomb of Jahangir<br>• Wah Gardens |
| 49. | Introduction to Colonial architecture |
| 50. | Colonial architecture, Indo Saracenic architecture, Indo gothic, French, Dutch and Portugese architecture in India |
| **Book References:** | |
| 1. | Cruickshank.D (ed) (1996). Cruickshank, Dan (editor), Banister Fletcher's A History of Architecture, Architectural Press, Newyork, USA. |
| 2. | Tadgell. C. Antiquity:,(1990), The History of Architecture in India, Phaidon, USA |
| 3. | Hilenbrand, Robert (2004), Islamic Architecture: Form Function and Meaning, |
| 4. | Fletcher, B. (2002). A History of Architecture on comparative method. London: CBS. |
| 5. | Kostof, S. (2012). History Of Architecture: Settings And Rituals. England: Oxford University Press. |
| 6. | Nutgens, P. (1997). The Story of Architecture Phaidon Press, Massachusetts, United States, London, United Kingdom |
| **Web References:** | |
| 1. | www.archdaily.com |
| 2. | www.coursera.org |
| 3. | www.edx.org |
| 4. | ocw.mit.edu |
| 5. | www.my-mooc.com |
| 6. | Oxford Art Online |
| 7. | Avery Index to Architectural Periodicals |

## Third Semester (2020 / 2021 / 2024 / 2025)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **Climatology** | |
| Course Code: | **ARC 2104 / ARC 214 / ARC 24214 / AP AR 2104** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** to enable students to understand and apply | | |
| 1. | Concept of climate as a significant determinant of built forms | |
| 2. | Concept of thermal and visual comfort through passive means. | |
| 3. | Climate based design principles for buildings in different climatic zones | |
| **Description of Contents in brief:** | | |
| 1. | Elements and types of climate, tools for measurement and understanding of climatic data. | |
| 2. | Relationship of climatic elements like solar radiation, humidity, air-movement with Human thermal comfort. Thermal comfort charts and indices. | |
| 3. | Thermal comfort through solar passive architecture; sun path diagrams and orientation, shading devices. Wind roses and orientation, natural ventilation techniques. Design tools and strategies. | |
| 4. | Principles of solar radiation and heat transfer. Thermal properties of building materials and elements. | |
| 5. | Visual comfort through daylighting. daylighting strategies; calculating opening sizes based on Indian standards | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Understand the effect of climate on building design and human comfort | |
| 2. | Design climate responsive buildings in terms of thermal and visual comfort. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | |
| 2. | Elements of climate | |
| 3. | Cont.. | |
| 4. | measurement of climatic parameters | |
| 5. | Cont.. | |
| 6. | climatic data recording, storage and presentation | |
| 7. | Cont… | |
| 8. | Relationship of climatic elements with Human thermal comfort. | |
| 9. | Cont.. | |
| 10. | Cont… | |
| 11. | Cont… | |
| 12. | Thermal comfort charts and indices. | |
| 13. | Cont.. | |
| 14. | Cont .. | |
| 15. | Exercise on mahoney's tables | |
| 16. | Cont… | |
| 17. | Cont… | |
| 18. | Thermal comfort through solar passive architecture; sun path diagrams and orientation, | |
| 19. | Cont… | |
| 20. | Cont… | |
| 21. | Cont… examples from around the world | |
| 22. | Exercise on shading device/façade/building shadow analysis | |
| 23. | Cont… | |

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| 24. | Cont… |
| 25. | Exercise on shading device/façade/ building design |
| 26. | Cont… |
| 27. | Cont… |
| 28. | Wind roses and orientation, natural ventilation techniques. |
| 29. | Cont.. |
| 30. | examples from around the world |
| 31. | Principles of solar radiation and heat transfer. |
| 32. | Cont… |
| 33. | Cont… |
| 34. | Thermal properties of building materials and elements. |
| 35. | Cont… |
| 36. | Numerical exercises on above |
| 37. | Cont… |
| 38. | Cont… |
| 39. | Daylighting, daylight factor |
| 40. | Visual comfort; lighting levels, Indian standards, glare |
| 41. | Cont.. |
| 42. | daylighting strategies |
| 43. | Numerical and design exercises on above |
| 44. | Cont… |
| 45. | Cont… |
| **Book References:** | |
| 1. | Manual Of Tropical Housing And Building Part I, O. Koenigsberger , |
| 2. | Man, Climate And Architecture, Givoni |
| 3. | Housing Climate & Comfort, Evans |
| 4. | National Building Code part 8 |
| 5. | SP 41 Handbook On Functional Requirements Of Buildings (Other Than Industrial Buildings) (Parts I-4) |
| 6. | BIS IS 2440 : 1975(R2008) Guide For Daylighting Of Buildings |
| **Web References:** | |
| 1. | |

## Third Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **Architectural Communication Skill** | |
| Course Code: | **ARC 2105 / ARC 215 / ARC 24215 / AP AR 2105** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To learn skills in problem solving, visualization, verbal and graphic communication with particular reference to Architecture. |
| 2. | To make students learn to prepare and present Architectural concepts and proposals. |
| **Description of Contents in brief:** | |
| 1. | Importance of Communication Skills, types of Communication, Verbal Communication, importance of posture, gesture, pronunciation, tone, etc on presentation quality, |
| 2. | Developing public speaking, group discussions and elocution skills, Technical paper writing and referencing, avoiding Plagiarism. |
| 3. | Preparing simple and interactive slide shows and presentations using computer software. |
| 4. | Preparing simple, complex architectural concepts and proposal with the help of text, drawings, posters, slides, videos, photographs. |
| 5. | Individual and group work on selected themes, article review, presentations and seminars. |
| **Course Outcomes:** | |
| 5. | The course intends to build the required communication skills of the students to help them gain confidence, communicative abilities, so that they may communicate effectively in real-life situations including formal presentations and Campus interviews. This will help the students to equip themselves for better performance in all subjects including Architectural Design that require verbal communication and written explanations. |
| **Lecture Schedule:** | |
| 1. | Introduction to subject/syllabus |
| 2. | Importance and need of Communication Skills |
| 3. | Types of Communication |
| 4. | Verbal Communication, importance of posture, gesture, pronunciation, tone , etc on presentation quality |
| 5. | Verbal Communication, importance of posture, gesture, pronunciation, tone , etc on presentation quality |
| 6. | Developing public speaking |
| 7. | Developing public speaking and exercises based on it |
| 8. | Continuation of exercise |
| 9. | Presenting above exercise before class |
| 10. | Presenting above exercise before class |
| 11. | Group discussions and elocution skills |
| 12. | Exercise based on group discussion |
| 13. | Presenting above exercise before class |
| 14. | Presenting above exercise before class |
| 15. | Technical paper writing |
| 16. | Selection of topic by students on technical paper writing |
| 17. | Paper writing in class, referencing |
| 18. | Discussing above in class |

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| 19. | Discussing above in class |
| 20. | Presentation before class |
| 21. | Presentation before class |
| 22. | Avoiding Plagiarism |
| 23. | Avoiding Plagiarism |
| 24. | PPT , slide show using computer software |
| 25. | PPT , slide show using computer software |
| 26. | Presenting simple, complex architectural concepts and proposals |
| 27. | Presenting simple, complex architectural concepts and proposals |
| 28. | Presenting above topic with the help of text, drawings, videos, photographs , etc |
| 29. | Exercise based on above |
| 30. | Continuation of above exercise |
| 31. | Presentation of above exercise before class |
| 32. | Presentation of above exercise before class |
| 33. | Poster making on topics like Save Environment, green buildings, energy efficiency, etc. |
| 34. | Poster making on topics like Save Environment, green buildings, energy efficiency, etc. |
| 35. | Poster presentation before class |
| 36. | Poster presentation before class |
| 37. | Expert lecture on Communicative abilities for formal/informal presentations and facing Campus interviews |
| 38. | Script writing and Skit on awareness for any topic (group work) |
| 39. | Script writing and Skit on awareness for any topic (group work) |
| 40. | Discussion for above in class |
| 41. | Skit enactment by students , group wise |
| 42. | Skit enactment by students, group wise |
| 43. | Skit enactment by students, group wise |
| 44. | Article review |
| 45. | Article review |
| 46. | Final discussion and doubt clearing on sessional and its submission dates |
| **Book References:** | |
| 1. | Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds by Carmine Gallo |
| 2. | Public Speaking for Success by Dale Carnegie |
| 3. | Step-by-Step Guide to Preparing For Campus Placements by Vidhi Gaur |
| 4. | How to Write a Scientific Article: ISI Articles, Index Articles, Journal Articles, Conference Articles, Writing by Hamed Niroumand |
| **Web References:** | |
| 1. | https://www.skillsyouneed.com/ips/communication-skills.html |
| 2. | https://corporatefinanceinstitute.com/resources/careers/soft-skills/communication/ |
| 3. | https://peptalkindia.com/9-important-tips-to-succeed-in-a-group-discussion/ |
| 4. | https://gdpi.hitbullseye.com/MBA/Public-Speaking.php |
| 5. | https://venngage.com/blog/poster-design/ |
| 6. | https://www.wikihow.com/Make-a-Skit |
| 7. | https://cs.stanford.edu/people/widom/paper-writing.html |

## Third Semester(2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **Structure - 1** | |
| Course Code: | **CIV 2106 ARC / CE 231 / CE 24231 / CE 2131** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Knowledge of Structural Mechanics<br>Mathematics (Differentiation, integration, calculus etc.)<br>Understanding of Basic Civil Engineering | |

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| **Course Objectives:** | |
| 1. | To understand RCC codes and practices and to design simple RCC structural members. |
| **Description of Contents in brief:** | |
| 1. | Bending stresses and deflection in simply supported and cantilever beams. |
| 2. | Properties of concrete making materials, Concept of Limit State Design for RCC structures, Limit state of collapse and serviceability. |
| 3. | Moment of resistance of homogenous beams of rectangular cross section for under reinforced, balanced, over reinforced and doubly reinforced sections. |
| 4. | Structural design of simply supported, cantilever and doubly reinforced beams. |
| 5. | Structural design of one way slabs (simply supported and cantilever). |
| **Course Outcomes:** | |
| 1. | The students will be able to apply knowledge of structural analysis to analyze structure to evaluate internal forces and deformation due to external loading. |
| 2. | The design forces thus evaluated will help for designing of RCC beams and one way slabs for safety against collapse and serviceability requirements. |
| 3. | Optimization of design for safe and economical design. |
| **Lecture Schedule:** | |
| 1. | Bending stresses and deflection in simply supported beam |
| 2. | Bending stresses and deflection in cantilever beam |
| 3. | Properties of concrete making materials |
| 4. | Concept of Limit State Design for RCC structures |
| 5. | Limit state of collapse |
| 6. | Limit state of serviceability |
| 7. | Moment of resistance of homogenous beams of rectangular cross section for under reinforced, balanced, over reinforced and doubly reinforced sections. |
| 8. | Structural design of simply supported beams |
| 9. | Structural design of cantilever beams |
| 10. | Structural design of doubly reinforced beams |
| 11. | Structural design of simply supported one way slab |
| 12. | Structural design of cantilever slab |
| **Book References:** | |
| 1. | Basic Structural Analysis: Wilbur and Norris |
| 2. | Design of R.C.C Structures: P.C. Warghese |
| 3. | Design of R.C.C Structures: Vazirani and Ratwani |
| 4. | Strength of Material: R.K. Rajput |
| 5. | Design of Reinforced Concrete Structures: N. Subramanian |
| 6. | Design of Reinforced Concrete Structures: N. Krishna Raju |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/105/105/105105166/ |
| 2. | https://nptel.ac.in/courses/105/105/105105105/ |
| 3. | https://nptel.ac.in/courses/105/105/105105104/ |

## Third Semester(2020 / 2021 / 2024 / 2025)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **III** | Year: **II** |
| Name of Course: | **Surveying** | |
| Course Code: | **CIV 2107 ARC / CE232 / CE 2132 / CE 24232** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** The objective of the subject is to enable students to understand and apply: | | |
| 1. | Basic principles and theories of topographic features, basic skills of landform and built form analysis through map and field observation. | |
| 2. | Use of various survey tools and equipment like Compass, Tapes, EDM, Electronic Theodolite (total Station) | |
| 3. | Documentation and analysis of physical profile and features of land and built form | |
| **Description of Contents in brief:** | | |
| 1. | Objectives of land survey, aspects of surveying instruments and the study of their use. Scales: Plain scales, Diagonal scales, comparative scale, shrunk scale, Vernier scale. | |
| 2. | Leveling and contouring, preparation of contour map in plan and section; slope analysis. Provisions of code and byelaws related to land survey and construction on contoured sites. | |
| 3. | Chain Survey, Compass survey, Plane table method and surveying with theodolite; use and application of Total station. | |
| **Course Outcomes:** With the completion of the course student should have capability to | | |
| 1. | Collect surveying field data and prepare map | |
| 2. | Use conventional and contemporary surveying instrumentation | |
| 3. | Carry out contour analysis. | |
| 4. | prepare and interpret survey drawings | |
| 5. | Interact technically with surveyors | |
| **Lecture Schedule:** (Practical on the topic after each lecture) | | |
| 1. | To set out and locate the objects near a straight line, by taking the perpendicular offsets. | |
| 2. | To determine the area of a given site method 1. | |
| 3. | Cont.. method 2 | |
| 4. | To set out a regular pentagon in the field method 1. | |
| 5. | Cont.. method 2 | |
| 6. | To determine the reduced level (R.L.) difference between two stations by carrying out differential leveling. | |
| 7. | To carry out the profile leveling along the given line. | |
| 8. | To carry out the leveling field work for the preparation of contour map of the given site. | |
| 9. | Cont.. | |
| 10. | To locate the given inaccessible objects | |
| 11. | Two / three-point problem | |
| 12. | Horizontal and vertical angle measurements. | |
| 13. | Drawing of conventional symbol sheet | |
| 14. | Determination of the map area using graphical/instrumental methods | |
| 15. | Study of topographic maps | |
| **Book References:** | | |
| 1. | Engineering Surveying: Theory and Examination Problems for Students, W. Schofield. Butterworth-Heinemann | |
| 2. | Introduction to Surveying, Michael Minchin, Department of Training, Government of Western Australia | |
| 3. | Schaum's Outline of Introductory Surveying | |

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|---|---|
| 4. | Surveying and Leveling-Part-I & II, T. P. Kanetkar and S. V. Kulkarni, Pune VidhyarthiGrihaPrakashan |
| 5. | Plane Surveying, A. M. Chandra., New Age International Publishers, New Delhi |
| 6. | Surveying Vol 1 & II, B. C. Punamia, Laxmi Publications, New Delhi |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/105/104/105104100/ |
| 2. | https://nptel.ac.in/courses/105/104/105104101/ |
| 3. | https://nptel.ac.in/courses/105/107/105107122/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

## BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Fourth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 2201** | Architectural Design Project – 4 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC 2202** | Building Materials & Construction – 4 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC 2203** | Theory of Architectural Design | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 2204** | Building Services – 1 (Water Supply & Sanitation) | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 2205** | Site Planning | Viva | 2 | 2 | - | - | 4 | 3 |
| **ARC 2206** | Computer Applications – 2 | Viva | 1 | - | 3 | - | 4 | 3 |
| **CIV 2207 ARC** | Structure – 2 | Theory | 1 | 2 | - | - | 3 | 2 |
| | **TOTAL HOURS: 29**<br>**Total Credits (Cumulative): 113** | | **8** | **8** | **3** | **10** | **29** | **29** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Architectural Design Project - 4** | |
| Course Code: | **ARC 2201 / ARC 221 / ARC 24221 / AP AR 2201** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce complexity of handling design of larger number of spaces and their circulation, under one single roof and on multiple levels. |
| 2. | The student is required to apply the passive techniques of building design and detailing in response to a chosen climatic zone so as to provide the maximum environmental comfort through. |
| 3. | The student will also be required to resolve the basic structural grid for a medium sized building as per the sizes of spaces and rationalizing the spaces in a module so as to try a systematic development of form. |
| **Description of Contents in brief:** | |
| 1. | Study of practices and design principles of vernacular architecture and its application with contemporary architectural interventions. |
| 2. | Design of a climate responsive simple building for public activity, in a non-urban setting or a situation without urban regulatory controls. The buildings may include Panchayat bhawan, rural school, primary health center, anganwadi, extension centers, forest huts, etc. Introduction to other role players in the architectural process viz., the client and the user. |
| **Course Outcomes:** | |
| 1. | Understand the complexities in space design and circulation in a medium size building. |
| 2. | Understand the different approaches required in response to different climatic conditions. |
| 3. | Understand application of passive means of climate response in building design. |
| 4. | Understand resolving of RCC structure for a simple building and rationalizing design within a structural module. |
| **Lecture Schedule:** | |
| 1. | Understanding of the design brief as introduced in the class. |
| 2. | Understanding the nature of activities and the spaces required for the same. |
| 3. | Collection and study of all relevant literature for developing the design strategies, |
| 4. | Understanding of functions and activity spaces, climatic analysis, constructional techniques, structural systems, site analysis etc. for developing design approach. |
| 5. | Synthesis of the data to come up with recommendations for various aspects of design. |
| 6. | Desk appraisal and case study of architectural projects of similar nature for understanding design approach by architect and critical appraisal of architectural quality achieved, structural and constructional systems used, climate response strategies, etc. so as to understand the practical aspect of design conception. |
| 7. | Synthesis of the data to come up with recommendations for design solution. |
| 8. | Development of proposal and assessment of work through studio interaction and stage wise jury/ review by coordinator/ examiner. |
| 9. | Presentation of the completed work to external jury in the viva for final assessment. The portfolio shall comprise of compiled synthesis of literature survey, case study and site analysis, approach to design conceptualization, floor plans, sections, elevations, detailed plans and sections, sketches, 3D visualizations, physical models, etc. to explain the design. |

| Book References: | |
|---|---|
| 1. | Manual of tropical housing and building, Otto Königsberger |
| 2. | Traditional Buildings of India, Ilay Cooper, Barry Dawson |
| 3. | Architecture Form Space and Order, Francis D. K. Ching |
| 4. | Sustainable Building Design Manual, Vol 2. Sustainable Building Design Practices, The Energy and Resources Institute (TERI) |
| 5. | Energy Efficient Buildings in India, Ed. Mili Majumdar |
| 6. | BIS, National Building code, 2016 |
| 7. | Landscape architecture by John, O. Simonds |
| 8. | Time Savers Standards for Building type |
| 9. | Time Savers Standards for Architectural Design |
| 10. | Time Savers Standards for Building Materials & Systems: Design Criteria and Selection Data |
| 11. | Neuferts Architects' Data |
| **Web References:** | |
| 1. | |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|---|
| Name of Program: **B.Arch.** | | Semester: **IV** | Year: **II** |
| Name of Course: | | **Building Materials and Construction - 4** | |
| Course Code: | | **ARC 2202 / ARC 222 / ARC 24222 / AP AR 2202** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** to enable students to understand | | | |
| 1. | Large span truss components and construction details. | | |
| 2. | Use of materials like steel, aluminum, glass, gypsum in interiors and exteriors; their construction and to enable them to represent same through technical drawings. | | |
| **Description of Contents in brief:** | | | |
| 1. | Types and fixing details of steel trusses – saw tooth, roof truss with north light glazing, simple trusses in steel, and ways of fixing and connections (to foundations, steel stanchions, and beams etc.). Space frames (single, double & triple layered tubular space frames with globe connections). Types of materials and details of industrial buildings, warehouse and other building typologies. | | |
| 2. | Study of various types of aluminum and wooden partitions, its extrusions and fixing details. Different types of wooden, aluminium panels, cladding components for various types' buildings and structures. Aluminum, glass and steel grill modules. | | |
| 3. | Types and fixing details of various materials for suspended ceilings and false ceilings using aluminum and other material sections). Construction details for providing thermal insulation in cold storages. Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards. | | |
| 4. | Various techniques to use glass and glass blocks with fixing details; structures like pavilions, greenhouses, staircases, multi storied buildings –curtain walls, roofing, panels. | | |
| 5. | Types and fixing details of sound reflecting, absorbing and insulating materials, their properties and fixing details. Study of relevant IS codes, Study of damp/water proofing materials such as Bitumen felts, etc. chemicals for W.P.C. &O.P.C etc. | | |
| **Course Outcomes:** Students will be able to | | | |
| 1. | Make a decision which type of construction detailing will be required for a given type of roofing depending on interior and exterior situation and make drawings for the same. | | |
| 2. | Understanding different wall treatments and prepare detail drawings. | | |
| 3. | Design and detail false ceiling with different materials. | | |
| 4. | Understand and execute glass as material. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to Steel truss | | |
| 2. | Types of steel truss and their use – 1 | | |
| 3. | Types of steel truss and their use – 2 | | |
| 4. | Details of steel truss for various spans – 1 | | |
| 5. | Details of steel truss for various spans – 2 | | |
| 6. | Details of steel truss for various spans – 3 | | |
| 7. | Details of steel truss for various spans – 4 | | |
| 8. | North Light truss – 1 | | |
| 9. | North Light truss – 2 | | |
| 10. | North Light truss – 3 | | |
| 11. | Monitor roof truss – 1 | | |
| 12. | Monitor roof truss – 2 | | |
| 13. | Monitor roof truss – 3 | | |

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| 14. | Tubular Space frames – single layered–1 |
| 15. | Tubular Space frames – single layered – 2 |
| 16. | Tubular Space frames – double layered – 1 |
| 17. | Tubular Space frames – double layered - 2 |
| 18. | Tubular Space frames - triple layered - 1 |
| 19. | Tubular Space frames - triple layered -2 |
| 20. | Introduction to partitions and their utility |
| 21. | Fixing details of wooden partitions – 1 |
| 22. | Fixing details of wooden partitions – 2 |
| 23. | Fixing details of wooden partitions – 3 |
| 24. | Fixing details of Aluminum partitions – 1 |
| 25. | Fixing details of Aluminum partitions – 2 |
| 26. | Fixing details of Aluminum partitions – 3 |
| 27. | Different types of wooden, aluminum panels, cladding components for various types' buildings and structures -1 |
| 28. | Different types of wooden, aluminum panels, cladding components for various types' buildings and structures -2 |
| 29. | Aluminum and steel grill modules – 1 |
| 30. | Aluminum and steel grill modules – 2 |
| 31. | Types and fixing details of various materials for suspended ceilings and false ceilings using aluminum and other material sections – 1 |
| 32. | Types and fixing details of various materials for suspended ceilings and false ceilings using aluminum and other material sections – 2 |
| 33. | Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards – 1 |
| 34. | Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards – 2 |
| 35. | Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards – 3 |
| 36. | Various techniques to use glass and glass blocks with fixing details |
| 37. | Types and fixing details of sound absorbing materials -1 |
| 38. | Types and fixing details of sound absorbing materials - 2 |
| 39. | Types and fixing details of sound absorbing materials - 3 |
| 40. | Application of sound absorbing materials |
| 41. | Study of damp-proofing materials - 1 |
| 42. | Study of damp-proofing materials - 2 |
| **Book References:** | |
| 1. | A Text Book of Building Construction, S.P. Arora&Bindra, |
| 2. | Building Construction, J. Jha&S.K. Sinha |
| 3. | Concrete Technology, M.S. Shetty |
| 4. | A Text book of Building Construction, B.C. Punmia, |
| 5. | Fundamentals of Building Construction, T.D. Ahuja and G.S. Birdie |
| **Web References:** | |
| 1. | |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Theory of Architectural Design** | |
| Course Code: | **ARC 2203 / ARC 223 / ARC 24223 / AP AR 2203** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** To enable the students to understand | |
| 1. | A critical body of knowledge in the theoretical domain of built environment. |
| 2. | How to appreciate the built environment and develop a critical evaluation in different social, cultural and environmental contexts. |
| 3. | Approaches and design process practiced in building design. |
| **Description of Contents in brief:** | |
| 1. | Introduction to Theory of Design and architecture: Definition and importance of theory, design and architecture. Creativity and creative thinking. Visual composition, rules and principles. Study of elements of design and principles. Examples from Art, architecture, Graphic and visual design etc. |
| 2. | Architectural Space, Mass and Aesthetics: Understanding of determinants of physical form, mass and space, visual and emotional effects of different forms. Importance of principles of aesthetics, proportion, scale, balance, rhythm, symmetry, hierarchy, pattern, axis etc. Art of seeing and perception. Perceptual qualities as affected by colors, light conditions, vision angles etc. |
| 3. | Organization of built forms and Spaces: Spatial relationships; space within space, interlocking space, adjacent space, space linked by common space. Elements of spaces making and factors influencing spatial organization and their types. Role of different building elements in architectural design, walls, partitions, roofs, staircases etc. |
| 4. | Design process, methods and programme formulation: Parameters and constraints in design. Developing design ideas, concept, and communication. Different design methods, Design matrices, process of design synthesis. Examples and experiences from architecture, environmental design and technology. Design philosophy and trend setting work of architects, designers, ecologists, engineers etc. Exercises for understanding process of design. |
| 5. | Character and Style in Building: Factors influencing the character and style of buildings. Indigenous architectural studies, studies of folk art and crafts, influence of tradition, culture and socio-economic developments on architecture. Study of examples from traditional and contemporary architecture ( including modern and postmodern). |
| **Course Outcomes:** | |
| 1. | To understand the relationship between need and design. |
| 2. | Appreciate the aesthetics of built environment. |
| 3. | Use the learnt principles and elements in his design exercises. |
| 4. | Gather knowledge about different design approaches and philosophies of architects. |
| **Lecture Schedule:** | |
| 1. | What is Design? Defining design |
| 2. | Tutorial: Interactive session on different definitions |
| 3. | What is Architecture ?Understanding architectural Design, role of an architect |
| 4. | Tutorial: Interactive session on above |
| 5. | Tutorial: Audio visual presentation on examples |
| 6. | Theory, philosophy and design |
| 7. | Tutorial: discussion and interactive session |
| 8. | Creativity and creative thinking |

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| 9. | Tutorial: Discussion on examples of creativity |
| 10. | Elements of design: Point, Line, shape, form, texture, colour etc. |
| 11. | Tutorial: Presentations on examples of elements of design |
| 12. | Tutorial: Visual composition rules and principles. |
| 13. | Tutorial: Examples and discussion on Principles of design and composition |
| 14. | Tutorial: Examples from Art, architecture, Graphic and visual design etc. |
| 15. | Importance of aesthetics in architecture |
| 16. | Physical form, mass and space, visual and emotional effects of different forms. |
| 17. | Tutorial: Principles of aesthetics, proportion, scale, balance, rhythm, symmetry, hierarchy, pattern, axis etc. |
| 18. | Tutorial: Golden ratio, optical illusion, Orders etc. |
| 19. | Art Movements versus Architectural design movements |
| 20. | Art of seeing and perception |
| 21. | Tutorial: Observation and Perception (examples) |
| 22. | Effects and use of colour and light in design |
| 23. | Tutorial: Examples and exercises on effect of colour, light and shadow |
| 24. | Understanding Space, Form and Design Organization of spaces and forms |
| 25. | Tutorial: Spatial relationships, indoor and outdoor space |
| 26. | Tutorial: Space within space, interlocking space, adjacent space, space linked by common space. |
| 27. | Tutorial: liner, radial, clustered Forms etc. |
| 28. | Elements of spaces making and factors influencing spatial organization |
| 29. | Tutorial: Study of different building elements and their contribution in design |
| 30. | Design process, methods and programme formulation: Parameters and constraints in design. |
| 31. | Tutorial: Different design methods, Design matrices, process of design synthesis. |
| 32. | Tutorial: Function and aesthetics in architecture Examples and experiences from architecture |
| 33. | Tutorial: Architecture without architects study of examples |
| 34. | Tutorial: Barrier free design (anthropometry and ergonomics) |
| 35. | Different tools and techniques of communicating ideas |
| 36. | Tutorial: Developing design ideas, concept, and communication. |
| 37. | Tutorial: Exercises for understanding process of design and Design as problem solving |
| 38. | Architectural character and style. Elements and factors influencing the character and style of buildings |
| 39. | Folk Arts and Crafts, indigenous practices and building design. Influence of tradition, culture and socio-economic developments on architecture |
| 40. | Tutorial: Study of examples from traditional architecture |
| 41. | Architects design philosophies: pioneers of the movements |
| 42. | Tutorial: Design philosophy and trend setting works of architects from different countries |
| 43. | Various trends and schools of thoughts in architecture. |
| 44. | Tutorial: Contemporary architects and architecture in India |
| 45. | Tutorial: Current debates and issues in design and architecture |
| **Book References:** | |
| 1. | Architecture: Form, Space and Order by Francis D.K.Ching |
| 2. | Visual Dictionary of Architecture by Francis D. K Ching |
| 3. | House form and culture by Amos Rappaport |
| 4. | Seven lamps of Architecture by John Ruskin |

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| 5. | Analyzing Architecture by Simon Unwin |
| 6. | Elements of space making byYatin Pandya |
| 7. | Thinking Architecture by Peter Zumthor |
| 8. | How Designers Think: The Design Process Demystified by Bryan Lawson |
| 9. | Responsive Environments: A Manual for Designers by Ian Bentley |
| 10. | What Designers know by Bryan Lawson |
| 11. | Modern Architecture since 1900 by William J. R.Curtis |
| 12. | How To Paint and Draw by Bodo W. Jaxtheimer |
| **Web References:** | |
| 1. | Web references shall be recommended by the instructor depending on the nature of design assignments |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Building Services – 1 (Water Supply and Sanitation)** | |
| Course Code: | **ARC 2204 / ARC 224 / ARC 24224 / AP AR 2204** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Fundamentals of water supply, drainage, sewerage system and solid waste disposal. |
| 2. | Water distribution systems and its requirements at different scales such as building, site, neighborhood, etc. |
| 3. | Sanitation and its layout requirements at different scales such as building, colony and neighborhood. |
| 4. | Calculations and disposal of rainwater and solid waste disposal. |
| **Description of Contents in brief:** | |
| 1. | The need and importance of building services in building design. Historical overview of water supply, plumbing and sewerage systems in India and worldwide. |
| 2. | Sources of water, treatment for domestic use, study of quality of potable water, standards in water supply. Test of potable water, Types of water supply pipes and joints, Water Supply and distribution networks at municipal and colony level. |
| 3. | Fixtures, fittings and pipes for water supply. Intake, storage and distribution of water, plumbing layout for single storied, multistoried, high-rise residences and public buildings. Calculation of water consumption, and water flow requirements as per standards. Recycling of waste water and sewage treatment plants. |
| 4. | Basic principles and standards of sanitation for urban, semi-urban, rural areas. Types of sanitary pipes, joints and laying, disposal of city effluent through public sewer lines with manholes etc. Type of sewer, Design of sewer, Layout and calculations for design of sanitary networks at neighborhood scale, Design calculations of septic tank, soak-pits, cesspools etc. |
| 5. | Treatment of city effluent and recycling of waste water, storm-water drainage and Rain Water Harvesting at city level. |
| 6. | Types of sanitary systems and layout for a single residence, multistory buildings, public building and cluster houses. Sanitary fixtures and fittings: placement and function. Design and drawing of Traps, inspection chambers, septic tank, soak pits, rain water harvesting and disposal etc. |
| 7. | Solid waste management by collection of refuse and recycling of city solid waste; prevailing byelaws for same. Placement of refuse chutes in multi-storied buildings. |
| **Course Outcomes:** | |
| 1. | Familiarization with all norms and standards of water supply and sanitation, design efficient water supply and sanitation layout with detail calculation to achieve functional, economical and aesthetical aspect in building design. |
| 2. | Techniques of data collection and analysis for designing the network system would be taught as part of this course. |
| **Lecture Schedule:** | |
| 1. | Introduction of physical infrastructure in Urban areas |
| 2. | Terminology in Water supply |
| 3. | Sources of potable water |
| 4. | System of water supply |
| 5. | Standards in water supply |
| 6. | Quality and tests of potable water |

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| 7. | Cont.... |
| 8. | Treatment of potable water: |
| 9. | Site visits of water treatment plant |
| 10. | Types of supply pipes: type of material their merits and demerits |
| 11. | Water supply fixtures: Valves, cocks and Traps |
| 12. | Cont.... |
| 13. | Fittings and Joinery fixtures in water supply: |
| 14. | Cont.... |
| 15. | Plumbing layout for single story and high-rise buildings |
| 16. | Cont.... |
| 17. | Distribution network of water supply at colony level |
| 18. | Cont.... |
| 19. | Distribution network of water supply at Municipal level |
| 20. | Demand estimation of water for house, cluster, neighborhood and city level |
| 21. | Factors of water consumption |
| 22. | Water flow requirements as per standards |
| 23. | Introduction of Sanitation |
| 24. | Concept of Ducts, shaft, chutes and OTS |
| 25. | Basic principles and standards of Sanitation ion Urban, Semi-urban and Rural area |
| 26. | Types of sanitation pipes |
| 27. | Terminology of soil appliances |
| 28. | Sanitary fitting and appliances : WC, Urinals, Bath tubs |
| 29. | Cont.... |
| 30. | Sanitary network: Traps, chambers, Man holes |
| 31. | Cont.... |
| 32. | Stacking Systems for waste and soil water |
| 33. | Disposal of city effluent through public sewer |
| 34. | Drainage scheme for residence and neighborhood: drainage layout |
| 35. | Recycle of waste water |
| 36. | Quantity of Sewage |
| 37. | Rain water harvesting |
| 38. | Quantity of storm water |
| 39. | Design of sewer: factors considering for sewer design |
| 40. | Shapes of sewer |
| 41. | Material of sanitation pipes and sewer |
| 42. | Design layout of sewerage system |
| 43. | Disposal of sewage |
| 44. | Basic principles of Solid Waste |
| 45. | Solid Waste: Generation and Characteristics |
| 46. | Solid Waste Management : Collection and Distribution of refuse |
| 47. | Solid Waste disposal |
| 48. | Recycle of city solid waste |
| 49. | Placement of refuse chutes in multi-storied buildings |
| 50. | Quiz & feedback |
| **Book References:** | |
| 1. | Water Supply and Sanitation for All by Hans G Huber, IWA Publisher |
| 2. | Water Supply by Alan C Twort |
| 3. | Water Supply and Sewerage by Steel E W, McGraw-Hill Publisher |
| 4. | Textbook of Water Supply and Sanitary Engineering by S. K. Hussain |

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| 5. | Water Supply & Sanitary Engineering by Birdie G S, DPR Publisher |
| 6. | Water Supply & Sanitary Engineering by Rangwala |
| 7. | Indian Code Council, International Plumbing Code |
| 8. | P.N. Khanna, Indian Practical civil Engineers' Handbook |
| **Web References:** | |
| 1. | https://www.who.int/water_sanitation_health/monitoring/en/ |
| 2. | NPTEL Lectures |
| 3. | Coursera |
| 4. | Udemy |
| 5. | E-books |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Site Planning** | |
| Course Code: | **ARC 2205 / ARC 225 / ARC 24225 / AP AR 2205** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Importance of site and its characteristics in architecture. |
| 2. | Determining factors which govern the siting of a given project. |
| 3. | Appropriate site analysis techniques and methodology of preparing a site analysis diagram. |
| 4. | To learn the planning of site services and utilities. |
| **Description of Contents in brief:** | |
| 1. | Introduction: Definitions - plot, site, land and region, units of measurements. Introduction to methods of site surveys; Modern surveying Instruments and their application. Need for surveying. Reading a technical drawing of site plan. |
| 2. | Site Analysis: Need of site analysis; Understanding topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available (a basic analysis of natural, cultural and aesthetic factors on and around a site). Reading and preferably preparing site analysis drawings and diagrams. |
| 3. | Detailed Analysis: Contour analysis (ridges and valleys), slope analysis, grading process and criteria, functional and aesthetic considerations. Selection criteria for the siting of various types of building typologies. |
| 4. | Site Context and Regulations: Contextualization of a site - existing surrounding land uses for cities. The possible effect of a project on its surroundings. Suitable case studies of the same. |
| 5. | Site Layout And Development: Exercise requiring siting of a given building typology, its planning for vehicular and pedestrian circulation; planning of site utilities, drainage and sewage disposal with consideration to topography and other site features. |
| **Course Outcomes:** The student should develop the capability to: | |
| 1. | Do site analysis. |
| 2. | Utilize site analysis for planning for architectural projects. |
| 3. | Plan better managed site services. |
| **Lecture Schedule:** | |
| 1. | Introduction to site planning |
| 2. | Definitions - plot, site, land and region, units of measurements. |
| 3. | Methods of establishing a site |
| 4. | Site surveys and need for surveying |
| 5. | Surveying methods |
| 6. | Surveying Instruments and their application |
| 7. | How to read a technical drawing of a site plan |
| 8. | Site Analysis, site inventory, need for site analysis |
| 9. | Factors to be considered for analyzing a site – Physical factors |
| 10. | Factors to be considered for analyzing a site – regulatory factors |
| 11. | Factors to be considered for analyzing a site – sensory factors |
| 12. | Site planning objectives and process |
| 13. | Exercise – Site Analysis – Site visit (on an assigned site) |
| 14. | Contd |
| 15. | Exercise – Site Analysis – Drawing preparation |

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| 16. | Contd |
| 17. | Contour signatures (terminologies) – ridge, slope, valley etc. |
| 18. | Contour analysis |
| 19. | Exercise based on above |
| 20. | Slope analysis |
| 21. | Exercise based on above |
| 22. | Grading process and criteria |
| 23. | Selection criteria for the siting of various types of building typologies |
| 24. | Studying on site context and its relation with existing uses |
| 25. | Effect of a project on its surroundings |
| 26. | Case studies |
| 27. | Case studies |
| 28. | Developing a site |
| 29. | Making a layout for a site |
| 30. | Decision on Siting of buildings and services and utilities |
| 31. | Exercise – Site development based on analysis done earlier |
| 32. | Contd |
| 33. | Contd |
| 34. | Contd |
| 35. | Contd |
| **Book References:** | |
| 1. | Ian Mcharg, Design with Nature |
| 2. | Kevin Lynch, Site planning |
| 3. | Edward. T. Q, Site Analysis |
| **Web References:** | |
| 1. | |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Computer Applications - 2** | |
| Course Code: | **ARC 2206 / ARC 226 / ARC 24226 / AP AR 2206** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand and apply basic CAD skills to create simple and complex two dimensional geometric forms. |
| 2. | To use CAD skills to create technically correct and presentable drawings. |
| **Description of Contents in brief:** | |
| 1. | Introduction to 2d Drafting. Introduction to computer aided 2-D drafting. To develop and understand basic set up and menu bars for computer aided drafting. (utility commands). Setting units and scale. |
| 2. | 2D Drafting Tools Drafting simple and complex geometric shapes such as squares, circles, triangles, lines, curves, poly lines and their combinations etc. Application of various toolbars and their sub tools including draw, edit, modify, view, file, dimension, parametric, etc. |
| 3. | 2D Drafting of Building Preparation of two dimensional architectural drawings (including plans, elevations and sections) incorporating layers, line-weights, texts, scale, dimensioning and formatting of drawings for taking prints and plots. |
| 4. | 2D Presentation Drawings. Preparation of two dimensional architectural presentation drawings (including plans, elevations and sections) incorporating human figures, plants, car etc. Preparation of two-dimensional architectural presentation drawings (including plans, elevations and sections) incorporating grid, column, dimensioning, legend and architectural elements details with proper line weight etc. |
| 5. | Practical Work. 2 dimensional architectural plan, elevation and sections for any one of the architectural design assignments studied in previous semesters with submission in the form of printouts in scale. |
| **Course Outcomes:** | |
| 1. | Learn and Grasp 2 D CAD drafting techniques. |
| 2. | Able to Identify errors in drawings. |
| 3. | To transform sketches and manually drafted drawings into CAD drawings. |
| 4. | Demonstrate ability to prepare presentation drawings with the help of computer softwares. |
| **Lecture Schedule:** | |
| 1. | Introduction to computer aided 2-D drafting |
| 2. | To develop understanding of basic set up and menu bars for computer aided drafting. |
| 3. | Utility commands - Screen Layout- status bar, tool bar, graphics area, labelled buttons, drawing editor, file handling commands |
| 4. | Continue exercises |
| 5. | Setting up units and coordinate system |
| 6. | Layer Properties and settings |
| 7. | Draw commands- Drafting simple and complex geometric shapes like line, squares, curves |
| 8. | Continue exercises |
| 9. | View and Edit commands |
| 10. | Continue exercises |
| 11. | Modify commands- Move , Rotate, Scale, copy, Mirror, erase, trim, extend |

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| 12. | Continue exercises |
| 13. | Using other tools and sub tools |
| 14. | Class assignment on simple shapes |
| 15. | Text Dimensions and parametric |
| 16. | Continue exercises |
| 17. | Class Assignment on above |
| 18. | Explanation on drafting a Building |
| 19. | Starting with setting scale and sheet settings |
| 20. | Preparation of Presentation Drawings |
| 21. | Drafting plans - Components of plan |
| 22. | Making Blocks |
| 23. | Layers style , colours and Line weights |
| 24. | Continue exercises |
| 25. | Dimensioning the plan components, door windows etc |
| 26. | Continue practice in lab |
| 27. | Drafting an Elevation and Section |
| 28. | Continue practice in Lab |
| 29. | Door elevation, windows elevations |
| 30. | Adding figures, furnitures, plants, cars etc |
| 31. | Details of key building components |
| 32. | Incorporating grids, columns, dimension numbers etc |
| 33. | Adding legends, area statement and other architectural elements with details |
| 34. | Exercise on above and orking with fill commands - hatches, solid fill etc |
| 35. | Sheet format and print layout. |
| 36. | Format conversion, and Print outs |
| 37. | Working on a design Assignment – 2-Dimensional architectural drawing of a selected building or building cluster – preparation of layers |
| 38. | Building plans – All floors |
| 39. | Annotations , dimensioning and legends |
| 40. | Working on building Elevations |
| 41. | Dimensioning and Annotations and legends of elevation |
| 42. | Working on sections |
| 43. | Dimensioning and Annotations and legends of sections |
| 44. | Layout, north, sheet formatting |
| 45. | Print settings for final submission |
| **Book References:** | |
| 1. | Engineering AutoCAD by AP Gautam, Pradeep Jain |
| **Web References:** | |
| 1. | |

## Fourth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IV** | Year: **II** |
| Name of Course: | **Structure - 2** | |
| Course Code: | **CIV 2207 ARC / CE 241 / CE 24241 / CE 2241** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Knowledge of structural analysis<br>Basic Structural Design<br>Understanding of Basic Civil Engineering | |

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| **Course Objectives:** | |
| 1. | To enable students to understand RCC codes and practices and design RCC structural members. |
| **Description of Contents in brief:** | |
| 1. | Analysis of continuous beams and rigid jointed plane frames by moment distribution method |
| 2. | RCC Design: Structural design of T and L beams |
| 3. | Design of slabs spanning in two directions |
| 4. | Design of Dog legged staircase |
| 5. | Structural design of columns (short and long columns) |
| 6. | Types of foundations, Design of isolated and combined (rectangular) footings |
| **Course Outcomes:** | |
| 1. | The students will be able to apply knowledge of structural analysis to analyze structure to evaluate internal forces and deformation due to external loading. |
| 2. | The design forces thus evaluated will help for designing of various RCC structures for safety against collapse and serviceability requirements. |
| 3. | Optimization of design for safe and economical design. |
| **Lecture Schedule:** | |
| 1. | Introduction to continuous beams |
| 2. | Determination of Static indeterminacy of continuous beams and frames |
| 3. | Development of concept of Moment distribution method |
| 4. | Absolute stiffness, Relative stiffness |
| 5. | Determination of distribution factors |
| 6. | Analysis of continuous beams by moment distribution method |
| 7. | Analysis of rigid jointed plane frames by moment distribution method |
| 8. | Structural design of RCC T beams |
| 9. | Concept of L beams |
| 10. | Codal provisions for design of two way slabs of various edge conditions |
| 11. | Design of slabs spanning in two directions |
| 12. | Codal provisions for design of stair cases |
| 13. | Design of Dog legged staircase |
| 14. | Introduction to columns having various end conditions |
| 15. | Structural design of short column |
| 16. | Structural design of long column |
| 17. | Various types of RCC foundations, Codal provisions |
| 18. | Design of isolated footing |
| 19. | Design of combined (rectangular) footing |
| **Book References:** | |
| 1. | Structural Analysis: R.C. Hibbeler |
| 2. | Design of R.C.C Structures: P.C. Warghese |
| 3. | Design of R.C.C Structures: Vazirani & Ratwani |

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| 4. | Structural Analysis: S.S. Bhavikatti (Vol. I & II) |
| 5. | Design of Reinforced Concrete Structures: N. Subramanian |
| 6. | Design of Reinforced Concrete Structures: N. Krishna Raju |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/105/105/105105166/ |
| 2. | https://nptel.ac.in/courses/105/105/105105105/ |
| 3. | https://nptel.ac.in/courses/105/105/105105104/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

## BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Fifth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 3101** | Architectural Design Project – 5 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC 3102** | Building Materials & Construction – 5 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC 3103** | Acoustics | Theory | 1 | 2 | - | - | 3 | 2 |
| **ARC 3104** | Quantity Surveying, Specifications and Valuation | Theory | 2 | 2 | - | - | 4 | 3 |
| **ARC 3105** | Computer Applications – 3 | Theory | 1 | 2 | - | - | 3 | 2 |
| **CIV 3106 ARC** | Structure – 3 | Viva | 1 | - | 3 | - | 4 | 3 |
| **EE 3107 ARC** | Building Services – 2 (Electrical Services) | Theory | 1 | 2 | - | - | 3 | 2 |
| | **TOTAL HOURS: 29**<br>**Total Credits (Cumulative): 142** | | **8** | **8** | **3** | **10** | **29** | **29** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | | Semester: **V** | Year: **III** |
| Name of Course: | | **Architectural Design Project - 5** | |
| Course Code: | | **ARC 3101 / ARC 311 / ARC 24311 / AP AR 3101** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** to make students understand: | | | |
| 1. | How to design in urban areas. | | |
| 2. | Characteristics of a public building. | | |
| **Description of Contents in brief:** | | | |
| 1. | Understanding dynamics of multi-functional public buildings in urban setting; activities of visitors and regular users. Providing for daily/regular, monthly, annual events and activities. Relating space and individual; human scale and urban scale. Societal aspirations for aesthetics and form. | | |
| 2. | Exercise in articulation and manipulation of programmed needs, criticism and evaluation of alternative concepts, decision making process. | | |
| 3. | Integration of basic building services on larger scale. Role of climate, building services, construction methods, bye-laws, codes (NBC etc.) on building and site design. | | |
| 4. | The design exercises may include buildings like Collectorate office, Degree College, navodaya vidyalaya, corporation office, shopping complex, dharamshala, inn, motels, budget hotels, etc. | | |
| **Course Outcomes:** Students will have capability to | | | |
| 1. | Understand the relationship between design and urban setting. | | |
| 2. | Design for multiple groups of users with due consideration to site, climate, services, bye-laws. | | |
| 3. | Derive a design process and design solution for public buildings. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to the subject, assessments and sessionals | | |
| 2. | Public Buildings in urban setting; Typological and chronological overview | | |
| 3. | cont… | | |
| 4. | Design brief discussion; factors and players | | |
| 5. | cont… urban context.. | | |
| 6. | cont… urban scale and human scale | | |
| 7. | cont… State and societal aspirations for aesthetics and form | | |
| 8. | cont… visitors, regular users, | | |
| 9. | cont… decision makers and users | | |
| 10. | Articulation and manipulation of programmed needs | | |
| 11. | cont.. | | |
| 12. | case study | | |
| 13. | case study | | |
| 14. | case study | | |
| 15. | case study | | |
| 16. | case study | | |
| 17. | case study | | |
| 18. | case study | | |
| 19. | case study presentation | | |
| 20. | case study presentation | | |
| 21. | Correlating design brief and case study learning | | |
| 22. | Design brief development | | |

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| 23. | cont.. |
| 24. | cont.. |
| 25. | Problem solving; Concept design and design development |
| 26. | cont.. |
| 27. | cont.. |
| 28. | cont.. , criticism and evaluation of alternative concepts |
| 29. | cont.. |
| 30. | Design proposal finalization |
| 31. | cont.. |
| 32. | cont.. |
| 33. | cont.. |
| 34. | cont.. |
| 35. | cont.. |
| 36. | cont.. |
| 37. | Discussion and freezing design |
| 38. | Discussion and freezing design |
| 39. | Final drawings, views, models |
| 40. | cont.. |
| 41. | cont.. |
| 42. | cont.. |
| 43. | cont.. |
| 44. | cont.. |
| 45. | cont.. |
| 46. | cont.. |
| 47. | Presentation |
| 48. | Presentation |
| 49. | Presentation |
| **Book References:** | |
| 1. | Form, Space and Order by Francis D. K. Ching |
| 2. | Francis D. K. Ching , Architectural Graphics |
| 3. | The Public Face of Architecture: Civic Culture and Public Spaces edited by Nathan Glazer, The free press |
| 4. | Analysing Architecture, Simon Unwin, Routledge, London. |
| 5. | Housing & Urbanisation, Charles Correa |
| **Web References:** | |
| 1. | https://architexturez.net/ |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Building Materials and Construction - 5** | |
| Course Code: | **ARC 3102 / ARC 312 / ARC 24312 / AP AR 3102** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** to enable students to understand | | |
| 1. | Steel in architecture | |
| 2. | Advanced slabs and foundations | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to structural steel properties and the types of sections used in various building components. | |
| 2. | Precast and pre engineered steel structures, making envelope in steel structure building | |
| 3. | steel composite construction | |
| 4. | Advance foundations like grillage, pile, raft | |
| 5. | Advanced RCC slabs like coffer and flat slabs | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Understand the important elements of a steel framed structure | |
| 2. | Provide details for various elements for construction of a steel framed building | |
| 3. | Decide and detail the type of foundation for large buildings | |
| 4. | Decide and detail the type of RCC slab to be chosen for large spans | |
| **Lecture Schedule:** | | |
| 1. | Introduction to structural steel properties and the types of sections used in various building components-1 | |
| 2. | Introduction to structural steel properties and the types of sections used in various building components-2 | |
| 3. | Introduction to structural steel properties and the types of sections used in various building components-3 | |
| 4. | Details of footings and foundations and its connection to steel columns and stanchions-1 | |
| 5. | Details of footings and foundations and its connection to steel columns and stanchions-2 | |
| 6. | Types of steel columns and stanchions -1 | |
| 7. | Types of steel columns and stanchions -2 | |
| 8. | Types of steel columns and stanchions -3 | |
| 9. | Types of steel beams and joists-1 | |
| 10. | Types of steel beams joists -2 | |
| 11. | Types of steel beams joists -3 | |
| 12. | Role of bracings in the frame. | |
| 13. | Different types of floor in steel construction and their details-1 | |
| 14. | Different types of floor in steel construction and their details -2 | |
| 15. | Different types of floor in steel construction and their details -3 | |
| 16. | Different types of wall systems in steel construction and their details -1 | |
| 17. | Different types of wall systems in steel construction and their details -2 | |
| 18. | Different types of wall systems in steel construction and their details -3 | |
| 19. | Creating openings in wall systems in steel construction and their details-1 | |
| 20. | Creating openings in wall systems in steel construction and their details-2 | |
| 21. | Construction details for integrating services in steel construction-1 | |
| 22. | Construction details for integrating services in steel construction-2 | |
| 23. | Construction details for integrating services in steel construction-3 | |

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| 24. | Cladding steel columns and beams-1 |
| 25. | Cladding steel columns and beams-2 |
| 26. | Cladding steel columns and beams-3 |
| 27. | Integrating RCC and PCC in steel construction-1 |
| 28. | Integrating RCC and PCC in steel construction-2 |
| 29. | Integrating RCC and PCC in steel construction-3 |
| 30. | Combining steel construction with traditional RCC frame-1 |
| 31. | Combining steel construction with traditional RCC frame-2 |
| 32. | Combining steel construction with traditional RCC frame-3 |
| 33. | Advanced foundations; Pile and Raft |
| 34. | Advanced foundations; Pile and Raft |
| 35. | Advanced foundations; Pile and Raft |
| 36. | Advanced RCC slabs; Coffer and Flat |
| 37. | Advanced RCC slabs; Coffer and Flat |
| 38. | Advanced RCC slabs; Coffer and Flat |
| **Book References:** | |
| 1. | Building Construction Volume 1 to 4, W.B. Mc Kay |
| 2. | Building Construction Volume 1 to 5, R. Barry |
| 3. | Building Construction Illustrated, Francis Ching D.K. |
| 4. | Civil Engineering construction Materials, S.K. Sharma |
| 5. | Building Construction, Sushil Kumar |
| 6. | Building Construction Handbook, R. Chudley, Roger Greeno |
| 7. | BIS IS: 800. 2007 |
| **Web References:** | |
| 1. | |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Acoustics** | |
| Course Code: | **ARC 3103 / ARC 313 / ARC 24313 / AP AR 3103** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** to enable students | | |
| 1. | To understand and apply basic laws and terminologies related to Acoustics. | |
| 2. | Identify acoustical requirements of a given activity, designing of space and calculations. | |
| 3. | To understand urban noise control and its application at site and building level. | |
| **Description of Contents in brief:** | | |
| 1. | To understand the need and importance of acoustics in various building typologies, the history of acoustics, works of pioneers. Introduction to general principles of sound, hearing, measurement. | |
| 2. | Behaviour of sound in free and enclosed spaces. Sound absorbing, reflecting and sound insulating materials. Reverberation time, design considerations for good acoustical design, Acoustical defects and remedies. | |
| 3. | Design exercise of an auditorium or other sensitive enclosures for speech, music, lecture, etc. | |
| 4. | Sound modification and reinforcement systems. | |
| 5. | Structure-borne and air-borne noise, urban noise; effects and controls. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Do basic analysis of spaces for acoustics and noise control. | |
| 2. | Apply the fundamentals of acoustics and create acoustically sound architectural designs. | |
| 3. | Communicate with acoustical consultants. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | |
| 2. | Need and importance of acoustics in various building typologies, | |
| 3. | History of acoustics, | |
| 4. | Desk appraisal of historical examples | |
| 5. | Presentation by students | |
| 6. | Works of pioneers | |
| 7. | Acoustical terms and definitions | |
| 8. | General principles of sound, Hearing mechanism | |
| 9. | Measurement of sound | |
| 10. | Numerical on above | |
| 11. | Numerical on above | |
| 12. | Sound in free field, Inverse square law | |
| 13. | Numerical on above | |
| 14. | Behaviour of sound in enclosed spaces | |
| 15. | Sound absorption, reflection, insulation etc phenomena. | |
| 16. | Numerical on above | |
| 17. | Classification and characteristics of sound absorption materials | |
| 18. | Cont… | |
| 19. | Assignment on sample collection | |
| 20. | Presentation by students | |
| 21. | SPL in rooms; influencing factors | |
| 22. | Numerical on above | |

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| 23. | Numerical on above |
| 24. | Reverberation; factors affecting reverberation, standards |
| 25. | Reverberation time, formulae by different researchers |
| 26. | Numerical on above |
| 27. | Numerical on above |
| 28. | Modifying RT; numerical |
| 29. | Design considerations for good acoustical design |
| 30. | Cont.. |
| 31. | Acoustical defects and remedies |
| 32. | Cont.. |
| 33. | Design project: auditorium or other sensitive enclosures for speech, music, lecture, etc for a given capacity |
| 34. | Planning, section development, profiles etc Ray tracing, sight lines |
| 35. | Cont… |
| 36. | Cont… |
| 37. | Cont… |
| 38. | Deciding materials |
| 39. | Calculation of RT; modifying if necessary |
| 40. | Modifying RT if necessary by changing design and specifications |
| 41. | Calculation of SPL |
| 42. | Calculation of SPL |
| 43. | Drawings and data sheets presentation |
| 44. | Sound modification and reinforcement systems |
| 45. | Psychological and physiological effects of noise, standards |
| 46. | Air-borne noise; effects and controls |
| 47. | Structure-borne; effects and controls |
| 48. | Urban noise; effects and controls |
| **Book References:** | |
| 1. | Acoustics and Noise Control, B.J.Smith et al, Addison Wesley Longman Ltd. |
| 2. | Design for Good Acoustics and Noise Control, John Moore, Macmillan |
| 3. | National Building Code Of India Part 8 Building Services, Section 4 Acoustics, Sound Insulation and Noise Control |
| 4. | Mechanical and Electrical Equipment for Buildings, Walter T. Grondzik, Alison G. Kwok, Benjamin Stein, John S. Reynolds. Chapter 26, 27 |
| 5. | Manual of Tropical Housing and Building, Koenigsberger et al, Orient Longman |
| 6. | Auditorium Acoustics and Architectural Design, by Michael Barron, E & FN Spon |
| 7. | Collected Papers on Acoustics by Wallace Clement Sabine, Cambridge Harvard University Press London : Humphrey Milford Oxford University Press 1922 |
| 8. | Master Handbook of Acoustics by F. Alton Everest, Ken C. Pohlmann, V edition, McGraw Hill NY |
| **Web References:** | |
| 1. | https://i-simpa.ifsttar.fr/ |
| 2. | https://nptel.ac.in/courses/124/105/124105004/ |
| 3. | http://www.roletech.net/books/HandbookAcoustics.pdf |
| 4. | Springer Handbook of Acoustics: Chapter 9 - GADE & MORTENSEN ... www.gade-mortensen.dk/.../Gade_%20Acoustics%20in%20halls%20SpringerC-9.pdf |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Quantity Surveying, Specifications and Valuation** | |
| Course Code: | **ARC 3104 / ARC 314 / ARC 24314 / AP AR 3104** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To develop an understanding of the quality and quantity of materials, quantity and classes of skilled and unskilled laborers and tools and plants required for the project. |
| 2. | To develop skill for precise and approximate estimations. |
| 3. | To be able to estimate and specify quantities of various items of material and work involved in an architectural project. |
| 4. | To be able to do rate analysis for any item of work. |
| **Description of Contents in brief:** | |
| 1. | The need for specification. Types of specification. Specification writing. Classification of specification, Brief specification and detailed specification- excavation, plain cement concrete, RCC, brickwork, DPC, Flooring, doors, windows frames and shutters, plastering, etc. |
| 2. | The various types & purposes of estimation, approximate estimate, bill of quantity, considerability of factors, rationale for measurement and billing, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work. Estimate abstract and Cost estimation (types and approaches to construction estimates). Estimate of list of quantities. Operating costs. Tender documents . |
| 3. | Detailed quantity estimates for various items of work of a building (earthwork excavation, brick work, PCC, RCC, plastering, flooring, woodworks, iron works, painting, etc. |
| 4. | The role of budgeting, financing and phasing in a project and its significance in estimation. Significance of time in cost-effectiveness. Introduction to valuation types, sinking fund, year of purchase, depreciation and their types, methods and purpose of valuation. |
| 5. | Preparing specifications and estimating cost for small building including brief specifications, calculating quantities for labor and materials, costing based on CPWD / PWD documents. |
| **Course Outcomes:** | |
| 1. | Write specifications for building construction. |
| 2. | Prepare approximate estimates of building projects |
| 3. | Prepare detailed estimates for a building project. |
| **Lecture Schedule:** | |
| 1. | Why Estimation and Specification, Process of Building execution |
| 2. | Valuation and its Role in profession |
| 3. | Types of Estimate (plinth rate, cube rate, detailed, abstract and BOQ) |
| 4. | Methods of Building Estimate |
| 5. | Individual Wall Method |
| 6. | Centre Line Method |
| 7. | Measurement of basic materials, units |
| 8. | Stage wise estimation of different building components |
| 9. | Foundation stage - excavation, filling, levelling, DPC, PCC, RCC |
| 10. | Slab level |
| 11. | Exercises on RCC including Centering |

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| 12. | Exercises on Masonry of different thickness and shapes |
| 13. | Exercises on Door Windows of different materials like metal and wood |
| 14. | Exercises on Flooring of different materials like stone, tile etc |
| 15. | Exercises on Plastering and Paints |
| 16. | Exercises on Electrification |
| 17. | Exercises on Sanitary |
| 18. | Exercises on Water Supply |
| 19. | Exercises on typical items like water tank, metal work etc |
| 20. | Specification and SOR's, DSR etc. |
| 21. | Writing specification of a Residence |
| 22. | Continued |
| 23. | Introduction to Major project of Estimate preparation - Small residence |
| 24. | Foundation Stage (RCC, Shuttering, Steel calculations etc) |
| 25. | Continued |
| 26. | Plinth Stage (RCC, Shuttering, Steel calculations etc) |
| 27. | Continued |
| 28. | Slab I Level (RCC, Shuttering, Steel calculations , Brk. Masonry, Plaster etc) |
| 29. | Continued |
| 30. | Slab II Level (RCC, Shuttering, Steel calculations , Brk. Masonry, Plaster etc) |
| 31. | Continued |
| 32. | Woodwork calculations all floors |
| 33. | Metal work all floors |
| 34. | Stone work / Tile work all floors |
| 35. | Fixtures and Fittings all floors |
| 36. | Putty , Paints and. Finishes all floors |
| 37. | Preparation of Abstract and Boq |
| 38. | Continued |
| 39. | Continued |
| 40. | Material Collection and Rate Analysis (Market Survey) |
| 41. | Exercises on rate analysis for item rate |
| 42. | Continued |
| 43. | Continued |
| 44. | Contents of Tender documents |
| 45. | Phasing and Budgeting |
| 46. | Continued |
| 47. | Continued |
| 48. | Valuation types and Methods |
| 49. | Continued |
| 50. | Tender Documents |
| **Book References:** | |
| 1. | I.S. 1200-1968 Methods of measurements of Buildings and Civil Engineering Works. |
| 2. | Rangwala, Estimating, Costing and Valuation (Professional practice) |
| 3. | B.N. Dutta, Estimating & Costing |
| 4. | PWD Standard Specifications , DSR etc. |
| **Web References:** | |
| 1. | https://cpwd.gov.in/Publication/Specs2009V1.pdf |
| 2. | https://www.wsdot.wa.gov/publications/manuals/fulltext/M3034/EstimatingGuidelines.pdf |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Computer Applications - 3** | |
| Course Code: | **ARC 3105 / ARC 315 / ARC 24315 / AP AR 3105** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand and apply basic CAD skills to create simple and complex three-dimensional geometric forms. |
| 2. | CAD skills to create technically correct and prepare three-dimensional building models |
| 3. | Skills to render and animate 3D building models. |
| **Description of Contents in brief:** | |
| 1. | Creating Three-Dimensional Geometry, Introduction to computer aided 3D drafting. Understand tools, command and basic set up for 3D. Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections. |
| 2. | 3D Model of Building, Understanding and converting plan, elevation and section of drawing to three dimensional building model using three dimensional tools. Creating building models using building elements and then converting model to orthographic projections. |
| 3. | Photo Realistic Rendering, making models photorealistic using materials, lighting, texture, background, etc. Creating new materials and environment attributes. |
| 4. | Walk Through of Interior/Exterior, create interior walkthroughs for small spaces such as bedroom, office etc. by adding scenes, furniture, texture, finishes with lighting effect and camera angles. Create building exterior walkthroughs by adding scenes, trees, human figures, cars, sun light effect and camera angles. |
| 5. | Practical Work, Making Three- dimensional photorealistic rendered architectural models for any one of the architectural design assignments completed in previous semesters and to create walkthrough of the same. |
| **Course Outcomes:** | |
| 1. | Visualize building / transform sketches and 2-dimensional CAD drawings to 3 dimensional building models and walkthrough. |
| 2. | Execute photo realistic rendering of the building project. |
| 3. | Demonstrate ability to prepare presentation models with the help of computer softwares. |
| 4. | Use 3D techniques for visualisation through various architectural projects of progressive complexity. |
| **Lecture Schedule:** | |
| 1. | Revision of AutoCAD 2D drafting tool and Digital drawings tools |
| 2. | Revision of Screen Layout- tool bar, graphics area, drawing editor, file handling commands etc making 2D plans, elevation and sections etc |
| 3. | Introduction to computer aided 3D drafting. |
| 4. | Understand tools, command and basic set up for 3D |
| 5. | Creating and editing simple and complex geometric meshes, surfaces and solids with their combinations etc |
| 6. | Continue with exercises |
| 7. | Application of various toolbars for three dimensional modelling. |
| 8. | Understanding 3D coordinate system using view points |
| 9. | 3D-modelling techniques like construction planes, drawing objects,. |

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| 10. | 3D surfaces setting up elevation, thickness and use of dynamic projections |
| 11. | Exercises |
| 12. | Surfacing in 3D, working with advanced surfacing commands – Solid modeling |
| 13. | Exercises |
| 14. | Using building elements and then converting model to orthographic projections. |
| 15. | Understanding and converting plan, elevation and section of drawing to three dimensional building model using three dimensional tools. |
| 16. | Exercises |
| 17. | Advanced solid modeling commands – Editing Solids |
| 18. | Complete solid 3 D modeling of Building |
| 19. | Exercises to Convert and draw 2 d architectural drawings to 3d forms |
| 20. | Exercises |
| 21. | Exercises continued |
| 22. | Introducing Photo Realistic Rendering |
| 23. | Making models photorealistic using different materials |
| 24. | Lighting, texture, background, etc. creating new materials and environment attributes. |
| 25. | Exercises and Practice |
| 26. | Exercises and Practice |
| 27. | Demonstrate presentation drawings , material application and lighting in 3D Cad |
| 28. | Interactive viewing in 3D |
| 29. | Demonstrate material application and lighting in 3D Cad |
| 30. | Class exercise and Assignment |
| 31. | Introduction to Walk through of Interior spaces and exterior spaces |
| 32. | Create interior walkthroughs for small spaces such as bedroom, office etc. |
| 33. | Adding scenes, furniture, texture, finishes with lighting effect and camera angles in interior spaces |
| 34. | Case study |
| 35. | Exercises |
| 36. | Create building exterior walkthroughs |
| 37. | Adding exterior elements like scenes, trees, human figures, cars, sun light effect and camera angles. |
| 38. | Exercises |
| 39. | Exercises |
| 40. | Introduction to rendering in 3D |
| 41. | Rendering process – Enhancing digital images from CAD application using Adobe Photoshop, Paint Shop Pro & other graphic programs. |
| 42. | Making Three- dimensional photorealistic rendered architectural models |
| 43. | Examples |
| 44. | Create complete walkthrough of the above building outdoors with rendering |
| 45. | Continue on exercise |
| 46. | Continue on exercise |
| 47. | Discussing other software for 3D visualisation and models. |
| **Book References:** | |
| 1. | Engineering AutoCAD by AP Gautam, Pradeep Jain |
| 2. | Fundamentals Of Three-Dimensional Computer Graphics by Watt |
| 3. | CAD For Interiors Beyond The Basics by J.A. Fiorello |
| 4. | Computer Aided Design guide For Architecture, Engineering And Construction by Aouad |
| **Web References:** | |
| 1. | |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Structure - 3** | |
| Course Code: | **CIV 3106 ARC / CE 331 / CE 24331 / CE 3131** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Knowledge of strength of materials<br>Knowledge of solid mechanics<br>Knowledge of structural analysis | |

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| **Course Objectives:** | |
| 1. | To understand IS codes for steel. |
| 2. | To be able to design load bearing structures and steel structural members. |
| **Description of Contents in brief:** | |
| 1. | Load Bearing Structures: Structural design and illustrative detailing of load bearing structures in brick masonry; load bearing wall and its foundation. |
| 2. | Isolated columns and its foundation in brick masonry. |
| 3. | Steel structures: Properties of steel as structural material, Rolled and built up sections. |
| 4. | Structural design of tension members, compression members and beams. |
| 5. | Introduction to connections. |
| **Course Outcomes:** | |
| 1. | The students will be able to apply knowledge of structural analysis to analyze structure to evaluate internal forces and deformation due to external loading. |
| 2. | The design forces thus evaluated will help for designing of various masonry and steel structures for safety against collapse and serviceability requirements. |
| 3. | Optimization of design for safe and economical design. |
| **Lecture Schedule:** | |
| 1. | Introduction to masonry structures |
| 2. | Load bearing masonry column foundation |
| 3. | Structural design and illustrative detailing of load bearing isolated column foundation in brick masonry |
| 4. | Load bearing masonry wall foundation |
| 5. | Structural design and illustrative detailing of load bearing wall foundation in brick masonry |
| 6. | Structural design of load bearing isolated columns in brick masonry |
| 7. | Structural design of load bearing walls in brick masonry |
| 8. | Steel structures: Properties of steel as structural material |
| 9. | Various types of rolled steel sections |
| 10. | Concept of design of steel structures (Limit state) |
| 11. | Structural design of tension members |
| 12. | Structural design of compression members |
| 13. | Structural design of beams |
| 14. | Introduction to connections |
| **Book References:** | |
| 1. | Design of Steel Structures: S.A. Kazimi |
| 2. | Comprehensive Design of Steel Structures: B.C. Punmia |
| 3. | Structural Steel Design: C. Jack C. McCormac and Stephen F. Csernak |
| 4. | Design of Masonry and Timber structures: Harbhajan Singh |
| 5. | Design of Steel Structures: N. Subramanian |
| 6. | Design of Steel Structures: S.K. Duggal |

| Web References: | |
|---|---|
| 1. | https://nptel.ac.in/courses/105/105/105105166/ |
| 2. | https://nptel.ac.in/courses/105/105/105105162/ |
| 3. | https://nptel.ac.in/courses/105/106/105106112/ |

## Fifth Semester (2020 / 2021 / 2024 / 2025)

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| Name of Program: **B.Arch.** | Semester: **V** | Year: **III** |
| Name of Course: | **Building Services - 2 (Electrical services)** | |
| Course Code: | **EE 3107 ARC / EE 331 / 24331 / EE 3131** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Basics of Physics | |

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| **Course Objectives:** | |
| 1. | To know the Basic laws and terminologies related to electrical services in buildings. |
| 2. | To understand the electrical requirements for given situation, its calculations and design. |
| 3. | To have a knowledge of artificial Illumination and its application in buildings. |
| **Description of Contents in brief:** | |
| 1. | Brief introduction to generation of electricity; types of power stations. |
| 2. | Power distribution system in city; function of sub stations; locational guidelines for substations, land and other infrastructural requirement for substation; power distribution system in locality. |
| 3. | Calculation of electrical load for residential and non - residential building, distribution board, electrical layout of building. |
| 4. | Detailed electrical layout in a building, placement of electrical fixtures and fittings; control systems. Solar energy integrated electrical design of buildings and smart buildings. |
| 5. | Illumination standards and artificial lighting design and lighting power density. Daylight integrated lighting system, timers and sensors. Study of lighting fixtures and fittings used in buildings, special lighting systems for museums or displays. |
| 6. | Provisions of standards, building byelaws and energy codes related to electrical services. Case study and project work. |
| **Course Outcomes:** | |
| 1. | Knowledge of generation and distribution of electricity |
| 2. | Numerical methods of electrical load calculation |
| 3. | Understand the artificial lighting systems |
| 4. | Knowledge of building byelaws and energy codes |
| **Lecture Schedule:** | |
| 1. | Introduction of generation of electricity |
| 2. | Brief introduction types of power stations |
| 3. | Generation of electricity using hydro power plants |
| 4. | Generation of electricity using steam power plants |
| 5. | Generation of electricity using nuclear power plants |
| 6. | Power distribution system in city |
| 7. | Block diagram of substation |
| 8. | Function of sub stations |
| 9. | Locational guidelines for substations |
| 10. | Land and other infrastructural requirement for substation |
| 11. | Power distribution system in locality. |
| 12. | Layout of substation |
| 13. | Calculation of electrical load for residential building, |
| 14. | Problems on calculation of electrical load for residential building |
| 15. | Calculation of electrical load for non - residential building |
| 16. | Problems on calculation of electrical load for non-residential building |
| 17. | Distribution board |
| 18. | Electrical layout of building |
| 19. | Detailed electrical layout in a building |

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| 20. | Placement of electrical fixtures and fittings |
| 21. | Control systems for electrical fixtures and fittings. |
| 22. | Solar energy integrated electrical design of buildings |
| 23. | Solar energy integrated electrical design smart buildings |
| 24. | Basic concept of illumination |
| 25. | Illumination standards |
| 26. | Problems on illumination |
| 27. | Artificial lighting System |
| 28. | Various types of lamps used for artificial lighting System |
| 29. | Problems on different types of lamps |
| 30. | Artificial lighting design |
| 31. | Lighting power density |
| 32. | Daylight integrated lighting system |
| 33. | Timers |
| 34. | Sensors |
| 35. | Study of lighting fixtures and fittings used in buildings |
| 36. | Designing of layout of lighting fixtures and fittings used in buildings |
| 37. | Special lighting systems for museums or displays. |
| 38. | Designing of layout of special lighting systems for museums or displays |
| 39. | Provisions of standards |
| 40. | Building byelaws |
| 41. | Energy codes related to electrical services |
| 42. | Case study |
| 43. | Project work |
| **Book References:** | |
| 1. | Fred Hall, Roger Greeno BA, “Building services handbook” (2005), ISBN 0 7506 6460 6 |
| 2. | Joseph B. Wujek, Frank R. Dagostino – “Mechanical and electrical systems in architecture, engineering, and construction”, ISBN-13: 978-0-13-500004-5 |
| 3. | Gupta, J.B., ‘Utilisation of Electrical Energy and Electric Traction’, S.K.Kataria and sons, 10th Edition, 1990. |
| 4. | H. Pratab, Utilization of Elect. Energy, 2012 edition, S.K. Kataria & Sons, 2012. |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/108/106/108106026/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

## BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Sixth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC3201** | Architectural Design Project – 6 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC3202** | Building Materials & Construction – 6 | Theory | 1 | - | - | 4 | 5 | 7 |
| **ARC3203** | Working Drawing | Viva | 1 | 2 | - | - | 3 | 2 |
| **ARC 3204** | Computer Applications – 4 (Building Information Modeling) | Viva | 1 | 2 | - | - | 3 | 2 |
| **CIV 3205 ARC** | Structure – 4 | Theory | 1 | - | 3 | - | 4 | 3 |
| **ME 3206 ARC** | Building Services – 3 (Mechanical Services) | Theory | 1 | 2 | - | - | 3 | 2 |
| | Departmental Elective – 1 | Theory | 2 | | 2 | - | 4 | 3 |
| | **TOTAL HOURS: 29**<br>**Total Credits (Cumulative): 171** | | **8** | **6** | **5** | **10** | **29** | **29** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Sixth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Architectural Design Project - 6** | |
| Course Code: | **ARC 3201 / ARC 321 / ARC 24321 / AP AR 3201** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand how to design closed environment buildings in urban areas. |
| 2. | Interior comfort for activities and movement with artificial means; air-conditioning, lighting, lifts, etc. |
| 3. | Service oriented building types |
| 4. | Integration of Multi-functional activity |
| 5. | Form, Space and Services with technological interventions |
| **Description of Contents in brief:** | |
| 1. | Understanding essentials for closed environment public buildings; interior comfort for activities and movement with artificial means; air-conditioning, acoustics, lighting, lifts etc. |
| 2. | Building envelope design, materials and finishes for energy efficiency and green rating (GRIHA,ECBC etc.). Exploring structural system alternatives. |
| 3. | Exercises on studies of closed environment buildings. Design (form and space) for multi activity closed environment facility like hospitals, hotels, corporate office, IT office, call-centers, cinema hall, small convention centers etc. |
| **Course Outcomes:** Students will be able to | |
| 1. | Design closed environment buildings for a specific purpose for a multiple group of users. |
| 2. | Understand and design for energy efficiency. |
| 3. | Produce a design process and design output for a specialized building type. |
| 4. | Design with norms applicable on site as per Development Plan and Adhiniyam |
| **Lecture Schedule:** | |
| 1. | Concept of Multi-Functional buildings |
| 2. | Continued |
| 3. | Urban setting and Building performance |
| 4. | Continued |
| 5. | Tutorials on identification of types of Multi-Functional buildings |
| 6. | Continued |
| 7. | Opportunities and Challenges in Design of such buildings |
| 8. | Designing environment |
| 9. | Continued |
| 10. | Project Identification and Background study – Convention Centres, Mall, Hospitals etc (Any one) |
| 11. | Case studies of similar type of Building and its environment |
| 12. | Case study Visit |
| 13. | Case study Visit |
| 14. | Case study Visit |
| 15. | Case study Visit |
| 16. | Assignment on Analysis of Case studies on parameters like site planning, site services, Building Design and Services, Structural systems, Materials and Specifications etc. |
| 17. | Tutorials on case studies |
| 18. | Tutorials on case studies |
| 19. | Building Bye laws |

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|---|---|
| 20. | Area Calculations |
| 21. | Site information |
| 22. | Applicable building bye laws |
| 23. | Lecture on Site Analysis and Site Planning |
| 24. | Continued |
| 25. | Continued |
| 26. | Active and Passive Design techniques |
| 27. | Continued |
| 28. | Continued |
| 29. | Design Methodology and Design Process |
| 30. | Continued |
| 31. | Continued |
| 32. | Conceptual Development of an Idea of multi-functional building activities and diverse users |
| 33. | Continued |
| 34. | Detailing of concept applying principles of Design of interior and outdoor spaces, energy efficient methods, structural innovations etc. |
| 35. | Continued |
| 36. | Continued |
| 37. | Design Development through façade designs, Materials and Integration of building blocks |
| 38. | Continued |
| 39. | Continued |
| 40. | Design Development by integrating services like HVAC, Plumbing, Firefighting etc. |
| 41. | Continued |
| 42. | Continued |
| 43. | Developing 3D model |
| 44. | Continued |
| 45. | Continued |
| 46. | Preparation of Presentation drawings |
| 47. | Continued |
| 48. | Continued |
| 49. | Preparation of working drawings |
| 50. | Continued |
| **Book References:** | |
| 1. | Francis D. K. Ching , Architectural Graphics |
| 2. | A Pattern Language: by Christopher Alexander (Author), Sara Ishikawa (Author), Murray Silverstein (Author) |
| 3. | Image of the City by Kevin Lynch |
| 4. | Form, Space and Order by Francis D. K. Ching |
| 5. | Architecture As Space Paperback – August 21, 1993 by Bruno Zev |
| 6. | Design Manual for a Barrier-Free Built Environment |
| **Web References:** | |
| 1. | https://www.irbnet.de/daten/iconda/CIB12257.pdf |
| 2. | http://www.bsu.edu/cap/programsfbfi/Open Building/openbuilding.htm |
| 3. | http://www.bsu.edu/cap/programsfbfi/Open Building/openbuilding.htm |
| 4. | https://www.cedengineering.com/userfiles/The%20MEP%20Design%20of%20Building%20Sevices.pdf |
| 5. | https://worldarchitecture.org/ |

## Sixth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|---|
| Name of Program: **B.Arch.** | | Semester: **VI** | Year: **III** |
| Name of Course: | | **Building Materials and Construction - 6** | |
| Course Code: | | **ARC 3202 / ARC 322 / ARC 24322 / AP AR 3202** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** to enable students to understand | | | |
| 1. | Modular coordination | | |
| 2. | Large span structural components and construction details. | | |
| 3. | 3D printing | | |
| **Description of Contents in brief:** | | | |
| 1. | Modular space grid. Modular dimensioning and modular drawing. Preferred sizes for horizontal and vertical coordinating and controlling dimensions. Controlling dimensions for building components. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components. | | |
| 2. | Skeleton frame works (space frames) - single layer grids (two-way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids. | | |
| 3. | Study of large span tensile structures, prefabricated systems like Geodesic domes, | | |
| 4. | Design and detailing of concrete used in advanced construction such as Precast concrete, pre stressed concrete, decorative concrete, insulated concrete forms (ICF), Concrete for Seismic design. Concrete shell roofs of various types and folded plates | | |
| 5. | Types of materials and its constitution/manufacturing, construction technology and requirement for 3D printed buildings structure and extraterrestrial printed structures. Tensile fabric structure by digital printing - translucent fabric, thin-film photovoltaic, texlon foil, PVC(poly vinyl chloride) coated polyester cloth and poly tetra fluroethlene, coated glass cloth etc. | | |
| **Course Outcomes:** Students will be able to | | | |
| 1. | Apply modular coordination | | |
| 2. | Conceptually design modern construction systems and techniques used in large scale buildings and other architectural projects. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction and advantages of modular coordination | | |
| 2. | Introduction to Modular space grid, Modular dimensioning and modular drawing. | | |
| 3. | Introduction to horizontal and vertical coordinating and controlling dimensions. | | |
| 4. | Controlling dimensions for widths of building components. | | |
| 5. | Controlling dimensions for heights of building components. | | |
| 6. | Introduction of prefabrication in India context – 1 | | |
| 7. | Introduction of prefabrication in India context – 2 | | |
| 8. | Classification of prefabricated components – 1 | | |
| 9. | Classification of prefabricated components – 2 | | |
| 10. | Introduction to space structures | | |
| 11. | Skeleton frame works (space frames) - single layer grids – 1 | | |
| 12. | Skeleton frame works (space frames) - single layer grids – 2 | | |
| 13. | Skeleton frame works (space frames) - single layer grids – 3 | | |
| 14. | Skeleton frame works (space frames) - Double layer grids – 1 | | |
| 15. | Skeleton frame works (space frames) - Double layer grids– 2 | | |
| 16. | Skeleton frame works (space frames) - Double layer grids – 3 | | |
| 17. | Introduction to Concrete shell roofs of various types – 1 | | |
| 18. | Introduction to Concrete shell roofs of various types – 2 | | |

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| 19. | Introduction to Concrete shell roofs of various types – 2 |
| 20. | Folded plates construction techniques – 1 |
| 21. | Folded plates construction techniques – 2 |
| 22. | Folded plates construction techniques – 3 |
| 23. | Shell structures – 1 |
| 24. | Shell structures – 2 |
| 25. | Shell structures – 3 |
| 26. | Introduction to study of prefabricated commercially available systems: |
| 27. | Space Deck System |
| 28. | Triodetic System |
| 29. | Mero System |
| 30. | Nodus System |
| 31. | Geodesic Dome – 1 |
| 32. | Geodesic Dome – 2 |
| 33. | Introduction to design and detailing of Precast concrete |
| 34. | Introduction to design and detailing of pre stressed concrete |
| 35. | Introduction to design and detailing of vaults |
| 36. | Introduction to design and detailing of domes |
| 37. | Introduction to decorative concrete |
| 38. | Concrete for Seismic design – 1 |
| 39. | Concrete for Seismic design – 2 |
| 40. | Introduction to Digital and Tensile Materials |
| 41. | Introduction to types of Digital and Tensile Materials and its constitution |
| 42. | Introduction to 3D printing of construction technology |
| 43. | Introduction to Tensile fabric structure by digital printing. |
| **Book References:** | |
| 1. | Analysis, Design and Construction of Double - Layer Grids Makowski |
| 2. | Shells, Membranes and Space Frames, K.Heki, (ed.) |
| 3. | Transmaterial 2: A Catalog of Materials That Redefine Our Physical Environment, Blaine Brownell |
| 4. | Material Architecture: emergent materials for innovative buildings and ecological construction 1st Edition by John E Fernandez |
| Web References: | |
| 1. | |

## Sixth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Working Drawing** | |
| Course Code: | **ARC 3203 / ARC 412 / ARC 24412 / AP AR 4102** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To develop and convert the intent of an architectural design into a set of documents that are technically correct and complete for work execution on site. All documents in this set should be complete and well-coordinated so as to explain properly the architectural decisions to the executing agencies. |
| **Description of Contents in brief:** | |
| 1. | Design of a simple ground plus one floor building like residence having multiple spaces like activity rooms, wet spaces (like washrooms, kitchen) and staircase. Making of presentation drawings in the form of floor plans, sections, site plan and main elevations. |
| 2. | Understand the Schematic Design (SD), Design Development (DD) and Construction Drawing (CD) stages of an architectural work. Development of design to its minutest details and resolving all issues using detailed building plans, site plans, sections, plinth beam plans, details, 3D visualizations, etc. Documenting all these decisions in the form of drawings, schedules, etc. complete with instructions, dimension and specifications. |
| 3. | Detailing of individual spaces like activity spaces, washrooms, kitchens, staircases, etc. for their finishes, pipe work (wherever needed), platforms, etc. Documenting all these decisions in the form of drawings, schedules, etc. complete with instructions, dimension and specifications. |
| 4. | Detailing of layout and number of various electrical fixtures, switches and switchboards using drawings, schedules, etc. complete with instructions, dimension and specifications. Detail of layout of internal and external plumbing and sanitation lines using drawings, schedules, etc. complete with instructions, dimension and specifications. |
| 5. | Detailing of other miscellaneous items like false ceiling details, door- window details, grills and jails, parapet wall or railings, boundary walls, schedule of finishes, etc. |
| **Course Outcomes:** | |
| 1. | Resolve and convert architectural design intent into drawings. |
| 2. | Produce proper documentation of Working drawing set for a project. |
| 3. | Ability to read and comprehend working drawing set. |
| **Lecture Schedule:** | |
| 1. | Setting out plan |
| 2. | Detailed floor plan |
| 3. | Edge of slab plan for all slabs |
| 4. | Terrace plan |
| 5. | Section - aa and bb<br>Elevation - e1 and e2<br>Profile - p1 and p2 |
| 6. | Staircase detail – plan and details - section and detail |
| 7. | Electrical plan and schedule– For all floors |
| 8. | Schedule of electrical fixtures<br>Toilet detail<br>Kitchen detail<br>Schedule of finishes |
| 9. | Door, window detail |

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| | Plumbing details<br>Reflected ceiling plan for selected area |
| **Book References:** | |
| 1. | BIS National building code |
| 2. | Architectural Working Drawings, Ralph W. Liebing |
| 3. | Francis D. K. Ching , Architectural Graphics |
| 4. | The Professional Practice of Architectural Working Drawings, 5th Edition Osamu A. Wakita, Nagy R. Bakhoum, Richard M. Linde |
| 5. | Working Drawing Handbook, Keith Styles |
| **Web References:** | |
| 1. | |

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## Sixth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Computer Applications – 4 (Building Information Modeling)** | |
| Course Code: | **ARC 3204 / ARC 324 / ARC 24324 / AP AR 3203** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** The objective of the subject is to enable students to understand and apply: | | |
| 1. | Skills and information to build comprehensive Building Information Models (BIM) using appropriate Digital software and Media. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to Fundamentals: Key concepts of BIM - reading and manipulating the software Interface - navigating within views - selection methods - the importance of levels and grids- create walls, doors, windows, and components - working with essential modification commands and load family. Creating floors, ceilings, and stairs - working with type and instance parameters – importing drawings - understanding the project browser and type properties palettes - adding sheets -inserting views onto sheets - adding dimensions and text to the mode and plotting. | |
| 2. | Advanced Modeling - Creating curtain walls, schedules, details, a custom family, and family types - “flex” a family with family types and work with reference planes - creating rooms and an area plan – tag components - customize existing wall styles. Create and edit a topo-surface, add site and parking components - draw label contours - work with phasing - understand groups and links- work with stacked walls - and learn the basics of rendering and create a project template. | |
| 3. | Rendering Choosing material for buildings- Creating custom walls, floors, and roofs - keynoting – working with mass elements - enhancing rendering with lighting - producing customized materials -Using sun and shadow settings - Walkthrough technique - adding decals - working with design options and worksets - and calculating energy analysis - managing revisions. | |
| 4. | BIM for Building Energy Simulation- Energy simulation for conceptual BIM models using massing- Detailed modeling using design elements- Rapid energy modeling and simulation with software. Conceptual Energy Analysis features to simulate performance. To produce energy consumption, carbon neutrality and renewable potential reports. | |
| 5. | BIM for Cost Estimating, Project Phasing and Administration- Introduction and theoretical information on the following topics- Model based Cost Estimating- Challenges in cost estimating with BIM - Cad geometrics verses BIM element description- Visualdata models - Material substitutions and value engineering- detailed estimates and take-offsheets- XML and automated cost estimate- project phasing and management- 4D modeling -BIM for project lifecycles. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Implement BIM concepts | |
| 2. | Perform building energy, simulation, construction and administration 4D visualization | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the BIM and it utility | |
| 2. | Understanding key concepts of BIM - 1 | |
| 3. | Understanding key concepts of BIM - 2 | |
| 4. | Importance and utility of levels and grids | |
| 5. | Understanding project Browser | |
| 6. | Practical | |
| 7. | Practical | |

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| 8. | Introduction to advanced modeling techniques |
| 9. | Customization of various building components – 1 |
| 10. | Customization of various building components – 2 |
| 11. | Customization of various building components – 3 |
| 12. | Practical |
| 13. | Practical |
| 14. | Create and edit a topo-surface |
| 15. | Practical |
| 16. | Practical |
| 17. | Inserting and editing site planning elements and components |
| 18. | Practical |
| 19. | Practical |
| 20. | Understanding work phasing |
| 21. | Practical |
| 22. | Practical |
| 23. | Creating project templates |
| 24. | Practical |
| 25. | Practical |
| 26. | Choosing material and applying materials |
| 27. | Practical |
| 28. | Practical |
| 29. | Working with mass elements |
| 30. | Practical |
| 31. | Practical |
| 32. | Understanding Rendering with lighting |
| 33. | Practical |
| 34. | Practical |
| 35. | Creating customized materials |
| 36. | Practical |
| 37. | Practical |
| 38. | Using sun and shadow settings |
| 39. | Practical |
| 40. | Walkthrough |
| 41. | Practical |
| 42. | calculating energy analysis |
| 43. | Practical |
| 44. | managing revisions |
| 45. | Practical |
| 46. | Energy simulation for conceptual BIM models using massing |
| 47. | Practical |
| 48. | produce energy consumption, carbon neutrality and renewable potential reports |
| 49. | Practical |
| 50. | BIM for Cost Estimating |
| 51. | Project Phasing and Administration |
| 52. | 4D modeling -BIM for project lifecycles |
| **Book References:** | |
| 1. | BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors |
| 2. | Building Information Modeling For Dummies |

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| 3. | BIG BIM, little BIM: The Practical Approach to Building Information Modelling |
| 4. | The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction |
| **Web References:** | |
| 1. | |

## Sixth Semester (2020 / 2021 / 2024 / 2025)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Structure - 4** | |
| Course Code: | **CIV 3205 ARC / CE 341 / CE 24341 / CE 3241** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Knowledge of structural analysis<br>Knowledge of structural design of RCC and steel structures<br>Basic Civil Engineering | |

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| **Course Objectives:** | |
| 1. | To understand concepts for structural design with advanced building structure technologies. |
| **Description of Contents in brief:** | |
| 1. | Introduction to concepts of structural design of modern structures - multistory buildings |
| 2. | Introduction to design of Flat slabs as per IS 456. |
| 3. | Introduction to Precast, Prestressed and Steel concrete composite structures. |
| 4. | Concept of Earthquake resistant design of buildings. |
| 5. | Design Project:<br>Structural design, drawings and detailing of a complete RCC building project. |
| **Course Outcomes:** | |
| 1. | The students will be able to apply knowledge of structural analysis to analyze structure to evaluate internal forces and deformation due to external loading. |
| 2. | The design forces thus evaluated will help for designing of RCC/steel structures (Project) for safety against collapse and serviceability requirements |
| 3. | Optimization of design for safe and economical design. |
| 4. | Concepts of structural design of modern structures. |
| **Lecture Schedule:** | |
| 1. | Introduction to concepts of structural design of modern structures - multistory buildings |
| 2. | Introduction to design of Flat slabs as per IS 456 |
| 3. | Concept of Precast construction |
| 4. | Introduction to Pre-stressed concrete |
| 5. | Introduction to steel-concrete Composite structures |
| 6. | Concept of Earthquake resistant design of buildings |
| 7. | Effect of Architectural features in seismic design of building |
| 8. | Introduction to Design Project |
| 9. | Determination of loads |
| 10. | Structural analysis of complete RCC building subjected to gravity loads |
| 11. | Structural design of complete RCC building |
| 12. | Drawings and detailing of various components of building |
| **Book References:** | |
| 1. | Prestressed Concrete: N. Krishna Raju |
| 2. | Composite Structure of Steel and Concrete (Volume-1): R.P. Johnson |
| 3. | Earthquake Resistant Design of Structures: P. Agarwal & M. Shrikhande |
| 4. | Structural Analysis: S.S. Bhavikatti (Vol. I & II) |
| 5. | Design of Reinforced Concrete Structures: N. Subramanian |
| 6. | Design of Steel Structures: Subramanyan |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/105/105/105105166/ |
| 2. | https://nptel.ac.in/courses/105/105/105105104/ |
| 3. | https://nptel.ac.in/courses/105/105/105105162/ |

## Sixth Semester

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Building Services – 3 (Mechanical Services)** | |
| Course Code: | **ME 3206 ARC / ME 341 / ME 24341 / ME 3241** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | General Awareness | |

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| **Course Objectives:** | |
| 1. | Overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems. |
| 2. | HVAC requirements for given situation, its calculations and design. |
| 3. | Lift, escalator and travelator requirements for given situation, its calculations. |
| 4. | Introduction to building automation systems. |
| **Description of Contents in brief:** | |
| 1. | Comfort conditions, Thermal comfort, Indoor Air Quality. |
| 2. | Air conditioning systems in buildings, Methods of air conditioning, Components used in air conditioning, Selection criteria for air conditioning systems, Refrigerants. |
| 3. | Ducting principles, layout schemes and placement of air conditioner outlets in central air conditioning systems. Understanding psychometric for HVAC design and Heat load calculations. |
| 4. | Design and provision of lifts, escalator and walk ways; its integration in buildings. |
| 5. | Fire-fighting provisions and its integration in buildings, provision of security systems, Acoustic and Sound Insulations. |
| 6. | Renewable energy integrated site planning / design of buildings. Provisions of code and byelaws related to mechanical services and firefighting systems. |
| **Course Outcomes:** | |
| 1. | Select the right type & position of air conditioning. |
| 2. | Plan & Select the suitable mechanical services for particular requirements of buildings. |
| 3. | Identify the services like lift, elevators, conveyors and escalators, fire fighting provisions etc. |
| **Lecture Schedule:** | |
| 1. | Introduction to Mechanical Services |
| 2. | Comfort conditions |
| 3. | Comfort conditions in present scenario |
| 4. | Thermal comfort |
| 5. | Comfort Equation |
| 6. | Thermal comfort parameters |
| 7. | Indoor Air Quality & Ventilation |
| 8. | Ventilation Types, Factors to be considered in design of Ventilation |
| 9. | Air Conditioning systems |
| 10. | Description of Air Conditioning systems |
| 11. | Components used in air conditioning |
| 12. | Description of air conditioning components |
| 13. | Selection criteria for Air Conditioning systems |
| 14. | Refrigerants |
| 15. | Classification of Refrigerants |
| 16. | Mini Test |
| 17. | Load calculations |
| 18. | Ducting principles |
| 19. | Types of Fans |

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| 20. | Layout schemes in central air conditioning systems |
| 21. | Placement of air conditioner outlets in central air conditioning systems |
| 22. | Understanding psychometric for HVAC design |
| 23. | Cryogenics |
| 24. | Food Preservation |
| 25. | Definition & Types of Lifts |
| 26. | Integration of lifts in buildings, Design Considerations, Location, Sizes, Components |
| 27. | Types of elevators and Escalators |
| 28. | Integration of Elevators & Escalators in buildings |
| 29. | Design of Walkways |
| 30. | Integration of Walkways in buildings |
| 31. | Design of Conveyors |
| 32. | IS codes for lifts, elevators, escalators & walkways |
| 33. | Fire-fighting provisions |
| 34. | Causes of fire and Effect s of fire |
| 35. | General Requirements of Fire Resisting buildings |
| 36. | Characteristics of Fire resisting materials, Maximum Travel Distance |
| 37. | Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs |
| 38. | Requirement of good Acoustic |
| 39. | Various sound absolvent |
| 40. | Factors to be followed for noise control in residential building |
| 41. | Renewable Energy integrated site planning |
| 42. | Wind and bio mass energy |
| 43. | Renewable Energy integrated design of buildings |
| 44. | Provisions of code and byelaws related to mechanical services |
| 45. | Visit a residential building & commercial building under construction and prepare layout for mechanical services |
| 46. | Prepare a case study for the fire fighting services for commercial building in the nearby area |
| 47. | Project work |
| 48. | Project work |
| **Book References:** | |
| 1. | Heating, Cooling and Lighting Design for Architects -Norbert Lechner |
| 2. | Heating Ventilating and Air Conditioning Analysis and Design - Faye C. Mcquiston And Jerald D. Parker |
| 3. | Bureau of Indian Standards - Hand Book of Functional Requirements of Buildings |
| 4. | Refrigeration and Air Conditioning – C.P. Arora |
| 5. | Mechanical Services for Buildings - Thomas D. Eastop, William Edward Watson |
| 6. | Air-conditioning and Ventilation of Buildings Vol. 1 - Croome, J.D. & Roberts, B.M |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/105/102/105102176/ |
| 2. | https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ce30/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Seventh Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 4101** | Architectural Design Project – 7 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC 4102** | Landscape Architecture | Viva | 2 | - | - | 2 | 4 | 3 |
| **ARC 4103** | Interior Design | Viva | 1 | - | - | 4 | 5 | 3 |
| **ARC 4104** | Project Management | Theory | 3 | - | - | - | 3 | 3 |
| **ARC 4105** | Town Planning | Theory | 4 | - | - | - | 4 | 4 |
| **ARC 4106** | Professional Practice and Building Bye Laws | Theory | 3 | - | - | - | 3 | 3 |
| | Elective – 2 (Open elective) | Theory | 2 | 2 | - | - | 4 | 3 |
| | **TOTAL HOURS: 30**<br>**Total Credits (Cumulative): 200** | | **16** | **2** | **0** | **12** | **30** | **29** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Seventh Semester

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| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Architectural Design Project -7** | |
| Course Code: | **ARC 4101 / ARC 411 / ARC 24411 / AP AR 4101** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Understanding Socio-economic factors of society.<br>Knowledge of Institutional buildings, mass housing, amenities and community facilities.<br>Study of land use, density and building bye-laws. Integration of stakeholders, participative architecture and designing for community. | |

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| **Course Objectives:** | |
| 1. | To understand how to include socio-economic demands in design. |
| 2. | Parameters like role of population density, user-satisfaction, participative architecture |
| **Description of Contents in brief:** | |
| 1. | Design of high-density, large-scale housing. Socio-economic determinants, legislative and economic constraints and technological alternatives shall be studied in detail. Exercises in simulation and conceptual modeling shall be conducted. |
| 2. | Application of concepts of community participation, phasing, financing and construction planning computer aided project documentation including basic working drawings, preliminary estimates, outline specifications and scheduling aimed at comprehensive understanding of the implementation process. |
| 3. | The design exercises may include apartment blocks, multi-story office building, hospitals, hotels, corporate offices, call centers, etc. |
| 4. | Study Tour- A study tour should be conducted during the semester as per the requirement of design studio/ exercise. |
| **Course Outcomes:** | |
| 1. | Be able to design campuses comprising of building with different uses for the community as client. |
| 2. | To understand society and transfer socio-cultural aspiration into built form. |
| 3. | Understand parameters of architectural design like integrated services, end-user satisfaction, diversity in users and inclusivity etc. |
| 4. | Understanding the design process for the large scale projects. |
| **Lecture Schedule:** | |
| 1. | Introduction to Design for community |
| 2. | Understanding of socio-cultral aspects and their relation with buildings |
| 3. | Realtionship between socio-cultural factors and its reflection in built form |
| 4. | Tutorial based on relationship and transformation of socio-cultural asptect into form |
| 5. | Formulation of the requirement based on above factors |
| 6. | Introduction to development plan to understand bye laws |
| 7. | Study of bye laws at city level |
| 8. | Study of national and international standards for mix of uses, level of servicesnad amentiesrequired |
| 9. | Tutorial based on comparative of standards |
| 10. | Critreian for site selection considering prevailing regulations |
| 11. | Introduction ot site planning |
| 12. | Study of topography, vegetaion and climate its reflection on bult form |

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| 13. | Site analysis based on physiographic aspects |
| 14. | Site analysis in context of urban settings |
| 15. | Study of permissible activities, built up mass etc with respect to regulations and by laws |
| 16. | Tutorial of site analysis with respect to physiographic feature |
| 17. | Tutorial of site analysis considering by laws |
| 18. | Tutorial on site analysis outcome of environmental and societal demand |
| 19. | Introduction to case studies |
| 20. | Criterion to select case studies |
| 21. | Identification of parameters of case study |
| 22. | Preparing the check list for case study |
| 23. | Introducing the problem with specific project |
| 24. | Tutorial for space requirement with respect to standards, case studies and site potential |
| 25. | Conceptual site plan |
| 26. | Tutorial based on site planning |
| 27. | Site planning alternatives |
| 28. | Tutorial based on alternatives |
| 29. | Interconnecting the different building block |
| 30. | Visual connectivity |
| 31. | Physical connectivity |
| 32. | Landscape and site planning |
| 33. | Design standards |
| 34. | Building Design: functional requirements |
| 35. | Evolution of form, individual blocks/ units |
| 36. | Collective form, unifying / intergration |
| 37. | Services required and incarporating them in buildings |
| 38. | Structural requirements of building |
| 39. | Tutorial based on service requirement |
| 40. | Tutorial based on structural requirement |
| 41. | Tutorial based on overall form evalution |
| 42. | Tutorial for communicating the design |
| 43. | Presentation of Design for crit |
| 44. | Incarporation /response to crit |
| 45. | Final presentation |
| **Book References:** | |
| 1. | Brooks, R. G. (1988). Site Planning: Environment, Process and Development. Michigan. |
| 2. | Root, B. J. (1985). Fundamentals of landscaping and site planning. AVI Publications. |
| 3. | Correa, C. (2010). A Place in the Shade: The New Landscape and Other Essays. New Delhi |
| 4. | Penguin Books.' Clapham, D., Clark, W. A. V. and Gibbs, K. (2012). The Sage Handbook of Housing Studies. London : Sage Publications. |
| 5. | Ferre, A. and Tihamer, S. H. (2010). Total Housing: Alternatives to Urban Sprawl. New York ACTAR Publishers. |
| 6. | Rapoport, A. (1969). House, Form & Culture. Eaglewood : Prentice Hall Inc. |
| 7. | Levitt, D. and Levitt, B. (2010). The Housing Design Handbook. New York : Routledge. Untermann, R. and Small, R. (1977). Site Planning for Cluster Housing. Van Nostrand Reinhold. |

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| 8. | Lee, K. E. (1984). Time Saver Standards for Site Planning. McGraw-Hill Ryerson. |
| 9. | Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore : McGraw Hill Professional. |
| 10 | Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford : Wiley-Blackwell. |
| 11 | Kloft, E. and Johann, E. (2003). High-rise Manual: Typol ogy and Design, Construction and Technology, 1st Ed. Basel : Birkhauser Verlag AG. |
| 12 | Markus, K., Rollbacher, R., Herrmann, E., Wietzorrek, U. and Ebner, P. (2009). Typology, Innovative Residential Architecture. Basel : BirkhauserVerlag AG. |
| 13 | Designing for people of all ages and abilities. North Carolina : North Carolina State University Press. |
| **Web References:** | |
| 1. | |

## Seventh Semester

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| Name of Program: **B.Arch.** | | Semester: **VII** | Year: **IV** |
| Name of Course: | | **Landscape Architecture** | |
| Course Code: | | **ARC 4102 / ARC 415 / ARC 24415 / AP AR 4105** | |
| Core/Elective/Other | | **Core** | |
| Prerequisite: | | | |
| **Course Objectives:** | | | |
| 1. | To understand landscape design as an allied field of architecture. | | |
| 2. | Process of landscape design for small and large buildings. | | |
| **Description of Contents in brief:** | | | |
| 1. | Introduction to Landscape Design: Introduction to Landscape Architecture its Importance for human beings, Need &scope of landscape architecture. Its influence on physical & visual environment. Study of Landscape elements such as land, vegetation, water, earth & climate, Natural & manmade elements, etc. Principles of landscape design such as unity, simplicity, variety, balance, proportion, sequence, etc. Social and economic factors. Psychological considerations of spaces and enclosures. | | |
| 2. | History of Landscape: History of Landscape Architecture including natural & cultural factors of the place, development of landscape architecture through history in different parts of the world such as China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome. Study of landscape architecture in Medieval period in India such as Mughal. Modern & Contemporary Landscape architecture. | | |
| 3. | Hardscapes & Softscapes: Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads&parking lots, walks & plazas. Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural idea about plants, plant selection, planting design and care of plants. | | |
| 4. | Landscape Design and Services: Macro and micro-climatic considerations in landscape architecture. Effect of climate on landscape and various components of landscape on the microclimate. Cultural aspects of the landscape architecture with contextual understanding. Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques. | | |
| 5. | Landscape design exercise: One exercise as study oriented work involving studying use of outdoor spaces by different user groups, landscape elements, street furniture, etc. Another exercise on Design for outdoor spaces with details of various elements & components. | | |
| **Course Outcomes:** The student should have the capability to: | | | |
| 1. | Understand concepts of landscape architecture. | | |
| 2. | Study and analyze site in relation to landscape design. | | |
| 3. | Able to design and detail landscape projects. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to Landscape Architecture its Importance. Important definitions | | |
| 2. | Need and scope of landscape architecture | | |
| 3. | Relation between landscape, architecture and the built environment | | |
| 4. | Different types of landscapes-Natural, manmade, rural, urban | | |
| 5. | Principles of landscape design | | |
| 6. | Social and economic factors in landscape design | | |
| 7. | Psychological considerations of spaces and enclosures | | |
| 8. | History of Landscape Architecture | | |
| 9. | Development of landscape architecture through history in different parts of the world | | |

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| 10. | Contd |
| 11. | Landscape architecture in Medieval period in India |
| 12. | Contd |
| 13. | Modern & Contemporary Landscape architecture. |
| 14. | Noted landscape architects and their works |
| 15. | Examples of Contemporary urban landscapes |
| 16. | Exercise – Presentation on urban landscapes |
| 17. | Contd |
| 18. | Landscape elements – Hard landscape |
| 19. | Landscape elements – Soft landscape |
| 20. | Design criterias for landscape design - visual, functional, micro-climatic, ecological and aesthetic |
| 21. | Contd |
| 22. | Basic horticultural idea about plants |
| 23. | Plant selection-interior and exterior plants. |
| 24. | Planting design – indoor and outdoor and care of plants. |
| 25. | Roof and deck landscapes |
| 26. | Macro and micro-climatic considerations in landscape architecture. |
| 27. | Effect of climate on landscape |
| 28. | Cultural aspects of the landscape architecture |
| 29. | Introduction to landscape Services & Sustainability |
| 30. | Role of vegetation in landscape architecture |
| 31. | Role of water body |
| 32. | Role of landform |
| 33. | Role of lighting |
| 34. | Surface water drainage and irrigation |
| 35. | Soil management techniques |
| 36. | Landscape design exercise |
| 37. | Contd |
| 38. | Contd |
| 39. | Contd |
| 40. | Contd |
| **Book References:** | |
| 1. | J.O. Symonds, Landscape Architecture |
| 2. | J.O. Symonds, Earthscape |
| 3. | J.O. Symonds, Architecture-A manual of site planning and design |
| 4. | Theory in Landscape Architecture: A Reader (Penn Studies in Landscape Architecture) |
| 5. | Landscape as Urbanism: A General Theory by Charles Waldheim |
| 6. | Cliff Tandy, Handbook of Urban Landscape |
| 7. | John l. Motloch, Introduction to Landscape Design |
| 8. | J. E. Ingels, Landscaping – Principles and Practice |
| 9. | Walker and Theodre, Planting Design |
| 10. | M. Bring, Japanese Gardens: Design & Meaning |
| **Web References:** | |
| 1. | |

## Seventh Semester

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Interior Design** | |
| Course Code: | **ARC 4103 / ARC 423 / ARC 24423 / AP AR 4203** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To equip and train the students with multiple aspects of theory and practice of Interior Design with development of skills to deal with diverse interior spaces. |
| **Description of Contents in brief:** | |
| 1. | Introduction, Purpose, scope, objectives and history of Interior Design, Principles and elements of Interior Design, space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc., their design value, color theory and scheme, light, Theory and practice of interior design; visual perception of interior spaces, function, form, scale, proportion, balance, harmony and rhythm. |
| 2. | Interior Design and Space-Surface Crafts: Surface treatments, materials, application techniques. Case Studies with examples of selected interiors. |
| 3. | Interior Design Technology, innovative trends and technologies, materials and interior construction, visual weights, acoustics and lighting. |
| 4. | Importance of anthropometrics and ergonomics in design. Modern interior materials and their applications. Furniture, color and lighting. Adapting interior design to architectural spaces. |
| 5. | Case studies of outstanding interior design examples. Project work. |
| **Course Outcomes:** | |
| 1. | To develop skill of designing of space making and presenting case studies elements for Interiors. |
| 2. | To equip the students with documenting the space- making crafts and space -surface crafts with its role in designing Interior-Architecture. |
| 3. | To inculcate the skill of designing Interior spaces, furniture, interior landscaping, graphics for visual merchandising and surfaces amongst the students. |
| **Lecture Schedule:** | |
| 1. | Introduction to Interior Design |
| 2. | Discussion on whole subject as per exercises covered in whole semester |
| 3. | Principles of interior design |
| 4. | Description of various principles of interior design |
| 5. | Explanation of each principle with applied examples |
| 6. | Practical applications of principles of interior design |
| 7. | Case study of live spaces on interior design |
| 8. | Elements of Interior Design |
| 9. | Study of impact of elements of interior design |
| 10. | Distribution of one of element of interior design to each student for detailed study with its functional and appropriate use. |
| 11. | Identification of successful works of renowned interior designers with its study |
| 12. | Listing of the elements of Interior Design with its application |
| 13. | Detailed study of the elements of interior design |
| 14. | Study on various elements of interior design i.e. Color |
| 15. | Light in interiors |
| 16. | Study on material and texture |
| 17. | Measures to control acoustics |

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| 18. | Impact of visual weight by Glass |
| 19. | Role of furniture in interiors |
| 20. | Design of False ceiling |
| 21. | Various types of wall treatments |
| 22. | Paneling work, materials and its use |
| 23. | Cladding |
| 24. | Painting materials |
| 25. | Art work i.e. murals, staining, etching work etc |
| 26. | Functional application of spaces |
| 27. | Study of designed interior space |
| 28. | Discussions on various projects chosen by students |
| 29. | Overall expert inputs |
| 30. | Review on issues of designed interior spaces with expert's inputs |
| 31. | Lecture on design exercise |
| 32. | Experts inputs on design |
| 33. | Discussions on students work |
| 34. | Review on issues of design with expert's inputs |
| **Book References:** | |
| 1. | Leydecker, S (ed.), "Designing Interior Architecture: Concept, Typology, Material, Construction", Birkhauser Verlag AG 2013 |
| 2. | Pandya, Yatin. "Elements of Space Making", Mapin Publishing Pvt. 2007 |
| 3. | Pandya, Yatin. "Concepts of Space in Traditional Indian Architecture", Mapin Publishing Pvt. 2005 |
| 4. | Chauhan, Muktirajsinhji (et.al.). "A History of Interior Design in India, Vol.1: Ahmedabad", SID, CEPT University 2007 |
| 5. | Brooker, Graeme. "Form + Structure: the organization of interior space", AVA Publishing SA, Switzerland 2007 |
| **Web References:** | |
| 1. | SWAYAM |
| 2. | MOOCS |
| 3. | NPTEL |
| 4. | Open access from university libraries |

## Seventh Semester

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Project Management** | |
| Course Code: | **ARC 4104 / ARC 413 / ARC 24413 / AP AR 410** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Building Materials and Construction courses 1 to 6<br>ARC 3104: Quantity Surveying, Specifications and Valuation | |

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| **Course Objectives:** to make students | |
| 1. | Understand the fundamentals of management and particularly project management. |
| 2. | recognize the importance of project management in architecture |
| 3. | Be in a better position while preparing for post-graduation in project management |
| **Description of Contents in brief:** | |
| 1. | Introduction, need, chronological development of management studies. Principles, theories and approaches to management such as classical, neo classical, systems, functional etc. Managerial skills and roles. Characteristics of projects and products |
| 2. | Need of planning techniques. Types of planning techniques like Bar charts, Networks; CPM and PERT. Calculation of total project time, floats etc. project monitoring and control. software for project management |
| 3. | Acquire projects, scope of work and Liasoning, Feasibility studies, project proposals and reports, Financial facilities. |
| 4. | Value of work and cash flow forecasting and analysis, preparing cash flow statements, Financial Management. Time value of money, Lifecycle costing and assessment. decision on appropriate specification, manpower, technology, etc. |
| 5. | Purpose and principles of organizing and organization structures. Human resource management; factors influencing productivity and motivation. |
| **Course Outcomes: Students will be able to** | |
| 1. | Calculate project durations and prepare bar charts, CPM and PERT networks for projects. |
| 2. | Prepare cash flow statements and basic financial management calculations for a project. |
| 3. | Assist their supervisor in organization and human resource management |
| 4. | Communicate with project management consultant |
| **Lecture Schedule:** | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern |
| 2. | Introduction, need, chronological development of management studies. |
| 3. | Principles, theories, concepts in management |
| 4. | Classical School scientific management |
| 5. | Neoclassical approach |
| 6. | Functional approach |
| 7. | Managerial skills |
| 8. | Managerial roles |
| 9. | Characteristics and classification of projects |
| 10. | Stages in project, Product lifecycle |
| 11. | Planning techniques; Bar charts, |
| 12. | Planning techniques; Bar charts, cont. (numerical) assignment part 1: bar chart for a construction project |
| 13. | Planning techniques; Networks; CPM |
| 14. | CPM (numerical) |
| 15. | Cont… CPM project duration |
| 16. | CPM (numerical) |

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| 17. | Cont… CPM project floats and critical path |
| 18. | CPM (numerical) |
| 19. | ESS, LSS and resource allocation and leveling |
| 20. | Planning techniques; Networks; PERT |
| 21. | PERT (numerical) |
| 22. | Project Monitoring |
| 23. | Project Controlling |
| 24. | Acquiring projects |
| 25. | Scope of work |
| 26. | Liasoning |
| 27. | Feasibility studies |
| 28. | Project proposals and reports |
| 29. | Financial facilities. |
| 30. | Financial management, Value of work |
| 31. | Project cash-flow forecasting and analysis. |
| 32. | Cash-flow forecasting and analysis (numerical) |
| 33. | Cash-flow forecasting and analysis (Assignment part 2: cash-flow of construction project) |
| 34. | Time value of money |
| 35. | Time value of money (numerical) |
| 36. | decision on appropriate specification, manpower, technology, etc. |
| 37. | Life cycle costing and assessment |
| 38. | Purpose and principles of Organization |
| 39. | Organization structures |
| 40. | Human resource management |
| 41. | Purpose and principles of staffing |
| 42. | Productivity, Motivation, Incentives |
| 43. | Assignment: architectural office organization and costing |
| **Book References:** | |
| 1. | Management, 9th ed, Harold S koontz, Cyril O'Donnel , McGraw Hill |
| 2. | Management, by Courtland L. Bovée, Marian Burk Wood, McGraw Hill |
| 3. | Modern Construction Management, 7th Edition, Prof. Frank Harris, Prof. Ronald McCaffer, Wiley-Blackwell |
| 4. | 'Projects: Planning, analysis, selection, implementation and review' by Prasnna Chandra, Tata Mc Graw Hill |
| 5. | CED 29, CONSTRUCTION PROJECT MANAGEMENT |
| 6. | Construction Planning and Management, P.S. Gahlot , B. M. Dhir, New Age International Publishers |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/110/107/110107081/ |
| 2. | https://nptel.ac.in/courses/110/104/110104073/ |
| 3. | https://nptel.ac.in/courses/105/104/105104161/ |

## Seventh Semester

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Town Planning** | |
| Course Code: | **ARC 4105 / ARC 414 / ARC 24414 / AP AR 4104** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand the context of town planning and its dynamics with respect to Architecture. |
| 2. | Various techniques to analyze various stages of urban Planning. |
| 3. | Development of cities and regions. |
| 4. | New concepts of town Planning. |
| **Description of Contents in brief:** | |
| 1. | Introduction to Town Planning |
| 2. | Process of Urban Planning and Planning Techniques |
| 3. | Principles in Urban Planning |
| 4. | Types of Urban Development Plans |
| 5. | Urban Institutions, Schemes & Regulations |
| **Course Outcomes:** | |
| 1. | Understand processes of urban planning involved in urban planning and development. |
| 2. | Understand the various development plans and their preparation. |
| 3. | Understand various stakeholders involved in urban planning. |
| 4. | Apply various techniques, scheme, acts in urban planning and designing exercises. |
| **Lecture Schedule:** | |
| 1. | Introduction to the subject |
| 2. | Role of various stakeholders in Planning |
| 3. | Defining and Classifying of Urban areas- Population, Density |
| 4. | Types of Cities and its Character (Port City, Industrial city etc) |
| 5. | Form of Settlement- Linear, Ribbon, Planned, Grid |
| 6. | Exercise based on above |
| 7. | Process of Urban Planning |
| 8. | Types of Survey |
| 9. | Types of Survey Contd. |
| 10. | Land Use Classification |
| 11. | Amenities and Utilities calculation in Urban Areas |
| 12. | Population Projection Methods |
| 13. | Calculation of Housing Requirement and Commercial |
| 14. | Calculation of Transportation and Industries |
| 15. | Calculation of Employment Requirement |
| 16. | Explanation of above with the help of case example |
| 17. | Exercise based on above |
| 18. | Urban Models- Concentric Models, Multi Nuclei etc. |
| 19. | Contribution of Eminent Planners |
| 20. | Contribution of Eminent Planners Contd. |
| 21. | Contribution of Eminent Planners Contd. |
| 22. | Concept of new town planning Approaches- New Urbanism, compact City etc. |
| 23. | Concept of new town planning Approaches- New Urbanism, compact City etc contd. |
| 24. | Defining Region, Types of Region- case study |

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| 25. | Defining Region, Types of Region- case study Contd. |
| 26. | Technique of Delineation of Region |
| 27. | Process of Preparation of Regional Plan |
| 28. | Process of Preparation of Master Plan |
| 29. | Process of Preparation of Zonal Plan |
| 30. | Process of Preparation of Transportation Plan |
| 31. | Structure Plan, Annual Plan and Special Area Plan |
| 32. | Preparation of Local Area Development Plan |
| 33. | Case Study on above and Discussion |
| 34. | T& CP Act and 74th Amendment Act |
| 35. | T& CP Act and 74th Amendment Act Contd. |
| 36. | Role and Function of Urban Development Authorities |
| 37. | Role and Function of Municipal Authorities |
| 38. | Role and Functions of NGO |
| 39. | Case study on each authorities |
| 40. | Case study on each authorities Contd. |
| 41. | Land acquisition Act, Coastal Regulation Zone Act |
| 42. | 5-year Plans |
| 43. | Schemes for Sustainable Urban Development |
| 44. | Community Planning |
| 45. | Good Governance- Characteristics |
| 46. | Assignment |
| 47. | Discussion |
| **Book References:** | |
| 1. | Arthur B. Gallion and Simon Eisner, The Urban Pattern – City Planning and Design |
| 2. | Burn, Stanly & Williams, Cities of the world – World Regional Urban Development |
| 3. | Lewis Keeble, Principles of Town and Country Planning |
| 4. | Cities in Evolution: An Introduction to the Town Planning movement and to the study of civics- Patrick Geddes |
| 5. | S.C. Garg, City Planning |
| **Web References:** | |
| 1. | http://mohua.gov.in/link/urdpfi-guidelines.php |
| 2. | https://niti.gov.in/planningcommission.gov.in/docs/plans/planrel/fiveyr/index5.html |
| 3. | https://www.ted.com/talks/peter_calthorpe_7_principles_for_building_better_cities |
| 4. | https://nptel.ac.in/courses/124/107/124107001/_- Housing Planning and Policy |

## Seventh Semester

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Professional Practice and Building Bye Laws** | |
| Course Code: | **ARC 4106 / ARC 424 / ARC 24424 / AP AR 4204** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce the profession of Architecture with the role of professional and statutory bodies, industry associations, societies, code of conduct, regulations for practicing Architecture, running of an Architect's office and applicable laws, rules and regulations, headfirst for projects and jobs. |
| 2. | To introduce the role of Architect's in tender and contract works. |
| **Description of Contents in brief:** | |
| 1. | Professional bodies in Architecture, introduction to Architectural profession, role of professional bodies. |
| 2. | The Architect's act 1972 and amendments, duties, liabilities and relationships of client, contractor and other technicians; Scope of work and services, the code of professional conduct and conditions of engagement of Architects. Scale of remuneration for Architectural services and mode of payments. Tendering procedure: Contracts and agreements, Tender, negotiations and award of work, types of tenders and their process; execution of contract; problems in operation of contract; Architectural competitions. Need of having benchmarks and standards. |
| 3. | Study of URDPFI guidelines, National Building Code and building byelaws. Methods of enforcement, monitoring and relevant civil laws for legal application. Procedures for development and implementation of acts and byelaws for land development and building design and execution process; preparation and procedure of approval drawings. |
| **Course Outcomes:** | |
| 5. | Students should become aware and familiar with legislations applicable to Architects, procedures for engagement in Architectural services, professional aspects of setting up and being part of an Architectural office with proficiency in communication for conducting everyday professional practice. |
| 6. | Awareness with the procedures for tendering, contract of works and real estate and aspects of practice with proficiency in preparation of projects proposals and presentations for obtaining Architectural projects. |
| **Lecture Schedule:** | |
| 1. | Introduction to Professional Practice in Architecture |
| 2. | Introduction to Architectural profession |
| 3. | Description of sessional program with discussions on work carried out in whole semester |
| 4. | Practical situation of Architectural profession |
| 5. | Distribution of assignment on Professional Practice |
| 6. | Professional bodies in Architecture |
| 7. | Role of professional bodies |
| 8. | Role of an Architect in a multidisciplinary team |
| 9. | Practicing Architecture: Setting up of an office and managing it |
| 10. | Procedures for engagement of an Architect by government agencies |
| 11. | Billing and Accounting |
| 12. | Conditions of engagement of Architects |
| 13. | Explanation of definitions |
| 14. | Lecture on Building Bye-Laws and codes |

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| 15. | National Building Code |
| 16. | Study of URDPFI guidelines |
| 17. | The Architect's act 1972 and amendments |
| 18. | Study of various sections, subsections and clauses of Architects act 1972 |
| 19. | Duties, liabilities and relationships of client |
| 20. | Duties, liabilities and relationships of contractor |
| 21. | Duties, liabilities and relationships of other technicians |
| 22. | Relationship between User/ Owner and Contractor |
| 23. | Relationship between with employees, associates |
| 24. | Relationship between consultants and supplier |
| 25. | Dos and don'ts in profession |
| 26. | the code of professional conduct |
| 27. | Scope of work and services in Architecture |
| 28. | Scale of remuneration for Architectural services and mode of payments |
| 29. | Scale of remuneration for various Architectural services and mode of payments |
| 30. | Study on Architectural competitions |
| 31. | Stages in Architectural competitions |
| 32. | Single stage Architectural competitions |
| 33. | Two stage Architectural competitions |
| 34. | Tender and Contract |
| 35. | Tender procedure |
| 36. | types of tenders and their process |
| 37. | Contracts and agreements |
| 38. | Negotiations and award of work |
| 39. | Execution of contract |
| 40. | Problems in operation of contract |
| 41. | Review on students work |
| 42. | Review on students work |
| **Book References:** | |
| 1. | Apte, V.S. 2008. Architectural Practice and Procedure. Padmaja Bhide, Pune<br>Building Byelaws of respective regions |
| 2. | National Building Code |
| 3. | Dutta BN, Estimating and Costing<br>Piotrowski, A. and Williams, J., 2001. The Discipline of Architecture. Univ. of Minnesota Press. |
| 4. | Nanavati, Roshan, 1984. Professional Practice. Lakhani Book Depot, Mumbai<br>COA latest. Handbook of Professional Documents. Council of Architecture. IIA-Guidelines for Professional Practice |
| 5. | RIBA - Handbook on Practice of Architecture |
| 6. | Eldred, G.W. 2008. The Beginner's Guide to Real Estate Investing. John Wiley & Sons. |
| 7. | Rangwala, S.C. Valuation of Real Properties. Charottar Publications.<br>URDPFI guidelines |
| **Web References:** | |
| 1. | SWAYAM |
| 2. | MOOCS |
| 3. | NPTEL |
| 4. | Open access from university Libraries |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Eighth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 4201** | Professional Training | Viva | - | - | - | - | - | 26 |
| **Total Credits (Cumulative): 226** | | | | | | | | **26** |

## Eighth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VIII** | Year: **IV** |
| Name of Course: | **Professional Training** | |
| Course Code: | **ARC 4201 / ARC 522 / ARC 24522 / AP AR 5201** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** Objective is to give a professional exposure to the students and an opportunity to learn in a professional environment. The student: | | |
| 1. | Is introduced to fundamental processes of designing of buildings on sites. | |
| 2. | Develops confidence in interacting with various key players in building design and execution processes. | |
| 3. | Develop an understanding of contemporary issues and techniques of building construction. | |
| **Description of Contents in brief:** | | |
| 1. | During the course of a minimum period of 16 calendar, the students should intern in architectural firms as a fulltime trainee. The student should involve herself/himself in various aspects of work in an office like | |
| 2. | Designing and detailing of project along with discussion with clients, and consultants. | |
| 3. | Office experience in respect of preparation of working drawing, detailing drawings, perspective, preparation of architectural models, study of filing systems of documents, drawings, plotting and preparation of tender document. | |
| 4. | Site experience, in respect of supervision of the construction activity, Observation, layout on site, study of the staking methods of various building, materials, taking the measurement and recording. | |
| 5. | After completion of training, every student will have to submit a detailed report with a set of drawings on at least two projects on which she/he has worked during the training period. | |
| **Course Outcomes**: The student will be able to | | |
| 1. | Assist in carrying out architectural projects or doing independently. | |
| 2. | Work in a team and help in Office management | |

**Note:** The trainee must ensure the supervising architect under whom he/she is interning is a registered architect with Council of Architecture, Delhi (for international firms prior permission and due process has to be followed) and has been practicing for duration of minimum five years.

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

# BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Ninth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| **ARC 5101** | Architectural Design Project – 8 | Viva | 1 | - | - | 6 | 7 | 10 |
| **ARC 5102** | Urban Design | Theory | 2 | 2 | - | - | 4 | 3 |
| **ARC 5103** | Research Principles and Dissertation | Viva | 1 | 2 | - | - | 3 | 2 |
| **HUM 5104 ARC** | Building Economics & Sociology | Theory | 3 | - | - | - | 3 | 3 |
| | Departmental Elective – 3 | Theory | 3 | 2 | - | - | 5 | 4 |
| | Departmental Elective – 4 | Viva | 3 | 2 | - | - | 5 | 4 |
| | **TOTAL HOURS: 27**<br>**Total Credits (Cumulative): 252** | | **13** | **8** | **0** | **6** | **27** | **26** |

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

## Ninth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Architectural Design Project – 8** | |
| Course Code: | **ARC 5101 / ARC 421 / ARC 24421 / AP AR 4201** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To enable students to understand the role of urban design and planning principles and other factors influencing campus layout and design. | |
| **Description of Contents in brief:** | | |
| 1. | Understanding role of planning principles, population and built density distribution, traffic and planning controls urban design, site analysis visual experience, place making, landscaping, site services including rain water harvesting in urban scale projects. | |
| 2. | Exercises on studies of urban design scale. Design of university campus, business districts (place), cultural/convention centers etc. | |
| **Course Outcomes:** | | |
| 1. | To be capable of designing a large campus for a specific purpose for a large population of multiple groups of users. | |
| 2. | Produce a design process and a design solution to an urban design problem. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the needs of Design in this semester | |
| 2. | Introduction to Campus planning | |
| 3. | Framing Design problem involving students | |
| 4. | Site finalization (preferably live site) | |
| 5. | Discussing requirements and Literature needs | |
| 6. | Cont.. | |
| 7. | Cont.. | |
| 8. | Discussion for site characteristics | |
| 9. | Cont.. | |
| 10. | Discussion on Site Analysis | |
| 11. | Cont.. | |
| 12. | Discussion on Climatic analysis | |
| 13. | Cont.. | |
| 14. | Finalizing Site analysis and Climatic analysis | |
| 15. | Discussion on assignment submitted by students | |
| 16. | Prevailing Rules and Regulations | |
| 17. | Cont.. | |
| 18. | Site level services | |
| 19. | Cont.. | |
| 20. | Building level services | |
| 21. | Cont.. | |
| 22. | Introduction to principles of Urban Design | |
| 23. | Cont.. | |
| 24. | Introduction to planning regulators | |
| 25. | Cont.. | |
| 26. | Introduction to mandatory services like Rain Water Harvesting, Water recycling, Renewable energy etc. | |
| 27. | Cont.. | |
| 28. | Detailed calculations for services involved | |

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| 29. | Cont.. |
| 30. | Discussion on Site level design |
| 31. | Cont.. |
| 32. | Cont.. |
| 33. | Discussion on Building level design |
| 34. | Cont.. |
| 35. | Cont.. |
| 36. | Cont.. |
| 37. | Discussion on interiors, landscaping, colour etc. |
| 38. | Cont.. |
| 39. | Finalization of double line plans, elevations, sections and views |
| 40. | Cont.. |
| 41. | Cont.. |
| 42. | Cont.. |
| 43. | Cont.. |
| 44. | Cont.. |
| 45. | Discussion on documents studied and reviewed by students as assignment |
| **Book References:** | |
| 1. | University Trends: Contemporary Campus Design by Isabelle Taylor, Jonathan Coulson, and Paul Roberts |
| 2. | Designing for Learning: Creating Campus Environments for Student Success by C. Carney Strange, James H. Banning |
| 3. | Architecture & Academe: College Buildings in New England Before 1860 by Bryant Franklin Tolles |
| 4. | Campus design by Richard P Dober |
| **Web References:** | |
| 1. | https://www.greenvillesc.gov/DocumentCenter/View/175/Design-Guidelines-for-the-Central-Business-District-PDF---8-MB-?bidId= |
| 2. | https://www.planning.org/pas/reports/report125.htm |

## Ninth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Urban Design** | |
| Course Code: | **ARC 5102 / ARC 422 / ARC 24222 / AP AR 4202** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Knowledge of settlement, town planning and public spaces.<br>Study of settlements through history and contemporary urban planning.<br>Understanding of theory of design. | |

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| **Course Objectives:** | |
| 1. | To understand Urban Design as discipline. |
| 2. | Understand complexities of different urban form of places in cities. |
| 3. | Sustainable urban forms respecting people's perception. |
| 4. | Interpret and integrate urban design solutions for environmental, technological, social, economic and cultural contexts at planning level. |
| **Description of Contents in brief:** | |
| 1. | Introduction to urban design: Urban design as interface between architecture and planning. City as a three dimensional entity. Study of volumes and open spaces at all spatial levels. |
| 2. | A brief historic review of the development of the urban design discipline and principles. Morphology of early cities - Greek agora, Roman forum, Medieval towns, Renaissance place making, ideal cities. Industrialization and city growth- the American grid planning, anti-urbanism and the picturesque, radiant city. |
| 3. | Imageability and townscape- Cullen, Lynch, concept of place and genius loci, collective memory historic reading of the city and its artifacts (Rossi). Social aspects of urban space - life on streets and between buildings, life style, gender and class (Jan Gehl, Jane Jacobs, William Whyte). |
| 4. | Contemporary theories in Urbanism, New Urbanism. Contemporary issues of urban ecology in Asian context, its articulation and urban sustainability. |
| 5. | Various tools through which an urban setting could be perceived - maps, sketches, photo documentations, reading, data collections, transects etc. Elements of urban design: Urban form as determined by inter-play of masses, voids, building typology. Scale, harmony, symmetry, color, texture, light and shade. Dominance, height, urban signage and graphics. Organization of spaces and their articulation in the form of squares, streets, vistas and focal points. Image of the city and its components such as edges, paths, landmarks, street features, sky - line, etc. |
| 6. | Urban transportation. Physical and non-physical determinants of urban forms: Activity and the morphology of places. Form, size and structure of cities and the related geometry co-related with their determinants. |
| 7. | Case studies of urban design characteristics of cities in India and abroad. Other related issues for public intervention. Control of urban design: Urban design and its control. Control of visual pollution. |
| 8. | Agencies responsible for ensuring better urban design, their roles, powers and limitations. Contemporary practices: Townscape policies, building byelaws and regulations for existing and emerging areas of development. Special rules for heritage and hilly areas. Evolution of urbanism and its future in India. |
| **Course Outcomes:** | |
| 1. | Understanding of evolution of form with society as determinant. |
| 2. | Appreciate sustainability at urban level. |

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| 3. | Integration of Urban form, mobility and people. |
| **Lecture Schedule:** | |
| 1. | Introduction to Concept of Urban Design |
| 2. | Comparative of urban design as extension of architecture |
| 3. | Difference between urban planning and urban design |
| 4. | Reading urban form, vocabulary and method |
| 5. | Objectives of urban design |
| 6. | Principles of urban design |
| 7. | Elements of urban design |
| 8. | Introduction to Concept & theories of Urban Design |
| 9. | Evolution of urban form in ancient times |
| 10. | Urban form in Greek, Roman and other civilizations |
| 11. | Tutorial on morphology of historic cities |
| 12. | Development of architecture viz a viz urban design in historic periods |
| 13. | Spaces (Public and urban) |
| 14. | Introduction to Urban design theories |
| 15. | Understanding the theories in present context |
| 16. | Tutorial: Reinterpretation of present urban form with theories |
| 17. | Introduction to Visual survey |
| 18. | Methods to conduct visual survey |
| 19. | Tutorial on visual survey |
| 20. | Townscape analysis |
| 21. | Urban design methods |
| 22. | Tutorial based on methods and their appropriateness |
| 23. | Introduction to Studio problem |
| 24. | Documentation of urban form |
| 25. | Understanding infrastructure in urban design |
| 26. | Services and Infrastructure at urban level |
| 27. | Integration of services with form |
| 28. | Place making theory |
| 29. | Transportation in urban design |
| 30. | Public transport, walkability and mobility in urban settings |
| 31. | Urban spaces |
| 32. | Design parameters for urban spaces |
| 33. | Tutorial based on studio problem (Concept submission) |
| 34. | Integration of urban form, services and people |
| 35. | Typology in urban forms/ settlements and cities |
| 36. | Heritage areas and their importance in urban design |
| 37. | Urban renewal/ redevelopment and conservation strategies |
| 38. | Examples of Urban renewal, regeneration, restoration, preservation |
| 39. | Tutorial on Urban renewal, regeneration, restoration, preservation |
| 40. | Tutorial based on studio (draft submission) |
| 41. | Appraisal of draft proposal/ analysis |
| 42. | Site introduction, site analysis, Data collection, research, etc. |
| 43. | Developing the development control rules |
| 44. | Role of agencies in DCR |
| 45. | Presentation of work |
| 46. | Interaction among students on work and crit |
| 47. | Final presentation |

| Book References: | |
|---|---|
| 1. | Williams,D. (2007). *'Sustainable Design: Ecology, Architecture & Planning'*. New Jersey:John Wiley &Sons. . |
| 2. | Krier, R.(1967). 'Urban Space'. Academy Editions:London |
| 3. | Koenigsberger, et.al (1984), *'Manual of Tropical Housing & Building: Part I - Climatic Design'*, Chennai :Orient Longman. |
| 4. | Martin. E. (1980). *'Housing, Climate and Comfort'*. The Architectural Press: London |
| 5. | Correa,C. (2010). *'A Place in the Shade: The New Landscape & Other Essay'*. India: Penguin Books |
| 6. | Correa,C. (2000).*'Housing and Urbanization'*.Thames and Hudson :London |
| 7. | Rewal, R. (2000). '*Humane Habitat at Low Cost: CIDCO, Belapur'*. New Mumbai, |
| 8. | Bacon, E. N. (1995). '*Design of cities'*. Thames and Hudson. |
| 9. | Giedion, S. (1952). ' *Space, Time and Architecture: The Growth of a New Tradition'.* Harvard University Press. |
| 10 | Bentley, I. (2001). '*Responsive Environments'*. London: Architectural Press. |
| 11 | Mumford, L. (1966). '*The city in history: Its origins, its transformations, and its prospects, with 64 plates'.* Penguin Books in association with Secker and Warburg. |
| 12 | Rowe, C., & Koetter, F. (2009). '*Collage City'.* Birkhäuser: MIT Press |
| 13 | Larice, M. & Macdonald, E. (eds) (2013). *'The Urban Design Reader'*. New York: Routledge. |
| 14 | Carmona,M.et.al,(2002). *'Public Places Urban Spaces Dimensions of Urban Design'*. London: Architectural Press. |
| 15 | Lynch, K. (1960). *'Image of the City'* . MIT Press |
| 16 | Spreiregen , P.D. (1965). 'Urban Design: The Architecture of Towns & Cities'.the university of Michigen: McGraw-Hill |
| **Web References:** | |
| 1. | www.coursera.org |
| 2. | www.edx.org |
| 3. | ocw.mit.edu |
| 4. | www.my-mooc.com |

## Ninth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Research Principles and Dissertation** | |
| Course Code: | **ARC 5103 / ARC 425 / ARC 24425 / AP AR 4205** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** to enable the students to | | |
| 1. | Acquire a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focused manner. | |
| 2. | Develop research capabilities and individual scholarly attitude. | |
| 3. | Develop analytical, synthesizing and interpretive skills and be able to present the same in standardized and systematic academic formats. | |
| **Description of Contents in brief:** | | |
| 1. | Study of a topic related to architecture and allied subjects with emphasis on critical understanding, logical reasoning and structured writing. | |
| 2. | To examine, interpret, compare, analyze from diverse perspectives to build an evidence-based, cogent and coherent body of analysis and answers. | |
| 3. | Students may be encouraged to select a topic which may eventually culminate in the Thesis | |
| **Course Outcomes:** After successful completion of the course student | | |
| 1. | Learns to Systematically abstract, analyze, synthesize and interpret existing literature. | |
| 2. | Develops a specialized knowledge in a subject area which maybe in addition to the prescribed coursework. | |
| 3. | Builds his/her capacity to work independently and methodically in a variety of intellectually demanding contexts. | |
| **Lecture Schedule:** | | |
| 1. | Introduction | |
| 2. | Researching a topic through secondary data; methods, sources, | |
| 3. | Cont.. | |
| 4. | Cont.. | |
| 5. | Cont.. | |
| 6. | Researching a topic; analyzing, inferring and drawing conclusions | |
| 7. | Cont.. | |
| 8. | Cont.. | |
| 9. | Cont.. | |
| 10. | Structuring, writing and Referencing | |
| 11. | Cont.. | |
| 12. | Cont… | |
| 13. | Discussions on topics and topic selection | |
| 14. | Cont… | |
| 15. | Cont.. | |
| 16. | Self study on the chosen topic with intermittent inputs; stage I | |
| 17. | Cont… | |
| 18. | Cont… | |
| 19. | Cont… | |
| 20. | Cont… | |
| 21. | Presentation and discussions | |
| 22. | Cont.. | |
| 23. | Self study on the chosen topic with intermittent inputs; stage II | |

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| 24. | Cont… |
| 25. | Cont… |
| 26. | Cont… |
| 27. | Cont… |
| 28. | Presentation and discussions |
| 29. | Cont.. |
| 30. | Self study on the chosen topic with intermittent inputs; stage III |
| 31. | Cont… |
| 32. | Cont… |
| 33. | Cont… |
| 34. | Cont… |
| 35. | Presentation and discussions |
| 36. | Cont.. |
| 37. | Report writing and discussions |
| 38. | Cont… |
| 39. | Cont… |
| 40. | Cont… |
| 41. | Cont… |
| 42. | Presentation and discussions |
| 43. | Cont… |
| 44. | Cont… |
| 45. | Cont… |
| **Book References:** | |
| 1. | Architectural Research Methods, Linda Groat, John Wiley &Sons Inc.,New York |
| 2. | Dissertation: An Architecture Student's Handbook. Iain Bordon and Katerina Ruedi, The Architectural Press, 2000 |
| Web References: | |
| 1. | https://issuu.com/ueluna/docs/the_dissertation_-_an_architecture_ |

## Ninth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Building Economics and Sociology** | |
| Course Code: | **HUM 5104 ARC / ARC 431 / HUM 24431 / HS 4231** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | Basic understanding of Economics concept is crucial.<br>Basic understanding of Indian society, culture.<br>Flexibility, interest and caliber to implement sociological concepts in engineering for betterment of societies. | |

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| **Course Objectives:** | |
| 1. | To understand the basic principles of building economics at macro and micro levels. |
| 2. | Understanding society and its issues. |
| **Description of Contents in brief:** | |
| 1. | Economics: Indian economy, economic features of development plans, Money and banking functions, factors of production, macro-economic theory, demand and supply, indifference curve analysis, equilibrium of firm, laws of returns, theory of growth and models. Economics of land as limited resource demand for land acquisition. Economic development in relation to the regional planning, regional economic theories, problems and prospects of balanced regional development. |
| 2. | Building Economics: Building Efficiency and cost reduction through planning, design of building components, use of new materials and innovative construction techniques etc. rent and other building acts, economics of high rise buildings. |
| 3. | Sociology: Community social and physical environment, social group and social structure, utility and relation with architecture. Indian Communities- rural and urban communities, their social structures and problems, cultural heritage, rituals and community gatherings etc. Trends and characteristics of urbanization, dynamics of urban growth and social change and attitude, value and behavior, review of Planning Commission reports. Social aspect of physical environment, its limitations and implications on buildings, neighborhood planning, slum improvements and city fabric. Case study, sociological study of communities with their habitat and built environment. |
| **Course Outcomes:** | |
| 1. | Students will understand economics tools and techniques used in cost reduction. |
| 2. | Understand the relationship between Architecture and Social Sciences. |
| 3. | Student should be able to relate and implement sociological concepts in Architecture engineering. |
| **Lecture Schedule:** | |
| 1. | Introduction to Economics, its features and basic economic problems |
| 2. | Macro and Micro Economics and Basic Concepts of Economics |
| 3. | Demand, Law of Demand |
| 4. | Supply, Law of Supply |
| 5. | Elasticity of Demand & Supply |
| 6. | Utility- Marginal, Total & Average |
| 7. | Indifference Curve Analysis |
| 8. | Factors of Production |
| 9. | Laws of Returns – Law of Variable Proportions |
| 10. | Laws of Returns – Law of Returns to Scale |
| 11. | Equilibrium of Firm – I |
| 12. | Equilibrium of Firm – II |
| 13. | Macro Economics-Economic system in India |

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| 14. | Economic features of Development Plans |
| 15. | Money and Banking Functions |
| 16. | Theory of Growth and Models |
| 17. | Land economics: Land as limited resource, Demand for Land Acquisition |
| 18. | Regional Economic Theories |
| 19. | Economic Development in relation to the regional planning, problems and prospects of balanced regional development |
| 20. | Meaning and Scope of Building Economics |
| 21. | Building Efficiency and Cost reduction through Planning |
| 22. | Issues and challenges associated with building projects : Design of building components, use of new materials and innovative construction techniques etc. |
| 23. | Rent and other Building Acts |
| 24. | Economics of High-rise Buildings |
| 25. | Introduction to sociology |
| 26. | Sociological approaches |
| 27. | Nature of society: Individuals and groups |
| 28. | Community Social and Physical Environment |
| 29. | Indian Communities: Rural and Urban Communities, Communities with their Habitat and Built Environment. |
| 30. | Cultural heritage, rituals and community gatherings |
| 31. | Social Structure and Social Change: Basic Concepts |
| 32. | Social Differentiation and Social Stratification |
| 33. | Theoretical Perspectives on Social Stratification |
| 34. | Systems of Stratification |
| 35. | Factors of Social Change |
| 36. | Social change-I: Definition of social change |
| 37. | Social change-II: Theories of social change |
| 38. | Social change-III: Social change in industrial society |
| 39. | Rural-Urban Continuum: Meaning and Context |
| 40. | History of Urbanization in India |
| 41. | History of Urbanization in India (continued) |
| 42. | Social change-IV: Urbanization and related issues in social change |
| 43. | Social Aspect Of Physical Environment, Its Limitations And Implications on Buildings, Neighborhood Planning, Slum Improvements And City Fabric |
| 44. | Review of Planning Commission reports |
| **Book References:** | |
| 1. | Economics for Engineers, M.L. Gupta, Abhishek Publications, 2000 |
| 2. | Microeconomic Theory, Larry Samuelson, Springer Science & Business Media |
| 3. | Building Economics for Architects – Thorbjoern Mann . |
| 4. | Principles of Population Studies by Asha A. Bhende & Tara Kanitkar |
| 5. | The Sociology of Architecture: Constructing Identities by Paul Jones |
| 6. | Sociology of Indian Society, C N Shankar Rao |
| 7. | Sociology: A Systematic Introduction by Harry M. Jhonson |
| 8. | Modern Economic Theory, K.K. Dewett and K.K. Bahl, S Chand; Reprint Edition, 2006. |
| 9. | An Introduction to Sociology by Vidya Bhushan and D.R. Suchdeva |
| 10 | Indian Society and Culture – Continuity & Change by Nadeem Husnain |
| **Web References:** | |
| 1. | https://nptel.ac.in/courses/109/104/109104125/ |
| 2. | https://nptel.ac.in/courses/109/104/109104074/ |

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| 3. | https://nptel.ac.in/courses/109/103/109103023/ |
| 4. | https://nptel.ac.in/courses/109/104/109104047/ |
| 5. | https://nptel.ac.in/courses/109/104/109104136/ |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

## BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Tenth Semester

| Course Number | Subject | Theory/ Studio/ Lab Exam | Scheme of Studies Periods per week | | | | Total Contact Hours | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Studio | | |
| ARC5201 | Design Thesis | Viva | - | - | - | 10 | 10 | 15 |
| | Elective – 5 | Theory | 3 | 2 | - | - | 5 | 4 |
| | Elective – 6 | Viva | 3 | 2 | - | - | 5 | 4 |
| | Elective – 7 | Viva | 3 | 2 | - | - | 5 | 4 |
| **TOTAL HOURS: 25<br>Total Credits (Cumulative): 279** | | | **9** | **6** | **0** | **10** | **25** | **27** |

## Tenth Semester

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Design Thesis** | |
| Course Code: | **ARC 5201 / ARC 511 / ARC 24511 / AP AR 511** | |
| Core/Elective/Other | **Core** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To give an opportunity to the student to design a major architectural project and apply the knowledge gained during academics and practical training. The students choose a large scale live architectural design project within the guidelines prescribed from time to time by the department. The student will develop the whole project through literature survey, desk appraisals, case studies and personal interviews with experts. The whole project will be done under the guidance of allotted guide from within the department. | |
| **Description of Contents in brief:** | | |
| 1. | This is a studio based subject where each stage of work will be introduced by thesis coordinator to the class and the student will accomplish the task under the supervision of guide. Each stage's work shall be presented to a team of jury for their comments and assessment. | |
| 2. | The project will include the complexities demanding site observations, understanding of regional climate, local resources, historic and socio-economic context, feasibility of project, sustainability and significance. The project will involve site visits, case studies, interviews, observations, documentation, literature studies and research methodologies to investigate and formulate program and requirement, exercises in formulation of detailed program and area statement etc., site planning digital Drawings and detailing of cluster of buildings (if large site) sustainability of design and climatic responses - passive and active. | |
| **Course Outcomes:** | | |
| 1. | Understand the complexities involved in a large scale architectural project. | |
| 2. | To use all the skills acquired in the duration of preceding academic courses. | |
| 3. | Methodically self-direct effort by choosing the project of choice, builds capacity to work independently and methodically in a variety of intellectually and professionally demanding contexts. | |
| 4. | Learn to make an original and individual, creative contribution to the academic discipline and/or the professional field in some cases. | |
| **Lecture Schedule:** | | |
| 1. | Major stages of works include –<br>• Selection of design topic in consultation with guide.<br>• Collection and study of all relevant literature for developing the design strategies, understanding of functions and activity spaces, climatic analysis, constructional techniques, structural systems, codes and bye laws, building services, site analysis etc. for developing design approach and basis for doing case study of a similar facility. Synthesis of the data to come up with recommendations for various aspects of design.<br>• Desk appraisal of national and international projects and case study of similar projects in India for understanding design approach by architect and critical appraisal of architectural quality achieved, structural and constructional systems used, building services, etc. so as to understand the practical aspect of design conception and execution so as to create a sound background for the proposal to | |

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| | be attempted in thesis. Synthesis of the data to come up with recommendations for various aspects of design.<br>• Analysis of site chosen for design for its climatic aspects, surroundings, approaches, potentials and challenges within in the form of physical features and other tangible and intangible features. Synthesis of the data to come up with recommendations for various aspects of design.<br>• Development of proposal for the thesis project under the supervision of the guide and assessment of work through stage wise jury/ review by examiners. This will be covered in stages of work.<br>• Presentation of the completed work to a team of external jury in the final viva for final assessment. The final portfolio shall comprise of compiled synthesis of literature survey, case study and site analysis, approach to design conceptualization, floor plans, sections, elevations, detailed plans and sections, sketches, 3D visualizations, physical models, etc. to explain the design supported by detailing of electives chosen. |
| **Book References:** | |
| 1. | BIS, National Building code, 2016 |
| 2. | Local building bye laws |
| 3. | Landscape architecture by John, O. Simonds |
| 4. | Time Savers Standards for Building type |
| 5. | Time Savers Standards for Architectural Design |
| 6. | Time Savers Standards for Building Materials & Systems: Design Criteria and Selection Data |
| 7. | Neuferts Architects' Data |
| **Web References:** | |
| 1. | |

# MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL, M.P. INDIA

## DEPARTMENT OF ARCHITECTURE AND PLANNING

## BACHELOR OF ARCHITECTURE
## PROGRAMME CURRICULUM
## JUNE 2020

### Electives

| | **Elective 1 (THEORY)** |
|---|---|
| ARC 301 | Evolution of human settlements |
| ARC 302 | Vernacular and traditional Indian architecture |
| ARC 303 | Art Appreciation |
| ARC 304 | Cultural expressions in architecture |
| ARC 305 | Color theory and its applications |
| ARC 306 | Modern and Contemporary World Architecture |
| ARC 307 | Modern and Contemporary Indian Architecture |
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| | **Elective 2 (OPEN ELECTIVE THEORY)** |
| ARC 311 | Ergonomics |

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| ARC 312 | Energy and Buildings |
| ARC 313 | Green building |
| ARC 314 | Intelligent buildings |
| ARC 315 | Steel architecture and design |
| ARC 316 | Advanced structural systems |
| ARC 317 | Appropriate technology |
| ARC 318 | Modular coordination |
| ARC 319 | Disaster Mitigation and management |
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| | **Elective 3 (THEORY)** |
| ARC 326 | Architectural Conservation |
| ARC 327 | Hospital systems and services |
| ARC 328 | Urban Housing |
| ARC 329 | Ekistics |
| ARC 330 | Rural planning |
| ARC 331 | Real estate development |
| ARC 332 | Architectural Pedagogy |
| ARC 333 | Research Methodologies |
| ARC 334 | Architectural Journalism |
| ARC 335 | Environmental codes and energy ratings |
| ARC 336 | Advanced theory of design |
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| | **Elective 4 (VIVA)** |
| ARC 341 | Animation |
| ARC 342 | Product design |
| ARC 343 | Building codes and byelaws |
| ARC 344 | Visual Digital art |
| ARC 345 | Furniture design |
| ARC 346 | Entrepreneurship skills for architects |
| ARC 347 | NGO administration |
| ARC 348 | Anthropology and Architecture |
| ARC 349 | Computer programming |
| ARC 350 | Contemporary building materials |
| ARC 351 | Industrial building systems |
| ARC 352 | CAD customization |
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| | **Elective 5 (THEORY)** |
| ARC 356 | Hotel planning and services |
| ARC 357 | Valuation and Arbitration |
| ARC 358 | Human resource management |
| ARC 359 | Mass housing design and standards |
| ARC 360 | Urban Planning and Environmental Design |
| ARC 361 | Urban and regional planning |
| ARC 362 | Traffic and transportation planning |

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| ARC 363 | Infrastructure planning and design |
| ARC 364 | Environmental impact assessment |
| ARC 365 | Research Techniques in Architecture |
| ARC 366 | Passive Solar Architecture |
| ARC 367 | Architectural literary heritage of India |
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| | **Elective 6 (VIVA)** |
| ARC 371 | Barrier free Architecture |
| ARC 372 | Set design |
| ARC 373 | Painting |
| ARC 374 | Glass Architecture |
| ARC 375 | Advanced Landscape Architecture |
| ARC 376 | High rise buildings |
| ARC 377 | Office management |
| ARC 378 | Marketing management and skills |
| ARC 379 | Auditorium, acoustics, systems and services |
| ARC 380 | Advanced building construction and technology |
| ARC 381 | Building Maintenance |
| ARC 382 | Earthquake resistant architecture |
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| | **Elective 7 (VIVA)** |
| ARC 386 | Photography |
| ARC 387 | Low cost building design and techniques |
| ARC 388 | Institutional building and campus planning |
| ARC 389 | Ideation |
| ARC 390 | Companies laws |
| ARC 391 | Leadership development Business environment |
| ARC 392 | Remote Sensing and GIS |
| ARC 393 | Sustainable building design |
| ARC 394 | Internet of things in Buildings |
| ARC 395 | Security systems |
| ARC 396 | Services in tall buildings |
| ARC 397 | Graphic design |

## Elective 1 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Evolution of human settlements** | |
| Course Code: | **ARC 301 / ARC 356 / ARC 24356 / AP AR 3256** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | Nil | |
| **Course Objectives:** To make students understand | | |
| 4. | The Relevance of evolution of human settlements in modern context. Historic determinants, settlement types: ancient, medieval, renaissance and industrial age. | |
| 5. | The origin and evolution of planning: Impacts of Industrial revolution on town planning and regional planning. Contemporary developments in planning in India; | |
| 6. | The Contributions of Ebenezer Howard, Patrick Geddes, Tony Garnier, Lewis Mumford, Le-Corbusier and others in planning. | |
| 7. | The fundamental problems of the city; changes with time and growth | |
| **Description of Contents in brief:** | | |
| 9. | Relevance of the study of Evolution; Hunter gatherer/farmer and formation of organized society; | |
| 10. | Historic determinants, settlement types: ancient, medieval, renaissance and industrial age. | |
| 11. | Factors responsible for birth and growth of settlements. Scale of Settlements | |
| 12. | Cosmological and other influences origin & growth of settlements, effects of cultural influence on physical form. | |
| 13. | Settlements as a political statement. New Delhi, Chandigarh, Washington D.C. Brazilia etc | |
| 14. | City as a living & spatial entity; Concepts of landmark, axis, orientation. City form as a living space. | |
| 15. | Human settlements as an expression of civilization, Basic elements of the city, Concepts of space, time, scale of cities | |
| 16. | City as an organism: a physical, social, economic and political entity. Emerging Concepts: Global City, inclusive city, Safe city, etc | |
| 17. | The dynamics of the growing city. Impact of industrialization and urbanization. Metropolis and Megalopolis; Generic and paracentric cities | |
| 18. | City of the future, future of the city; shadow cities, divided cities; Models of planning: Advocacy and Pluralism in Planning; Systems approach to planning: rationalistic and incremental approaches, mixed scanning and middle range planning, advocacy planning and action planning, equity planning | |
| **Course Outcomes:** Students will be able to | | |
| 4. | Physical nature and characteristics of the urban environment and its components. | |
| 5. | Models of the planning process. | |
| 6. | How a settlement grows | |
| 7. | Physical structure and relationship between parts of settlements | |
| **Lecture Schedule:** | | |
| 46. | Defining the settlement | |
| 47. | Factors contributing the birth and growth of settlement | |
| 48. | Study of Transition of a society, Hunter gatherer/farmer and formation of organized society | |
| 49. | Human settlements as an expression of civilization, Basic elements of the city, Concepts of space, time, scale of cities | |
| 50. | | |
| 51. | **Tutorial-I** | |
| 52. | Study, effects of cultural influence on physical form | |

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| 53. | **Tutorial-II** |
| 54. | Study of cities and towns in medieval India and Europe |
| **55.** | **Tutorial-III** |
| 56. | Study of cities and towns in renaissance India and Europe |
| 57. | **Tutorial- IV** |
| 58. | Industrial era cities |
| 59. | **Tutorial-V** |
| 60. | Post Industrial era cities |
| 61. | Study of City as a political statement. New Delhi, Chandigarh, Washington D.C. Brazilia etc |
| 62. | **Tutorial-VI** |
| 63. | Cities as political entity |
| 64. | Cities as social entity |
| 65. | Cities as economic entity |
| 66. | City as a living & spatial entity; Concepts of landmark, axis, orientation. |
| 67. | City form as a living space. |
| 68. | **Tutorial-VII** |
| 69. | Cites and respective civilizations |
| 70. | Principles of city planning |
| 71. | **Tutorial-IX** |
| 72. | **Mid term** |
| 73. | Factors affecting the growth of a settlement |
| 74. | Impact of industrialization on settlements |
| 75. | Urbanization of settlements |
| 76. | Understanding Metropolis |
| 77. | Understanding Megalopolis |
| 78. | Understanding Paracentric cities |
| 79. | **Tutorial-X** |
| 80. | City of the future, future of the city; shadow cities, divided cities |
| 81. | City of the future, future of the city; sustainable cities |
| 82. | City of the future, future of the city; Low carbon cities |
| 83. | City of the future Global City, inclusive city, Safe city |
| 84. | Models of planning, Advocacy and Pluralism in Planning |
| 85. | Models of planning, rationalistic and incremental approaches |
| 86. | Models of planning mixed scanning and middle range planning |
| 87. | Models of planning advocacy planning |
| 88. | Models of planning action planning, equity planning |
| **Book References:** | |
| 7. | The Urban pattern: City planning and design / GALLION, A B |
| 8. | Text book of Town Planning / BANDOPADHYAY, ABIR |
| 9. | Introduction to Town Planning / CATANES, A & SNYDER J |
| 4. | Design of cities / BACON, EDMUND N |
| 5. | The city in history / MUMFORD, LEWIS |
| 6. | Garden cities of tomorrow / HOWARD EBENEZER |
| **Web References:** | |
| 2. | https://issuu.com/sivaraman4/docs/unit_1_human_settlement_planning |
| 3. | https://issuu.com/sivaraman4/docs/unit_2_human_settlement_planning |
| 4. | https://www.greenblue.com/na/history-of-urban-planning/ |

## Elective 1 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Vernacular and Traditional Indian Architecture** | |
| Course Code: | **ARC 302 / ARC 565 / ARC 24565 / AP AR 5165** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** To make students understand how humanity has been addressing their shelter needs creatively with minimum resource input and maximum quality output, by studying | | |
| 1. | How vernacular architecture is diverse from other historical & contemporary styles of architecture. | |
| 2. | Design as an outcome of site responsiveness ,native techniques and various social, economic and cultural values of the society. | |
| **Description of Contents in brief:** | | |
| 1. | An overview of the various theories related to Vernacular and traditional architecture, the background and need for a vernacular approach. The determining factors; social, ethnic, cultural, geographical, climatic, lifestyle, material, economic, symbolic, construction technology. | |
| 2. | Evolution of settlement and building typologies with changes in the above mentioned factors by referring suitable cases such as palaces, houses etc. from various part of India like north to south and east to west. | |
| 3. | Documentation of Case studies of vernacular and traditional settlements / building typology from various regions in India | |
| 4. | Assimilation of vernacular architecture in modern era, an overview of pioneers' such as Hasan Fathy, Geoffrey Bawa, Laurie Baker etc. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Design small scale sustainable shelters | |
| 2. | Improve problem solving skills | |
| 3. | Identify and assimilate vernacular and traditional design inputs, as desired by client | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | |
| 2. | An overview of the various theories related to Vernacular and traditional architecture, | |
| 3. | An overview of the various theories related to Vernacular and traditional architecture, cont.. | |
| 4. | Background and need for a vernacular approach. | |
| 5. | Visit to museum of man | |
| 6. | Visit to museum of man | |
| 7. | Documentation, presentation and discussion on site visit | |
| 8. | Documentation, presentation and discussion on site visit | |
| 9. | Documentation, presentation and discussion on site visit | |
| 10. | Documentation, presentation and discussion on site visit | |
| 11. | The determining factors; social, ethnic, cultural, lifestyle, economic, symbolic, | |
| 12. | The determining factors; social, ethnic, cultural, lifestyle, economic, symbolic, cont.. | |
| 13. | The determining factors; geographical, climatic, materials. | |
| 14. | The determining factors; geographical, construction technology. | |
| 15. | North Indian Traditional and vernacular architecture | |
| 16. | West Indian Traditional and vernacular architecture | |
| 17. | South Indian Traditional and vernacular architecture | |
| 18. | Central Indian Traditional and vernacular architecture | |
| 19. | East Indian Traditional and vernacular architecture | |

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| 20. | Briefing on Group-work on above, (these five regions will be taken up by different groups) |
| 21. | Group-work cont.. |
| 22. | Group-work cont.. |
| 23. | Group-work cont.. |
| 24. | Group-work cont.. |
| 25. | Presentation and discussion on above |
| 26. | Presentation and discussion on above |
| 27. | Presentation and discussion on above |
| 28. | Presentation and discussion on above |
| 29. | Live Case Example study (Group-work; different groups will cover different aspects) |
| 30. | Live Case Example study(Group-work; different groups will cover different aspects) |
| 31. | Group-work cont.. |
| 32. | Group-work cont.. |
| 33. | Group-work cont.. |
| 34. | Group-work cont.. |
| 35. | Presentation and discussion on above |
| 36. | Presentation and discussion on above |
| 37. | Presentation and discussion on above |
| 38. | Presentation and discussion on above |
| 39. | Assimilation of vernacular architecture in modern era, |
| 40. | Assimilation of vernacular architecture in modern era, |
| 41. | an overview of pioneers' such as Hasan Fathy, |
| 42. | an overview of pioneers' such as Geoffrey Bawa, |
| 43. | an overview of pioneers' such as Laurie Baker |
| 44. | an overview of work of other contemporary architects |
| 45. | Assignment on above |
| 46. | Presentation and discussion on above |
| **Book References:** | |
| 1. | Traditional buildings of India, Cooper and Dawson , Thames & Hudson |
| 2. | Mud Architecture of the Indian Desert, Jain, K. and Jain, M., Aadi Centre |
| 3. | Encyclopedia of Vernacular Architecture of the World. Oliver, P., Cambridge University Press. |
| 4. | Architecture for the Poor: An Experiment in Rural Egypt. Fathy,Hassan, Univ. of Chicago Press |
| **Web References:** | |
| 1. | |

## Elective 1 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Art Appreciation** | |
| Course Code: | **ARC 303 / ARC 578 / ARC 24578 / AP AR 5169** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce the various art forms that exist from ancient to modern times. |
| 2. | To sensitize the students towards the moral, aesthetical, cultural, political contexts and potential of art. |
| 3. | To develop a knowledge of art and ability to recognize design elements and principles in selected works of art. |
| 4. | To develop aesthetic sensibilities and interpretation of physical forms. |
| **Description of Contents in brief:** | |
| 1. | Introduction of art its various definitions and philosophies -Kant, Walter Benjamin, Rabindranath Tagore, etc., its purpose and need in human life; evolving role of art both historically and in modern times. |
| 2. | Formal analysis of Art such as line, shape, form, space, color, light, value, texture, composition, media and technique, various styles including personal, regional, etc. Art principles such as unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement. |
| 3. | Historical overview of art aesthetics of various and cultures and traditions and their influences including important works of daily utilities, crafts, sculptures and buildings from Prehistoric period, ancient Egypt, ancient Mesopotamia, ancient Greek, ancient Roman art, medieval Europe, India, China, Persia, Japan and Renaissance, Baroque, Neoclassicism, Romanticism, Realism. |
| 4. | Introduction to iconography and symbolism with cases from Hinduism, Islamic and Christian traditions and exercise dealing with iconographic analytical techniques. Various art movements and their influences on Realism, Impressionism, Expressionism, Dadaism, Fauvism, Cubism, Surrealism, De Stijl, Critical Regionalism, Brutalism, Structuralism, Deconstructivism etc. Theories of Visual Perception. Introduction to Modern Art media such as photography, movies, documentaries, installation art, etc. |
| **Course Outcomes:** | |
| 1. | Develop an understanding of the various art forms. |
| 2. | Fine tune the aesthetic sense and critically appreciate art. |
| **Lecture Schedule:** | |
| 1. | Introduction to art and its relevance to architecture |
| 2. | Art and its related definitions, purpose and need |
| 3. | Historical overview of aesthetic theories and concepts |
| 4. | Philosophies by pioneers – Rabindranath Tagore, Walter Benjamin etc |
| 5. | Role of art continuing to modern day |
| 6. | Awareness, creativity and communication – Visual thinking, perception and awareness, looking and seeing |
| 7. | Awareness, creativity and communication – Aesthetics, Art and beauty, Art and experience, Creativity. |
| 8. | Awareness, creativity and communication – Untrained folk artists, form and content, iconography |
| 9. | Formal analysis of art |
| 10. | Principles of art |

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| 11. | Understanding and classification of different art forms |
| 12. | Comparative analysis of different art forms |
| 13. | Study of art forms in various historical periods and contexts – crafts, sculptures, buildings |
| 14. | Art aesthetics of Prehistoric period |
| 15. | Art aesthetics of Ancient civilizations – Egypt and Mesopotamia |
| 16. | Art aesthetics of Ancient Greek and Roman |
| 17. | Art aesthetics of Medieval Europe |
| 18. | Art aesthetics of India |
| 19. | Art aesthetics of Far east – China and Japan |
| 20. | Art aesthetics of Persia |
| 21. | Art aesthetics of European styles - Renaissance, Baroque, Rococo |
| 22. | Art aesthetics of European styles - Neoclassicism, Romanticism, Realism. |
| 23. | Iconography and symbolism |
| 24. | Case examples from Hinduism |
| 25. | Case examples from Islamic traditions |
| 26. | Case examples from Christianity |
| 27. | Iconographic analytical techniques |
| 28. | Exercise - Study and presentation of art/master's work |
| 29. | Contd |
| 30. | Art movements and their influence on various ideologies - Realism, Impressionism |
| 31. | Expressionism, Dadaism |
| 32. | Fauvism, Cubism |
| 33. | Surrealism, De Stijl |
| 34. | Art Nouveau |
| 35. | Critical Regionalism |
| 36. | Brutalism |
| 37. | Structuralism |
| 38. | Deconstructivism |
| 39. | Site visit |
| 40. | Visual perception in art |
| 41. | Exploring various modern art medias and techniques |
| 42. | Contd |
| 43. | Exercise – Expressing art through a certain media |
| 44. | Contd |
| **Book References:** | |
| 16. | Ways Of Seeing by John Berger |
| 17. | The Story of Art by E.H.Gombrich |
| 18. | History Of Art by Janson and Janson |
| 19. | Indian Art by Partha Mitter |
| 20. | Introduction To Indian Art by Ananda k Coomaraswamy |
| 21. | Huntington, Susan.L. The Art of Ancient India: Buddhist,Hindu,Jain. New York, Weatherhill, 1985. |
| 22. | Humanities Through The Arts by F. David Martin and Lee A Jacobus |
| 23. | History of Beauty by Umberto Eco et al |
| 24. | Sir Banister Fletcher, A History of Architecture, University of London, the Antholone Press, 1986 |
| 25. | The Story of Architecture, Patrick Nuttgens |
| **Web References:** | |
| 1. | |

## Elective 1 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Cultural expressions in Architecture** | |
| Course Code: | **ARC 304 / ARC 579 / ARC 24579 / AP AR 5191** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To appreciate and understand architecture as manifestation of a broader cultural and intellectual milieu to which it belongs and evolves from. To understand the social, economic, and political underpinnings of works of architecture. | |
| 2. | To able to relate architecture with the epochal events, movements, social mores etc. of history. | |
| **Description of Contents in brief:** | | |
| 1. | An introduction to how culture is expressed in arts, crafts and architecture with suitable example such as belief and notions of universe (cosmos) and ideal man during Vedic times was codified into Vastu-Shastra system which developed the principles of city planning, buildings siting and orientation, spatial layout etc. | |
| 2. | A historical overview of various cultural developments such as philosophy, schools of thoughts, social norms, beliefs, propaganda, etc. and how cultural development influenced the distinctive evolution of building styles, motifs, scale, monumentality, symbolism, of works of architecture through suitable examples. Examples can be two different schools of thought in Buddhism such as Hinayana and Mahayana giving rise to two distinct architecture forms in terms of their styles, motifs, spatial planning etc. | |
| 3. | Church used as an instrument to spread particular beliefs, propaganda etc. during different times - theological and political underpinnings of Gothic style, revival of classicism to counter Protestant Christianity, etc. Development of Indo – Saracenic style as a political move to integrate with the Indian society by British, etc. | |
| 4. | An overview of modern art movements and their philosophical motivations such as Cubism, futurism, Constructivism, Postmodernism, Deconstructivism, Arts & crafts movement, etc. with suitable examples. | |
| **Course Outcomes:** | | |
| 1. | To develop understanding of cultural expression in architecture as resultant of socioeconomic and political roots of society. | |
| 2. | Appreciation of various art movements resulting into manifestations of architectural forms. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 1 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Colour Theory and its Applications** | |
| Course Code: | **ARC 305 / ARC 566 / ARC 24566 / AP AR 5166** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand various aspects of colour and its application. | |
| 2. | To study brush strokes and textures and effective use of different medium. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to visual perception theories with emphasis on the role of colours. | |
| 2. | Study of Color theory, basic color terminology, Color systems and schemes. Color vision. Formal, Symbolic and Functional Aspects of Color in Design and Architecture and perception. Understand color interactions and contrasts, harmony of colors, color frames and compositions. | |
| 3. | Study of color planning and applications in design and architecture, environmental graphics, Develop color compositions to meet the formal, symbolic and functional design requirements. Analyze the design considerations related to color planning criteria. | |
| 4. | Propose architectural color design appropriate to the design considerations and requirements. | |
| **Course Outcomes:** | | |
| 1. | Understand the visual and psychological impact of colours. | |
| 2. | To use colour effectively to enhance the aesthetic level of the design at hand. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, its importance and applications | |
| 2. | Role of colours in design | |
| 3. | Elements of design in basic composition. Introduction to principles of organization/ composition, Repetition, Variety, Radiation, Rhythm, Gradation, Emphasis & Subordination, Proportion, Harmony, Balance | |
| 4. | Visual perception theories - Gestalt principles etc | |
| 5. | Understanding of visual grammar | |
| 6. | Psychological impact of colours | |
| 7. | Exercise - Application of visual grammar and Gestalt principles | |
| 8. | Study of Color theory (Newton's color wheel, Munsell colour wheel) basic color terminology, Color systems and schemes | |
| 9. | Exercise – colour wheel chart - Newton's color wheel | |
| 10. | Exercise – colour wheel chart - Munsell colour wheel | |
| 11. | Aspects of colour in design and architecture | |
| 12. | Color interactions and contrasts | |
| 13. | Harmony of colors | |
| 14. | Color frames and compositions. | |
| 15. | Two dimensional medium in black and white medium | |
| 16. | Exercise - Design of two dimensional medium in black and white medium | |
| 17. | Two dimensional medium in colour medium | |
| 18. | Exercise - Design of two dimensional medium in colour medium | |
| 19. | Evaluate visual grammar with composition | |
| 20. | Exercise - Based on the above aspects | |
| 21. | Form generation techniques – from 2D to 3D, Additive and Subtractive form | |

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| 22. | Exercise – Composition with 3D in black and white medium |
| 23. | Exercise – Composition with 3D in colour medium |
| 24. | Exercise - Evaluation and analysis of 3D form with visual grammar |
| 25. | Colour planning in design and architecture |
| 26. | Exercise based on above topic |
| 27. | Exercise contd. |
| 28. | Study of environmental graphic design |
| 29. | Exercise based on above topic |
| 30. | Exercise contd. |
| 31. | Developing color compositions to meet the formal, symbolic and functional design requirements. |
| 32. | Exercise based on above topic |
| 33. | Exercise – Appraisal of the contribution of color design taking up examples by means of graphical / verbal presentation(s) |
| 34. | Exercise contd. |
| 35. | Exercise –Design/Composition of architectural spaces using colours with visual/ perceptional/psychological quality exploring possibilities and creativity |
| 36. | Exercise contd. |
| 37. | Exercise contd. |
| **Book References:** | |
| 1. | Form, Space and Order by Francis D. K. Ching |
| 2. | Rendering with Pen and Ink by Robert W. Gill |
| 3. | Koffka, K. (1935). *Principles of Gestalt Psychology.* New York: Harcourt, Brace. |
| 4. | Karl Gerstner, Visual Language, 2005 |
| 5. | Jasper Morrison, A world without words. 1992, 1998 |
| 6. | Krier, Rob, Architectural Composition, Academy Editions, London, 1988. |
| 7. | Shibikawa, Ikuyoshi and Takashashi Yumi, Designers guide to Colour |
| 8. | Smithles KW, Principles of Design in Architecture. Chapman and Hall 1983. |
| 9. | Wucius, Wong, Principles of two dimensional design, Von Nostrand Reinhold 1972 |
| 10 | Maier, Manfired Basic Principles of Design Vol 1, 2, 3 & 4 Von Nostrand Reinhold NY 1977 |
| **Web References:** | |
| 1. | |

## Elective 1 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Modern and Contemporary World Architecture** | |
| Course Code: | **ARC 306 / ARC 352 / ARC 24352 / AP AR 3252** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand the impact of the technology on architecture of occidental world since late 18th century. | |
| 2. | To explore the design philosophies of 'master's of occidental architecture in the field of architecture and art in modern and contemporary world. | |
| 3. | To analysis and discuss the development the salient features of landmark buildings in the timeline of world contemporary architecture. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to industrial revolution and its impact on architecture | |
| 2. | Development of 'New Art form of Architecture' | |
| 3. | Chicago School of Architecture | |
| 4. | Functionalism of Modernity | |
| 5. | Development of International Style | |
| 6. | 20th Century World Architecture | |
| **Course Outcomes:** | | |
| 1. | Identify different styles and schools of contemporary architecture. | |
| 2. | Analyze the contributing factors for the design development of different styles. | |
| 3. | Analyze the works of the famous master architects introduced to the student. | |
| 4. | Evaluate the works of modern architecture that the student is coming across in everyday's life. | |
| 5. | Design buildings in the contemporary architectural styles. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to Modern and contemporary world architecture | |
| 2. | Historical background of the modern era in architecture | |
| 3. | Historical background of the modern era in architecture and its socio cultural impact | |
| 4. | Historical background of the modern era in architecture and architecture | |
| 5. | Early and Late Renaissance period | |
| 6. | Early and Late Renaissance period | |
| 7. | Late Renaissance and development of 4th in architecture | |
| 8. | Example of Late Renaissance and development of 4th in architecture | |
| 9. | Development of open space in Late Renaissance period | |
| 10. | Introduction to Industrial Revolution: Advent of Steel , glass and Ferro-concrete | |
| 11. | Revolutionary works of different architect and their inventions | |
| 12. | Advent of Steel and Henry Labrouste | |
| 13. | Great Exhibitions of 1851 and 1889 and their contributions | |
| 14. | Contribution of Gustava Eiffel to architecture and his works | |
| 15. | Development of Ferro concrete: Auguste Perret, Tony Garnier | |
| 16. | Development of 'New Art & Architecture' | |
| 17. | Development of 'New Art & Architecture' | |
| 18. | Art Nouveau movement and Victor Horta | |
| 19. | H.P. Berlage, H. H. Richardson and 'True Construction' | |

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| 20. | Balloon Frame Structure and Plane Surfaces in America |
| 21. | Chicago School of Architecture |
| 22. | Works and philosophies of different Architect of Chicago school |
| 23. | Louis Sullivan |
| 24. | Louis Sullivan |
| 25. | Frank Lloyd Wright |
| 26. | Introduction to Functionalism of Modernity |
| 27. | Works and philosophies of different Architect of this period |
| 28. | Walter Gropius and Bauhaus |
| 29. | Walter Gropius and Bauhaus |
| 30. | Le Corbusier |
| 31. | Development of International Style |
| 32. | Development of International Style |
| 33. | Works and philosophies of different Architect of this period |
| 34. | Mies van der Rohe |
| 35. | Mies van der Rohe |
| 36. | Philip Johnson |
| 37. | Philip Johnson |
| 38. | Louis I Kahn |
| 39. | Louis I Kahn |
| 40. | 20th Century World Architecture |
| 41. | Works and philosophies of different Architect of this period |
| 42. | Eero Saarinen,Alvar Aalto, Oscar Niemeyer,Richard Neutra etc. |
| 43. | Eero Saarinen,Alvar Aalto, Oscar Niemeyer,Richard Neutra etc. |
| 44. | Norman Foster, Antonio Gaudi, Frank O. Gehry, M. Pei, Kenzo Tange etc. |
| 45. | Norman Foster, Antonio Gaudi, Frank O. Gehry, M. Pei, Kenzo Tange etc. |
| **Book References:** | |
| 1. | Space, Time and Architecture – Siegfried Gideon |
| 2. | The Puzzle of Architecture – Robin Boyd |
| 3. | Modern Architecture – Kenneth Frampton |
| 4. | The Story of Architecture – Patrick Nuttgens |
| 5. | History of Architecture – Sir Bannister Fletcher |
| 6. | Architecture and Independence –John T. Lang, Madhavi Desai, Miki Desai |
| 7. | *LIBRARY OF CONTEMPORARY ARCHITECTURE* |
| 8. | Space, Time and Architecture – Siegfried Gideon |
| 9. | The Puzzle of Architecture – Robin Boyd |
| 10 | Modern Architecture – Kenneth Frampton |
| **Web References:** | |
| 1. | www.archdaily.com |
| 2. | www.coursera.org |
| 3. | ww.edx.org |
| 4. | ocw.mit.edu |
| 5. | www.my-mooc.com |
| 6. | Oxford Art Online |
| 7. | Avery Index to Architectural Periodicals |

## Elective 1 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VI** | Year: **III** |
| Name of Course: | **Modern and Contemporary Indian Architecture** | |
| Course Code: | **ARC 307 / ARC 353 / ARC 24353 / AP AR 3253** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand the impact of the technology on architecture of India subcontinent since late 18th century. |
| 2. | To explore the design philosophies of masters of different period of Indian architecture in the field of architecture. |
| 3. | To analysis and discuss the development the salient features of landmark buildings in the timeline of Indian contemporary architecture. |
| **Description of Contents in brief:** | |
| 1. | Architectural History of India till Indian Renaissance. |
| 2. | Introduction to industrial revolution and its impact on Indian architecture. |
| 3. | Development of Colonialism 'Indo-Sarcenic architecture1615- 1947 AD. |
| 4. | Post-Independence Architecture- Revivalism, geometric forms, Expressionist style, biomimicry architecture. |
| 5. | Traditional experience of town planning. |
| 6. | 20th Century Indian Architecture. |
| **Course Outcomes:** | |
| 1. | Identify different styles and schools of post-independence and contemporary Indian architecture. |
| 2. | Analyze the contributing factors for the design development of different styles. |
| 3. | Analyze the works of the famous master architects introduced to the student. |
| 4. | Evaluate the works of modern architecture that the student is coming across in everyday's life. |
| 5. | Design buildings in the contemporary architectural styles. |
| **Lecture Schedule:** | |
| 1. | Architectural History of India till Indian Renaissance |
| 2. | The Indus Valley Civilization 3000-1700 BC |
| 3. | Post MahaJanapada Period 600 BC-200AD |
| 4. | Middle ages 200 -1500 AD |
| 5. | Mughal architecture 1500- 1615 AD |
| 6. | Colonialism In India |
| 7. | Different period Colonialism In India |
| 8. | Different period Colonialism In India and their architectural style |
| 9. | Indo-Sarcenic architecture1615- 1947 AD |
| 10. | Indo-Sarcenic architecture1615- 1947 AD |
| 11. | Development of Various Styles - Neo-classical, Victorian , Gothic Revival etc. |
| 12. | Works and philosophies of Master's Architect- Sir Edwin Lutyens, Thomas Lyon, James A. Fuller, George Wittet, Herbert Baker etc. |
| 13. | Works and philosophies of Master's Architect- Sir Edwin Lutyens, Thomas Lyon, James A. Fuller, George Wittet, Herbert Baker etc.Examples of Indo-Sarcenic architecture1615-1947 AD |

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| 14. | Works and philosophies of Master's Architect- Sir Edwin Lutyens, Thomas Lyon, James A. Fuller, George Wittet, Herbert Baker etc.Contribution of Gustava Eiffel to architecture and his works |
| 15. | Discussion on examples from British Colonial Period |
| 16. | Discussion on examples from British Colonial Period |
| 17. | Discussion on examples from British Colonial Period |
| 18. | Discussion on examples from British Colonial Period |
| 19. | Discussion on examples from British Colonial Period |
| 20. | Discussion on examples from British Colonial Period |
| 21. | Chicago School of Architecture |
| 22. | Introduction to Post Independence Architecture |
| 23. | Impact of socio political conditions during Post Independence Architecture on Architecture |
| 24. | Impact of socio cultural conditions during Post Independence Architecture on Architecture |
| 25. | Works and philosophies of Le Corbusier |
| 26. | Town Planning of Chandigarh |
| 27. | Town Planning of Chandigarh |
| 28. | Art and Architecture of Chandigarh |
| 29. | Art and Architecture of Chandigarh |
| 30. | Introductions to different style of Post Independence architecture |
| 31. | Five distinct approaches of architectural expressions in India during Post-Independence period |
| 32. | Five distinct approaches of architectural expressions in India during Post-Independence period |
| 33. | Plastic or geometric forms exploiting the potential of concrete |
| 34. | Plastic or geometric forms exploiting the potential of concrete |
| 35. | New language of brick and concrete |
| 36. | New language of brick and concrete |
| 37. | New language of brick and concrete |
| 38. | Brutalism - bold and aggressive articulation of structural elements |
| 39. | Brutalism - bold and aggressive articulation of structural elements |
| 40. | Brutalism - bold and aggressive articulation of structural elements |
| 41. | Harmonizing with the micro environment |
| 42. | Harmonizing with the micro environment |
| 43. | Regionalism |
| 44. | Regionalism |
| 45. | Traditional experience of town planning: The Asiad Games Village, New Delhi (1982) |
| 46. | Regional building vocabulary: The Jawahar Kala Kendra, Jaipur, The VidhanBhavan, Bhopal |
| 47. | Usage of local materials: Laurie Bakers Works and Philosophies |
| 48. | Usage of local materials: Laurie Bakers Works and Philosophies |
| 49. | Identity of Post Independence India in Modernism : Summary and Discussion |
| 50. | Identity of Post Independence India in Modernism : Summary and Discussion |
| **Book References:** | |
| 1. | Frampton, K. (1996). Charles Correa. London: Thames & Hudson |

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| 2. | Correa, Charles. (2003). Oxford Art Onlinedoi:10.1093/gao/9781884446054.article.t019584 |
| 3. | Rewal, R., G., K. M., Rewal, A., & Singh, R. B. (2012). Raj Rewal: Selected architectural works. New Delhi: Architectural Research Cell |
| 4. | Matharoo, G. S., Futagawa, Y., Eek, P. H., Eek, P. H., & Eek, P. H. (2009). A dialogue with editor: Gurjit Singh Matharoo. Tokyo: A.D.A. Edita |
| 5. | Rewal, R. (n.d.). Tradition And Innovation. New Architecture and Urbanism: Development of Indian Traditions,18- 27. doi:10.5848/csp.1892.00002 |
| 6. | Correa, C. (2000). Charles Correa housing and urbanisation. London: Thames & Hudson. |
| 7. | Ashraf, K. K., &Belluardo, J. (1998). An architecture of independence: The making of modern South Asia: Charles Correa, Balkrishna Doshi, Muzharul Islam, AchyutKanvinde. New York, NY: Architectural League of New York. |
| 8. | K Murray, I. (2013). Charles Correa: Indias Greatest Architect. London: RibaPubns. |
| 9. | Sir Banister Fletcher(1986), A History of Architecture, University of London, The Antholone Press |
| **Web References:** | |
| 1. | www.archdaily.com |
| 2. | www.coursera.org |
| 3. | ww.edx.org |
| 4. | ocw.mit.edu |
| 5. | www.my-mooc.com |
| 6. | Oxford Art Online |
| 7. | Avery Index to Architectural Periodicals |

## Elective 2 (OPEN ELECTIVE THEORY)

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| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Ergonomics** | |
| Course Code: | **ARC 311 / ARC 568 / ARC 24568 / AP AR 5168** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand work physiology, human physical dimension concerns like human body structure and function. |
| 2. | To develop sensitivity towards the importance of human factors in design. |
| **Description of Contents in brief:** | |
| 1. | Study Anthropometry, body growth and types. Understand static and dynamic anthropometry, standing posture, squatting and cross-legged postures. Understand anthropometric measuring techniques. Human body- structure and function, posture and body supportive devices. |
| 2. | Study of chair characteristics, vertical work surface, horizontal work surface, movement, work counter, behavior and perception. |
| 3. | Study environments factors influencing human performance, ergonomic design process, ergonomics design methodology, ergonomics criteria/check while designing and design process involving ergonomics. Performance support and design intervention, occupational safety and stress at workplace in view to reduce the potential fatigue, errors, discomforts and unsafe acts. |
| 4. | Design workstation design, furniture support, vertical arm reach and design application possibility. Study design and human compatibility, comfort and adaptability aspects and ergonomics in India. |
| **Course Outcomes:** | |
| 1. | Understanding of anthropometry and ergonomics. |
| 2. | Be able to design furniture, workstations and utility items according to ease of use and comfort. |
| **Lecture Schedule:** | |
| 1. | Introduction to the subject |
| 2. | Overview of Anthropometry and Ergonomics and its relation to architecture |
| 3. | Anthropometry – human body structure and function |
| 4. | Anthropometry – body growth and types |
| 5. | Static and dynamic anthropometry |
| 6. | Understanding various standing postures |
| 7. | Understanding various sitting postures |
| 8. | Squatting and cross legged postures |
| 9. | Anthropometric measuring techniques |
| 10. | Human activity and the use of space |
| 11. | Exercise - Average measurements of human body in different postures-its proportion and graphic representation |
| 12. | Exercise contd. |
| 13. | Exercise contd. |
| 14. | Posture and job relation |
| 15. | Posture and body supportive devices |
| 16. | Ergonomics and its application |
| 17. | Brief overview of Physical ergonomics, Cognitive ergonomics and Environmental ergonomics |

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| 18. | Detailed understanding of Physical ergonomics |
| 19. | Chair characteristics |
| 20. | Vertical work surface |
| 21. | Horizontal work surface |
| 22. | Movement and work counter |
| 23. | Exercise related to the topic |
| 24. | Detailed understanding of Cognitive ergonomics |
| 25. | Human behavior and perception |
| 26. | Visual performance and displays |
| 27. | Exercise related to the topic |
| 28. | Detailed understanding of Environmental ergonomics |
| 29. | Environments factors influencing human performance |
| 30. | Exercise related to the topic |
| 31. | Ergonomic design process |
| 32. | Ergonomic design methodology |
| 33. | Ergonomics criteria/check while designing and design process |
| 34. | Occupational safety and stress at workplace in view to reduce the potential fatigue, errors, discomforts and unsafe acts. |
| 35. | Exercise - Workstation design focusing on movement, arm reach etc |
| 36. | Contd. |
| 37. | Contd. |
| 38. | Exercise – Assessing design and human compatibility, comfort and adaptability aspects and ergonomics in India. |
| 39. | Contd. |
| 40. | Contd. |
| **Book References:** | |
| 1. | Bridger, RS: Introduction to Ergonomics, 2nd Edition, Taylor &Francis, 2003 |
| 2. | Dul, J. and Weerdmeester,B.Ergonomics for beginners, a quick reference guide, Taylor & Francis, 1993. |
| 3. | Green, W.S. and Jordan,P .W, Human Factors in Product Design, Taylor & rancis, 1999. |
| 4. | D. Chakrabarti, Indian Anthropometric Dimensions for ergonomic design practice, National Institute of Design,Ahmedabad, 1997 |
| 5. | G.Salvendy (edit), Handbook of Human Factors and ergonomics, John Wiley & Sons, Inc., 1998 |
| 6. | Singh,S (Edt),Ergonomics Interventions for Health and Productivity, Himanshu Publications, Udaipur, New Delhi, 2007 |
| 7. | Alvin R. Tilley, Henry Dreyfuss Associates: The Measure of Man and Woman: Human Factors in Design, Revised Edition |
| 8. | W.E. Woodson, Human Factor Design Handbook, McGraw Hill, New York, 1981 |
| 9. | Mark S. Sanders, & Ernest J. McCormick, Human factors in Engineering & Design, McGraw-Hill, Inc |
| **Web References:** | |
| 1. | |

## Elective 2 (OPEN ELECTIVE THEORY)

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| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Energy and buildings** | |
| Course Code: | **ARC 312** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To familiarize the students with role of energy in built environment and for the efficient use of energy in design process. | |
| **Description of Contents in brief:** | | |
| 1. | Principles and applications of climate, energy use, and comfort as determinants of architectural form. | |
| 2. | Architectural methods for climate adaptation using non-mechanical means of ventilating, cooling, heating, and lighting. | |
| 3. | Design and performance predictions for passive approaches to solar heating, heat transfer mechanisms. | |
| 4. | Concept of Total Comfort. Human comfort and its assessment. Concept of embodied energy. Embodied energy for material and building component. Energy for production of building materials. Total energy need for building. | |
| 5. | Energy-efficient principles of a building and their various application techniques in different climatic zones prevailing in India including solar active and passive features. | |
| 6. | Types, availability and reserves of conventional and non-conventional energy sources. Energy Conservation, Indian Energy Conservation Act 2001 Features, Energy Star Rating of buildings and Equipments, Bureau of Energy Efficiency. | |
| 7. | Energy Conservation Building Code (ECBC). Energy Building Code, Guidelines: Thermal Insulation, Heating, Ventilation and Air . Conditioning System, Building Lighting Design: Lighting levels, light efficient options, CFL, LEDs, Fixtures, Day lighting timers, Building Energy Management. | |
| 8. | Introduction to Building rating systems in India. Detailed study on LEED and GRIHA (Green Rating for Integrated Habitat Assessment). Case study national and international examples. | |
| 9. | Strategies for climate- responsive design. Case examples. | |
| **Course Outcomes:** | | |
| 1. | Sensitization and ability to design energy efficient buildings. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
| 1. | Buildings, Climate and Energy by Markus & Morris, Pitman Publishing Ltd. 1980. | |
| 2. | “Energy efficient buildings: architecture, engineering and environment”, Dean Hawkes, Wayne Forster; W.W. Norton & Company, 2002 | |
| 3. | Energy Efficient Buildings in India by Milli Majumdar | |
| 4. | Energy efficient buildings by Wagner Walter | |
| 5. | Indian Energy Conservation Act 2001, GoI | |
| 6. | Energy Conservation Building Code Manual, GoI | |
| 7. | “GRIHA Manuals”, The Energy and Resources Institute (TERI), 2011 | |
| 8. | “Energy-efficient Buildings in India”; The Energy and Resources Institute (TERI), 2001 | |
| **Web References:** | | |
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## Elective 2 (OPEN ELECTIVE THEORY)

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| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Green Building** | |
| Course Code: | **ARC 313 / ARC 367 / ARC 24367 / AP AR 3267** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | Eco – Environmentally responsive and resource efficient buildings are Green Buildings. This course will develop an understanding to conceptualize the design of building, choice of eco-friendly and appropriate building material, techniques and technology and building energy management systems. | |
| **Description of Contents in brief:** | | |
| 1. | Basics of climate responsive building design, Green materials, building construction techniques and building technology, Green building services and systems. | |
| 2. | Conservation of water, rain water harvesting and recyclability of water: systems and techniques, recycle of solid and liquid waste: systems and techniques. | |
| 3. | Solar and other alternate energized technology and systems integrated to building. | |
| 4. | Site planning for green buildings, Building energy management system. | |
| **Course Outcomes:** | | |
| 1. | Development of complete understanding for design of a green building or campus from preliminary design to construction and operation of building. | |
| 2. | Market survey and case studies will further strengthen the knowledge of state of art systems and technology prevailing in the market. | |
| **Lecture Schedule:** | | |
| 1. | Effect of sun movement, orientation, wind movement and microclimate of surroundings | |
| 2. | Thermal design | |
| 3. | Design for natural light | |
| 4. | Natural and mechanical ventilation | |
| 5. | Alternate to conventional bricks | |
| 6. | Alternate to concrete and mortars | |
| 7. | Glass and glazing design of windows | |
| 8. | Alternate material and techniques for external and internal finishes | |
| 9. | Efficient construction technology and precautions during construction | |
| 10. | Water and energy efficient plumbing systems and gadgets | |
| 11. | Water and energy efficient sanitary services and gadgets | |
| 12. | Energy efficient domestic appliances and gadgets | |
| 13. | Energy efficient lighting fixtures and daylight integrated lighting system and controls. | |
| 14. | Energy efficient cooling and heating systems | |
| 15. | Methods of conservation of water during construction | |
| 16. | Efficient Water supply techniques | |
| 17. | Rain water harvesting in building | |
| 18. | Methods of collection of used water for recycle | |
| 19. | Recycle of solid and liquid waste: systems and techniques | |
| 20. | Category of solid waste from buildings during construction and operation | |
| 21. | Methods of recycle the construction waste and efficient disposal of non-usable waste | |
| 22. | Recycle of domestic organic solid waste within site | |
| 23. | Environmentally safe methods for disposal of plastic and electronic waste | |
| 24. | Treatment and recycle methods of liquid waste / sewage | |
| 25. | Solar and other alternate energized technology and systems integrated to building | |

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| 26. | Alternative energy systems and technology |
| 27. | Passive solar heating and cooling of buildings |
| 28. | Solar water heating systems and pumps integrated to buildings |
| 29. | Solar energy integrated lighting and other domestic gadgets |
| 30. | Market survey for available solar systems |
| 31. | Zoning of site |
| 32. | Landscape scheme for modification of microclimate |
| 33. | Location of STP, substation and water storage tank to minimize distribution losses |
| 34. | Locating captive solar power or wind power plant in site |
| 35. | Types of sensors used in buildings, Location of sensors, Control devices and software |
| 36. | Study of Energy Conservation Building Code |
| 37. | Study of LEEDS and GRHA guidelines |
| 38. | Study of various manual and computer tools to design energy efficient buildings |
| 39. | Study of Daylight design software |
| 40. | Case study of energy efficient independent buildings in India |
| 41. | Case study of energy efficient buildings international examples |
| 42. | Market survey for energy efficient materials and construction technology |
| 43. | Survey for available systems and techniques for solar energy operated gadgets and equipment |
| 44. | Government schemes and guideline for domestic and building terrace solar power plants |
| 45. | Survey of Commercially available solar water heating systems |
| 46. | Online Case study of green independent building |
| 47. | Online case study of green buildings in campus |
| **Book References:** | |
| 1. | Green Building Illustrated by Frank Ching, Francis D. K., Shapiro, Ian M. |
| 2. | Green Building A to ZAuthor: Jerry Yudelson |
| 3. | Handbook of Green Building Design and Construction: LEED, BREEAM, and Green GlobesAuthor: Sam Kubba |
| 4. | Sustainable Building Design - Applications Using Climatic Data in IndiaAuthors: Kabre,Chitrarekha |
| 5. | Green from the ground up: sustainable, healthy, and energy-efficient home construction (builder's guide) Author David Johnston and Scott Gibson |
| 6. | Bureau of Energy Efficiency, (2011). Energy Conservation Building Code User Guide, New Delhi: Bureau of Energy Efficiency. |
| 7. | S. Shnapp, J. Laustsen, Mitigation Potential from India's Buildings, Global Buildings Performance Network, Paris, France. 2013. |
| 8. | Szokolay, S.V. (1990). "Design and research issues: passive control in the tropics." Proc. of 1st World Renewable Energy Congress on Energy and the Environment into the 1990s. Vol. 4, Solar and Low Energy Architecture. |
| 9. | S.V. Szokolay, Introduction to Architectural Science, Architectural press, Elsevier Science Oxford,U.K. |
| **Web References:** | |
| 1. | https://www.calrecycle.ca.gov/greenbuilding/materials |
| 2. | https://epdf.pub/green-building-handbook-a-companion-guide-to-building-products-and-their-impact-.html |
| 3. | https://doi.org/10.11129/detail.9783955532215 |
| 4. | https://www.sciencedirect.com/book/9780123851284/handbook-of-green-building-design-and-construction |
| 5. | https://link.springer.com/article/10.1186/s40594-019-0171-6 |

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| 6. | https://www.sciencedirect.com/science/article/abs/pii/S2210670719309503 |
| 7. | https://issuu.com/unhabitat/docs/sustainable_building_design_for_tro |
| 8. | https://www.slideshare.net/mirandazadeng/green-building-ppt-53285881 |
| 9. | https://www.teriin.org/sites/default/files/2019-04/Making-Indian-Cities-Energy-Smart_UNSW-TERI.pdf |

## Elective 2 (OPEN ELECTIVE THEORY)

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| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Intelligent Buildings** | |
| Course Code: | **ARC 314 /ARC 579/ARC 24579/AP AR 5179** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | The requirement for today's buildings are self-operative, digitally operative from remote places, digital security and digitally controlled services. Such digitisation of building offers highly efficient operative systems which saves resources and energy too. Objective of this course is to understand the technological know-how and to know state of art technology to design electronically / digitally operated and controlled buildings also called as smart buildings. |
| **Description of Contents in brief:** | |
| 1. | Conventional buildings and intelligent buildings. |
| 2. | Building systems and services, intelligent management of building systems and services, types of sensors and control systems. |
| 3. | Digital security of buildings, digital monitoring system. |
| 4. | Case studies |
| **Course Outcomes:** | |
| 1. | This course will give an insight to learner that Intelligent buildings to be designed to obtain sustainable (i.e. sustain their performance for future generations), healthy and technologically up to date; meet regulatory demands; meet the needs of the occupants; and be flexible and adaptable enough to deal with change and save resources. |
| **Lecture Schedule:** | |
| 1. | Introduction of intelligent buildings |
| 2. | Difference between conventional and intelligent buildings |
| 3. | Need for intelligent buildings |
| 4. | Building systems |
| 5. | Building services |
| 6. | Parameters of systems can to digitised |
| 7. | Parameter of services can be digitised |
| 8. | Types of sensors and devices for thermal control |
| 9. | Sensors and devices for lighting systems |
| 10. | Sensors and devices for integrated daylight systems |
| 11. | Sensors and devices for air conditioning systems |
| 12. | Control devices and software |
| 13. | Devices for intelligent water supply systems |
| 14. | Computing and software for water supply systems |
| 15. | Devices for intelligent security systems |
| 16. | Control devices and software for security systems |
| 17. | State of art construction technology |
| 18. | Integration of intelligent systems for construction technology |
| 19. | Intelligent systems for vertical circulation systems |
| 20. | Intelligent systems for horizontal circulation |
| 21. | Intelligent fixtures for toilets |
| 22. | Intelligent monitoring systems for public spaces |
| 23. | Intelligent monitoring systems for high rise buildings |
| 24. | Intelligent monitoring systems for public buildings |

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| 25. | Intelligent monitoring systems for domestic buildings |
| 26. | Intelligent monitoring systems for Airports |
| 27. | Intelligent monitoring systems for railway stations |
| 28. | Intelligent fire control systems |
| 29. | Market survey for available brands of sensors |
| 30. | Market survey of available control devices and software |
| 31. | Case study of intelligent residence |
| 32. | Case study of intelligent small commercial buildings |
| 33. | Case study of intelligent campus |
| 34. | Case study of intelligent Multi story apartment |
| 35. | Case study of intelligent multi-story office building |
| 36. | Case study of intelligent high-rise building |
| 37. | Case study of intelligent railway stations |
| 38. | Case study of intelligent Airports |
| 39. | Case study of intelligent hospitals |
| 40. | Case study of intelligent school buildings |
| 41. | Case study of intelligent museums |
| 42. | Case study of intelligent malls |
| 43. | Recommendation of System architecture for small buildings |
| 44. | Recommendation for real time management of buildings |
| **Book References:** | |
| 1. | Sustainable Intelligent Buildings for Better Health, Comfort and Well-Being Professor Derek Clements-Croome, University of Reading, UK |
| 2. | A Concept for an Operative Platform to Manage Intelligent Buildings by Jaoa Figueiredo, Jose sa da costa |
| 3. | Intelligent Infrastructure for Energy Efficiency by Neil Gershenfeld, Stephen Samouhos , Bruce Nordman |
| 4. | Intelligent Buildings: An Introduction edited by Derek Clements-Croome |
| 5. | An Intelligent Energy Management System for Educational Buildings by Ahmad Al Daraiseh, Nazraf Shah, Eyas El Qawasameh |
| **Web References:** | |
| 1. | https://www.tandfonline.com/doi/abs/10.1080/17508975.2011.582313 |
| 2. | https://journals.sagepub.com/doi/full/10.1155/2013/867693 |
| 3. | https://iopscience.iop.org/article/10.1088/0957-0233/24/7/074023/meta |
| 4. | https://www.tandfonline.com/doi/abs/10.1080/13614570902953549 |
| 5. | https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8667.2008.00566.x |
| 6. | https://ieeexplore.ieee.org/abstract/document/8458006 |
| 7. | https://www.researchgate.net/profile/Narayan_Dungana/publication/305279633_A_Seminar_Report_on_Intelligent_Building/links/57865ed208ae3949cf5559e6.pdf |
| 8. | http://www.palmajournal.org/articles/2017-162/5356.pdf |

## Elective 2 (OPEN ELECTIVE THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Steel architecture and design** | |
| Course Code: | **ARC 315 / ARC 595 / ARC 24595 / AP AR 5185** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce the design potential of steel as an important material in modern construction and familiarize the students with the structural merits and limitations of steel. |
| **Description of Contents in brief:** | |
| 1. | Study of materiality of steel, structural properties of steel, advantages of steel in construction. Overview of history of metal in construction and technological development from iron to steel, study industrialization and mass fabrication of steel. |
| 2. | Various industry-manufacture steel- hollow structural sections, hot rolled steel shapes, various hollow structural sections. Understanding of various typologies of high tech movement – extruded, grid/bay, arched / curved structures, tensile. Comparison of diagrid structures with standard-frame structures. Study of curved steel– creating curves in steel buildings, limitations in curving steels. Study of evolution of AESS (architecturally exposed structural steel) through high-tech movement, its connection types (bolted, welded and cast connections), member types (tubular and standard sections). |
| 3. | Various steel frame designs, basic connection strategies, basic understanding of steel floor systems, truss systems and braced systems. Introduction to steel as a sustainable material - recycled, reuse, adaptive reuse of steel and glazing systems, support systems for glazing. |
| 4. | Study of technical aspects of combining steel with glass, various steel and glass envelope systems (curtain wall system, wind braced support systems, spider steel connections with structural glass, simple and complex cable systems, handling curves and lattice shell construction). Study of advanced framing system, low carbon design strategies, transformations of architectural design into fabricated elements, use of steel in temporary/ exhibit buildings. |
| 5. | Need for corrosion and fire protection, various finishes and coating systems of steel. Detailed study corrosion protection and fire protection systems. |
| **Course Outcomes:** | |
| 1. | To develop the application of steel as structural material and its use in buildings of simple and complex nature. |
| 2. | Understanding of advanced applications of steel in buildings. |
| **Lecture Schedule:** | |
| 1. | As per syllabus |
| **Book References:** | |
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| **Web References:** | |
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## Elective 2 (OPEN ELECTIVE THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Advanced structural systems** | |
| Course Code: | **ARC 316 / ARC 596 / ARC 24 596 / AP AR 5186** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce the basic concepts of pre-stressing, conceptual approach to design of pile foundations and tall structural systems, shells and folded plates and tensile structure for the large span constructions. | |
| **Description of Contents in brief:** | | |
| 1. | Understanding of Soil Exploration. | |
| 2. | Study of types of pile foundation and its construction techniques, design of end bearing piles, design of under-reamed pile foundation for apartment buildings as per National Building Code. | |
| 3. | Introduction to pre-stressed concrete materials, methods of pre-stressing, comparison between RCC and pre stressed concrete. Understanding tall buildings structural systems, rigid frames, braced frames, shear wall. Wall frame buildings, tubular buildings, tube-in tube buildings, outrigger braced system with outline of their behaviour and their applicability for various heights. | |
| 4. | Understand Shells types. Folded plates types, Comparison with shells applicability. | |
| 5. | Understand arches types, and analysis of three hinged arches. | |
| 6. | Definitions of single, double & multi-layered grids – two way & three way space grids, connectors, domes and its various forms, geodesic domes, suspended-cable structures, types of cable network systems, shapes of cable suspended systems, examples of tensile membrane structures, types of pneumatic structures. | |
| **Course Outcomes:** | | |
| 1. | Conceptualization of large span constructions. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 2 (OPEN ELECTIVE THEORY)

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|---|---|---|---|
| Name of Program: **B.Arch.** | | Semester: **VII** | Year: **IV** |
| Name of Course: | | **Appropriate Technology** | |
| Course Code: | | **ARC 317 / ARC 360 / ARC 24360 / AP AR 3260** | |
| Core/Elective/Other | | **Elective** | |
| Prerequisite: | | | |
| **Course Objectives:** | | | |
| 1. | To give exposure to the concepts of appropriate building technology and services suitable in Indian context, its applicability in both rural and urban applications. | | |
| 2. | Enrich the conventional knowledge with alternative material and construction techniques. | | |
| **Description of Contents in brief:** | | | |
| 1. | Study alterative materials and construction techniques developed in recent past. Study soil & its composition & properties, suitability of soil for mud walls, soil composition test, plasticity test, test for optimum water content, soil stabilization, Wattle & daub walls, rammed earth walls, adobe walls, etc. | | |
| 2. | arches, Vaults, domes using soil cement, compressed mud blocks, | | |
| 3. | Nubian arch roof. Burnt clay tile roofing, ferro-cement roofing units, doubly curved tile roofing, pre-cast joists. | | |
| 4. | Use bamboo as building material its properties, available in country. | | |
| 5. | Overview of work done by Hasan Fathy, Laurie Baker, HUDCO, DA, etc. Site visits of appropriate building technology projects in India with issues pertaining to site, material, services, technology, and construction. | | |
| **Course Outcomes:** Students will be able to | | | |
| 1. | Design small scale buildings using appropriate technology specifications. | | |
| 2. | make construction details of various building elements using appropriate technology specifications. | | |
| **Lecture Schedule:** | | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | | |
| 2. | An overview of the origin and development of appropriate technology | | |
| 3. | cont.. | | |
| 4. | Background and need for appropriate technology approach. | | |
| 5. | information gathering from secondary sources on building designs | | |
| 6. | cont.. | | |
| 7. | cont.. | | |
| 8. | Documentation, presentation and discussion | | |
| 9. | cont.. | | |
| 10. | cont.. | | |
| 11. | cont.. | | |
| 12. | Soil Lab visit | | |
| 13. | cont.. | | |
| 14. | cont.. | | |
| 15. | report and discussion | | |
| 16. | cont.. | | |
| 17. | construction materials and techniques for walls construction | | |
| 18. | cont.. | | |
| 19. | cont.. | | |
| 20. | cont.. | | |
| 21. | construction materials and techniques for opening spanning | | |

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| 22. | cont.. |
| 23. | cont.. |
| 24. | cont.. |
| 25. | construction materials and techniques for roof spanning |
| 26. | cont.. |
| 27. | cont.. |
| 28. | cont.. |
| 29. | construction materials and techniques for roof covering |
| 30. | cont.. |
| 31. | cont.. |
| 32. | cont.. |
| 33. | Project work |
| 34. | cont.. |
| 35. | cont.. |
| 36. | cont.. |
| 37. | Presentation and discussion on above |
| 38. | cont.. |
| 39. | cont.. |
| 40. | cont.. |
| **Book References:** | |
| 1. | DA handbook |
| 2. | Architecture for the Poor: An Experiment in Rural Egypt. Fathy,Hassan, Univ. of Chicago Press |
| **Web References:** | |
| 1. | Laurie baker center |

## Elective 2 (OPEN ELECTIVE THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Modular Coordination** | |
| Course Code: | **ARC 318 / ARC 592 / ARC 24592 / AP AR 5182** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To equip the students with tools for basic research, development and real life applications of dimensional and functional coordination of modular systems. | |
| **Description of Contents in brief:** | | |
| 1. | An introduction to conventional modular principles and practices in the West in the early, medieval, industrial and post-industrial phases - additional input on the vernacular theories of modular principles in India, modules in nature. | |
| 2. | Study of modular components in civil construction through an understanding of various components, relationship between the analytical methods of building technologies and the synthetic process of architectural design. | |
| 3. | Modules in interior design, space utilization in an interior envelope, modular applications in commercial spaces, furniture design, relationship between utility zones and circulation. | |
| 4. | Study Modular philosophy in electrical systems, air-conditioning, electronic systems, industrial products and applications. | |
| 5. | Study Industry examples in modular coordination –prefabrication, production systems, etc. | |
| **Course Outcomes:** | | |
| 1. | To develop understanding of modular coordination approach to design and construction of built form. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 2 (OPEN ELECTIVE THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **VII** | Year: **IV** |
| Name of Course: | **Disaster Mitigation and management** | |
| Course Code: | **ARC 319 / ARC 356 / ARC 24356 / AP AR 3276** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | Introductory Information about Buildings, materials, Elements, Architecture. Introductory knowledge of Town Planning, Architecture and Planning softwares. Statistics and demographics, earth and environmental basics. | |

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| **Course Objectives:** | |
| 1. | To create awareness about natural disasters, reasons of their occurrence and have basic knowledge of disaster management, mitigation and techniques for post disaster monitoring and design. |
| **Description of Contents in brief:** | |
| 1. | Introduction to natural Disasters and Disaster Management in India. |
| 2. | Development of Disaster Management Mechanisms in India. |
| 3. | Disaster Risk Mitigation strategies. |
| 4. | Post Disaster Management and Cross Cutting Issues. |
| **Course Outcomes:** | |
| 1. | General awareness of natural disasters their causes and effects. |
| 2. | Basics of Disaster Management Mechanisms in India and idea of disaster mitigation. |
| 3. | Basic learning of Post Disaster Management and Cross Cutting Issues. |
| **Lecture Schedule:** | |
| 1. | Introduction to Natural disasters and man-made disasters |
| 2. | Basic definitions and terms and concepts related to disaster management |
| 3. | Tutorial on disasters: Introduction of minor assignment |
| 4. | Tutorial on disasters: discussions on minor assignment |
| 5. | Factors and significance. Characteristic, causes and effects of natural hazards viz. Droughts earthquakes |
| 6. | Factors and significance. Characteristic, causes and effects of natural hazards viz. Cyclones floods |
| 7. | Tutorial on disasters: work and discussion on minor assignment |
| 8. | Tutorial on disasters: presentation on minor assignment |
| 9. | Factors and significance. Characteristic, causes and effects of natural hazards viz. landslides and other disasters |
| 10. | Disaster profile of India and introduction to regional and seasonal disaster preparedness and response |
| 11. | Tutorial: Introduction of Major assignment on study of any one disaster part-1 |
| 12. | Tutorial: Work on Major assignment on individual study of any one disaster part-1 |
| 13. | Disaster management overview-National |
| 14. | National and state level Acts, rules, policies, laws, byelaws |
| 15. | Tutorial: Literature Review on Major assignment on study of any one disaster part-1 |
| 16. | Tutorial: Literature Review on Major assignment on study of any one disaster part-1 |
| 17. | Disaster management overview-Global |
| 18. | Kyoto Framework of disaster mitigation and management |
| 19. | Tutorial: Discussions on Major assignment on study of any one disaster part-1 |
| 20. | Tutorial: Discussions on Major assignment on study of any one disaster part-1 |
| 21. | Disaster management policy – national and states |
| 22. | Disaster Management Act – national and states |

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| 23. | Tutorial: Presentations on Major assignment on study of any one disaster part-1 |
| 24. | Tutorial: Presentations on Major assignment on study of any one disaster part-1 |
| 25. | Disaster Management Mechanisms: national, state and district levels |
| 26. | Select global practices; disaster and development; |
| 27. | Tutorial: Presentations on Major assignment on study of any one disaster part-1 |
| 28. | Tutorial: Presentations on Major assignment on study of any one disaster part-1 |
| 29. | Physical planning and disaster management plans; |
| 30. | Various role players in disaster management – NGOs / CBOs and Armed Forces;. |
| 31. | Tutorial: Introduction of Major assignment on case studies part-2 |
| 32. | Tutorial: Literature Review of Major assignment on case studies part-2 |
| 33. | Community Based Disaster Preparedness (CBDP), Disaster Risk Mitigation; |
| 34. | Disaster safe construction practices for different types of disasters, |
| 35. | Tutorial: Work on Major assignment on case studies part-2 |
| 36. | Tutorial: Work on Major assignment on case studies part-2 |
| 37. | Disaster Preparedness Forecasting and early warning systems for various disasters |
| 38. | Communication and information technology in disaster management; |
| 39. | Tutorial: Discussions on Major assignment case study part-2 |
| 40. | Tutorial: Discussions on Major assignment case study part-2 |
| 41. | Disaster education and awareness; |
| 42. | Documentation and case studies on natural disasters |
| 43. | Tutorial: Discussions on Major assignment case study part-2 |
| 44. | Tutorial: Discussions on Major assignment case study part-2 |
| 45. | Post Disaster Management and Cross Cutting Issues, Post disaster management; |
| 46. | Rehabilitation and reconstruction of disaster affected areas; urban, disaster mitigation;. |
| 47. | Tutorial: Work on Major assignment Global inputs part-3 |
| 48. | Tutorial: Discussions on Major assignment Global inputs part-3 |
| 49. | Natural resource management for disaster safe habitation; relationship between, disaster and environment; safe hill area development guidelines and coastal zone regulations for safe habitation; |
| 50. | Human settlement planning for consequence mitigation of global warming and climate change |
| 51. | Tutorial: Presentations on Major assignment Student inputs part-4 |
| 52. | Tutorial: Presentations on Major assignment Student inputs part-4 |
| **Book References:** | |
| 10. | Disaster Recovery, Brenda D. Phillips, CRC Press 30 |
| 11. | Earthquake Architecture: New Construction Techniques for Earthquake Disaster Prevention, Garcia, Belen, New York, Loft Publications |
| 12. | Planning for Disaster Willium G. Ramroth |
| 13. | Disaster Management Handbook, Pinkowski J., CRC Press |
| 14. | Environmental Hazards : Assessing Risk and Reducing Disaster, Smith, K., David P., London, Routledge Publications |
| 15. | Urban Planning for Disaster Recovery: Alan March Maria Kornakova, Butterworth-Heinemann |
| **Web References:** | |
| 1. | https://nidm.gov.in/pdf/pubs/DRR-Urban.pdf |
| 2. | https://planningtank.com/urbanisation/urban-planning-can-contribute-resilience-disaster-risk-reduction |
| 3. | https://www.sciencedirect.com/book/9780128042762/urban-planning-for-disaster-recovery |

## Elective 3 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Architectural Conservation** | |
| Course Code: | **ARC 326 / ARC 365 / ARC 24365 / AP AR 3265** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To sensitize students towards role of conservation and revitalization of built and un-built with tangible and intangible remains of past with its relevance today. | |
| 2. | To expose equip students to develop models of sustainable integrated conservation addressing the complexities of historic buildings, heritage cities and cultural landscapes. | |
| 3. | To stimulate and encourage Architectural conservation through adoption of a combination of pedagogic methods which include studio exercises, laboratory experiments, special lectures, site visits and tutorials. | |
| 4. | To focus on challenging real world conservation issues through site based studio exercises and 'hands on' practical experience in conservation through workshops and the training towards addressing all scales of heritage, through emerging theoretical, technical and management subjects, ensuring that students develop the ability to connect philosophy, theory and practice; and devise realistic, implementable and innovative conservation interventions. | |
| 5. | To encourage community outreach, and enhance academic interface with citizens, civil society, self-help groups, NGOs and communities for a more broad based and rooted participatory approach towards conservation of our heritage assets. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to Conservation and related topics with meaning/definition, purpose of studying, theory of conservation–origin and history, role of conservation in the Social, Economic and Environmental Sustainability of the human habitats, urban and cultural landscapes, conservation practice. | |
| 2. | Conservation and its relation to History of Architecture and History of Culture Architectural symbolism; Buildings of historic traditions as Record of Program and Purpose, Architectural Design principles with reference to the relevant theories, Comparative cultures with city forms and traditional Planning; | |
| 3. | Tools for cultural studies. Building elements, forms and documentation with elements of buildings, building precincts; documentation with sketching, measured drawing, photography, models, study of crafts traditions, walkthroughs etc. sensitive repairs, Inventories, mapping methods, study of evolution, understanding change. Material science, condition survey, condition mapping and environmental studies Processes of extraction/production, behavior of the material, damages and repair, structural defects and repairs, quantities and estimation, specifications; Impacts of change on the ecological and well as human habitat. | |
| 4. | Construction, Structure and Infrastructure: Behavior of basic structural elements and structural systems adopted in old structures of historic, archeological and architectural importance; Defects and deterioration, repairs and rehabilitation, Infrastructural up gradations in historic areas, sustainable mobility, innovations in development. | |
| **Course Outcomes:** | | |
| 1. | Course acquaint the students with notions of cultural and natural ecology, and their synthesis into formation of legible cultural landscapes. | |

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| 2. | The course will also equip the students to address concerns for protection of the natural environment and techniques for sustainable development of cultural landscapes within multidisciplinary planning processes. |
| **Lecture Schedule:** | |
| 1. | Introduction to Architectural Conservation |
| 2. | Introduction to sessional Programme |
| 3. | Discussions with roadmap on internal assignment and work carried during whole semester |
| 4. | Classroom lectures on Stimulating, well structured, interactive lecture courses with presentations and discussions to familiarize students with core concepts. |
| 5. | Classroom lectures on techniques and methods of heritage conservation necessary for developing professional skills. |
| 6. | Special lecture series with focus on case studies and best practices to highlight real-world challenges and innovative, realistic conservation interventions in both the Indian and the International context |
| 7. | Special lecture series intended to sensitise students and develop capacity for assessment of outcomes and evaluation of best practices as well as failures. |
| 8. | Studios work on site based guided, 'immersive' studio exercises, with specialist inputs to |
| 9. | Reviews and expert inputs |
| 10. | Developing the skills for documentation, analysis and holistic understanding of complexities of heritage buildings, sites, settlements and landscapes |
| 11. | Reviews and expert inputs |
| 12. | Reviews and expert inputs on development of sustainable conservation interventions and management frameworks. |
| 13. | Supplement classroom lectures and relate theory and research with practices and existing situation on the ground |
| 14. | Field visits 'on site', and understanding from historic sites |
| 15. | Identification of challenges from archaeological areas and living traditional environments, |
| 16. | Interpretation of complexities and challenges of conservation with solutions/ Proposals |
| 17. | Classroom discussions with case studies |
| 18. | Laboratory related interpretation from supplement class room lectures for better scientific understanding of historic building systems. |
| 19. | Reviews on Assignments/Self-study/Guided tutorials: Linked with classroom courses, supervised and guided by faculty and external specialists. |
| 20. | Reviews and submissions with expert inputs |
| **Book References:** | |
| 1. | Stubbs J., "Time Honored: A Global View of Architectural Conservation", Wiley, Edition 01 2009 |
| 2. | Orbasli, A., "Architectural Conservation: Principles and Practice", Wiley Blackwell, Edition 1 2007 |
| 3. | Jokilehto, J., "History of Architectural Conservation (CONSERVATION AND MUSEOLOGY) ", Routledge, edition 01 2002 |
| 4. | Cohen, N., "Urban Conservation", MIT Press |
| **Web References:** | |
| 1. | WEB REFERENCES |
| 2. | SWAYAM |
| 3. | MOOCS |
| 4. | NPTEL |
| 5. | Open access from university Libraries |

## Elective 3 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Hospital Systems and Services** | |
| Course Code: | **ARC 327 / ARC 587 / ARC 24587 / AP AR 5177** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Expose students to modern hospital planning techniques, including design, planning and implementation |
| 2. | Focuses on hospital infra & extra structure and departments in health care and public health organizations. |
| 3. | Individuals who complete the Hospital Systems and Services will have knowledge of hospital planning & administration |
| 4. | Learn how to develop, implement, and evaluate a strategic plan for a healthcare facility |
| **Description of Contents in brief:** | |
| 1. | Introduction to hospital in the health system – definitions – hospital and medical care institutions – types and functions – medical care. History and development of hospitals – hospitals as an organization – hospital as part of social system - its role in primary health care to achieve health for all beyond. Planning – Measuring the community needs – Services required – Services available external – Internal factors. |
| 2. | Role of architects – requirement – Preliminary sketches – Final sketches – Models – Working drawings – Specifications – Cost estimates – Construction problems – Control modifications – Buildings, rules and bye laws. |
| 3. | Site examinations – Physical environment – Expansion possibilities – Utilities – Water – Electricity – Sewer lines – Telephones – Transportation – Permits – License. Hospital building – external – Internal arrangements – Architectural aspects – Residential accommodation. |
| 4. | Role of administrator in building a hospital – Physical planning of departments – OP- IP – Laboratory – dietary – Laundry – MRD – Nursing _ Operation theatre – Emergency services – Blood bank – Intensive care units. |
| 5. | Equipment requirements – Built in equipment – Locally available – Expandable Planning and management of support services CSSD – MRD – Clinical Laboratories-Laundry – Radiological services- Security services – Medical records- Transportation services – Front office – Guest relations – Ambulatory care – Medical gas supply services – Hospital stores- Mortuary – Kitchen services – Dietary – Hospital Sanitation – Pollution – Waste disposal – Control of insects and rodents – Housekeeping – Safety and hygiene – Energy conservation –Water conservation. |
| 6. | Maintenance – Types –Policy organization for maintenance – Electrical –Civil – Medical and hospital associated equipment. |
| **Course Outcomes:** Students will be able to | |
| 1. | Define planning for growth and change |
| 2. | Apply hospital engineering |
| 3. | Explicate considerations based on requirements |
| 4. | Enlist the plans for hospitals |
| 5. | Undertake planning a hospital |
| 6. | Identify site for the hospital |
| **Lecture Schedule:** | |
| 1. | What is health and wellness? |
| 2. | Human Settlements and healthcare facilities - Evolution |

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| 3. | Healthcare Delivery Systems. Healthcare Matrix: The role of a hospital |
| 4. | Planning Principles. Site Selection for Hospital. Project Feasibility & Viability Analysis. Socio-Economic Analysis; Techno-Economic Feasibility Report; SWOT Analysis |
| 5. | Introduction to Standards. Indian Healthcare and Hospital Standards |
| 6. | Laws Applicable to Medical Practice & Hospitals in India |
| 7. | How to read and Interpret a technical drawing; P.P.R/D.P.R.; Architect's Design Brief; Project Manuals; Facility Management Manuals |
| 8. | Site Planning Principles for Hospitals including orientation of buildings, terrain, climatological considerations etc. |
| 9. | Master-Planning of Hospitals with respect to Urban Design and Landscaping with Case Study |
| 10 | REVIEW Assessment<br>1. Site Selection, SWOT Analysis Study<br>2. Preparing Project Report<br>3. Creating Master plan |
| 11 | Introduction to Architecture Design; Balancing Form and Function; Components of a Hospital |
| 12 | Introduction to Evidence Based Healthcare Design - Accident & Emergency |
| 13 | Introduction to and design consideration of OPD |
| 14 | Introduction to and design consideration of IPD |
| 15 | Diagnosis |
| 16 | Introduction to and design consideration of ICU |
| 17 | Introduction to and design consideration of OT Complex |
| 18 | Introduction to and design consideration of Hospital Labs |
| 19 | Introduction to and design consideration of Administrative Department |
| 20 | Introduction to and design consideration of Laundry |
| 21 | Introduction to and design consideration of Mortuary |
| 22 | Interrelationship between Classrooms and Clinics |
| 23 | Dietary Department |
| 24 | Introduction to and design consideration of Blood Bank |
| 25 | Inter-Departmental relationship in a hospital. Balancing Factors |
| 26 | Design considerations for Health Sub-centres, Primary Health Centres, Community Health Centres, District Hospitals |
| 27 | Design of AYUSH Hospitals: Ayurveda, Yoga, Unani, Siddha and Homeopathy |
| 28 | Air Ambulance Services, Green Corridors and drone |
| 29 | Introduction to the design of Teaching Hospitals |
| 30 | Review & Assessment |
| 31 | Introduction to Healing Design of Hospitals |
| 32 | Accreditation of Hospitals. Indian and International Accreditation Agencies. Green Ratings |
| 33 | Safe Hospitals. Hospitals of the Future. |
| 34 | Review Assessment: Design of Ward, Design of Critical Care Centre, Physically Challenged Facilities, Design of a basic Primary Health Centre, and Preparation of the programme (flowchart) of a basic hospital |
| 35 | Allied Units: Special Design Interventions for: Cancer Units - Radiation prevention, Burns Units -Special Considerations, Eye Hospital |
| 36 | NABL and 4 standard of research for Labs. Bio Safety Levels for Lab Design |
| 37 | Water Supply, Gas Supply, HVAC and Bio-Medical Waste Disposal |
| 38 | BIM Software in Hospital |
| 39 | High Infection Centers: Infection Control in a Hospital; SARS, HIV and TB |

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| 40 | ART Centre, DOTS centre |
| 41 | Introduction to Facility Management |
| 42 | Team Member- Roles & Responsibilities |
| 43 | Hospital Construction Management |
| 44 | Case Study of AIIMS in India |
| 45 | Review, Discussions and Conclusion |
| **Book References:** | |
| 1. | Convert Richard P & Mc Nulty Elizabeth: Management Engineering for Hospitals, Chicago., Deegum II & Arthur: Management by Objectives., Maryland, Aspen 1977. |
| 2. | Stephen Verderber & Ben J. Refuerzo, 2006, Innovations in Hospital Architecture, Taylor & Francis |
| 3. | Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar and Sidhartha Satpathy, 2007, Modern Trends in Planning, Designing of Hospitals: Principles and Practices, Jaypee Publication |
| **Web References:** | |
| 1. | https://www.youtube.com/watch?v=KKuXcs5B0Kg |
| 2. | https://swayam.gov.in/nd2_arp19_ap47/preview |
| 3. | https://www.chcf.org/wp-content/uploads/2017/12/PDF-SB1953HospitalConstructionIB.pdf |
| 4. | https://www.youtube.com/watch?v=tFy5fDR3UvQ |

## Elective 3 (THEORY)

| | | |
|---|---|---|
| Name of Program: **B. Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Urban Housing** | |
| Course Code: | **ARC 328 / ARC 557 / ARC 24557 / AP AR 5157** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | Nil | |

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| **Course Objectives:** | |
| 1. | Create awareness about importance of housing in Indian context |
| 2. | Impart knowledge for designing housing projects |
| 3. | Sensitize towards various issues of housing pertaining to affordability |
| 4. | Introduce students to various neighborhood planning and design techniques |
| **Description of Contents in brief:** | |
| 1. | Fundamentals of Housing This course aims to look at urban housing from different perspectives; welfare and economic. Defining characteristics of housing, housing demand analysis, price functions and housing delivery systems. |
| 2. | Housing and human needs, influences on housing. Housing as an integral part of urban development. Study of transition from traditional to contemporary pattern of Housing in India. |
| 3. | Housing for Urban Poor, Problems and issues of housing. National Housing Policy 2007, various programmes run by States, role of various agencies in housing like HUDCO, CIDCO, State Housing Boards, etc. |
| 4. | Study of housing concepts: Mass housing, Low cost housing, Self-help housing, Co-operative housing etc. |
| 5. | Housing based on- income groups, density patterns and arrangement of units, temporary housing for post disaster mitigation, rehabilitation housing, Slum up gradation, etc. Space standards for housing schemes, Design concepts with reference to socio-economic factors and community planning considerations for residential layouts. Sense of- community, safety & security, belongingness, concept of neighborhood and community living. |
| 6. | Case study of various contemporary housing projects Concept of density standards and relationship of built and un-built in housing layouts, concept of FSI Design concepts for cost reduction, use of prefabrication, modular co- ordination and pre-stressed components etc. |
| 7. | Alternate technologies for housing, understanding of site planning of housing schemes and basic infrastructure and amenities at layout level. |
| **Course Outcomes:** Students will be able to | |
| 1. | Development of understanding towards housing design and the intricacies involved in it |
| 2. | Apply knowledge about local housing market, policy making, planning, etc. |
| 3. | Develop housing strategy at city level and housing project development |
| 4. | Design urban housing projects along with its formulation and monitoring |
| 5. | Demonstrate knowledge related to urban habitat, housing domain and techniques required to analyze and apply solutions to urban housing related problems |
| **Lecture Schedule:** | |
| 1. | Fundamentals of Housing |
| 2. | Urban housing from different perspectives; welfare and economic |
| 3. | Characteristics of housing |
| 4. | Housing demand analysis, price functions |
| 5. | Housing delivery systems |
| 6. | Housing and human needs, influences on housing |
| 7. | Housing as an integral part of urban development |
| 8. | Study of transition from traditional to contemporary pattern of Housing in India |

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| 9. | Housing policy in India and developing countries and aspects of informal housing |
| 10. | Housing and Community Development |
| 11. | Case Study, Discussions and Unit Conclusion |
| 12. | Housing Programme and Project Development |
| 13. | Evaluation of Housing shortage |
| 14. | Housing for Urban Poor, Problems and issues of housing |
| 15. | Programmes housing run by States |
| 16. | Role of various agencies in housing like HUDCO, CIDCO, State Housing Boards, etc. |
| 17. | Housing finance |
| 18. | Approaches to Affordable Shelter Housing shortage, especially for low income groups |
| 19. | Approaches to slum development through minimal intervention and collaborative approach |
| 20. | Case Study of various projects implemented under RAY |
| 21. | Midterm Evaluation |
| 22. | Low-income housing provision and their typologies |
| 23. | City level housing strategy |
| 24. | Study of housing concepts: Mass housing, Low cost housing |
| 25. | Self-help housing, Co-operative housing etc. |
| 26. | Housing based on- income groups, density patterns and arrangement of units |
| 27. | Concept of density standards and relationship of built and un-built in housing layouts |
| 28. | Alternate technologies for housing, understanding of site planning of housing schemes |
| 29. | Temporary housing for post disaster mitigation, rehabilitation housing etc. |
| 30. | Space standards for housing schemes |
| 31. | Design concepts with reference to socio-economic factors |
| 32. | Community planning considerations for residential layouts |
| 33. | Sense of community, safety, belongingness, concept of neighborhood & community |
| 34. | Basic infrastructure and amenities at layout level |
| 35. | Case study of various contemporary housing projects |
| 36. | Concept of FSI Design concepts for cost reduction |
| 37. | Use of prefabrication, modular co- ordination and pre-stressed components etc. |
| 38. | Case Studies of Pradhan Mantri Awas Yojna (PMAY) Urban |
| 39. | Investment scope in Urban Housing in India |
| 40. | Introduction to PPP in Urban Housing |
| 41. | Comparison of Housing Policies and Programs of various states in India |
| 42. | Case Studies of Affordable housing Scheme of Madhya Pradesh with other states |
| 43. | Introduction to Housing finance institutions |
| 44. | Group Discussion on cross subsidy prevalent in urban housing in India |
| 45. | Final Conclusion, Feedback and Evaluation |
| **Book References:** | |
| 1. | Goethert, Reinhard, Tools for the Basic Design and Evaluation of Physical Components in New Urban Settlements. |
| 2. | Leuris (S), Front to back: “A Design Agenda for Urban Housing”, Architectural Press, 2006. |
| 3. | Richard Kintermann and Robert small, “Site planning for Cluster Housing”, Van Nastrand Reinhold company, Jondon/New York 1977. |
| 4. | Mohanty. L.N.P., Mohanty. S, “Slum in India” APH Publications., 2005 |
| **Web References:** | |
| 1. | http://documents.worldbank.org/curated/en/116811468774964940/Urban-housing-in-India |

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|---|---|
| 2. | Das, S. K., Urban Coherence and Housing Strategies Design Ideas in Practice in India. Methods of Estimating Housing Needs, United Nations No. 67 XVII 15. |
| 3. | https://www.orfonline.org/research/housing-poverty-in-urban-india-the-failures-of-past-and-current-strategies-and-the-need-for-a-new-blueprint-48665/ |
| 4. | https://www.india.gov.in/topics/housing/urban-housing |

## Elective 3 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Ekistics** | |
| Course Code: | **ARC 329 / ARC 359 / ARC 24359 / AP AR 3259** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To develop an understanding of evolution of settlement planning. | |
| 2. | To study role and contribution of the planners towards contemporary town planning. | |
| **Description of Contents in brief:** | | |
| 1. | Study of meaning and scope in relation to town planning and architecture. Study of evolution of settlement patterns and their principles from early to modern periods of history; Study of changing form and pattern of human settlements in ancient, medieval, colonial and modern India. | |
| 2. | Role and contribution of the pioneers towards contemporary town planning thought - Patrick Geddes, Patric Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Ebenezer Howard, Clarence Perry, Clearance stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright. | |
| 3. | Introduction to urbanization, globalization and its impact on cities, SEZs, emergence of new forms of developments, self-sustained communities, transit development and integrated townships. Scope and Content of Master plan, planning area, land use plan and Zoning regulations, Study need of zonal plan linkage to master plan and land use plan, planned unit development (PUD), applicability and development regulations. | |
| 4. | Definition and explanation of the concepts of density, FAR, land use and zoning. Study urban renewal plan, redevelopment, rehabilitation and conservation. Study of emergence of the metropolitan phenomenon; planning problems of cities and solutions, rural –urban dynamics, rural and regional systems. Case studies of projects like JNNURM, RAY, etc. | |
| **Course Outcomes:** | | |
| 1. | Distinct understanding of regulated urban development in cities. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 3 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Rural Planning** | |
| Course Code: | **ARC 330 / ARC 556 / ARC 24556 / AP AR 5156** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand the importance of rural development in the national perspective. Exposure to various Poicies, Programs and schemes. Potential and challenges of rural India. |
| **Description of Contents in brief:** | |
| 1. | Introduction: Scope and overview of rural development; Historical perspective - Rural Development Programmes in India, Problem/perception and identification. Policies and Schemes for rural development. Review of Rural Development Programmes in agriculture and social sectors. Structure of Backward society and Agricultural Society. |
| 2. | Urban- Rural dynamics: Economic inequality and rural poverty – measurement, Rurban concepts, Per-Urbanisation, Strategies of Rural Development – growth oriented strategy, Welfare strategy ,Responsive strategy, Holistic strategy,right-based strategy. |
| 3. | Rural services: Rural Infrastructure Development Schemes, Service Delivery System in Rural areas, Rural Infrastructural Sector ,Rural Housing Programmes , Appropriate Technologies in Rural Housing., Understand rural institutions andOrganizations-rural banks, co-operatives, , micro-finance, self-help groups and rural credit access. Relevant case studies. |
| 4. | Rural governance: Rural Governance past and present, Panchayet Raj– its evolutation, Institutions of Rural India- its structure and function. legislative and other elected bodies, Transition from rural development administration to rural development management, Participatory development management. |
| 5. | Sustainable Rural Development: Recent models of rural development programmes. PURA models Result based monitoring system (RBM/PIME). Relevant Sustainable Development goals and international commitments. Relevant case studies. |
| **Course Outcomes:** | |
| 1. | Through this course student will understand rural development in all its dimensions. Dynamism between Urban and Rural development. |
| **Lecture Schedule:** | |
| 1. | Introduction: Scope and overview of rural development; Historical perspective. |
| 2. | Rural Development Programmes in India, Problem/perception and identification |
| 3. | Policies and Schemes for rural development. Case studies, Review of Rural Development Programmes in agriculture and social sectors. Structure of Backward society and Agricultural Society |
| 4. | Urban- Rural dynamics:, Economic inequality and rural poverty – measurement, |
| 5. | Case studies, Mini Test |
| 6. | Rurban concepts, Per-Urbanisation |
| 7. | Strategies of Rural Development – growth oriented strategy, Welfare strategy , Responsive strategy, Holistic strategy,right-based strategy |
| 8. | Rural services: Rural Infrastructure Development Schemes, Service Delivery System in Rural areas , Rural Infrastructural Sector ,Rural Housing Programmes , Appropriate Technologies in Rural Housing |
| 9. | Understand rural institutions andOrganizations-rural banks, co-operatives, , micro-finance, self help groups and rural credit access. Relevant case studies |

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| 10. | Rural governance: Rural Governance past and present, Panchayet Raj– its evolutation, Institutions of Rural India.- its structure and function. legislative and other elected bodies, |
| 11. | Transition from rural development administration to rural development management, Participatory development management. |
| 12. | Case studies Mid Semester Assessment |
| 13. | Case studies |
| 14. | Sustainable Rural Development: Recent models of rural development programmes. PURA models Result based monitoring system (RBM/PIME). |
| 15. | Relevant Sustainable Development goals and international commitments |
| 16. | End Term Assesssment |
| **Book References:** | |
| 1. | Introduction to Rural Planning: Economies, Communities and Landscapes (Natural and Built Environment Series) Nick Gallent et. al. |
| 2. | Rural Planning and Development (Critical Concepts in Built Environment) 1st Edition: editor Nick Gallent and Mark Scott |
| **Web References:** | |
| 1. | https://www.researchgate.net/ publication/311276491_Ruralism_The_Future_of_Villages_and_Small_Towns_in_an_Urbanizing_World |

## Elective 3 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Real Estate Development** | |
| Course Code: | **ARC 331 / ARC 560 / ARC 24560 / AP AR 5160** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand land as a scarce and valuable resource, exposure to real-estate development process and awareness of the various instruments available to develop a property. | |
| **Description of Contents in brief:** | | |
| 1. | Study of fundamental concepts of real estate development process, real-estate properties, developers, and the role of other professions. | |
| 2. | Modeling sequential events in real estate development process - site evaluation, land procurement, development team assembly and market study. | |
| 3. | Study of basis of cash flow, basic calculations for time value of money in real estate, calculation for direct capitalization, calculations for discounted cash flow, mortgage basics (mortgage calculations and decisions). | |
| 4. | Process of identification of a project, getting the financing - sources of commercial equity and debt, social and community desirability – how it will work, financial feasibility, approval procedures, the entitlement process, collaborating, public-private partnerships and the expanding role of local governments. | |
| 5. | Understanding aspects like finalizing a deal, legal commitments and obligations, construction, work management, and making it worthwhile creating value. | |
| 6. | Various types of real-estate properties such as multi-family, student housing, affordable housing, senior housing, mixed use, transport oriented development, smart growth, brown field development, etc., In house sales promotion, franchisee system, joint venture and sharing issues, procedure and laws relating to transfer of completed project. | |
| **Course Outcomes:** | | |
| 1. | Broadening of knowledge base and pragmatic understanding of real estate properties and process of urban development. | |
| 2. | Exposure to market forces and real life situation to become to become competitive in profession. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject | |
| 2. | Land, Real estate and Real property | |
| 3. | Importance of Real Estate as a financial product | |
| 4. | Classification of property, characteristics of different property types | |
| 5. | Real Estate Development and Real Estate Management | |
| 6. | Macro Level Socio-Economic Issues and Increasing Property Assets | |
| 7. | Fundamental concepts of real estate development process | |
| 8. | Discussion on Real Estate developers, and the role of other professions | |
| 9. | Public Sector, Private Sector Role | |
| 10. | Discussion on Modeling sequential events in real estate development process | |
| 11. | Site evaluation, Land procurement | |
| 12. | Development team assembly and Market study | |
| 13. | Real Estate Development Matrix; A Multi-Disciplinary Project | |
| 14. | Cont.. | |
| 15. | Cont.. | |

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| 16. | Activity - Case Analysis |
| 17. | Study of basis of cash flow |
| 18. | basic calculations for time value of money in real estate |
| 19. | calculation for direct capitalization |
| 20. | Tutorial for direct capitalization |
| 21. | calculations for discounted cash flow |
| 22. | Tutorial for discounted cash flow |
| 23. | Mortgage basics (mortgage calculations and decisions) |
| 24. | Tutorial for mortgage calculations |
| 25. | Process of identification of a project, getting the financing - sources of commercial equity/ debt |
| 26. | Social and community desirability – how it will work |
| 27. | Financial feasibility |
| 28. | Approval procedures, the entitlement process |
| 29. | Collaborating, public-private partnerships and the expanding role of local governments |
| 30. | Understanding aspects like finalizing a deal |
| 31. | Legal commitments and obligations |
| 32. | Construction, work management, and making it worthwhile creating value |
| 33. | Types of real-estate properties; Multi-family, Student housing, Senior housing |
| 34. | Affordable housing, Mixed use, Transport oriented development |
| 35. | Smart growth, Brown field development |
| 36. | In house sales promotion |
| 37. | Franchisee system, joint venture and sharing issues |
| 38. | Procedure and laws relating to transfer of completed project. |
| 39. | Concepts of Valuation |
| 40. | Cont.. |
| 41. | Arbitration in Real Estate Development |
| 42. | Cont.. |
| 43. | Real Estate Development Report |
| 44. | Cont.. |
| 45. | Discussion on documents studied and reviewed by students as assignment |
| **Book References:** | |
| 1. | The Real Estate Developer's Handbook: How to Set Up, Operate, and Manage a Financially Successful Real Estate Development by Tanya Davis |
| 2. | Real Estate Development: Principles and Process by Mike E. Miles |
| 3. | Real Estate Development Matrix by Daniel B Kohlhepp, Kimberly J. Kohlhepp |
| **Web References:** | |
| 1. | http://morris.marginalq.com/GREM_RE720_MoreFiles/Urban%20Econ%20Graaskamp%20ULI.PDF |
| 2. | https://www.ccimef.org/pdf/2012-299.The-Real-Estate-Development-Matrix.4-21-12.pdf |
| 3. | https://scholarship.sha.cornell.edu/cgi/viewcontent.cgi?article=1045&context=crer |
| 4. | https://realestatedevelopmentmatrix.com/ |

## Elective 3 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Architectural pedagogy** | |
| Course Code: | **ARC 332 / ARC 361 / ARC 24361 / AP AR 3261** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To make students understand architectural pedagogy as a subject helpful for them in teaching profession. | |
| **Description of Contents in brief:** | | |
| 1. | Planning of teaching lessons for Core Subjects such as Architecture Design, Building Construction, Architectural Drawing, etc. Planning of teaching lessons for Allied subjects such as Building Services, Structures, etc. and associated subjects such as Humanities, Management, Psychology, History, Fine Arts, etc. Planning of assessment methods - need & importance, defining goals and objectives for Assessment, planning and stages of assessment program. | |
| 2. | Making the weight age in total programs. Motivation and moral boosting its meaning & definition, need & importance. Introduction to Instructional Methodology its meaning, definition, need and importance of instructional methodology. | |
| 3. | Instruction and Learning including psychology of instruction, instructional theories such as Gagne, Instructional Models. Instructional Methods and techniques on Lecture Method, Demonstration Method, Case Study method, Project Method, Programmed Instruction / Learning, Studio method | |
| 4. | Instructional techniques- seminar, symposium, tutorial, conference etc. Instructional Media it's Meaning, need and importance, Non-Projected media, Projected Media, Computer- Based Multimedia. | |
| **Course Outcomes:** | | |
| 1. | Get appreciate the special needs for improving architectural education. | |
| 2. | Prepare effective lectures/demonstrations for various architectural topics and develop systems for their evaluation. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 3 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Research Methodologies** | |
| Course Code: | **ARC 333 / ARC 362 / ARC 24362 / AP AR 3262** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To appreciate the process of research |
| 2. | To make the students aware of potential of research in the field of architecture |
| 3. | To present the systematic process of architectural research |
| **Description of Contents in brief:** | |
| 1. | Introduction to Basic Research |
| 2. | Introduction to Applied Research |
| 3. | Scientific Research Method |
| 4. | Study methods of conducting research |
| 5. | Selection of topics and its relevance |
| 6. | Identification and formulation of problem |
| 7. | Compiling and analyzing existing research database |
| 8. | Research design, research instruments, analysis and presentation of results |
| 9. | Study evaluation of findings, conclusions and recommendation |
| 10 | Understand techniques of research – report writing |
| **Course Outcomes:** Students should be able to | |
| 1. | Conduct research process as effective tool of study. |
| 2. | Conduct formulation of idea, data collection, analysis, synthesis and derive to conclusion. |
| 3. | Produce report by culminating the research as documented academic resource. |
| **Lecture Schedule:** | |
| 1. | Introduction to Basic Research |
| 2. | Study Basic and Applied Research |
| 3. | Introduction to Architectural Research |
| 4. | Study Research in Architecture |
| 5. | Nature, Purpose and Scope of Architectural Research |
| 6. | Technical and Behavioral Aspects of Oriented Research |
| 7. | Science and Scientific Method |
| 8. | Various Steps in Scientific Method |
| 9. | Hypothesis |
| 10. | Methods of Conducting Research |
| 11. | **Introduction to Assignment** |
| 12. | Selection of Topics And Its Relevance |
| 13. | **Assignment Progress** |
| 14. | Identification of Problem |
| 15. | **Assignment Progress** |
| 16. | Formulation of Problem |
| 17. | **Assignment Progress** |
| 18. | Compiling Existing Research Database |
| 19. | **Assignment Progress** |
| 20. | Analyzing Existing Research Database |
| 21. | **Assignment Progress** |
| 22. | Research Design |

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| 23. | Research Instruments |
| 24. | Data Collection |
| 25. | **Assignment Progress** |
| 26. | Data Analysis |
| 27. | **Assignment Progress** |
| 28. | Presentation of Results |
| 29. | **Assignment Progress** |
| 30. | Conclusion |
| 31. | **Assignment Progress** |
| 32. | Implications With Special Reference To Architectural Research |
| 33. | Evaluation Of Findings |
| 34. | Evaluation Of Conclusions |
| 35. | Evaluation Of Recommendations |
| 36. | **Assignment Evaluation** |
| 37. | Report Writing |
| 38. | **Assignment Submission** |
| **Book References:** | |
| 1. | Architectural Research Methods - David Wang and Linda Groat |
| **Web References:** | |
| 1. | https://issuu.com/ymahgoub/docs/lecture1-research_methods_in_archit |
| 2. | https://www.researchgate.net/publication/226862953_Architectural_Research_Methods |

## Elective 3 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Architectural Journalism** | |
| Course Code: | **ARC 334 / ARC 559 / ARC 24559 / AP AR 5159** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce the skills relevant to the professional journalism and enhance writing skills and architectural critique. | |
| **Description of Contents in brief:** | | |
| 1. | Study of journalism – nature, objectives, scope with emphasis on architectural journalism, research, reporting, writing, editing, photography. Writing and composing styles for mass communication | |
| 2. | Photojournalism and the contributions of photography to the professional practice of architecture. Understanding the individual demands in the context of print, mass and online media | |
| 3. | Documentation of environment, social change. Interviewing techniques, argument and debate technique in the investigation of social problems. Evidence, proof, refutation, persuasion and training in argumentative speaking. Regional, national and international discussion forums. | |
| 4. | Presentation standards and guidelines for documentation; to understand issues such as copyright, public arts and code of ethics, basic knowledge on press laws, Press Council of India, | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Write and communicate architectural issues of interest. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| Book References: | | |
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| Web References: | | |
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## Elective 3 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Environmental codes and energy ratings** | |
| Course Code: | **ARC 335 / ARC 591 / ARC 24591 / AP AR 5181** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand emerging discourse on sustainability by study of UN frame work convention of climate change, Kyoto protocol, Earth Summit, national policies on sustainable and energy efficient development. | |
| **Description of Contents in brief:** | | |
| 1. | Policy guidelines of sustainable architecture, mandatory requirements, the Energy Conservation Act 2001(52 of 2001) its legal framework, institutional arrangement and a regulatory mechanism at the Central and State level to embark upon energy efficiency drive in the country. | |
| 2. | Study of guidelines of ECBC, The Indian Green Building Council and LEED, The Energy and Research Institute (TERI) and the GRIHA System. The Energy Conservation (Amendment) Act, 2010 - main amendments, energy efficiency measures as standard and labeling program, demand side management. | |
| 3. | Various government-led initiatives such as Bachat Lamp Yojana (BLY), Strengthening Institutional Capacity of State Designated Agencies (SDAs), State Energy Conservation Fund (SECF), Energy Efficiency in Small and Medium Enterprises (SMEs) and designated consumers, professional certification and accreditation, School Education Program, Indo-German Energy Efficiency Project, Energy Conservation Awards National mission for Enhanced Energy Efficiency (NMEEE), Perform, Achieve and Trade (PAT), Market Transformation for Energy Efficiency (MTEE), Energy Efficiency Financing Platform (EEFP), Framework for Energy Efficient Economic Development (FEEED), Partial Risk Guarantee Fund (PRGF), Venture Capital Fund for Energy Efficiency (VCFEE). | |
| 4. | The Environment (protection) Act 1986, rules to regulate environment pollution and Prevention, control and abatement of environmental pollution and institutional mechanism. | |
| **Course Outcomes:** | | |
| 1. | Broad understanding of environmental and energy regulations and its impact on efficient built forms. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 3 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Cultural expressions in Architecture** | |
| Course Code: | **ARC 336 / ARC 578 / ARC 24578 / AP AR 5191** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To impart knowledge about the various theories in design and to understand the various design processes and practices that have developed and apply in the process of architectural design. | |
| **Description of Contents in brief:** | | |
| 1. | Understanding of design, nature of good design and evaluation of design, types of design classifications, role of designer. Historical overview of theories of design, design as a profession. | |
| 2. | Design process, stages in the design process, different considerations, and different ideas of design methodology. Different approaches to design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design. | |
| 3. | Understand creativity, imagination, etc. Theories on thinking such as convergent and divergent thinking, lateral and vertical thinking, creative techniques like checklists, brainstorming, syntactic, etc. Design puzzles and traps, blocks in creative thinking. | |
| 4. | Various approaches to generate ideas for architectural design like types of concepts, personal philosophies and strategies of design, channels that encourage creativity in architecture. | |
| **Course Outcomes:** | | |
| 1. | Development of understanding of various theories of design and formulation of approaches to generate conceptualization of ideas and creativity in architecture. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Animation** | |
| Course Code: | **ARC 341 / ARC 580 / ARC 24580 / AP AR 5195** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To familiarize the students with various approaches, methods and techniques of Animation Technology. | |
| 2. | To develop competencies and skills needed for becoming an effective animator, mastering traditional & digital tools to produce stills and moving images. | |
| **Description of Contents in brief:** | | |
| 1. | Study applying laws of human motion and psychology in 2-D or 3-D characters. Understand programming languages, algorithm and flow charts, define symbols of flowchart, (Examples- HTML editing & viewing HTML files). | |
| 2. | Overview of terms used, types, skills, basic principles, drawing tools, rapid sketching & drawing and developing animation character. Study of anatomy & body language. | |
| 3. | Introduction to equipment required for animation and developing the characters with computer animation. Use 2D and 3D virtual drawing for animation, sequential movement drawing, Skills required for an animation artist (draw gestures, Basic proportions, rotation in arcs, key lines, perspective, mannequin, volume construction, balance, muscles, light & shape and action, hands & legs, foreshortening and facial expressions). | |
| 4. | Introduction pose sketching (action analysis), acting, modeling, sketching from acting and sketching from live models. Introduction to rapid sketching techniques, sketching from memory, live action. Digital editing and motion graphics, visual effects and V.F.X.-I. Exercise on suitable software. | |
| **Course Outcomes:** | | |
| 1. | Be able to use digital tools representing design ideas. | |
| 2. | Prepare animated presentations. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
| 1. | V.K. Jain, Multimedia and Animation | |
| **Web References:** | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Product Design** | |
| Course Code: | **ARC 342 / ARC 456 / ARC 24456 / AP AR 4156** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To develop an understanding of the methods and techniques involved in furniture and product design with focus on integration of the marketing, design, and manufacturing process. |
| 2. | Awareness of tools and methods for product design and ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective. |
| **Description of Contents in brief:** | |
| 1. | Brief introduction to product designing and its various elements. |
| 2. | History of product design, role of product designers. |
| 3. | Introduction to applied anthropometry, human activities, their nature and application of human factors data. |
| 4. | Understanding of product development cycle and phases. Information input and processing. |
| 5. | To understand the visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols. To understand form, color, symbols, user specific criteria, material, technology, recyclability and packaging. Multiple utility oriented approach to product design. |
| 6. | Design of household elements kitchen racks, cabinets, furniture like chairs/computer table, etc. To design industrial products- watch, automobile headlights etc. |
| **Course Outcomes:** | |
| 1. | Ability to comprehend human dimensions and body movement, user needs and activities to arrive at a usable product. |
| **Lecture Schedule:** | |
| 1. | Introduction to product designing |
| 2. | Elements of product designing |
| 3. | History of product design |
| 4. | Role of product designers |
| 5. | Introduction to ergonomics and its application. Definition of three major areas: Physical ergonomics, Cognitive ergonomics and Environmental ergonomics |
| 6. | Exercise on Ergonomics |
| 7. | Exercise on Ergonomics |
| 8. | Anthropometry and its relation to product designing |
| 9. | Exercise on Anthropometry |
| 10. | Exercise on Anthropometry |
| 11. | Understanding user needs and activity, sociology and psychology |
| 12. | Exercise and research on user activity and needs |
| 13. | Exercise and research on user activity and needs |
| 14. | Overview of semantics, bionics, ethnography etc in designing |
| 15. | Environmental concerns |
| 16. | Creativity and Ideation |
| 17. | Introduction of 'Form Language' (Colour theory, texture, material) |
| 18. | Form development processes |

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| 19. | Two dimensional presentations: Free Hand Drawing and treatment techniques by using different medium. Representation drawings like, Isometric, perspective and exploded views. Generation of quick renderings, concept renderings and detailed renderings drawings. |
| 20. | Three dimensional representations: Model Making. Material exploration and development of models through different techniques |
| 21. | Materials studies. Different types of materials and their properties |
| 22. | Exercise on new materials in market |
| 23. | Manufacturing techniques – fabricating, rapid prototyping, moulding, forming etc |
| 24. | Exercise on manufacturing techniques |
| 25. | Marketing – patent, design rights, branding, product service systems, liabilities etc. Understanding of market trends. |
| 26. | Product feasibility, performance and range |
| 27. | Regulations and legislation – ISO (International Organisation for Standardisation) etc. |
| 28. | Exercise - Design of household elements |
| 29. | Exercise - Design of household elements |
| 30. | Exercise - Design of household elements |
| 31. | Physical model making |
| 32. | Exercise - Design industrial products |
| 33. | Exercise - Design industrial products |
| 34. | Exercise - Design industrial products |
| 35. | Physical model making |
| **Book References:** | |
| 1. | The Fundamentals of Product Design – Richard Morris |
| 2. | The Elements of User Experience: User-Centred Design for the Web by Jesse James |
| 3. | Debkumar Chakrabarti, Indian Anthropometric Dimensions (For Ergonomic Design Practice) |
| 4. | W.E. Woodson, Human Factor Design Handbook, McGraw Hill, New York, 1981 |
| 5. | Bridger, RS: Introduction to Ergonomics, 2nd Edition, Taylor & Francis, 2003. |
| 6. | Krippendorff, Klaus, & Butter , Reinhart. “Product semantics: Exploring the symbolic qualities of form,” Innovation: 3.2 (1984): 4-9 |
| 7. | Krippendorff, Klaus. The Semantic Turn: A New Foundation for Design. Boca Raton: CRC Press, 2006. |
| 8. | Ideation: An AVA Book, AVA publishing SA |
| 9. | John Berger, Ways of seeing |
| 10. | Koos Eissen and Roselien Steur , (2011) Sketching: The Basics |
| 11. | Koos Eissen and Roselien Steur , (2014) Sketching - product design presentation |
| 12. | Scott Robertson and Thomas Bertling, (2014) How to Render: the fundamentals of light, shadow and reflectivity |
| 13. | Bjarki Hallgrimsson, (2012) Prototyping and Modelmaking for Product Design |
| 14. | Chris Lefteri (2007) Making it: manufacturing techniques for product design, Laurence King Publishing |
| 15. | Ashby, M.F. (1992), Materials selection in Mechanical Design, Pergamon press |
| 16. | Hudson, Jennifer (2008), Process: 50 product designs from concept to manufacture |
| **Web References:** | |
| 1. | |

## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Building codes and byelaws** | |
| Course Code: | **ARC 343 / ARC 351 / ARC 24351 / AP AR 3251** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To provide students insight of building codes and norms, their need and nature of building codes, standards and regulations. |
| **Description of Contents in brief:** | |
| 1. | Overview of basic terminologies, nature and scope of building codes in special regions like heritage zones, environmentally sensitive zones, disaster prone regions, coastal zones, hilly areas etc. |
| 2. | Study of building regulations. Overview of administrative processes for obtaining building permits at various stages. General land use, building classifications and permissible uses, norms for exterior and interior open spaces, setbacks and margins, norms for building projections in open spaces, considerations in FAR, guidelines for open green areas. |
| 3. | Norms for vehicular areas - means of access, norms for access widths for various types of buildings, requirements of parking spaces, standards for turning radius, access to service areas. |
| 4. | Norms for fire-protection - Overview of fire protection norms for various building classifications, norms for fire exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes, etc. |
| 5. | Norms for building services: Norms for lighting and ventilation, Introduction to basic terminologies, components of daylight factor, general principles of opening for good lighting, considerations in artificial lighting, general principles for natural and mechanical ventilation, overview of norms for acoustical and electrical installations. |
| 6. | Requirements for parts of buildings: plinth, habitable rooms, kitchen, wet areas, mezzanine, store rooms, elevated parts like chimneys, parapets etc, Introduction to local building byelaws - study of local administrative provisions for obtaining building permits, architecture control and provision of building services, regulations for super structures, building height regulations, regulations for multi-storied buildings etc. |
| **Course Outcomes:** | |
| 1. | Gauge the importance of building regulations and byelaws in development. |
| 2. | Apply these to actual building design. |
| **Lecture Schedule:** | |
| 1. | Introduction to building bye laws, objectives, scope, applicability etc |
| 2. | Basic terminologies |
| 3. | Building codes in heritage zones |
| 4. | Building codes in environmentally sensitive zones |
| 5. | Building codes in disaster prone regions |
| 6. | Building codes in coastal zones |
| 7. | Building codes in hilly areas |
| 8. | Considerations for universal accessibility |
| 9. | Overview of building regulations - NBC |
| 10. | Jurisdiction and applicability of the building bye-laws |
| 11. | Functions of local authority |
| 12. | Administrative processes for obtaining building permits |

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| 13. | Detailed study of regulations – land use, building classifications and permissible uses |
| 14. | Detailed study of regulations – norms of exterior and interior, setbacks and margins |
| 15. | Detailed study of regulations – building projections in open spaces, considerations in FAR, guidelines for open green areas. |
| 16. | Norms for vehicular areas |
| 17. | Contd |
| 18. | Contd |
| 19. | Norms for fire-protection |
| 20. | Contd |
| 21. | Contd |
| 22. | Norms for building services – basic terminologies |
| 23. | Norms for lighting and ventilation |
| 24. | Daylight factor |
| 25. | Principles of natural lighting, artificial lighting |
| 26. | Principles for natural and mechanical ventilation |
| 27. | Norms for acoustics |
| 28. | Norms for electrical installations |
| 29. | Requirements for parts of buildings - plinth, habitable rooms, kitchen, wet areas, mezzanine, store rooms, elevated parts like chimneys, parapets etc |
| 30. | Contd |
| 31. | Contd |
| 32. | Overview of local (Bhopal) bye laws and regulations |
| 33. | Local administrative provisions for obtaining building permits |
| 34. | Provision of building services |
| 35. | Regulations for super structures |
| 36. | Building height regulations |
| 37. | Regulations for multi-storied buildings |
| 38. | Related assignments |
| 39. | Related assignments |
| 40. | Related assignments |
| **Book References:** | |
| 1. | National Building code of India 2005 |
| 2. | MP Bhumi Vikas Niyam 2012 |
| 3. | Timesaver Standards for Building Types |
| **Web References:** | |
| 1. | |

## Elective 4 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Visual digital art** | |
| Course Code: | **ARC 344 / ARC 452 / ARC 24452 / AP AR 4152** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce video, image and vector editing using editing software. | |
| 2. | To enable students the creation of interactive patterns by introducing scripting, synchronization of sound with patterns generated and presentation using voice over. | |
| **Description of Contents in brief:** | | |
| 1. | Experimenting with sequencing, cutting trimming, speed manipulation of movie, filters, transitions, output settings, saving the output with the help of video editing software. | |
| 2. | Image editing, text formatting, color overlays, etc. Importing files using standard and linking options. Using scripts and behaviors, understanding stage, cast and time line, using cast library. | |
| 3. | Exercise to import movie file in the editing software and overlap 2D animation film creation. Synchronize the sound and create a perfect blend of AVI and 2D Animation film. | |
| **Course Outcomes:** | | |
| 1. | Development of multimedia communication skills. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 4 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Furniture design** | |
| Course Code: | **ARC 345 / ARC 458 / ARC 24458 / AP AR 4158** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To introduce the basics of furniture designing so that they can explore it as an option for specialization at post graduate level. The subject will expose the students to all aspects of furniture design. |
| **Description of Contents in brief:** | |
| 1. | Development of furniture through history. |
| 2. | Understanding of ergonomics and anthropometry for different types of furniture units through critical and analytical studies. |
| 3. | Design approach for furniture layout within an activity space. |
| 4. | Understand materials used in furniture, like wood, processed wood, steel, glass, etc., and how to work on them. Hybrid furniture where two or more materials are used for structure/covering/finishing etc. |
| 5. | Important considerations for designing of furniture including selection of material/finish/cost etc. mass production of furniture, modular/ pack-able, easy to transport furniture, built-in furniture, multi-functional furniture, accessories/gadgetry in furniture design. |
| 6. | Hands on working on selected furniture design, including study of miniature models for their ergonomics, structure, assembly, finishing and aesthetics. |
| 7. | Fabrication of prototype for various assignments. |
| 8. | The subject is a workshop based subject with hands on working as an integral part of learning. |
| **Course Outcomes:** | |
| 1. | To be able to appreciate the design skills required for a specialization in furniture design. |
| 2. | Understand importance of furniture design in interior of a space. |
| **Lecture Schedule:** | |
| 1. | History of furniture |
| 2. | Understanding of ergonomics and anthropometry for different types of furniture units. |
| 3. | Wood as material for furniture; natural wood and processed wood, structure, properties, joinery, machines and tools, hardware and adhesives, finishes, etc. |
| 4. | Steel as material for furniture; properties, welding and joinery, machines and tools, hardware and, finishes, etc. |
| 5. | Design strategies for different types of furniture like seating, storage, display, tables, etc. |
| 6. | Design strategies for interiors of an activity area and importance of appropriate furniture for an activity in the available space. |
| 7. | Finishing type and their raw materials, decorative hardware for furniture in different base materials. |
| 8. | Essentials of mass production in furniture |
| **Book References:** | |
| 1. | Time Savers Standards for Architectural Design |
| 2. | Time Savers Standards for Interior Design and Space Planning |
| 3. | Neuferts Architects' Data |
| 4. | Illustrated Cabinetmaking: How to Design and Construct Furniture That Works, Bill Hylton |

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| 5. | The Complete Book of Woodworking, Tom Carpenter, Mark Johanson |
| 6. | The Art of Welding, W. A. Vause |
| **Web References:** | |
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## Elective 4 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | Entrepreneurship Skills for Architects | |
| Course Code: | **ARC 346 / ARC 571 / ARC 24571 / AP AR 5162** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce set up for business as an architect. | |
| 2. | To develop the creative and leadership skills for the same and to develop the confidence and skills in preparing business plans and to propose and sell ideas to potential clients and investors. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to Entrepreneurship: Meaning of entrepreneur, concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship. The skills required to be an entrepreneur, the entrepreneurial decision process, and role models, mentors and support system. | |
| 2. | Entrepreneur Skills: Leadership skills, creativity, self-motivation, administration, time management, marketing, finance management, people skills and starting a business. Understanding of future oriented decision-making principles to increase the organization's innovative and competitive qualities, re-definition of problems, user experience, rapid prototyping, multidisciplinary entrepreneurship skills, and risk-taking financial, social and environmental risks. Understanding of job procurement, cash flow, costing, risk assessment and employee management. | |
| 3. | Business and Finance: Business ideas, methods of generating ideas, and opportunity recognition. Meaning and significance of a business plan, components of a business plan, and feasibility study. Importance of new venture financing, types of ownership securities, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks. | |
| 4. | Organization Management: Study of industry organizations – private, government, NGO's. Design and make presentations on a strategic business model for a design and innovation challenge in the context of the current design and social situation. Design and develop business plans and to propose ideas to potential clients and investors. Study of branding, use of social media, and advertising, public-speaking, and human resource management. | |
| 5. | Practicing Architecture: Setting up of an office and managing it, billing, accounting; Relationship with client, employees, associates, consultants, contractors, and supplier. Presentation, documentation, IT practice, project delivery methods, Supervision for ensuring compliance of relevant laws by client and contractor, liability of an Architect, professional indemnity, Consumer Protection Act, Copyright Act. | |
| **Course Outcomes:** | | |
| 1. | To make an effort to develop personality of the individual as a pragmatic and forceful professional. | |
| **Lecture Schedule:** | | |
| 1. | Meaning of entrepreneur, concept of entrepreneurship, the history of entrepreneurship development | |
| 2. | Role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship | |

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| 3. | The skills required to be an entrepreneur, the entrepreneurial decision process, and role models, mentors and support system |
| 4. | Leadership skills, creativity, self-motivation, administration, time management, marketing, finance management, people skills and starting a business |
| 5. | Mini Test |
| 6. | Understanding of future oriented decision-making principles to increase the organization's innovative and competitive qualities, re-definition of problems, user experience, rapid prototyping, multidisciplinary entrepreneurship skills, and risk-taking financial, social and environmental risks |
| 7. | Understanding of job procurement, cash flow, costing, risk assessment and employee management |
| 8. | Business ideas, methods of generating ideas, and opportunity recognition. Meaning and significance of a business plan, components of a business plan, and feasibility study Importance of new venture financing, types of ownership securities, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks |
| 9. | Mid Semester Assessment |
| 10. | Study of industry organizations – private, government, NGO's. Design and make presentations on a strategic business model for a design and innovation challenge in the context of the current design and social situation |
| 11. | Design and develop business plans and to propose ideas to potential clients and investors |
| 12. | Study of branding, use of social media, and advertising, public-speaking, and human resource management |
| 13. | Understanding office setup and its management, billing, accounting; Relationship with client, employees, associates, consultants, contractors, and supplier |
| 14. | Presentation, documentation, IT practice, project delivery methods, Supervision for ensuring compliance of relevant laws by client and contractor, liability of an Architect |
| 15. | Professional indemnity, Consumer Protection Act, Copyright Act |
| 16. | End Term Assesssment |
| **Book References:** | |
| 1. | Architect and Entrepreneur: A Field Guide to Building, Branding, and Marketing Your Startup Design Business by Eric Reinholdt |
| 2. | Letters To A Young Architect by Christopher Benninger |
| 3. | The Archipreneur Concept by Tobias Maescher |
| **Web References:** | |
| 1. | https://www.evolvingarchitect.com/blog/architect-entrepreneur |
| 2. | https://archicgi.com/blog/architecture/ |

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## Elective 4 (VIVA)

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| Name of Program: **B.Arch.** | | Semester: **IX** | Year: **V** |
| Name of Course: | | **NGO Administration** | |
| Course Code: | | **ARC 347 / ARC 575 / ARC 24575 / AP AR 5166** | |
| Core/Elective/Other | | **Elective** | |
| Prerequisite: | | | |
| **Course Objectives:** | | | |
| 1. | To provide an understanding of NGO Administration, develop practical skills. | | |
| 2. | To address real-life problems in a participatory and interactive learning environment to enhance management capacity. | | |
| **Description of Contents in brief:** | | | |
| 1. | Study of concept, functions, roles and establishment of NGO. Issues and Challenges in NGO Management, development issues, development indicators. Legal procedures for establishment of NGOs. | | |
| 2. | Overview of Societies Registration Act, Indian Trust Act, Indian Company's Act, Charitable endowment Act and FCRA, Memorandum of Association and Bye laws, Tax Reliefs under various Acts. Study Results-Based Management and Project Cycle Management. Introduction and concept of Logical Framework analysis, SWOT Analysis. | | |
| 3. | Designing and planning a project, Identifying and analyzing problems. Deciding the overall strategy, defining the response, strategic planning. Study of NGOs vis-a-vis development concerns of the community. Become familiar with results-based Management and learn the basics of project management. | | |
| 4. | Learn about the process of internal assessments. Understand the selection process of marketing tools for fundraising and different criteria of donor agencies in supporting a project. Become familiar with the principles of good communication and negotiations and learn the basics of team work and conflict resolution. | | |
| 5. | The success stories of NGO and other organization - international / national/ regional level. | | |
| **Course Outcomes:** | | | |
| 1. | Understand the working of an NGO. | | |
| 2. | Be able to participate in the working/help in setting up an NGO. | | |
| **Lecture Schedule:** | | | |
| 1. | As per syllabus | | |
| **Book References:** | | | |
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| **Web References:** | | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Anthropology and Architecture** | |
| Course Code: | **ARC 348 / ARC 585 / ARC 24585 / AP AR 5175** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand the relationship between society and the making of the built environment and to understand phenomenology and the role of meaning in built form. | |
| **Description of Contents in brief:** | | |
| 1. | Study concepts of culture, society, politics and anthropology – relation between society and built environment. Understand cultural anthropology from the view of architecture. Architecture as a continuous process for kinship and house societies, perceptions of built form, conceptions of space, symbolism and technology. | |
| 2. | Study of conditions of modernity, fragmentation of society, Heidegger and notions of dwelling, Christian Norberg Schulz and concepts of genius loci. Rapoport and studies on the meaning of built environment. Study of Joseph Rykwert theories on the idea of house. Bollnow and the idea of space, Jan Pieper and the notions of sacred space. | |
| 3. | Understand Meaning of urban studies and urban anthropology, role of cities, urban ethnography, primary units, major components and units of integration, anthropology and contemporary urban issues. | |
| 4. | Case studies of traditional architecture in India to find impact of anthropological studies on contemporary architecture and design. | |
| **Course Outcomes:** | | |
| 1. | Broader understanding of correlation between concepts of anthropology on society and built form. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Computer Programming** | |
| Course Code: | **ARC 349 / ARC 451 / ARC 24451 / AP AR 4151** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To study Basic Computer organization: Processor & amp; Memory Model and Networking Concepts. | |
| **Description of Contents in brief:** | | |
| 1. | Study of Programming in 'C'. Need of Programming Languages, Flowcharts and algorithm development, data types, constants, variables, declarations, operators and expressions, operator precedence and associativity, input and output operations, formatting, decision making, branching and looping, array and character strings, built-in and user-defined functions, the scope and lifetime of variables, structures and unions, pointers, pointer arithmetic/expressions, pointers and arrays, pointers and structures, dereferencing file handling, command line arguments, defining macros, preprocessor directives simple use of dynamic memory allocation: malloc and calloc functions. Introduction to Networking Concepts and Internet usage, e-mail, FTP, TELNET, Search Tools, Browsers, HTML Programming using Visual Editors. | |
| 2. | Programming preliminaries, some simple program in C, numeric constants and variables, arithmetic expression, input and output conditional statements, loops, arrays, logical expressions, functions, character strings enumerated data type and stacks, structures. | |
| 3. | Development of computer programs for three dimensional representation of simple architectural objects (C, C++); AutoCAD application in two and three dimensional architectural drawing, UCS generations, creation of entities, dimensioning. Application of solids and surfaces; Customization of AutoCAD. Programming in AutoLisp and creation of architectural library elements; Development of computer programs for design and analysis of building elements, building environments and site developments (C, C++, AutoLisp); Application of3D Studio and other 3D-Imaging softwares. | |
| **Course Outcomes:** | | |
| 1. | Understand the fundamentals of computer programming. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to computer programming in Architecture | |
| 2. | Study of Programming in 'C'. | |
| 3. | Need of Programming Languages | |
| 4. | Flowcharts and algorithm development | |
| 5. | Data types, constants, variables, declarations, operators and expressions | |
| 6. | (Cont.)Data types, constants, variables, declarations, operators and expressions | |
| 7. | (Cont.)Data types, constants, variables, declarations, operators and expressions | |
| 8. | Operator precedence and associativity | |
| 9. | Input and output operations | |
| 10. | Formatting | |
| 11. | Decision making | |
| 12. | Branching and looping | |
| 13. | Array and character strings | |
| 14. | Built-in and user-defined functions | |
| 15. | The scope and lifetime of variables | |
| 16. | Structures and unions | |

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| 17. | Pointers, pointer arithmetic/expressions, pointers and arrays, pointers and structures |
| 18. | (Cont.)Pointers, pointer arithmetic/expressions, pointers and arrays, pointers and structures |
| 19. | (Cont.)Pointers, pointer arithmetic/expressions, pointers and arrays, pointers and structures |
| 20. | Dereferencing file handling |
| 21. | Command line arguments |
| 22. | Defining macros |
| 23. | Pre-processor directives simple use of dynamic memory allocation: malloc and calloc functions. |
| 24. | Introduction to Networking Concepts and Internet usage, e-mail, FTP, TELNET, Search Tools, Browsers, HTML Programming using Visual Editors. |
| 25. | (Cont.)Introduction to Networking Concepts and Internet usage, e-mail, FTP, TELNET, Search Tools, Browsers, HTML Programming using Visual Editors. |
| 26. | Programming preliminaries |
| 27. | Some simple program in C |
| 28. | Numeric constants and variables, arithmetic expression |
| 29. | Input and output conditional statements, loops, arrays, logical expressions |
| 30. | (Cont.) Input and output conditional statements, loops, arrays, logical expressions |
| 31. | Functions, character strings enumerated data type and stacks, structures. |
| 32. | Development of computer programs for three dimensional representation of simple architectural objects (C, C++); |
| 33. | (Cont.) Development of computer programs for three dimensional representation of simple architectural objects (C, C++); |
| 34. | AutoCAD application in two and three dimensional architectural drawing |
| 35. | (Cont.) AutoCAD application in two and three dimensional architectural drawing |
| 36. | UCS generations |
| 37. | Creation of entities |
| 38. | Dimensioning |
| 39. | Application of solids and surfaces |
| 40. | Customization of AutoCAD |
| 41. | Programming in AutoLisp and creation of architectural library elements |
| 42. | (Cont.) Programming in AutoLisp and creation of architectural library elements |
| 43. | Development of computer programs for design and analysis of building elements, building environments and site developments (C, C++, AutoLisp); |
| 44. | (Cont.) Development of computer programs for design and analysis of building elements, building environments and site developments (C, C++, AutoLisp); |
| 45. | Application of3D Studio and other 3D-Imaging softwares |
| **Book References:** | |
| 1. | Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, Prentice Hall of India. |
| 2. | E. Balaguruswamy, *Programming in ANSI C*, Tata McGraw-Hill. |
| 3. | Byron Gottfried, *Schaum's Outline of Programming with C*, McGraw-Hill. |
| 4. | Seymour Lipschutz, *Data Structures*, Schaum's Outlines Series, Tata McGraw-Hill. |
| 5. | Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, *Fundamentals of Data Structures in C*, W. H. Freeman and Company. |
| 6. | R. G. Dromey, *How to Solve it by Computer*, Prentice-Hall of India. |
| **Web References:** | |
| 1. | |

## Elective 4 (VIVA)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Contemporary building materials** | |
| Course Code: | **ARC 350 / ARC 581 / ARC 24581 / AP AR 5171** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce and to know the categories of new materials currently used in any building site and also the modern products used in architecture, building and finishing like eco – friendly, composite, durable, advanced, smart. | |
| **Description of Contents in brief:** | | |
| 1. | Study the needs of ultra-performance materials in building design as a substitute for special performance, thermal/sound/moisture protection, fitting, equipment and furnishing. The properties of the contemporary materials (multidimensional, repurposed, recombinant, intelligent, interfacial, etc.). | |
| 2. | The types of advanced concrete - bendable concrete, light transmitting concrete, translucent concrete, pervious concrete, eco-cement etc. and types of reinforcement materials, properties and performance in concrete reinforcement. Aramid fibers, bio-steel, Carbon / Graphite Fibers and fiber-glass etc. | |
| 3. | Types, terminology and classification of composite of materials such as particle reinforced, fiber reinforced and structural boards. Use of composite materials namely Polymer Matrix Composites (PMCs), Fiber Reinforced Polymers (FRPs) along with cement, steel, aluminum, wood, glass for thermal insulation, fire protection, coating and painting and structural monitoring etc. | |
| 4. | Introduction to types of Nano-materials such as carbon nano tubes etc. their properties, performance and application. Nano composite used with cement, steel, wood, glass, for thermal insulation, fire protection, coating and painting and structural monitoring etc. Tensile fabric structure by digital printing (translucent fabric, thin-film photo voltaics, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and PTFE (poly tetra fluroethlene), etc. | |
| **Course Outcomes:** | | |
| 1. | Building awareness for application of innovative building materials for appropriate purpose and performance to have efficient buildings. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Industrial building systems** | |
| Course Code: | **ARC 351 / ARRC 597 / ARC 24597 / AP AR 5187** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To have basic knowledge about the necessity and techniques of pre-fabricated building components used for construction, exposure to various types of pre-fabricated systems. | |
| 2. | To recognize the importance of modular coordination in industrialized building systems. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to Feasibility of using industrial building system in different types of buildings, manufacturing of building components. Technology requirements for industrial building system and use of industrial building system as an alternative for disaster mitigation. | |
| 2. | Understand concept and definition of Modular dimensional discipline. Understand advantages and limitations of modular principle; components of residential buildings and precast elements. Understand purpose and need for off-site, on site prefabrication elements and construction joints with architectural and technical limitations. | |
| 3. | Introduction to the equipment used, manufacturing processes, transportation of components assembly and finishing. | |
| 4. | Structural, social and economic issues related to industrial building system. | |
| **Course Outcomes:** | | |
| 1. | Conceptualization of large span constructions. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 4 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **IX** | Year: **V** |
| Name of Course: | **Cad Customization** | |
| Course Code: | **ARC 352 / ARC 459 / ARC 24459 / AP AR 4159** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To utilize the tools within the AutoCAD program, modify the User Interface and enhance the operation of the program in specific areas of use. | |
| **Description of Contents in brief:** | | |
| 1. | Understanding of graphic software while learning to configure basic shape files, complex line types, hatch patterns, along with CAD office configurations and plotting styles. | |
| 2. | Major Course Topics should include Creating ribbons, creating pull-down, cascading and cursor menus, Customizing toolbars, Image tile menus, Shapes, Auto Lisp and Visual Lisp, Creating line types and hatch patterns, Creating programmable dialog boxes, etc. | |
| **Course Outcomes:** | | |
| 1. | Be able to employ the tools available in AutoCAD effectively. | |
| 2. | Enhance the operation of the software by customizing it. | |
| **Lecture Schedule:** | | |
| 1. | Introduction and utility of cad customization | |
| 2. | Understanding Basics of CAD | |
| 3. | Lab | |
| 4. | Lab | |
| 5. | Understanding 3D Basics | |
| 6. | Lab | |
| 7. | Lab | |
| 8. | Customization of line types | |
| 9. | Lab | |
| 10. | Lab | |
| 11. | Customization of Blocks | |
| 12. | Lab | |
| 13. | Lab | |
| 14. | Customization of sheet formats and paper size | |
| 15. | Lab | |
| 16. | Lab | |
| 17. | Customization of text styles | |
| 18. | Lab | |
| 19. | Lab | |
| 20. | Customization of dimension styles | |
| 21. | Lab | |
| 22. | Lab | |
| 23. | Customization layers | |
| 24. | Lab | |
| 25. | Lab | |
| 26. | Understanding shape files | |
| 27. | Lab | |
| 28. | Lab | |

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| 29. | Understanding complex line types |
| 30. | Lab |
| 31. | Lab |
| 32. | Hatch patterns |
| 33. | Lab |
| 34. | Lab |
| 35. | Creating ribbons |
| 36. | Lab |
| 37. | Lab |
| 38. | Creating pull-down |
| 39. | Lab |
| 40. | Lab |
| **Book References:** | |
| 1. | Pradeep Jain & A.P. Gautam, Engineering AutoCAD |
| **Web References:** | |
| 1. | |

## Elective 5 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Hotel planning and services** | |
| Course Code: | **ARC 356 / ARC 588 / ARC 24588 / AP AR 5178** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To develop a comprehensive understanding of the specialized nature of services, and infrastructure provisions required for a hotels and restaurant design and planning. | |
| **Description of Contents in brief:** | | |
| 1. | Study of comprehensive and specialized services, amenities and infrastructure provisions in restaurants and hotels. | |
| 2. | Study of Building bye laws, rules and code provisions for various Star of hotels and emerging concepts of smart hotels, etc. Study of spatial- planning for a hotel integrating all the services such as HVAC, sanitary, waste management, electricity / energy, surveillance systems, telecommunication, fire safety, parking; and site planning. | |
| 3. | Introduction to the hospitality industry and how hotel building projects have contributed in urban developments, raising the economic and the tourism profile of a locality or region. (Particularly how architecture and design in smaller scale have enhanced interest for single destinations with relevant case examples). | |
| 4. | A comprehensive design exercise which would involve design concepts, profitability considerations, planning /development strategy, regulations, construction and management, management including operational planning and service. | |
| **Course Outcomes:** | | |
| 1. | Comprehend how hospitality industry functions. | |
| 2. | Be able to effectively design a restaurant/hotel. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 5 (THEORY)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Valuation and Arbitration** | |
| Course Code: | **ARC 357 / ARC 553 / ARC 24553 / AP AR 5153** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To develop an understanding of real–estate market and how valuation is done for properties and land in the profession. | |
| 2. | To develop an understanding of Arbitration and ADRS for resolution of legal disputes in practice. | |
| **Description of Contents in brief:** | | |
| 1. | Study characteristics of value, regarding the building. Factors affecting the value of built up property. | |
| 2. | Introduction to Value & Valuation including factors affecting value, supply and demand, cost of reproduction, valuation tables occupation of value, gild edged security; variables, the real market and its properties, the various types of investors in the market and their interests, purposes of valuation. | |
| 3. | Mathematics of valuation including simple interest, compound interest, present value, given amount per annum, annual sinking fund, present value of a given amount per annum, year of purchase in perpetuity, redemption of capital, numerical examples, etc. Methods of valuation such as land-building basis, development method of valuation, valuation for rating purpose, valuation for Government taxation, valuation for mortgage, consider valuables in Town planning, regarding the plots and development. | |
| 4. | Introduction to Mortgage including mortgage repayment and depreciation mortgage and mortgager, relation between mortgage and annual repayment, depreciation rates, numerical examples. Interest rate and life of property, various market interests on capital, concept of net income, economic life of a building property. | |
| 5. | Introduction to Rent with various forms of rent, methods of valuation, direct comparison of capital cost, of land and cost of building, rental methods, development methods, belting. Arbitration including definition, scope, role of arbitrator, reference, submission, articles of agreement and award. | |
| **Course Outcomes:** | | |
| 1. | Understand the concept and methods of valuation. | |
| 2. | Be able to execute the valuation of small immovable property. | |
| 3. | Understand the concept of Arbitration and ADRS | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject | |
| 2. | Importance of Real Estate as a financial product and | |
| 3. | Valuation as a Profession | |
| 4. | Purposes of Valuation | |
| 5. | Valuation for Mortgage/ lease | |
| 6. | Valuation for Selling/ Purchasing | |
| 7. | Valuation for Income/Wealth tax | |
| 8. | Cost, Price and Value | |
| 9. | Different forms of Value | |
| 10. | Characteristics of Value | |
| 11. | Introduction to Methods of Valuation | |
| 12. | Prerequisites for becoming a Valuer | |

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| 13. | Essential Qualities for good Valuer |
| 14. | Sinking Fund |
| 15. | Exercise based on above |
| 16. | Capitalized cost |
| 17. | Year's purchase |
| 18. | Exercise based on above |
| 19. | Methods of Deprecation |
| 20. | Exercise based on above |
| 21. | Valuation Tables |
| 22. | Numerical on Valuation Tables |
| 23. | Fixation of rent for private/government, residential, commercial buildings |
| 24. | Tutorial on Rent fixation |
| 25. | Detailed methods of Valuation |
| 26. | Rental method of Valuation |
| 27. | Exercise based on above |
| 28. | Land and Building method of Valuation |
| 29. | Tutorial on Land and Building method of Valuation |
| 30. | Comparative method of Valuation |
| 31. | Tutorial on Comparative method of Valuation |
| 32. | Valuation for large open lands |
| 33. | Tutorial on Valuation for large open lands |
| 34. | Valuation Reports |
| 35. | Tutorial for Valuation Report |
| 36. | Process of enrolment as Valuer |
| 37. | Process of becoming registered Government Valuer |
| 38. | Duties and responsibilities as registered Government Valuer |
| 39. | Concept of Arbitration |
| 40. | Introduction to ADRS |
| 41. | Cont.. |
| 42. | Arbitration act-1940 with amendments till date. |
| 43. | Cont.. |
| 44. | Role and qualities of an arbitrator |
| 45. | Process of Arbitration |
| 46. | Arbitration with reference to competitions, valuation, contract, land disputes and its legal implications |
| 47. | Cont.. |
| 48. | Discussion on documents studied and reviewed by students as assignment |
| **Book References:** | |
| 1. | Commercial Property Valuation: Methods and Case Studies by Paolo Benedetto |
| 2. | Property Valuation by Peter Wyatt |
| 3. | Property Valuation: The Five Methods by Douglas Scarrett |
| 4. | Introducing Property Valuation by Michael Blackledge |
| **Web References:** | |
| 1. | https://www.thebalancesmb.com/real-estate-mediation-and-arbitration-for-disputes-2867176 |
| 2. | https://www.nar.realtor/arbitration-dispute-resolution |
| 3. | https://www.pircher.com/media/publication/55_Brown%20-%20Probate%20and%20Property%20Article.pdf |

## Elective 5 (THEORY)

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|---|---|---|
| Name of Program: **B. Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Human Resource Management** | |
| Course Code: | **ARC 358 / ARC 577 / 24577 / AP AR 5168** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | Nil | |

**Course Objectives:**

1. Develop the knowledge, skills and concepts needed to resolve actual human resource management problems or issues also evaluate the procedures and practices used for recruiting and selecting suitable employees.
2. Manage the employment relationship, which is a shared responsibility between employers, management, human resources specialists, and employees.
3. Identify the human resources needs of an organization or department, additionally conduct a job analysis and produce a job description from the job analysis.
4. Assess training requirements and design a successful orientation and training program.

**Description of Contents in brief:**

1. Need for Human Resources Management
   - Human Resources Management-Roles and Responsibilities
   - The Changing Role of HRM and Growing Professionalism within the HR Function
   - HRM Challenges in the Twenty-First Century
   - Legal issues in HRM
2. Matching HR Needs and People
   - Job Design
   - Job Analysis
   - Human Resources Planning
   - Understanding a Shifting Labour Market
3. Developing People
   - Employee Orientation and Socialization
   - Training and Development
   - Performance Management
   - HR's Role in Setting a Climate for People Development
4. Compensation and Recognition
   - Employee Compensation
   - Incentives and Rewards
   - Employee Benefits and Services
   - Trends in Compensation and Benefits
5. Recruitment and Selection
   - Recruitment Strategies
   - Processes for Selecting the Best Candidate
   - Legal Issues Related to Recruitment and Selection
   - Online and Social Media Recruitment Tools
6. Developing a Healthy Work Environment and Effective Employee Relations
   - Occupational Health and Safety Legislation - Creating a Safe Work Environment
   - The Human Rights Code - Establishing a Positive Work Environment
   - Managing Employee Separations
   - Labour-Management Relations
   - Disciplinary and Grievance Procedures

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| **Course Outcomes:** Students will be able to | |
| 1. | Apply the principles and techniques as professionals for developing human resources in an organization |
| 2. | Administer and contribute to the design and evaluation of the performance management program. |
| 3. | Develop, implement, and evaluate organizational development strategies aimed at promoting organizational effectiveness. |
| 4. | Present and evaluate communication messages and processes related to the human resources function of the organization. |
| **Lecture Schedule:** | |
| 1. | Need for Human Resources Management |
| 2. | Human Resources Management-Roles and Responsibilities |
| 3. | The Changing Role of HRM and Growing Professionalism within the HR Function |
| 4. | HRM Challenges in the Twenty-First Century |
| 5. | Legal issues in HRM |
| 6. | Matching HR Needs and People |
| 7. | Job Design |
| 8. | Job Analysis |
| 9. | Human Resources Planning |
| 10. | Understanding a Shifting Labour Market |
| 11. | Case Studies on Architectural Market and Labour Force Scenario |
| 12. | Mini Test and Preliminary Evaluation |
| 13. | Developing People |
| 14. | Employee Orientation and Socialization |
| 15. | Training and Development |
| 16. | Performance Management |
| 17. | HR's Role in Setting a Climate for People Development |
| 18. | Compensation and Recognition |
| 19. | Employee Compensation |
| 20. | Incentives and Rewards |
| 21. | Employee Benefits and Services |
| 22. | Trends in Compensation and Benefits |
| 23. | Interim Discussions, Case Studies and Conclusions |
| 24. | Mid Term Evaluation |
| 25. | Techniques for developing human resources in an organization |
| 26. | Recruitment and Selection |
| 27. | Recruitment Strategies |
| 28. | Processes for Selecting the Best Candidate |
| 29. | Legal Issues Related to Recruitment and Selection |
| 30. | Online and Social Media Recruitment Tools |
| 31. | Case Study of Labour Strikes in India |
| 32. | Discussion on best practices in HR Management |
| 33. | Group Discussion |
| 34. | Developing a Healthy Work Environment and Effective Employee Relations |
| 35. | Occupational Health and Safety Legislation - Creating a Safe Work Environment |
| 36. | The Human Rights Code - Establishing a Positive Work Environment |
| 37. | Design and evaluation of the performance management program |
| 38. | Managing Employee Separations |
| 39. | Labour-Management Relations |

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| 40. | Disciplinary and Grievance Procedures |
| 41. | Carrot and Stick Approach |
| 42. | Organizational development strategies and promoting organizational effectiveness |
| 43. | Communication messages and processes related to the HR function of the organization |
| 44. | Final Conclusions, Discussions |
| 45. | Final Evaluation |
| **Book References:** | |
| 1. | Dessler, G., Chhinzer, N., & Gannon, G. (2019). Management of human resources: The essentials, (5th Cdn ed.) plus MyManagementLab w/ Pearson eText. Toronto, ON: Pearson Education Canada. |
| 2. | Beanchamp Tom L: Ethical Theory and Business, Prentice Hall. |
| 3. | Mahesh V S: Thresholds of Motivation, Tata McGraw Hill. |
| **Web References:** | |
| 1. | http://www.whatishumanresource.com/human-resource-management |
| 2. | https://www.humanresourcesedu.org/what-is-human-resources/ |
| 3. | https://hbr.org/1981/09/managing-human-resources |
| 4. | https://open.lib.umn.edu/humanresourcemanagement/chapter/1-1-what-is-human-resources/ |

## Elective 5 (THEORY)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Mass housing design and standards** | |
| Course Code: | **ARC 359 / ARC 357 / ARC 24357 / AP AR 3257** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand mass housing projects of various nature and issues related to design considerations to understand mass housing project for slum improvement schemes, transit accommodation for people affected by natural disasters like earthquake, refugees, etc. | |
| **Description of Contents in brief:** | | |
| 1. | Defining house and housing; Urbanization and housing; Equity and efficiency parameters of housing; Current issues in housing. Difference between housing need and housing demand; Understanding housing shortage; Housing demand assessment methods: definition and limitations; Sources of housing statistics data and their uses (Census, NSSO etc.); Urban and rural housing statistic; Quantitative and qualitative aspects of housing | |
| 2. | Housing Development Process Factors affecting residential location; Ecological and institutional approach to housing; Housing subsystems and their characteristics: formal and informal housing, public and private sector housing; Development process: policy context, actors and their interrelationships; Inner city housing: slums, squatter / unauthorized / incremental / marginal and partial housing, site and services development; Role of institutions in housing: international agencies, NGOs, State, financing organizations, private developers, cooperatives | |
| 3. | Housing Standards and Design- Factors of residential densities: location, costs and development control regulations; Housing designs parameters, materials and their relationship to costs; Housing design imperatives: climate and disaster compliance, community-based diversity. Housing Policy Analyses- Evaluation of urban and rural housing policy and programs in India; Slum improvement programs; Comparative policy analysis | |
| 4. | Study of special design considerations for the user, etc.; Mass housing project for various income groups in urban areas. Density distribution, servicing, etc. Mass housing project for Slum Improvement schemes by government or private organizations, old age people. Rehabilitation / transit accommodation /camps for people affected by natural disasters like earthquake, floods, refugees, or other disasters. | |
| 5. | Case studies with analysis of the mass housing projects with respect to of the project considering socio-economic conditions. Government policies for promotion, development control, finance and pricing, technology and time constraints. Study of geography, local conditions and climatic conditions influencing the housing design decisions. | |
| 6. | Evolving design brief for the project, progress of construction and completion. | |
| **Course Outcomes:** | | |
| 1. | Differentiate between the equity and efficiency parameters of housing. | |
| 2. | Interpret housing data. | |
| 3. | Calculate housing shortage. | |
| 4. | Measure residential densities based on different factors. | |
| 5. | List the housing design parameters and explain their relevance to housing costs recall the context wise policy recommendations under housing sector. | |

| Lecture Schedule: | |
|---|---|
| 1. | Defining house and housing |
| 2. | Urbanization and housing |
| 3. | Equity and efficiency parameters of housing |
| 4. | Current issues in housing |
| 5. | Difference between housing need and housing demand; |
| 6. | Continued |
| 7. | Understanding housing shortage; |
| 8. | Housing demand assessment methods: definition and limitations; |
| 9. | Sources of housing statistics data and their uses, |
| 10. | Urban and rural housing statistic |
| 11. | Quantitative and qualitative aspects of housing |
| 12. | Factors affecting residential location |
| 13. | Ecological and institutional approach to housing; |
| 14. | Continued |
| 15. | Housing subsystems and their characteristics |
| 16. | Formal and informal housing |
| 17. | Public and private sector housing |
| 18. | Development process: policy context, actors and their interrelationships; |
| 19. | Inner city housing: slums, squatter / unauthorized / incremental / marginal and partial housing |
| 20. | Site and services development; |
| 21. | Role of institutions in housing: international agencies, NGOs |
| 22. | State, financing organizations |
| 23. | Private developers, cooperatives |
| 24. | Factors of residential densities: location, costs and development control regulations; |
| 25. | Housing designs parameters, materials and their relationship to costs; |
| 26. | Housing design imperatives: climate and disaster compliance, community-based diversity |
| 27. | Evaluation of urban and rural housing policy and programs in India; |
| 28. | Slum improvement programs; Comparative policy analysis |
| 29. | Study of special design considerations for the user, etc.; |
| 30. | Mass housing project for various income groups in urban areas. |
| 31. | Density distribution, servicing, etc. |
| 32. | Mass housing project for Slum Improvement schemes by government or private organizations, old age people. |
| 33. | Rehabilitation / transit accommodation /camps for people affected by natural disasters like earthquake, floods, refugees, or other disasters. |
| 34. | Case studies with analysis of the mass housing projects with respect to of the project considering socio-economic conditions. |
| 35. | Government policies for promotion, development control, finance and pricing, technology and time constraints. |
| 36. | Study of geography, local conditions and climatic conditions influencing the housing design decisions. |
| 37. | Evolving design brief for the project, progress of construction and completion. |
| 38. | Continued |
| 39. | Continued |
| 40. | Continued |
| **Book References:** | |

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|---|---|
| 1. | Kavita Datta and G.A. Jones (1999), 'Housing and Finance in Developing Countries', Routledge, London. |
| 2. | UNCHS (1994), 'National Experience with Shelter Delivery for the Poorest Group', UNCHS, Nairobi. |
| 3. | Gilbert A and Gugler J (1992), 'Cities Poverty and Development – Urbanization in Third World', Oxford University Press. |
| 4. | Cedric Pugh (1990), 'Housing and Urbanization', Sage Publications, New Delhi. |
| 5. | Andrao, D.Thomas, 1986,'Housing and Urban Renewal'. George Allen and Unwin, Sydney. |
| 6. | H.A.Hye. 'Integrated Approach to Rural Development', Sterling Publishers, New Delhi, 1986. |
| **Web References:** | |
| 1. | https://www.hudco.org/ |
| 2. | https://mhada.gov.in/en |

## Elective 5 (THEORY)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Urban Planning and Environmental Design** | |
| Course Code: | **ARC 360** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** The objective of the subject is to: | | |
| 1. | Introduce planning discipline its role, importance and scope. | |
| 2. | Familiarize students with basic planning terminology/vocabulary/thoughts. | |
| 3. | Introduce interdisciplinary character of physical planning. | |
| 4. | Give overview of planning practice and actions in India. | |
| 5. | Sensitize students about the importance and role of maintaining ecosystem functions to ensure that city infrastructure is spatially and functional coherent. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to planning discipline. Defining planning as a discipline, it's multidisciplinary nature, role of a planner. Fields of planning- Urban, regional, environmental, transport and infrastructure planning. Definitions and basis of planning. Various definitions of town and country planning, goals and objectives of planning, components of planning, benefits of planning, arguments for and against planning. Economics and social planning as basis of physical planning. Planning process and levels of planning in India. | |
| 2. | Urbanisation in India and urban problems. Socio-economic impacts of growth of urban areas, rural-urban migration. Impact of technology on urban form. Land use distribution, urban structure and form. | |
| 3. | Types of plans and definition of development plan. Introduction to types of development plans: master plan, city development plan, structure plan, district plan, action area plan, subject plan, comprehensive planning, zonal plans etc. Hierarchy of plans: regional plan, sub-regional plan, sector plans and spatial plans, town planning schemes. | |
| 4. | Evolution of settlements their pattern, size and structure. Influence of socio-cultural, economic, military and religious factors on planning and development of historical cities. Various civilizations and Egyptian, Mesopotamian, Greek, Roman settlements. Town planning in medieval times and in Renaissance Europe. Origin and evolution of civic planning, impact of industrial revolution on town and regional planning. Concepts of garden city, city beautiful, linear city etc. Contributions of leading masters (thinkers, town planners) in planning | |
| 5. | Definitions of Green Infrastructure, Its Significance to Urban Planning, Components and Hierarchy of GI; Regional Parks and Reserves, Protected Areas, Community Parks and Open Spaces, Conservation Corridors, Urban Rivers, Green Belts Etc. | |
| 6. | Economic, Social and Environmental Benefits of Green Infrastructures, Ecosystem Services, Conceptual Exploration of 'Green Growth' Idea | |
| 7. | Objectives of GI Planning From Regional to Neighborhood Scale; Land Conservation, Biodiversity Conservation, Protection of Fragmented Ecological Habitats, Restoration of Disturbed Habitats, Ecotourism, Managing Disaster Risks, Ameliorating Urban Heat Island Effect and Energy Conservation, Urban Space Quality, Community Health, Etc. | |
| 8. | Approaches for Planning Green Infrastructures; Integration with Land Use Planning, Making Grey and Blue Infrastructures Efficient, Urban Regeneration through Enhanced Urban Landscapes and Design, Community Participation | |
| **Course Outcomes:** | | |
| 1. | Understand basic vocabulary of planning. | |

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| 2. | Identify dynamics of cities and initiatives to resolve important physical planning problems. |
| 3. | Appreciate responsibility of planner and importance of physical planning in development process. |
| 4. | Highlight the importance of green infrastructure in preventing the loss of bio- diversity through landuse planning, conservation measures and policy interventions. |
| **Lecture Schedule:** | |
| 1. | Planning as a discipline, it's multidisciplinary nature, role of a planner, Fields of planning – Urban, Regional, , Environmental, Transport etc. |
| 2. | Planning in India (Post independent and colonial impact) |
| 3. | Economics, social and physical planning, Natural resources and planning, Development and growth, Sustainable Development |
| 4. | Planning process and levels of planning in India, Urbanisation in India |
| 5. | Urban and rural India-Planning concerns of cities, towns and villages, Urban problems and rural development issues |
| 6. | Town and country planning, goals and objectives of planning, Top Down and Bottom up approach |
| 7. | Managing cities and towns, Urban governance, local government, different planning and development agencies/organisations |
| 8. | Hierarchy of plans: regional plan, sub-regional plan, sector plans, spatial plans, town planning schemes |
| 9. | Types of plans: Master plan, city development plan, structure plan, district plan, action area plan, subject plan, comprehensive planning, zonal plans etc |
| 10. | Development plan, purpose, process of preparation |
| 11. | Evolution of settlements: Settlement size, pattern and structure; Global distribution of settlements and population |
| 12. | Different factors influencing development of settlements; Classification of settlements |
| 13. | Census classification and definitions; Use of census data for planners |
| 14. | Historical cities and their planning and principles; Examples from Indian cities |
| 15. | Principles of planning as discussed in ancient Indian text; Development of civilization: Global perspective ,River valley civilization |
| 16. | Cont. |
| 17. | Cont. |
| 18. | Egyptian, Mesopotamian, Greek, Roman Civilizations |
| 19. | Cont. |
| 20. | Town planning in Medieval times; Walled cities and Fortification; Renaissance Europe |
| 21. | Cont. |
| 22. | Planning in post industrial revolution era; Origin and evolution of civic planning |
| 23. | Impact of industrial revolution on town and regional planning |
| 24. | Utopian concepts, Concepts of garden city, City beautiful, linear city etc. |
| 25. | Contributions of all leading masters in planning |
| 26. | Contribution of masters to Indian planning/town planning |
| 27. | New towns in India, Examples; Impact of technology on urban form |
| 28. | Contemporary examples of planning initiatives -Case studies |
| 29. | Different planning policies, programmes, acts, bye laws |
| 30. | Urban finance taxation systems |
| 31. | Future of physical planning |
| 32. | Introduction to Green Infrastructure, its definition, components and significance in planning |

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| 33. | Hierarchy of Green Infrastructure |
| 34. | Regional Parks, Reserves, Protected Areas, Community Parks, Open Spaces, Conservation Corridors, Urban Rivers, Green Belts etc. |
| 35. | Benefits of Green Infrastructure: Economic, Social and Environmental Benefits; Ecosystem Services |
| 36. | Conceptual Exploration of 'green growth' ideas |
| 37. | Introduction to Green Infrastructure Planning- Objectives from regional to neighborhood |
| 38. | Land, Biodiversity Conservation, Protection of Fragmented Ecological Habitats |
| 39. | Restoration of Distributed Habitats |
| 40. | Managing disaster risk; Ameliorating Urban Heat Island Effect; |
| 41. | Energy conservation; Urban Space quality; Community Health etc. |
| 42. | Approaches for Planning Green Infrastructure- Integration with Land Use Planning |
| 43. | Making Grey Infrastructure Efficient |
| 44. | Urban Regeneration through Enhanced Urban Landscapes |
| 45. | Community Participation |
| **Book References:** | |
| 1. | Urban Pattern: City Planning and Design- Arthur B. Gallion, Simon Eisner |
| 2. | Town planning in ancient India- Binode Behari Dutt |
| 3. | An Introduction to Regional Planning: concepts, theory and practice- John Glasson |
| 4. | URDPFI guidelines |
| 5. | Urbanisation and urban systems in India- R. Ramachandran |
| 6. | Planning the Indian City- M N Buch |
| 7. | Encyclopedia of urban planning-Arnold Whittick |
| 8. | Urban Geography: A Global Perspective-Michael Pacione |
| 9. | Green Infrastructure: Linking Landscapes and Communities, Benedict M.A. & McMahon E.T., Island Press, Washington, DC. |
| 10. | Planning for an extensive open space system: linking landscape structure and function, Landscape and Urban Planning, Ahern J., 1991, 21, 131-45. |
| 11. | Principles of Ecosystem Stewardship: Resilience-Based Natural Resource Management in a Changing World, Chapin III F.S., Kofinas G.P. & Folke C. (eds.), Springer, New York. |
| **Web References:** | |
| 1. | http://www.mohua.gov.in/ |
| 2. | https://nrcd.nic.in/ |
| 3. | https://niti.gov.in/ |
| 4. | https://censusindia.gov.in/ |
| 5. | https://rural.nic.in/ |

## Elective 5 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Urban and Regional Planning** | |
| Course Code: | **ARC 361 / ARC 561 / ARC 24561 / AR AP 5161** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand basic components of urban areas and regions. |
| 2. | Types of planning theory and techniques. |
| 3. | Types of Plans such as comprehensive planning, master plans, structure plans, zonal plans. |
| 4. | Levels of Urban and regional planning at different levels like national level, state level, district level etc. |
| **Description of Contents in brief:** | |
| 1. | Urban planning its definition, hierarchy and need. Regional planning its definition, hierarchy and need. Evolution of City Planning including settlement size, pattern and structure as a function of socio-cultural, economic, military and religious factors, origin and evolution of civic planning; impacts of industrial revolution on town and regional planning. |
| 2. | Overview of different planning theories and models such as garden city, city beautiful, linear city etc. Introduction to planning theory & techniques such as settlement system, classification of settlements, central goods and services, range, threshold, city-region relationship, structure of city regions, area of influence, dominance, rural-urban fringes, push and pull factors, migration trends and impacts on urban and rural development, characteristics of the urban environment - land uses, physical structure and relationship between parts of a city. |
| 3. | Introduction to surveys, analyses and methods, techniques of conducting surveys for land use, building use, density, structural condition of buildings, heights of building, land utilization and physical features of land; data requirement for various types of plans; population, distance criteria; performance standards, etc. |
| 4. | Introduction to demography in urban planning. Demographic variables such as population study, fertility, mortality, migration; evolution of mortality-trends, biological and social factors and mortality-gender, race, social structure, life-style, occupation, ethnic groups, socio-economical group mobility, literacy level, life-table techniques; and population estimation, projection and population forecasting. |
| 5. | Planning norms and development norms for green-field, existing areas, renewal schemes and development. Types of City Plans such as comprehensive planning, master plans, structure plans, zonal plans. |
| **Course Outcomes:** | |
| 1. | Students should be able to understand the process of urban planning. |
| 2. | Will be able to analyse plans at different levels/scales like city, zone or district. |
| 3. | Students will able to prepare different level of plans based on the planning norms. |
| **Lecture Schedule:** | |
| 1. | Introduction to Urban and Regional planning |
| 2. | Principles and objects of Urban Planning, Economic justification and necessity of Urban planning |
| 3. | Hierarchy and need of Regional planning |
| 4. | Evolution of City Planning including settlement size, pattern and structure as a function of various factors |

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| 5. | Class exercise |
| 6. | Ideal site characteristics, Cost of Urban planning |
| 7. | Impacts of industrial revolution on town and regional planning |
| 8. | Present position of Urban planning in India |
| 9. | Class exercise |
| 10. | Introduction to planning theory & techniques |
| 11. | Planning theories and models such as garden city, city beautiful, linear city with examples and their success and failure story |
| 12. | Lab exercise |
| 13. | Settlement system, classification of settlements |
| 14. | Overview of central goods and services, range and threshold |
| 15. | Introduction to city-region relationship, structure of city regions, area of influence and dominance. Various push and pull factors |
| 16. | Cause of migration, migration trends and its impacts on urban and rural development |
| 17. | Characteristics of the urban environment and various types of land uses |
| 18. | Brief example of physical structure and relationship between parts of a city |
| 19. | Class Discussions |
| 20. | Introduction to surveys and its necessity |
| 21. | Data collection techniques |
| 22. | Methods adopted to analyse data |
| 23. | Conducting surveys for land use, building use, density, structural condition of buildings |
| 24. | Analysis and preparation of maps , drawings and Reports |
| 25. | Exercises |
| 26. | Data requirement for various types of plans; population, distance criteria |
| 27. | Practical for conducting a survey for an area |
| 28. | Conducting a survey for a heritage building |
| 29. | Discussion and exercise |
| 30. | Understanding the role of demography in urban planning, Description about demographic variables |
| 31. | Understanding the evolution of mortality-trends with practical examples |
| 32. | Description about biological, social factors and mortality-gender, race, social structure |
| 33. | Description about life-style, occupation, ethnic groups, socio-economical group mobility |
| 34. | Detailing about life-table techniques |
| 35. | Population projection technique and population forecasting |
| 36. | Numerical problems regarding Population projection |
| 37. | Exercise on population projections |
| 38. | Planning norms and development norms by selecting any state |
| 39. | Zoning, objectives and importance of zoning, types of zoning |
| 40. | Brief description of comprehensive planning, master planning and zonal planning |
| 41. | Review of master plans – Case studies |
| 42. | Discussions on Master plans |
| 43. | Overview of green-field and existing area development norms, Overview of including renewal schemes and development |
| 44. | Selection of a Regional Plan and data collection |
| 45. | Data analysis and discussion on selected areas |
| **Book References:** | |
| 1. | A Reader in Planning Theory, Faludi, A, Pergamon Press, Oxford |
| 2. | Principles and Practice of Town and Country Planning, Keeble, L., The Estate Gazette, London |

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| 3. | Urban and Regional Planning: McLoughlin, J.B., Faber and Faber, London. |
| 4. | Control and Urban Planning , McLoughlin, J.B., Faber and Faber, London. |
| 5. | Urban and Regional Planning, Hall, P. Fourth edition, Routledge, London. |
| 6. | Planning in the Public Domain, Freidmann, J., Princeton University Press, Princeton. |
| **Web References:** | |
| 1. | |

## Elective 5 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Traffic and Transportation Planning** | |
| Course Code: | **ARC 362 / ARC 563 / ARC 24563 / AR AP 5163** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To impart knowledge on understanding of urban transportation problems in planner's perspective and objectives to serve as guiding factors in the planning process, Integration of land use and transportation, identification of the factors influencing the demand for urban travel and development of relationship between the factors and the travel demand. |
| **Description of Contents in brief:** | |
| 1. | Transport development: Economic, political and social significance and transport development, urban form and city structure, Transportation systems and their types, Design and operational characteristics of various public transportation, Problems and prospects, Transport policies and programs in India, Transport coordination with various agencies, Concept of PCU, Travel and Traffic Characteristics. |
| 2. | Road Hierarchy: ROW, Urban and Rural road classification, Urban Road structure, At-grade and grade separated intersections, Planning management and geometric criteria for roads & junctions. |
| 3. | Transport survey and studies: Study area definitions, Traffic survey and their types, need, design of proforma, methods of conducting surveys, analysis and interpretation, Sampling methods & survey techniques, Programming and processing of travel data, Analysis and interpretation of traffic studies. Parking design standards |
| 4. | Traffic management: Travel demand Management, Traffic Management, Planning and management criteria for junction improvement, Arterial improvement techniques. Design of Street furniture, Road Infrastructure, Bus and truck terminals |
| 5. | Transportation Planning Process: conceptual approach of planning process, Techniques for urban structures analysis, urban travel characteristics, four stage modeling in transportation planning process, transport and land use integration. |
| 6. | Transport and environment: Traffic noise, factor affecting noise statement measures, standards, air pollution standards, traffic safety, transport planning for different target groups, Norms and guidelines for highway landscape, street lighting; types, standards and design considerations. |
| 7. | Economic evaluation: pricing and funding of transport services and systems, economic appraisal of highway and transport projects. Techniques for estimating direct and indirect road user costs and benefit value of time, intelligent transport system (ITS); Need, applications and types. |
| **Course Outcomes:** | |
| 1. | The course provides adequate exposure to basic understanding of transportation planning and management in urban areas, travel demand forecasting, landuse transport integration, road infrastructure and terminal facilities. |
| **Lecture Schedule:** | |
| 1. | Role of transportation in physical planning |
| 2. | Economic, political and social significance and transport development |
| 3. | Evaluation of urban structure and Urban Form |
| 4. | Continue.. |
| 5. | Transportation System and Types |

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| 6. | Operational Characteristics of Public and Mass Transport Systems |
| 7. | Continue.. |
| 8. | Terminologies in transportation i.e. Trip PCU, ROW etc |
| 9. | Transport policies and programs in India |
| 10. | Continue.. |
| 11. | Travel Characteristics |
| 12. | Traffic Characteristics |
| 13. | Transport coordination with various agencies |
| 14. | Urban Road Hierarchy |
| 15. | Continue.. |
| 16. | Rural Road Hierarchy |
| 17. | Traffic Surveys , Applications and Techniques |
| 18. | Sampling methods, survey Analysis and interpretation of traffic studies |
| 19. | Traffic Volume Count Survey |
| 20. | Origin and Destination Survey |
| 21. | Continue.. |
| 22. | Parking Surveys and design standards |
| 23. | Speed and Delays Surveys |
| 24. | Public Transport Surveys |
| 25. | Pedestrian Surveys |
| 26. | Standards of pedestrian footpath and refuse spaces |
| 27. | Travel Demand Management |
| 28. | Traffic Management |
| 29. | Continue.. |
| 30. | Existing traffic management schemes in Indian cities |
| 31. | Continue.. |
| 32. | Conceptual approach of Transport Planning Process |
| 33. | Four Stage Planning and Modeling |
| 34. | Trip generation and Trip Distribution |
| 35. | Modal Split and Trip Assignment |
| 36. | Introduction of transport and landuse integration |
| 37. | Study of landuse transport models |
| 38. | Continue.. |
| 39. | Traffic noise, factor affecting noise statement measures |
| 40. | transport planning for different target groups |
| 41. | Norms and guidelines for highway landscape |
| 42. | Standards and design considerations for street lighting |
| 43. | Economic Evaluation Criteria and its Assessment |
| 44. | Continue.. |
| 45. | Intelligent transport system (ITS) its types and applications. |
| 46. | Continue.. |
| **Book References:** | |
| 1. | Introduction to transport planning by Michael J Bruton |
| 2. | Principal of Urban transport system planning by Hutchinson |
| 3. | Transport modeling by Ortuzer and Williumson |
| 4. | Traffic and Transportation planning and engineering by L R Kadiyali |
| 5. | Transport Planning and Traffic Engineering by C A O'Flaherty |
| 6. | Public Transport Planning and Management by Ashish Verma and T V Ramanayya |

| Web References: | |
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| 1. | NPTEL lectures |
| 2. | Coursera |
| 3. | Udemy |
| 4. | E-Books |

## Elective 5 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Infrastructure Planning and Design** | |
| Course Code: | **ARC 363 / ARC 564 / ARC 24564 / AR AP 5164** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To equip and train the students with multiple aspects of theory and practice of Infrastructure Planning and design with development of skills to deal with diverse requirements of capacity building. | |
| **Description of Contents in brief:** | | |
| 1. | Water Supply and Sanitation : Quantity and quality of water, source of supply, transmission and distribution, treatment methods, design guidelines.<br>Sanitation – concepts, disposal systems, low cost sanitation options; engineering aspects of sewage disposal;<br>Wastewater – generation, disposal system<br>Storm water drainage – systems<br>Sewerage treatment Plant | |
| 2. | Solid Waste Disposal and Management : Basic principles, generation, characteristics, collection, disposal, management. | |
| 3. | Fire and Electrification, and Social Infrastructure : Planning for fire protection, services and space standards, location criteria; Planning for Education, health, civic, cultural infrastructure | |
| 4. | Traffic and Transportation : Planning for infrastructure and facilities for transport | |
| **Course Outcomes:** | | |
| 1. | To develop skill of development of infrastructure and presenting solutions on sustainable development with infrastructure planning and design. | |
| 2. | To inculcate the skill of fulfilling the requirements of Infrastructure Planning and Design with short term and long term measures as it is application amongst the students. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to Infrastructure Planning and Design | |
| 2. | Discussion on whole subject as per exercises covered in whole semester | |
| 3. | Principles of Infrastructure Planning and Design | |
| 4. | Description and study of issues on Infrastructure Planning and Design with reference to URDPFI guidelines | |
| 5. | Explanation and application of each standard and guidelines with applied examples | |
| 6. | Identification of various applied issues of Infrastructure Planning and Design on day to day life | |
| 7. | Case study of live spaces on Infrastructure Planning and Design | |
| 8. | Available standards and guidelines for Infrastructure Planning and Design from global to local | |
| 9. | Study of impact of various issues of Infrastructure Planning and Design applicable on vulnerable situations | |
| 10. | Distribution of topic for study on Infrastructure Planning and Design to each student for detailed study with its functional and appropriate use. | |
| 11. | Identification and study of successful projects/works of renowned Architects and Planners | |
| 12. | Listing of the issues of Infrastructure Planning and Design with its application during disaster mitigation | |

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| 13. | Detailed study of the issues of water supply and sanitation for sustainable Infrastructure Planning and Design |
| 14. | Teaching Sources of water supply |
| 15. | Teaching Quantity and quality of water |
| 16. | Class lecture and discussions on design guidelines for quantity and quality of water |
| 17. | Wastewater – generation, disposal system |
| 18. | Storm water drainage – systems |
| 19. | Sewerage treatment Plant |
| 20. | low cost sanitation options |
| 21. | Class lecture on transmission, distribution, treatment methods |
| 22. | Sanitation – engineering aspects of sewage disposal |
| 23. | Study on various issues on Infrastructure Planning and Design for Sanitation |
| 24. | Concepts, disposal systems |
| 25. | Study on low cost sanitation options |
| 26. | Engineering aspects of sewage disposal |
| 27. | Class lecture on Solid Waste Disposal and Management |
| 28. | Class lecture on reduce, reuse and recycle |
| 29. | Basic principles of SWM |
| 30. | Lecture on generation and characteristics of SWM |
| 31. | Collection method of SWM |
| 32. | Disposal of SWM |
| 33. | Classroom lecture on overall management of SWM |
| 34. | Fire and Electrification, and Social Infrastructure |
| 35. | Planning and designing for fire protection |
| 36. | Planning and designing for fire services and space standards |
| 37. | Location criteria |
| 38. | Planning for Education, health, civic |
| 39. | Cultural infrastructure |
| 40. | Class lecture on Traffic and Transportation |
| 41. | Class lecture on Planning for infrastructure and facilities for transport |
| 42. | Discussions on various projects chosen by students |
| 43. | Overall expert inputs |
| **Book References:** | |
| 1. | Chattopadhyay, S. (2009). New Essays on inclusive housing, Macmillan, Delhi. |
| 2. | Husain S K, Oxford & Ibh Publishing Updated 3rd Edition 2017, Textbook Of Water Supply And Sanitary Engineering |
| 3. | G. Payne, G.(1999). Making Common Ground, Intermediate Technology Publications, Ltd,London. |
| 4. | LR Kadiyali, Traffic Engineering and Transport Planning |
| 5. | Mathey, K. (1992). Beyond Self-help Housing, Mansell Publishing Ltd., London. |
| 6. | Reading Material on Infrastructure Planning and design, ITPI Publication, New Delhi |
| 7. | Tchobanoglous G , McGraw Hill, Integrated Solid Waste Management Engineering Principles And Management Issues |
| **Web References:** | |
| 1. | SWAYAM |
| 2. | MOOCS |
| 3. | NPTEL |
| 4. | Open access from university libraries |

## Elective 5 (THEORY)

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| Name of Program: **B.Arch.** | | Semester: **X** | Year: **V** |
| Name of Course: | | **Environmental impact assessment** | |
| Course Code: | | **ARC 364 / ARC 554 / ARC 24556 / AR AP 5154** | |
| Core/Elective/Other | | **Elective** | |
| Prerequisite: | | | |
| **Course Objectives:** | | | |
| 1. | To help students develop a comprehensive and critical understanding of EIA process. | | |
| 2. | To learn the methods of evaluating impact of building activities on components of environment. | | |
| 3. | Understand how EIA is used in research, planning, project or program evaluation, monitoring, and regulatory enforcement | | |
| 4. | To imbibe the significance of EIA in the planning and decision-making process | | |
| **Description of Contents in brief:** | | | |
| 1. | Importance of EIA , comprehensive understanding of the process. | | |
| 2. | Statutory requirement and regulatory enforcement, its significance in the planning and decision-making process. | | |
| 3. | Overview of the relationship between natural environment and human societies and the environmental impact due to unchecked development on regions, communities, etc. | | |
| 4. | Environmental Impact Assessment as a planning process with aims to predict, evaluate, and mitigate the potential impacts of proposed projects/policies/programs. | | |
| 5. | Methods and techniques in EIA and SIA to predict impacts. | | |
| 6. | Study of the legal, economic, social, administrative and technical process of preparing and/or evaluating environmental impact documents, public participation. | | |
| 7. | Assessment of impacts on land use (Urban and regional); resources (including air, water, flora and fauna) and social & health impacts with relevant case studies from India and abroad. | | |
| 8. | Critical reviews of EIA documents for policy development, project planning or for legal or political action planning, preparations of portions of environmental documents through administrative and legal requirements and standards of professional practice, EMP, Risk assessment. | | |
| **Course Outcomes:** | | | |
| 1. | To gain a critical understanding of the use, strengths, and limitations of EIA. | | |
| 2. | To understand impact of various activities on components of environment. | | |
| 3. | To carry out the EIA of a project. | | |
| **Lecture Schedule:** | | | |
| 1. | Importance of EIA understanding of the use, strengths, and limitations of EIA | | |
| 2. | Statutory requirement and regulatory enforcement, its significance in the planning and decision-making process. | | |
| 3. | Process of EIA, Types of EIA all over world | | |
| 4. | Process of EIA in India | | |
| 5. | Overview of the relationship between natural environment and human societies and the environmental impact due to unchecked development on regions, communities, etc | | |
| 6. | Continue... | | |
| 7. | Exercises | | |
| 8. | EIA notifications, Acts and amendments | | |
| 9. | Categories of projects | | |
| 10. | Environment Clearance categories A and B (B1 and B2) | | |

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| 11. | Environmental Impact Assessment as a planning process with aims to predict, evaluate, and mitigate the potential impacts of proposed projects/policies/programs |
| 12. | Study of Environment components – Landuse, Air, Land , Water flora and fauna etc |
| 13. | Baseline study and survey techniques |
| 14. | Continue… |
| 15. | EIA methods of impact prediction like checklist, matrix method, network etc |
| 16. | Continue… |
| 17. | Exercises on checklist methods… |
| 18. | Case studies |
| 19. | Exercises on matrix method … |
| 20. | Case studies |
| 21. | Exercises on network method |
| 22. | Methods of EIA evaluation – Baettle, |
| 23. | Case studies |
| 24. | Exercise on Battle evaluation method |
| 25. | Environment Impact statement (EIS) |
| 26. | Exercise of writing EIS |
| 27. | Environment Impact Mitigation |
| 28. | Mitigation measures for Air , water, land, etc |
| 29. | Social impact assessment methods for visual, cultural, environmental justice and social/quality of life impact models; |
| 30. | Building development related specific impacts |
| 31. | Rain water harvesting calculations |
| 32. | Waste water and sewage - STP |
| 33. | Parking management |
| 34. | Air and Noise impact models |
| 35. | Environment Management Plan |
| 36. | Air, water monitoring Plan |
| 37. | Public Participation in EIA |
| 38. | Post EIS monitoring/impact auditing |
| 39. | Exercises.. |
| 40. | Disaster management Plan and Risk assessment |
| 41. | Assignment on complete EIA study |
| 42. | Continue on assignment |
| 43. | Continue on Assignment |
| 44. | Presentation and discussions. |
| 45. | Evaluation of proposed government policies and programs |
| 46. | Review of current controversies in EIA practice |
| 47. | Discussion on current shortcomings in EIA process |
| **Book References:** | |
| 1. | Environmental Impact Assessment: A Methodological Approach - Richard K. Morgan |
| 2. | Handbook on Environmental Impact Assessment by Petts Judith |
| 3. | Environmental Law in India by Leela Krishnan |
| **Web References:** | |
| 1. | http://moef.gov.in/ |
| 2. | www.epa.gov/nepa |
| 3. | Environmental clearance reports from MoEF website |

## Elective 5 (THEORY)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Research Techniques in Architecture** | |
| Course Code: | **ARC 365 / ARC 363 / ARC 24363 / AR AP 3263** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | To understand importance of research in architecture. |
| 2. | To understand the theoretical and practical significance of research. |
| 3. | To provide students the exposure to software for analysis and formatting of report. |
| **Description of Contents in brief:** | |
| 1. | Introduction |
| 2. | Research Types |
| 3. | Research Design |
| 4. | Research Methods |
| 5. | Research Areas |
| 6. | Introduction to Statistics |
| 7. | Literature study |
| 8. | Data Documentation and Analysis |
| 9. | Data conversion |
| 10 | Data Presentation |
| 11 | Reporting the Research |
| 12 | Referencing |
| **Course Outcomes:** Students should be able to | |
| 1. | Evolve in-depth understanding of specific area/subject through primary and secondary analytical techniques and presentations. |
| 2. | Conduct formulation of idea, data collection, analysis, synthesis and derive to conclusion. |
| 3. | Produce report by culminating the research as documented academic resource. |
| **Lecture Schedule:** | |
| 1. | Introduction to Research Techniques in Architecture |
| 2. | Study types of research in process of formulating a research plan, various methods of research, their applications, data and simple statistical analysis, interpret and infer from the data. |
| 3. | Continued |
| 4. | Continued |
| 5. | Continued |
| 6. | Continued |
| 7. | Continued |
| 8. | Continued |
| 9. | Methods of technical writing and presenting a research report. |
| 10. | Continued |
| 11. | Research design - components of research, literature study and research. |
| 12. | Continued |
| 13. | Continued |
| 14. | Methods of research in architecture - interview techniques such as designing a questionnaire, face-to-face interviews, internet survey, etc. and visual techniques. |
| 15. | Continued |
| 16. | Continued |

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| 17. | Continued |
| 18. | Continued |
| 19. | Study content analysis, observations, activity mapping, accession / erosion trace observations, cognitive maps, data documentation and analysis. |
| 20. | Continued |
| 21. | Continued |
| 22. | Continued |
| 23. | Continued |
| 24. | Continued |
| 25. | Continued |
| 26. | **MIDTERM** |
| 27. | Understand areas of research in architecture (qualitative and quantitative paradigms). |
| 28. | Introduction to Statistics - simple statistical methods frequencies / percentages mean / median / mode, correlation, chi square test – inferring from the data and interpreting the meaning of those inferences. |
| 29. | Continued |
| 30. | Continued |
| 31. | Continued |
| 32. | Continued |
| 33. | Continued |
| 34. | Continued |
| 35. | Continued |
| 36. | Understand software for statistical data analysis of analyzing numerical data, statistical data analysis. |
| 37. | Continued |
| 38. | Significance of literature study, different sources of information such as books, journals, newspapers, internet, magazines, audio-recordings, etc. |
| 39. | Continued |
| 40. | Data Documentation and Analysis including understanding the nature of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). |
| 41. | Continued |
| 42. | Understand Converting data into numerical form for data analysis. |
| 43. | Continued |
| 44. | Techniques of presenting the numerical data – graphical (pie charts, bar charts, line graphs etc.), tabulations, verbal qualitative data, architectural drawings / maps. |
| 45. | Continued |
| 46. | Understand Reporting the Research including different sections of a research report, technical writing and language |
| 47. | Referencing and documenting the bibliography |
| **Book References:** | |
| 1. | Research Methods and Techniques in Architecture - Niezabitowska, E.D. |
| 2. | Architectural Research Methods - David Wang and Linda Groat |
| **Web References:** | |
| 1. | https://issuu.com/ymahgoub/docs/lecture1-research_methods_in_archit |
| 2. | https://www.re-thinkingthefuture.com/article/understanding-research-methodologies-in-architecture/ |
| 3. | https://www.researchgate.net/publication/226862953_Architectural_Research_Methods |

## Elective 5 (THEORY)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Passive Solar Architecture** | |
| Course Code: | **ARC 366** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | The main objective is to meet the challenges of sustainable development by offering this specialized course of solar passive design emphasizing the strategies, concepts and services. |
| 2. | The aim is to develop skills, knowledge and understanding related to environmental sustainability, construction and building technology, adopting the principles and practices of sustainable building design, while responding to environmental challenges such as Climate change, environmental degradation etc. The course offers a contextualized and deep understanding of sustainability in architecture. |
| **Description of Contents in brief:** | |
| 1. | Introduction and basic concepts of solar passive architecture, solar energy availability, micro climate and buildings, steady state thermal analysis of buildings, principles of thermal comfort. |
| 2. | Conceptual design of passive solar buildings, appreciation of various built forms of various climates, cooling load of buildings, factors affecting the cooling load, methods of calculation etc. |
| 3. | Heat attenuation, role of thermal mass, parameters influencing thermal mass effectiveness, calculations, case studies. |
| 4. | Fenestration components and systems, design of shading systems, solar geometry, design tools. |
| 5. | Solar passive techniques , passive cooling systems its applications and guidelines, simple techniques, thermal storage walls, roof pond systems, radiation techniques etc Case studies as an exercise for better understanding of the above strategies. |
| **Course Outcomes:** | |
| 1. | Students will learn about the basic systems and building features that can be used to passively heat buildings using solar energy. They will learn how to evaluate climate and solar availability to determine feasibility of cost-effective passive solar systems at specific project sites. And they will gain knowledge of guidelines to use in preparing feasibility studies for passive solar projects. |
| **Lecture Schedule:** | |
| 1. | Introduction and basic concepts: passive solar design principles |
| 2. | Solar energy availability |
| 3. | Micro climate: Climate & microclimate, topography as climate modifier |
| 4. | Urban forms as climate modifiers |
| 5. | Climate and design requirements |
| 6. | Principles of thermal comfort, Approximate estimation of solar savings |
| 7. | Conceptual design of passive solar buildings |
| 8. | Appreciation of Built form for different climates |
| 9. | Appreciation of Built form contd. |
| 10. | Cooling load of buildings: factors affecting, methods of calculation etc |
| 11. | Tutorial based on the above |

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| 12. | Heat Attenuation and its impact on buildings |
| 13. | Role of thermal mass, heat transfer mechanism, parameters |
| 14. | Transient heat transfer and thermal storage |
| 15. | Fenestration components and systems |
| 16. | Design of fenestration system for day lighting |
| 17. | Tutorial exercises |
| 18. | Building clusters and solar exposure |
| 19. | Description of solar geometry |
| 20. | Graphical design tools |
| 21. | Solar control techniques |
| 22. | Types of passive systems: attached green house, thermal storage roof and convective loop. |
| 23. | Classification of passive cooling systems according to the major natural source from which the cooling energy is derived. |
| 24. | Tutorial based on the above |
| 25. | Minimizing cooling needs by building design: building shape & layout, orientation, size of windows, shading of window, color of the envelope and climatic impact of plants around building. |
| 26. | Minimizing cooling needs by building design continued……. |
| 27. | Tutorial exercises |
| 28. | Radiative cooling –The earth as a cooling source for buildings. |
| 29. | To study the solar passive and active concepts of the buildings and documenting the same during field work. |
| 30. | Presentation of the above work by the students |
| 31. | Presentation of the above work by the students |
| 32. | Cooling of attached outdoor spaces. |
| 33. | Passive solar configuration – outline of various passive systems for heat gain. Indirect Gain – Trombe wall, Water wall and Transwall. |
| 34. | Passive solar configuration continued…. |
| 35. | Passive solar configuration continued…. |
| 36. | Sun spaces / attached solarium / conservatory. |
| 37. | Roof Pond / Skytherm – Vary Thermal Wall |
| 38. | Tutorial exercises on the above passive systems |
| 39. | Earth sheltered / earth bermed structures and earth-air tunnels |
| 40. | The use of earth-air tunnels to heat or cool the buildings |
| 41. | Discussions on the other alternatives of the passive solar systems |
| 42. | Modern and postmodern passive architecture |
| 43. | The above methods, strategies, systems, and construction details emphasizing the passive architecture |
| 44. | Simplified methods for passive cooling Applications |
| 45. | Assignment based on live case studies and discussions |
| **Book References:** | |
| 1. | Givoni Baruch,(1994) “Passive and Low Energy Cooling of Buildings”, Van Nostrand Reinhold, New Yord. |

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|---|---|
| 2. | Sodha, M., Bansal, N. K., Bansal, P. K., KuMEB, A., and Malik, M. A. S.,(1986) “Solar Passive Buildings”, Pergamon Press, Oxford. |
| 3. | Kishnani, N., (2012) “Greening Asia – Emerging principles for sustainable Architecture” publications : FuturArc., Singapore. |
| 4. | Bansal, Narender, K.., Hauser Gerd and Minke Gernot,(1994) “Passive Buildings Design: |
| 5. | A Hand book of Natural Climatic Control”, Elsevier Science, Amsterdam. |
| 6. | Chandra,M.,(1995) “ Passive and low energy cooling systems of buildings – A review with special reference to Indian conditions” IE(I) , A.R Vol.76,p.p 12-22 |
| 7. | Chandra, M and Puri, J.S, (2000) “Cooling and Heating of Buildings with buried Earth – tube heat exchanger: An experiment study.” SESI Journal, Vol.10,No.1,p.p 1-10. |
| 8. | Cook, J., and Bansal, N.K (2001) “Sustainability Through Building,” Omega Scientific publishers, India |
| 9. | Bansal,N.K., (1983) 'Periodic Analysis of Ventilated Trombe Wall', Int. J. Energy Research 7 (1), 163. |
| 10 | CBRI, (1878) “SummerTtropical Index”, , Building digest no 135 CBRI, Roorke, India. |
| 11 | Kaushik, S. C., Tiwari, G. N. and Nayak, J. K., (1988) ’Thermal control in passive solar building,” Go-Environ Academia press, Jodhpur. |
| 12 | Chandra,M.,(1997) “ Design Principles of external shading devices for solar control in Buildings”IE(I) journal – AR Vol.77,p.p 33-52 |
| 13 | Sodha, M. S., Bansal, N. K., Kumar, A., Malik, M. A. S.,(1986) “Solar passive building”, Pargamon press., New york. |
| 14 | Sodha, M. S., Kaur, J., Sawhney, R.L (1992) ‘Effect of underground floor water storage on thermal performance of a room’, Int. J. Energy Research, 16,315-325. |
| 15 | Trombe A, Seress L.(1994) ‘Air-Earth exchanger study in real site experimentation and simulation. Energy and buildings 21,pp:155-162. |
| 16 | Antinucci, M. Fleury, B. Lopez, D. Asian, J, Maldonado, E, Santamouris, M., Tombazisa. And Yannas, S., (1992) “Passive and hybrid cooling of buildings,” State of Art, Vol. 11, pp. 251-27. |
| 17 | Bansal, N.K.,(1983 )'Periodic Analysis of Ventilated Trombe Wall', Int. J. Energy Research 7 (1), 163. |
| 18 | Worth,D.,(1992) ‘Embodied Energy Analysis of Buildings.’ Part 1: Determining the energy content of the Building Materials. ESD seminar, Deakin University. |
| 19 | Chandra,M.,(1997), ‘Trombe wall as solar solution” Indian Architect & Builder, Vol.10,No.6 ,p.p 106-109. |
| 20 | Bansal,N.K., (2002) 'Evaluation of Natural Cooling Techniques in Indian Climatic Conditions' , International Journal of Ambient Energy, 23(1). |
| 21 | Krishan, A., Baker,N., Yannas, S and Szokolay,.(1999) “CLIMATE RESPONSIVE ARCHITECTURE:A Design Handbook for Energy Efficient Buildings” McGraw Hill Education (India) Private Limited.( ISBN-10: 0074632183) |
| **Web References:** | |
| 1. | https://en.wikipedia.org/wiki/Passive_solar_building_design |
| 2. | https://sustainability.williams.edu/green-building-basics/passive-solar-design |
| 3. | https://www.researchgate.net/publication/323289561_Solar_Passive_Architecture |
| 4. | https://www.irjet.net/archives/V3/i12/IRJET-V3I12307.pdf |
| 5. | https://sustainablesources.com/energy/passive-solar-design/ |

## Elective 5 (THEORY)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Architectural literary heritage of India** | |
| Course Code: | **ARC 367 / ARC 555 / ARC 24555 / AP AR 5155** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | History of Architecture, ability to read Sanskrit | |
| **Course Objectives:** To familiarize the students with | | |
| 1. | The available literature on Indian system of architecture (*Stapathya*) | |
| 2. | The complexities of design systems followed in Indian system of architecture | |
| **Description of Contents in brief:** | | |
| 1. | Classification of literary heritage especially Dravida and Nagra translated texts. Understanding commonalities and exclusiveness of texts and overall structure of texts. | |
| 2. | Contents of texts such as; study of site selection, system of measurement, mandalas, components of buildings like pillars, base, etc. | |
| 3. | Building type such as pavilions, temples, houses, etc. study of town planning, village planning and fort designs. | |
| 4. | Visual interpretation of buildings described in such texts like Mayamatam, Manasara, Samarangana, Sutradhara, etc. | |
| 5. | Documenting and understanding of constructional practices and building materials. Intangible and mystic information in text. Relevance of information in these texts in contemporary scenario. | |
| **Course Outcomes:** Students will | | |
| 1. | Become aware of the literary architecture heritage | |
| 2. | Understand the relevance of these texts to present day construction | |
| 3. | Improve design skills | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | |
| 2. | Literary heritage translated texts available, structure, commonalities and exclusiveness | |
| 3. | South Indian Sanskrit and translated texts | |
| 4. | North and Central Indian Sanskrit and translated texts | |
| 5. | East and West Indian Sanskrit and translated texts | |
| 6. | Content analysis of texts | |
| 7. | Site selection | |
| 8. | Orientating method | |
| 9. | System of measurement | |
| 10. | Mandalas | |
| 11. | Building components; base | |
| 12. | Building components; base | |
| 13. | Building components; pillars | |
| 14. | Building components; pillars | |
| 15. | Building components; entablature | |
| 16. | Building components; entablature | |
| 17. | Building components; roof | |
| 18. | Building components; roof | |
| 19. | Building types; temples | |
| 20. | Building types; temples | |
| 21. | Building types; temples | |
| 22. | Building types; temples | |
| 23. | Building types; palaces | |

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| 24. | Building types; palaces |
| 25. | Building types; houses |
| 26. | Building types; houses |
| 27. | Building types; houses |
| 28. | Building types; houses |
| 29. | Building types; pavilions |
| 30. | Building types; pavilions |
| 31. | Building types; pavilions |
| 32. | Interior items; furniture, doors, sculpture etc. |
| 33. | Interior items; furniture, doors aculpture etc. |
| 34. | Settlement types; villages |
| 35. | Settlement types; villages |
| 36. | Settlement types; forts |
| 37. | Settlement types; towns |
| 38. | Settlement types; towns |
| 39. | Exercises on visual interpretation |
| 40. | Exercises on visual interpretation |
| 41. | Exercises on visual interpretation |
| 42. | Building materials in literature |
| 43. | Building materials in literature |
| 44. | Relevance of architectural literary heritage in Contemporary academics and practice |
| **Book References:** | |
| 1. | Mayamatam, Bruno Dagens, IGNCA |
| 2. | Manasara, P.K. Acharya, |
| 3. | Samaranganasutradhara, D.N. Shukla |
| 4. | Theory and practice of Samaranganasutradhara Adam Hardy |
| 5. | The architecture of Hindus. Ram Raz |
| 6. | Vastusutra upnishad, IGNCA |
| 7. | Vishwakarma Prakash |
| 8. | Manushyalayachandrika |
| 9. | Rajavalabha |
| 10. | Kalatatvakosa all volumes, IGNCA |
| **Web References:** | |
| 1. | http://ignca.gov.in/ |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Barrier free Architecture** | |
| Course Code: | **ARC 371/ ARC 354 / ARC 24354 / AR AP 3254** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To study Barrier Free Environment is one which enables people with disabilities to move about safely and freely and to use the facilities within the built environment. It provides an environment that supports the independent functioning of individuals and participates without assistance, in everyday activities. | |
| **Description of Contents in brief:** | | |
| 1. | Types of disability, Mobility devices and controls. Guidelines and space standards for barrier free built Environment for disabled and elderly persons in various buildings such as institutes, hospitals, public spaces, shopping complexes and office buildings etc. | |
| 2. | Construction and maintenance standards, classifications of buildings and access provisions. Design elements within buildings, Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems. Floor materials. | |
| 3. | Design elements outside the buildings - kerb at footpath, road crossing, public toilet, bus stop, toilet booth, and signage. Provisions for residential buildings and public buildings and places like auditorium, parks, restaurants, railway station. Access audit and implication in building byelaw. | |
| 4. | Persons with Disabilities Act (equal opportunities, protection of rights and full participation) and bye-laws which would be applicable to all buildings and facilities used by the public. Introduction to how the modern day technology can aid in universal design/ built barrier free environment through audio and visuals. | |
| **Course Outcomes:** | | |
| 1. | Sensitization towards needs of differently abled people. | |
| 2. | Be able to design barrier free buildings and also carry out building audit. | |
| **Lecture Schedule:** | | |
| 1. | Introduction about barrier free environment | |
| 2. | Types of disability – physical, sensory, intellectual etc | |
| 3. | Barrier free basic anthropometric and mobility devices - dimensions, vision cone, reach ranges etc | |
| 4. | Standards for construction and maintenance | |
| 5. | Design elements - Site planning and parking provisions - Parking and Passenger Loading Zones, Curb Ramps, Walks and Paths, Approach to Plinth Level - Ramped Approach Stepped Approach, Entrance Landing, Entrance and Exit doors, etc. | |
| 6. | Contd. | |
| 7. | Designing of elements within buildings - Space Allowances – Minimum access provisions, general allowances; Clear or Ground space for wheel chairs; Physical Parameters; Protruding Objects; Ground and Floor Surfaces. | |
| 8. | Contd. | |
| 9. | Designing of elements within buildings - corridors, windows, stairways, lifts, toilets, signage, guiding and warning systems. Floor materials. | |
| 10. | Contd. | |
| 11. | Designing of elements within buildings - Controls and operating measures and other facilities – Counter, Water Fountain, Telephone, Mailbox, and Vending Machine | |

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| 12. | Contd. |
| 13. | Exercise relating to above topic |
| 14. | Exercise relating to above topic |
| 15. | Design elements outside the buildings - kerb at footpath, road crossing, public toilet, bus stop, toilet booth. |
| 16. | Contd. |
| 17. | Exercise relating to above topic |
| 18. | Exercise relating to above topic |
| 19. | Signages - Types of Signage, signage requirements, Signage Specifications - Character Proportion, Character Height, Raised / Brailled Characters and Pictogram, Finish and Contrast, Mounting Location and Height, Symbols of Accessibility, Illumination Levels. |
| 20. | Signage Design- Language, Sign Typeface, Suggested Sizes for Letters and Symbols, Text Design, Colour and Contrast. Sign Installation - Illumination, Sign positioning. |
| 21. | Exercise relating to above topic |
| 22. | Exercise relating to above topic |
| 23. | Provisions for residential buildings – single storeyed, multi storeyed etc |
| 24. | Guidelines and space standards for barrier free built Environment in public buildings |
| 25. | Provisions for public buildings and places like auditorium, parks, restaurants, railway station. |
| 26. | Contd. |
| 27. | Best examples and case studies in universal design practice. |
| 28. | Exercise – Presentation of case examples |
| 29. | Exercise – Presentation of case examples |
| 30. | Access audit - definition, purpose and method, retrofitting techniques for barrier free environment. |
| 31. | Contd. |
| 32. | Implication of audit in building byelaw. |
| 33. | Disability Acts and National Policies – brief overview of Acts present, Information on various types of national Institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards thereof. |
| 34. | The role of NGO's, professional and outreach. |
| 35. | Persons with Disabilities Act, 1995 |
| 36. | United Nations Convention for Rights of Persons with Disabilities (UNCRPD). |
| 37. | National Policy for provisions for elderly persons |
| 38. | Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons. |
| 39. | Introduction to similar efforts in other countries. |
| 40. | Discussion of how the modern day technology can aid in universal design/ built barrier free environment |
| 41. | Design exercise |
| 42. | Design exercise |
| **Book References:** | |
| 1. | Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly Persons, CPWD, Ministry of Urban Affairs and Employment, India. |
| 2. | Universal Design, Selwyn Goldsmith, Architectural Press. |
| 3. | Timesaver Standards for Building Types |
| **Web References:** | |
| 1. | Readings – articles of related topics to be shared |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Set design** | |
| Course Code: | **ARC 372 / ARC 453 / ARC 24453** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce and provide exposure about the design potential in set design. | |
| 2. | To inculcate the ability to translate the requirements of the script to physical demonstration according to the traditions followed in the theatre, television and cinema industry. | |
| **Description of Contents in brief:** | | |
| 1. | Learning visualization of plays, multi-set plays, and musical theatre productions. | |
| 2. | Understanding Visual composition. This course emphasizes practical application of and experiences in technical theatre, including scene design, set construction, color and texture, lighting, sound, and the use of stage materials. | |
| 3. | Constructing actual sets as a project. | |
| **Course Outcomes:** | | |
| 1. | To be able to apply principles of visual composition and spatial placement of objects to arrive at need based thematic set proposals. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
| 1. | Designing and Drawing for the Theatre by Lynn Pecktal | |
| 2. | Drawing Scenery by Rich Rose | |
| 3. | Theory and Craft of the Scenic Model by Darwin Reid Payne | |
| 4. | The Dramatic Imagination: Reflections and Speculations on the Art of Theatre by Robert Edmond Jones | |
| 5. | The Stage Is Set by Lee Simonson | |
| 6. | Stagecraft I, A Complete Guide to Backstage Work Textbook and Workbook,William Lord | |
| 7. | Theatre Art In Action, National Textbook Co. | |
| 8. | The Stage and The School, Glencoe McGraw-Hill | |
| **Web References:** | | |
| 1. | Where Do I Start? -Design Video Communications, Ltd. | |
| 2. | How Do I Paint It? -Design Video Communications, Ltd. | |
| 3. | Shedding Some Light? Design Video Communications, Ltd. | |
| 4. | Setting The Stage –Rosco Laboratories | |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Painting** | |
| Course Code: | **ARC 373 / ARC 455 / ARC 24455 / AP AR 4155** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce students to painting as a primary medium for artistic expression, develop ability to verbalize ideas and processes in art making and develop an understanding of history, major styles and contemporary issues in painting. | |
| **Description of Contents in brief:** | | |
| 1. | Color Theory - Color wheel (primary/secondary, complementary), transparency/opacity, hue, value (intensity, brightness), chroma (saturation, purity), temperature (warm/cold) and color contrast. | |
| 2. | Attributes; interaction, harmony, psychology/mood, culture & expression and color schemes such as monochromatic, analogous & complementary. Composition; bounded composition, out-of-frame composition, space, movement, balance, asymmetry, rhythm, shapes, proportion & lighting. | |
| 3. | Media Characteristics & Surfaces; acrylic and oil, paper; wood & canvas (primed/ unprimed). Painting techniques - brush strokes and textures. Introduction to various artistic styles and traditions – personal style, regional style, period style, etc. in Indian context. Genres of Painting – portraits, religious, landscape, still life, abstract, etc. x | |
| 4. | Overview of historical and modern art movements and works of famous artists of India and abroad. | |
| **Course Outcomes:** | | |
| 1. | Developing paintings as a medium of artistic expression and infusion of painting art in architecture. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Glass Architecture** | |
| Course Code: | **ARC 374 / ARC 584 / ARC 24584 / 5174** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To provide the students with the latest & recent trends in architecture and to understand the selection and usage of glass for appropriate purposes and for improving the building performance using glass. | |
| **Description of Contents in brief:** | | |
| 1. | Study evolution & importance of glass in modern architecture - applications of glass in buildings (facade / interior applications). Understand the production and properties of glass, value additions such as coating technology its importance and necessity. | |
| 2. | Processing - concepts on tempering, heat strengthening, laminated, ceramic fritting. Different types of glass - mirror, lacquered, fire-resistant and modern glass with different applications. Glass for segments such as hospitals, green homes, airports, offices and other buildings. Understanding glass & human safety compliances, fire-safety considerations. | |
| 3. | Role of glass in Acoustics. Study theory of electromagnetic radiation, internal & external reflections, day-lighting in buildings. | |
| 4. | Introduction and basic concepts on solar control and thermal Insulation (SF, UV, SHGC). Need for Green Buildings – energy-efficient buildings, benefits of going green, achieving energy-efficiency using glass. | |
| 5. | Performance parameters (Energy codes and Green ratings- ECBC, IGBC, GRIHA. Case study Green Building Designed predominantly with energy efficient materials. Calculations involving basic factors in Glass Design, Optimization of Glass for wastage reduction and standardization of design. | |
| **Course Outcomes:** | | |
| 1. | Application of glass as a versatile material for appropriate use and improved building performance in outdoors as well as indoors. | |
| **Lecture Schedule:** | | |
| 1. | Introduction – Glass the Building Material | |
| 2. | Importance of glass in modern architecture | |
| 3. | Glass as an exterior element | |
| 4. | Glass as an interior element | |
| 5. | Properties of glass | |
| 6. | Production of glass | |
| 7. | Value additions – coating technology etc | |
| 8. | Processing – tempering, heat strengthening, laminated, ceramic fritting | |
| 9. | Types of glass - mirror, lacquered, fire-resistant and modern glass with different applications. | |
| 10. | Exercise – Market survey | |
| 11. | Exercise – Market survey | |
| 12. | Design and application of sealant | |
| 13. | Use of glass for different building functions - hospitals | |
| 14. | Glass in airport buildings | |
| 15. | Glass in offices and workplaces | |
| 16. | Use of glass in residences | |

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| 17. | Robustness of glass structures Blast resistant glass; shock and bullet resistant glass; seismic action. |
| 18. | Human safety compliances in using glass as a material |
| 19. | Fire-safety considerations, fire resistant glazing |
| 20. | Role of glass in Acoustics, acoustic glass solutions |
| 21. | Theory of electromagnetic radiation, internal & external reflections |
| 22. | Role of glass in day-lighting in buildings – windows, skylight etc |
| 23. | Basic concepts on solar control and thermal Insulation (SF, UV, SHGC) |
| 24. | Concept of green buildings, the need and understanding |
| 25. | Energy-efficient buildings and its benefits |
| 26. | Role of glass in attaining energy efficiency |
| 27. | Introduction to National Building Code (NBC) 2016 |
| 28. | Performance parameters - Energy codes and Green ratings- ECBC, IGBC, GRIHA |
| 29. | Case example of Green Building designs in India |
| 30. | Case example of Green Building designs abroad |
| 31. | Calculations involving basic factors in Glass Design |
| 32. | Optimization of Glass for wastage reduction |
| 33. | Standardization of design, specifications |
| 34. | Exercise – Case study of project |
| 35. | Exercise – Case study of project |
| 36. | Exercise – Case study of project |
| **Book References:** | |
| 1. | R. Nijsee: Glass in Structures, Birkhauser, Basel, Berlin, Boston, 2003. |
| 2. | C. Schittich et al. Glass construction manual, Bikhauser. Basel, Boston, Berlin, 1999. |
| 3. | ISTRUCTE: Structural use of Glass in building, The Inst. 0f Structural Engineers, London, 1999. |
| 4. | National Building Code |
| 5. | Documents of ECBC, IGBC, GRIHA, TERI |
| **Web References:** | |
| 1. | |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Advanced Landscape Architecture** | |
| Course Code: | **ARC 375** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand Regional scale of landscape architecture and its allied aspects. | |
| 2. | To study contemporary landscapes and how environmental issues and ecological issues have been resolved in them. | |
| **Description of Contents in brief:** | | |
| 1. | Modern garden design and innovations in landscape architecture; The contemporary history of the profession with study of theory and works of Andrew Jackson Downing, Frederick Law Olmsted, Ian McHarg, Thomas Church, Lawrence Halprin. Burle Marx to present day significant designers. | |
| 2. | The growth and development of Landscape as a profession. Professional education, the environmental movement, large scale regional planning, significant landscape architectural projects of the past century. | |
| 3. | Landscapes and cities: rural settlements and civic transformations; landscape fragmentation, sensitivity and change. | |
| 4. | Multifunctional landscapes, Continuous Productive Urban Landscapes- urban agriculture for sustainable cities; Market gardens | |
| 5. | Landscapes- as historic preservation resource; Green pilgrimage network, Sacred landscapes. Historic Urban Landscapes. | |
| **Course Outcomes:** | | |
| 1. | Understanding landscape architecture from a larger perspective. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
| 1. | Poetics of Garden by Charles Moore | |
| 2. | Modern landscape Architecture: a Critical Review published by the MIT press | |
| 3. | Preserving Modern Landscape Architecture, Papers From The Wave Hill, National Park Service Conference | |
| 4. | Landscape Transformed, Academy Editins, 1996 | |
| 5. | Design with Nature, Ian Mc Harg | |
| **Web References:** | | |
| | | |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B. Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **High Rise Buildings** | |
| Course Code: | **ARC 376 / ARC 594 / AR24594 / AP AR 5184** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** to make students understand | | |
| 1. | To give an experience in the implementation of new technological concepts which are applied in High Rise Buildings. | |
| 2. | To study different methods of construction to successfully achieve the structural design with recommended specifications. | |
| 3. | To study technological principles of Design and feasibility of High rise buildings | |
| 4. | To provide a coherent development to the students for the courses in sector high density building construction technology | |
| **Description of Contents in brief:** | | |
| 1. | High rise buildings through history | |
| 2. | Principles applied to the Architectural design of High rise building form. | |
| 3. | Structural systems adopted for high rise buildings like rigid frame system, shear wall system, tubular system, concept of mechanical floor, | |
| 4. | High rise buildings user perception and basic design concepts, structural efficiency, aspect ratio, wind flow analysis etc. | |
| 5. | Bye laws related to High rise and High density buildings CTBUH guidelines | |
| 6. | High rise buildings services- Fire fighting, water-supply, sanitation, Elevators etc. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Architectural Design of High rise building | |
| 2. | The students will learn to understand the theoretical and practical aspects of new technology in high rise building construction along with various aspects of Architectural Design | |
| 3. | The students will get a diverse knowledge of Advanced technology practices applied to real life problems. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to High Rise High Density Buildings, types of High Rise buildings | |
| 2. | History and important bench marks in High Rise buildings | |
| 3. | Architectural principles involved in designing High Rise buildings. | |
| 4. | Design dilemma, form follows function or function follows form | |
| 5. | Perception, Aspect ratio and Structural efficiency in design | |
| 6. | Tutorial-I: | |
| 7. | Introduction to structural systems used in High Rise Buildings | |
| 8. | Rigid Frame structural system | |
| 9. | Tutorial-II: Case study | |
| 10. | Shear wall structural system | |
| 11. | Tutorial-III: Case Study | |
| 12. | Tubular structural system | |
| 13. | Tutorial -IV: Case Study | |
| 14. | Diagrid structural system | |
| 15. | Tutorial -V: Case Study | |
| 16. | Exoskeletal structural system | |
| 17. | Tutorial-VI: Case study | |
| 18. | Design of Mechanical floor | |

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| 19. | Tutorial -II: Case study of each of the above structural system types |
| 20. | Bye laws related to high rise buildings |
| 21. | Bye laws related to mechanical floors |
| 22. | Introduction to Wind Flow around High rise buildings |
| 23. | Tutorial-III: Wind Flow analysis of around High rise Buildings |
| 24. | Design and placements of elevators |
| 25. | Types of Elevators |
| 26. | Vertical zoning in buildings with respect to elevators |
| 27. | Mid Term |
| 28. | Introduction and importance of fire hazard prevention in design |
| 29. | Fire escape design and bye laws related to fire hazards |
| 30. | Vertical zoning with respect to fire fighting |
| 31. | Tutorial- IV: Fire Escape Plan |
| 32. | Water supply design and principles in High Rise buildings |
| 33. | Sanitation and solid waste design and principles in High Rise Buildings |
| 34. | Tutorial- V: Services Design Exercise |
| 35. | Tutorial -VI: Study of Elevators |
| **Book References:** | |
| 1. | Modern Construction Envelops, by Andrew Watts, newtechnic, publishing |
| 2. | Modern Steel Construction, AISC |
| 3. | Architecture of Tall Buildings, CTBUH |
| **Web References:** | |
| 1. | https://tinyurl.com/y29f859p |
| 2. | https://www.skyscrapercenter.com/ |
| 3. | https://www.ctbuh.org/resource/height |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B. Arch.** | **Semester: X** | **Year: V** |
| Name of Course: | **Office Management** | |
| Course Code: | **ARC 377 / ARC 572 / ARC 24572 / AP AR 5163** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |

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| **Course Objectives:** | |
| 1. | Develop an understanding of the diverse range of responsibilities ensuring that office processes and activities are efficiently and smoothly managed. |
| 2. | Induce an assertive and organized approach to managing people and processes in office. |
| 3. | Facilitate harmonious and productive working in the office environment. |
| 4. | Introduce management skills and planning techniques to improve information flow and achieve objectives of an architectural office. |
| **Description of Contents in brief:** | |
| 1. | INTRODUCTION TO ADMINISTRATIVE OFFICE MANAGEMENT<br>○ Principles of Administrative Office Management<br>○ Solving Problems in Administrative Office Management |
| 2. | MANAGING HUMAN RESOURCES<br>○ Selecting and Orienting the Office Staff<br>○ Supervising the Office Staff<br>○ Training, Appraising, and Promoting Office Personnel<br>○ Office Job Analysis<br>○ Office Administration<br>○ Labor-Management Relations in the Office<br>○ Office Personnel Problems and Practices |
| 3. | MANAGING ADMINISTRATIVE SERVICES<br>○ Space Management for Administrative Services<br>○ Ergonomics in the Office<br>○ Telecommunications in Administration |
| 4. | MANAGING ADMINISTRATIVE SYSTEMS<br>○ Analyzing Administrative Office Systems<br>○ Improving Office Productivity<br>○ Budgetary Control |
| 5. | OVERVIEW OF QUALITY MANAGEMENT PRINCIPLES<br>○ Quality Theories<br>○ Quality Tools<br>○ Total Quality Management ( TQM) Implementation |
| **Course Outcomes:** Students will be able to | |
| 1. | Understand the range of responsibilities and skills required by the office manager |
| 2. | Apply techniques to plan and manage workload effectively and achieve objectives |
| 3. | Create and apply a checklist of systems and procedures for smooth running of an office |
| 4. | Identify components of good human relations within an office environment |
| 5. | Employ effective management practices, current equipments, and techniques |
| 6. | Demonstrate an understanding of quality movement concepts that impact the office |
| 7. | Apply sound practices of office management to the solution of everyday office problems |
| **Lecture Schedule:** | |
| 1. | Introduction to Office Management |
| 2. | Functions of Office Management |
| 3. | Office Accommodation and Environment |

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| 4. | Office Machines, manuals, charts and reports |
| 5. | Personnel Management, Supervision, Control and coordination |
| 6. | The office layout |
| 7. | The role of a manager |
| 8. | Organizing the Organization |
| 9. | How recruitment & selection affect office management |
| 10. | Writing job description |
| 11. | Conducting a job interview |
| 12. | Office/Workplace ethics |
| 13. | Office administration |
| 14. | The paper flow challenge |
| 15. | Planning, organizing and controlling |
| 16. | Introduction to Time management |
| 17. | Prevent overuse of technology |
| 18. | The top office time wasters |
| 19. | Organizational faults |
| 20. | The “administrator/process manager” role |
| 21. | The “people/HR manager” role |
| 22. | The “project manager” role |
| 23. | Organizational skills |
| 24. | Communication and other interpersonal skills |
| 25. | Essential skills for the Office Manager |
| 26. | Image, dress and professionalism |
| 27. | Time management, planning and prioritizing |
| 28. | Problem solving and decision making; Stress responses |
| 29. | Understanding and applying company objectives, policies, procedures and protocols |
| 30. | Practicing exceptional office etiquette |
| 31. | Engineering administrative processes for efficiency and effectiveness |
| 32. | Contributing to the financial efficiency of your company |
| 33. | Managing people so that they are happy and productive |
| 34. | Office related procurement, supplier contracts and Service Level Agreements |
| 35. | Planning, Organizing, Staffing. Directing, Motivating and Coordinating functions |
| 36. | Receiving, Recording, Arranging and Giving Information |
| 37. | Management Functions in office management |
| 38. | Public Relations Functions in office management |
| 39. | Instituting Office Systems and Routines |
| 40. | Retention of Records and Safeguarding Assets |
| 41. | Form Designing and Control; Stationary and Supplies Control |
| 42. | Personnel Function and Controlling Office Costs |
| 43. | Selection and Purchase of Office Appliances |
| 44. | The office functions: planning, organizing, staffing, directing, motivating, and coordinating. |
| 45. | Final Conclusions, Discussions |
| **Book References:** | |
| 1. | Administrative Management: Setting People Up for Success, 1st Edition, Carlene Cassidy; Robert Kreitner, Ph.D.; Susie VanHuss |
| 2. | The Administrative Professional: Technology & Procedures, 14th Edition, Patsy Fulton-Calkins; Dianne S. Rankin; Kellie A. Shumack, Ph.D. |
| 3. | Modern Office Management, by Niraj Kumar & Chetan Srivastava; Publisher: New Royal Book Company (2013) ISBN**:** 9383138017 |

| Web References: | |
|---|---|
| 1. | https://accountlearning.com/office-management-meaning-definition-elements/ |
| 2. | https://www.kullabs.com/classes/subjects/units/lessons/notes/note-detail/5713 |
| 3. | https://tyrocity.com/topic/concept-of-office-management/ |
| 4. | https://www.thebalancesmb.com/control-chaos-in-small-business-2948509 |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Marketing management and skills** | |
| Course Code: | **ARC 378 / ARC 576 / ARC 24576 / AP AR 5167** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To introduce the concept of market and marketing and ideas about launching a product. | |
| 2. | To introduce the various marketing strategies. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to marketing, concept of market and marketing, marketing environment, controllable factors - factors directed by top management - factors directed by marketing, uncontrollable factors - demography, economic conditions, competition. | |
| 2. | Social and Marketing planning, marketing planning process - Boston consultancy group model, marketing mix, marketing mix variables. Developing, testing and launching of new products. | |
| 3. | Market segmentation and market targeting - introduction to segmentation, targeting and product positioning. Marketing research - need and scope, marketing research process, research objectives, developing research plan, collecting information, analysis, and findings. | |
| 4. | Consumer behaviour - factors influencing consumer behavior, perceived risks Product life cycle, marketing strategies for different stages of product life cycle. | |
| 5. | Marketing communication, marketing mix variables, steps in developing effective communication, identification of target audience, determination of communication objectives. | |
| 6. | Designing the message,selecting the communication channels,promotion mix evaluation, advertising and sales promotion,factors in advertising, sales promotion tools. New trends in marketing- Brand management, significance of branding to consumers and firms. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | State the role and functions of marketing within a range of organizations. | |
| 2. | Describe key marketing concepts, theories and techniques for analyzing a variety of marketing situations. | |
| 3. | Identify and demonstrate the dynamic nature of the environment in which marketing decisions are taken and Synthesize ideas into a marketing plan | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
| 1. | Majumdar R., Marketing Research, Text, Applications and Case Studies, New Age International (P), 1991 | |
| 2. | Ramaswamy V.S. & Namkumari S, Marketing Management: Planning, Implementation and Control, Macmillan India Limited, 2002 | |
| 3. | Robert, Marketing Research, Prentice Hall of India,1999 | |
| 4. | T N Chabra and S K Grover : Marketing management, Dhanpat Rai, 2007 | |
| 5. | Kotler P, Marketing Management: Analysis, Planning, Implementation and Control, Prentice Hall of India,1993 | |
| 6. | Stanton W.J., Etzel M.J. & Walker B.J, Fundamentals of Marketing, McGraw Hill International Edition, 1994 | |
| **Web References:** | | |
| | | |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Auditorium Acoustics, Systems and Services** | |
| Course Code: | **ARC 379 / ARC 593 / ARC 24593 / AR AP 5183** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To develop a comprehensive understanding of architectural acoustics for auditoriums, multiplexes and cinema halls. | |
| 2. | To develop a comprehensive understanding and integration of the specialized nature of services and systems for auditoriums, multiplexes and cinema halls. | |
| **Description of Contents in brief:** | | |
| 1. | Sound principles and engineering; measurement of sound, frequency, intensity, decibel scale, auditory range, etc. | |
| 2. | Auditorium design (size, shape, sitting arrangement design criteria for speech and music, acoustical correction design and modification techniques, | |
| 3. | Electro-Acoustics (various systems such as unidirectional, stereophonic, digital and surround sound systems, various requirements for theatres, motion picture halls, multiplexes and multipurpose auditoriums, etc. | |
| 4. | Open-Air Acoustics ;behaviour of sound in free field, absorption from air and other elements, barriers, landscaping elements, thermal and wind gradient, reduction of noise by screening, screening by planting and relevant case examples of design and planning of open-air theatres | |
| 5. | Integrating services such HVAC, lighting, electricity / energy, fire safety, telecommunication, surveillance systems, sanitary, garbage, parking; and site planning; building byelaws, rules and code provisions | |
| **Course Outcomes:** Students will | | |
| 1. | Understand the fundamentals of auditorium acoustics. | |
| 2. | Be able to design an effective acoustic environment. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the subject, syllabus, assignments and evaluation pattern | |
| 2. | Development of area of study; simple to complex. | |
| 3. | Definitions and study parameters | |
| 4. | Behavior of sound in indoor spaces | |
| 5. | Visual clarity needs | |
| 6. | Speech clarity and intelligibility | |
| 7. | Auditorium design; size, shape, sitting arrangement | |
| 8. | Auditorium design acoustical correction design and modification techniques | |
| 9. | Case study | |
| 10. | Case study | |
| 11. | Case study | |
| 12. | Design exercise | |
| 13. | Design exercise | |
| 14. | Design exercise | |
| 15. | Design exercise | |
| 16. | Design exercise | |
| 17. | Design exercise | |
| 18. | Submission of data sheets and drawings | |
| 19. | Electro-Acoustics | |

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| 20. | Electro-Acoustics cont… |
| 21. | Specific needs of auditorium, cinema, music, speech for above |
| 22. | Assignment on above |
| 23. | Assignment on above cont… |
| 24. | Open-Air Acoustics ;behaviour of sound in free field, |
| 25. | absorption from air and other elements, barriers, landscaping elements, thermal and wind gradient, s |
| 26. | reduction of noise by screening, screening by planting |
| 27. | relevant case examples of design and planning of open-air theatre |
| 28. | Case study |
| 29. | Case study |
| 30. | Design exercise |
| 31. | Design exercise |
| 32. | Design exercise |
| 33. | Design exercise |
| 34. | Integrating HVAC services |
| 35. | Integrating lighting, electricity / energy, |
| 36. | Integrating fire safety, telecommunication, surveillance systems, |
| 37. | Integrating sanitary, garbage, parking; and site planning; |
| 38. | Integrating building byelaws, rules and code provisions |
| 39. | Integration of above aspects in the design |
| 40. | Integration of above aspects in the design |
| 41. | Integration of above aspects in the design |
| 42. | Integration of above aspects in the design |
| 43. | Integration of above aspects in the design |
| 44. | Integration of above aspects in the design |
| 45. | Final drawings and data sheets |
| 46. | Final drawings and data sheets |
| **Book References:** | |
| 1. | Acoustics and Noise Control, 3rd Edition, B. J. Smith, R. J. Peters, Stephanie Owen, T&F India |
| 2. | Master Handbook of Acoustics, Sixth Edition 6th Edition, F. Alton Everest, Ken Pohlmann, McGraw-Hill Education TAB |
| **Web References:** | |
| 1. | https://www.roomeqwizard.com/ |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B. Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Advanced Building Construction and Technology** | |
| Course Code: | **ARC 380 / ARC 551 / ARC 24551 / AP AR 5151** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** to make students understand | | |
| 1. | To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction. | |
| 2. | To study different methods of construction to successfully achieve the structural design with recommended specifications. | |
| 3. | To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology. | |
| 4. | To provide a coherent development to the students for the courses in sector of Advanced construction technology. | |
| 5. | To present the new technology in building construction and concepts related to Advanced construction technology. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to MMC- Modern Methods of Construction, Volumetric construction, Hybrid construction, Panellised construction. | |
| 2. | Modern construction systems and techniques adopted like lift-slab, slipform, shotcrete etc. | |
| 3. | Precast: Floor Slabs Types, DryWalls, Columns, Installation Details, Finishes. | |
| 4. | External Façade: Glass façade- types and installation details. | |
| 5. | Large Span roofing like Domes, shells, vaults. Large span roofing for special areas like gymnasium, airport, stadium, etc. | |
| 6. | Space frames tensile structures, pneumatic structures | |
| **Course Outcomes:** Students will be able to | | |
| 1. | The students will gain an experience in the implementation of new construction technology on engineering concepts which are applied in field Advanced construction technology. | |
| 2. | The students will get a diverse knowledge of Advanced technology practices applied to real life problems. | |
| 3. | The students will learn to understand the theoretical and practical aspects of new technology in building construction along with the design and management applications. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to Modern Methods of Construction | |
| 2. | Types of MMC (Modern Methods of Construction) | |
| 3. | Volumetric Construction Techniques | |
| 4. | Hybrid Construction Techniques | |
| 5. | Panellised Construction Techniques | |
| 6. | Introduction to Modern Techniques of Construction and Types | |
| 7. | Lift Slab construction techniques | |
| 8. | Tutorial-I | |
| 9. | Slip-formwork Technique | |
| 10. | Tutorial-II | |
| 11. | Shotcrete Technique | |
| 12. | Tutorial-III | |
| 13. | Introduction to Precast construction technique | |

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| 14. | Dry wall construction Technique and installations procedures |
| 15. | Precast column Technique and installations procedures |
| 16. | Tutorial- IV |
| 17. | Mid Term |
| 18. | Introduction to External Facades |
| 19. | Introduction to glass facades Types and installations |
| 20. | Introduction to large span roofing systems |
| 21. | Evolution of domes |
| 22. | Introduction to domes and types of domes |
| 23. | Geodesic domes Geometry and types of Geodesic domes |
| 24. | Tutorial-V |
| 25. | Introduction to Lamella Domes |
| 26. | Lamella Domes Geometry and types of Geodesic domes |
| 27. | Tutorial -VI |
| 28. | Introduction To Vaults |
| 29. | Types of vaults |
| 30. | Introduction to Tensile Structures |
| 31. | Types and geometries of Tensile structures |
| 32. | Installation of various types of tensile structures |
| 33. | Tutorial-VII |
| 34. | Introduction to Pneumatic Structures |
| 35. | Types and characteristics of Pneumatic structures |
| 36. | Tutorial- VIII |
| 37. | Introduction to shells |
| 38. | Design and geometries of Shell structures |
| 39. | Tutorial- IX |
| **Book References:** | |
| 1. | R. Chudley, Construction Technology Vol. I, II, III, IV, Longman Group Limited, London |
| 2. | R. Chudley (revised by R. Greeno), Building Construction Handbook, Addison Wesley, Longman Group, England |
| 3. | S.S. Ataev, Construction Technology, Mir Publishers |
| **Web References:** | |
| 1. | https://www.designingbuildings.co.uk/wiki/Types_of_dome |
| 2. | https://www.vikingdome.com/domes/ |
| 3. | https://www.geometrica.com/en/cladding |

## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Building Maintenance** | |
| Course Code: | **ARC 381 / ARC 583 /ARC 24583/ AP AR 5173** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand building types and their maintenance needs and a basic knowledge of standard practices. | |
| 2. | To develop an understanding of maintenance as a substantial contribution towards adequacy of design and suitability of materials. | |
| **Description of Contents in brief:** | | |
| 1. | Need and importance of building maintenance, its economic and social significance. Categories of maintenance -planned maintenance, preventive maintenance, running care-taker maintenance, CPWD/state PWD pattern of maintenance. | |
| 2. | Maintenance Generators – climatic conditions; usages, defects in original design/ construction, changing standards and tastes. | |
| 3. | Study of organization of maintenance- managing maintenance, financing & budgeting for maintenance, etc. Understanding of technology and techniques involved in building maintenance. Introduction to execution of maintenance work, controlling costs, information systems in maintenance. Inspections - annual, periodical, special, checklist and proformas. Creating database for maintenance, maintaining building registers, inventories, inspection reports, records, user complaints. | |
| 4. | Understanding building defects & ailments, examining symptoms of various types and patterns of buildings disease and ailments, structural, non-structural finishes, stains, services ailments, leakages & dampness, corrosion protection, sulphate attacks. Diagnosing & determining causes, prescribing effective remedial action. | |
| **Course Outcomes:** | | |
| 1. | Developing concept of maintenance as continuous phenomena and preventive approach for longevity of buildings. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 6 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Earthquake Resistant Architecture** | |
| Course Code: | **ARC 382/ ARC 567/ ARC 24567/ AP AR 5167** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | Earthquake when occur, building shakes laterally causes damages in structure and sometimes collapse of building. This course is aimed to understand the reasons of damages in buildings during earthquake and also how to deal with design so that occurrence of damages can be minimized. | |
| **Description of Contents in brief:** | | |
| 1. | Science of earthquake, impacts of earthquake on buildings. | |
| 2. | Basis for earthquake design of buildings, prevention of damages in building due to earthquake in existing buildings, design for earthquake for proposed buildings. | |
| 3. | Guideline for construction of buildings in earthquake prone areas. | |
| 4. | Standards and codes for earthquake resistant building design. | |
| **Course Outcomes:** | | |
| 1. | This course will give an insight to learner that how ground behaves during earthquake and due to shaking of ground how building respond to it. | |
| 2. | The course will give an understanding that what are basics to be integrated in building design so that they are safe and losses can be minimized. | |
| **Lecture Schedule:** | | |
| 1. | Science of earthquake | |
| 2. | Characteristic of earthquake waves | |
| 3. | Terminology and definitions | |
| 4. | Measurement of earthquake | |
| 5. | Causes for failure of buildings | |
| 6. | Structural failure of building | |
| 7. | Partial failure of buildings | |
| 8. | Material failure of buildings | |
| 9. | Foundation failure of buildings | |
| 10. | Failure of load bearing structure – foundation | |
| 11. | Failure of load bearing structure – Walls and windows | |
| 12. | Failure of RCC structure – Foundation and column | |
| 13. | Failure of building structure – Beams and staircase | |
| 14. | Basics of building design | |
| 15. | Material for buildings | |
| 16. | Configuration of buildings | |
| 17. | Do's and Don'ts in plans of building | |
| 18. | Do's and Don'ts in sections of building | |
| 19. | Design for load bearing structures – Foundation | |
| 20. | Design for load bearing structure – Walls and opening | |
| 21. | Design for RCC structure – Column | |
| 22. | Design of RCC structure - foundation | |
| 23. | Design for RCC structure – Beams and slabs | |
| 24. | Earthquake resistant design techniques – Foundation | |
| 25. | Earthquake design advance techniques – Shear Wall | |
| 26. | Shear wall construction | |

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| 27. | Bracing of building |
| 28. | Earthquake Zones of India |
| 29. | Standards and codes for design |
| 30. | Preparation of checklist for earthquake design |
| 31. | History of earthquake in India |
| 32. | Case study – Bhuj |
| 33. | Continued |
| 34. | Case study – Srinagar |
| 35. | Case study – Latur |
| 36. | History of earthquake international |
| 37. | Case study 1 – International |
| 38. | Case study 2 – International |
| 39. | Case study 3 – International |
| 40. | Design recommendation for Zone 3 |
| 41. | Continued |
| 42. | Design recommendation for Zone 4 |
| 43. | Continued |
| **Book References:** | |
| 1. | Some Concepts in Earthquake Behaviour of Buildings Author C. V. R. Murty Rupen Goswami A. R. Vijayanarayanan Vipul V. Mehta |
| 2. | EARTHQUAKE RESISTANT DESIGN OF STRUCTURES 1 Dr. G. P. Chandradhara |
| 3. | Handbook on construction of earthquake resistant building by Indian Railways |
| 4. | Earthquake resistant design of structure by S K Duggal |
| 5. | Earthquake Design Practice for Buildings, Third edition Author Edmund Booth |
| **Web References:** | |
| 1. | https://cdn.ymaws.com/www.nibs.org/resource/resmgr/BSSC/FEMA_P-749.pdf |
| 2. | https://www.engineeringbookspdf.com/earthquake-resistant-design-of-structures-2nd-edition/ |
| 3. | https://link.springer.com/content/pdf/bfm%3A978-3-540-93818-7%2F1.pdf |
| 4. | https://www.academia.edu/14715082/EARTHQUAKE_RESISTANT_DESIGN_OF_STRUCTURES |
| 5. | https://www.fema.gov/media-library-data/20130726-1759-25045-5477/fema_p_749.pdf |

## Elective 7 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Photography** | |
| Course Code: | **ARC 386/ ARC 454/ARC 24454 / AP AR 4154** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To give exposure to photography (still and video) as means of documentation and medium of expressions. | |
| **Description of Contents in brief:** | | |
| 1. | History of photography till contemporary times. | |
| 2. | Study basic equipments – development of cameras and lenses and their types, techniques –film speed, lighting, exposure, measurement, grey scale and photo-finishing. | |
| 3. | Contemporary photography tools, print equipment and, papers. | |
| 4. | Composing photographs for different purposes; role of subject, foreground, background, light source, color. | |
| 5. | Use of software tools for processing of photographs and videos. | |
| 6. | Photography practical on - Simple objects and subjects, lighting, still life composition with the play of light and shadow. Photographing historical and modem buildings. Architectural details such as staircases, brackets, cornices, louvers columns, inlay design, Indoor/outdoor sculptures, murals etc. | |
| 7. | The subject is skilled based and may require field trips for exercises and lessons. | |
| **Course Outcomes:** | | |
| 1. | Will have ability to compose technically correct photograph shots. | |
| 2. | Acquiring technical knowledge and usage of photography equipment. | |
| 3. | Will be able to handle various settings as appropriate for a type of photograph or video. | |
| 4. | Acquire an additional skill. | |
| **Lecture Schedule:** | | |
| 1. | History of photography till contemporary times. | |
| 2. | Photography in modern times before the coming of Digital era | |
| 3. | Contd | |
| 4. | Contd | |
| 5. | Contemporary camera for still and video photography and their development | |
| 6. | Contd. | |
| 7. | Contd. | |
| 8. | Composing a shot | |
| 9. | Contd. | |
| 10. | Contd. | |
| 11. | Contd. | |
| 12. | Contd. | |
| 13. | Use of software tools such as Adobe Photoshop for processing of still photographs | |
| 14. | Contd. | |
| 15. | Contd. | |
| 16. | Contd. | |
| 17. | Contd. | |
| 18. | Use of software tools such as Adobe Premiere Pro for processing of still photographs | |
| 19. | Contd. | |
| 20. | Contd. | |
| 21. | Contd. | |

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| 22. | Contd. |
| **Book References:** | |
| 1. | Portraits, Steve McCurry |
| 2. | Architectural Photography, Adrian Schulz |
| 3. | The Landscape Photography Book, By Scott Kelby |
| 4. | Digital Video Shooting for Beginners and Moving Image Theory, By Ron Belshaw |
| **Web References:** | |
| 1. | |

## Elective 7 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Low-cost building design and techniques** | |
| Course Code: | **ARC 387/ ARC 590/ ARC 24590/AP AR 5180** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand the various low cost design systems and to understand use of materials, construction and execution techniques in design of low-cost buildings. | |
| **Description of Contents in brief:** | | |
| 1. | Need and demand for low-cost buildings, and the related issues and challenges. Study of low-cost buildings, construction techniques. Low-cost building construction systems, methods & techniques. | |
| 2. | Introduction to low-cost buildings, building components influencing cost of buildings. Study Modular coordination in building design, prefabrication- total and partial, and impact of prefabrication on employment. Understand Building construction detailing for cost reduction, cost control techniques, research and development by various organizations in the country and foreign countries to reduce the cost. | |
| 3. | Case study of low-cost building projects in India with issues related to site, material, services, technology, and construction, and expectations of user. Post-occupancy evaluations of such projects. | |
| **Course Outcomes:** | | |
| 1. | Development of construction technology and innovative techniques as tools to address demand to mass construction. | |
| **Lecture Schedule:** | | |
| 1. | Overview of need and demand for low-cost buildings | |
| 2. | Issues and challenges of low cost design | |
| 3. | Overview of low cost buildings and architects following low cost design techniques in various parts of India | |
| 4. | Case examples of low cost buildings in Northern India | |
| 5. | Case examples of low cost buildings in Southern India | |
| 6. | Case examples of low cost buildings in Eastern India | |
| 7. | Case examples of low cost buildings in Western India | |
| 8. | Case examples of low cost buildings in Central India | |
| 9. | Case examples of indigenous low cost buildings in various parts of the world | |
| 10. | Contd | |
| 11. | Exercise – Presentation on vernacular architects and their works | |
| 12. | Contd | |
| 13. | Overview of Low-cost building construction systems, methods & techniques. | |
| 14. | Building components influencing cost of buildings | |
| 15. | Modular coordination in building design | |
| 16. | Need for cost effective construction | |
| 17. | Innovations of building techniques for cost effective construction | |
| 18. | Exploration of materials for reducing the cost - indigenous building materials, organic and inorganic building materials, alternative building materials, use of industrial and agricultural wastes | |
| 19. | Concepts of cost effective materials - Soil, Fly ash, Ferro cement, Lime, Fibres, Stone Dust, Boulders and oversize metal, Bitumen etc. | |

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| 20. | Cost effective building material products : Walls – Stabilised and sun dried, soil blocks & bricks, Hollow concrete blocks, stone masonry blocks, Ferrocement partitions. |
| 21. | Contd |
| 22. | Cost effective building material products : Roofs – Precast R.C. Plank & Joists roof, precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, improved country tiles, Thatch roof. |
| 23. | Contd |
| 24. | Site visit on related topic |
| 25. | Market survey on cost effective materials |
| 26. | Survey of materials development by research organizations like CBRI, SERC etc. |
| 27. | Cost Effective Construction Technologies - Stub Foundation, Rat Trap Bond, Ferro cement technique, Mud Technology etc |
| 28. | Use of cost effective technologies through the use of local materials |
| 29. | Reinvention and upgradation of traditional technologies |
| 30. | Prefabrication |
| 31. | Exploring cost effective construction equipment - Brick moulding machine etc |
| 32. | Building construction detailing for cost reduction |
| 33. | Cost control techniques |
| 34. | Research and development by various organizations in the country and foreign countries to reduce the cost |
| 35. | Critical analysis (in terms of initial investment, maintenance cost and longevity of buildings) |
| 36. | Post occupancy evaluation of projects |
| 37. | Exercise - Case study of low-cost building projects in India |
| 38. | Contd |
| 39. | Contd |
| 40. | Contd |
| **Book References:** | |
| 1. | Low Cost Housing in Developing Countries- G.C. Mathur |
| 2. | Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao – New Age International Publishers |
| 3. | Buildings How to Reduce Cost – Laurie Backer - Cost Ford |
| 4. | Publication of CBRI, SERC, RRL, NBO, COSTFORD. |
| **Web References:** | |
| 1. | |

## Elective 7 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Institutional building and campus planning** | |
| Course Code: | **ARC 388/ ARC 552/ ARC 24552/ AP AR 5152** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To develop a comprehensive understanding of planning of institutional campus and the specialized nature of services, amenities and infrastructure planning required for an institution. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to various types of institutes such as educational, religious, cultural, etc. with focus on the particular site services and planning strategies required for each. | |
| 2. | Introduction to institution building design with emphasis on their services for water, sanitation, garbage, electricity / energy, telecommunication, parking and site planning along with emphasis on detailing of special requirements for areas like lecture halls, congregation spaces -conference, assembly halls, OATs, auditoriums, etc. | |
| 3. | Study of building byelaws, rules and code provisions for institutional buildings also introduction to smart technologies for institution buildings. study of principles of a campus design, organic order, participation incremental growth, patterns diagnosis, campuses in India and abroad, planning process, site analysis, the building program, campus master plan, landscape design, road networking, parking, design of open spaces etc. related to campus design. | |
| 4. | Case studies and design exercises of campus planning with integration of services of institutional building services with site services, campus master planning with focus on movement pattern, parking, housing, amenities, functional requirements and other context-specific services required. Design emphasis on detailing of spatial layout, site-planning and services, etc. | |
| **Course Outcomes:** | | |
| 1. | Grasp the complexities of campus planning. | |
| 2. | Become adept in designing the services for large campuses. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 7 (VIVA)

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|---|---|---|---|
| Name of Program: **B.Arch.** | | Semester: **X** | Year: **V** |
| Name of Course: | | **Ideation** | |
| Course Code: | | **ARC 389 /ARC 573/ARC 24573/AP AR 5164** | |
| Core/Elective/Other | | **Elective** | |
| Prerequisite: | | | |
| **Course Objectives:** | | | |
| 1. | To understand the creative process involving design research & thinking, prototyping, technology, business etc. in order to generate ideas for architecture, art and design. | | |
| 2. | To explore the various design research skills, strategies, form, and processes. | | |
| **Description of Contents in brief:** | | | |
| 1. | The course structure should be exercise based such that it ideally explores various formal aspects of design resolution methods, understanding of new ideas in various product designs in context to human and his habitation, environmental concerns, materiality, formal and cultural aesthetics. | | |
| 2. | Inspiration for design - using our senses -seeing, hearing, touching, tasting, smelling, feeling and collecting, obsessing, hoarding, re-appropriating, re-contextualizing and remixing. Research / Brainstorming – asking and listening, researching (visual, materials, user /ethnographic, systems activity, primary, scholarly), brainstorming, game-storming, ideation. | | |
| 3. | Representation and Organization of information (Sketching / Mapping) - visualizing, drawing, sketching, planning & mapping techniques, grouping, clustering, comparing, contrasting, organizing and designing, reorganizing and redesigning, shaping and forming, discerning and revealing, connecting and disconnecting. | | |
| 4. | Prototyping - making, building, creating, rapid prototyping, iterating, Selection and edition, breaking then repeating the whole exercise with a new strategy. Marketing / Pitching of the design idea - Storytelling, engaging, communicating, selling, etc. | | |
| **Course Outcomes:** | | | |
| 1. | Development of creative process of ideas, themes for understanding, of architecture, and design. | | |
| 2. | Initiation of space for creativity and hypothesis for conceptualization and idea formation. | | |
| **Lecture Schedule:** | | | |
| 1. | As per syllabus | | |
| **Book References:** | | | |
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| **Web References:** | | | |
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## Elective 7 (VIVA)

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| **Name of Program: B. Arch.** | **Semester: X** | **Year: V** |
| **Name of Course:** | **Companies Law** | |
| **Course Code:** | **ARC 390/ARC 573/ARC 24570/AP AR 5161** | |
| **Core/Elective/Other** | **Elective** | |
| **Prerequisite:** | | |
| **Course Objectives:** | | |
| 1. | To impart expert knowledge of the various provisions of the Companies Act. | |
| 2. | Introduction to schedules, rules, notifications, circulars including secretarial practice, case laws and Secretarial Standards. | |
| 3. | Formulate strategies for organizational up-gradation and functioning. | |
| 4. | Understand how to raise and manage funds and accounts in a company. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to Company Law: Jurisprudence of Company Law; Meaning, Nature, Features of a company; Judicial acceptance of the company as a separate legal entity; Concept of Corporate Veil, Applicability of Companies Act; Definitions and Key Concepts. Shares and Share Capital: Meaning and types of Capital; Concept of issue and allotment; Issue of Share certificates; Further Issue of Share Capital. | |
| 2. | Members and Shareholders: How to become a member; Register of Members; Declaration of Beneficial Interest; Rectification of Register of Members; Rights of Members; Variation of<br>Shareholders' rights; Shareholders Democracy; Shareholder agreement, Subscription Agreements, Veto powers. Debt Instruments: Issue and redemption of Debentures and Bonds; creation of security; Debenture redemption reserve; debenture trust deed; conversion of debentures into shares; Overview of Company Deposits. | |
| 3. | Charges: Creation of Charges; Registration, Modification and Satisfaction of Charges; Register of Charges; Inspection of charges; Punishment for contravention; Rectification by Central Government in Register of charges. Distribution of Profits: Profit and Ascertainment of Divisible Profits; Declaration and Payment of Dividend; Unpaid Dividend Account; Investor Education and Protection Fund; Right to dividend; rights shares and bonus shares to be held in abeyance. Corporate Social Responsibility. | |
| 4. | Transparency and Disclosures: Board's Report; Annual Return; Annual Report; Website disclosures; Policies. An overview of Inter-Corporate Loans, Investments, Guarantees and Security, Related Party Transactions. Registers and Records: Maintenance and Disposal. An overview of Corporate Reorganization. | |
| 5. | Board Constitution and its Powers: Board composition; Restriction and Powers of Board; Board Committees- Audit Committee, Nomination and Remuneration Committee, Stakeholder relationship Committee and other Committees. Directors: DIN requirement, Types of Directors; Appointment/ Reappointment, Disqualifications, Vacation of Office, Retirement, Resignation and Removal, and Duties of Directors; Rights of Directors | |
| 6. | Meetings of Board and its Committees: Frequency, Convening and Proceedings of Board and Committee meetings; Agenda Management; Management Information System; Meeting Management; Resolution by Circulation; Types of Resolutions. General Meetings: Annual General Meeting; Extraordinary general Meetings; Other General<br>Meetings; Types of Resolutions; Notice, Quorum, Poll, Chairman, Proxy; Meeting and Agenda | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Differentiate between kind of corporate entities that are permitted to be set up | |

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| 2. | Incorporate a Company and will be aware about rules and procedures for running a company |
| 3. | Appreciate the manner of raising funds and roles and responsibilities of directors |
| 4. | Understand the rights and obligations of shareholders and other stakeholders including employees and creditors |
| 5. | Winding up of a company and its procedures |
| **Lecture Schedule:** | |
| 1. | Business Organization, Corporate personality and Registration of companies |
| 2. | Business and corporate personality: its nature, advantages, disadvantages and types |
| 3. | Registration, incorporation and commencement of business by companies |
| 4. | Objects, powers of companies and their internal administration |
| 5. | Kinds of meetings and other applicable law |
| 6. | Kinds of companies |
| 7. | Meetings of companies |
| 8. | Other laws affecting companies |
| 9. | Raising of capital by companies |
| 10. | Share capital and its nature, kinds, rights and liabilities of shareholders |
| 11. | Alteration of capital and its implications |
| 12. | Raising of capital by companies by issue of securities |
| 13. | Listing and de-listing of securities and their implications |
| 14. | SEBI- issue of capital and disclosure requirements |
| 15. | Issue of capital and disclosure requirements of Indian companies: Part 1 |
| 16. | Issue of capital and disclosure requirements of Indian companies: Part 2 |
| 17. | Insider trading and fraudulent and unfair dealings in securities and their implications |
| 18. | Borrowings and investments by companies |
| 19. | Corporate borrowings and investments |
| 20. | Foreign Direct investments in Indian companies |
| 21. | Corporate Management and Governance: Part 1 |
| 22. | Governance structure of companies |
| 23. | Directors, their appointment, qualifications, position, powers, duties and liabilities |
| 24. | Types of directors and other managerial personnel companies |
| 25. | Corporate Management and Governance |
| 26. | Corporate governance in Indian companies |
| 27. | Corporate Social Responsibility |
| 28. | Promoters, their position, power, duties and liabilities |
| 29. | Dividend and accounts of companies |
| 30. | Director's responsibility statement and other duties in lying accounts before shareholders |
| 31. | Audit of companies |
| 32. | Auditors, their duties and liabilities |
| 33. | Business rescue proceedings and compromises |
| 34. | Compromises, Arrangements, Reconstruction, Amalgamation and Mergers of companies |
| 35. | Take over and Acquisition of companies |
| 36. | Recent cases on Mergers and Acquisition |
| 37. | Investigation and adjudicatory machinery |
| 38. | Investigation of companies, its need and procedure |
| 39. | Company Law board/ National Company Law Tribunal/ National Company Law Appellate Tribunal, their constitution, powers and duties |
| 40. | Special courts, their constitution, powers and duties |
| 41. | Remedies to shareholders and others |

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| 42. | Shareholders and creditors remedies of personal actions, derivative actions or class action suits including cases of oppression and mismanagement |
| 43. | Winding up, its need, grounds and effect on shareholders, creditors and other stakeholders |
| 44. | Insolvency and Bankruptcy |
| 45. | Corporate Insolvency |
| 46. | Insolvency and Bankruptcy code,2016 |
| **Book References:** | |
| 1. | Company Law Ready Reckoner; Commercial Law Publishers, 151, Rajinder Market, Opp. Tis Hazari Court, Delhi-110054 by R. Suryanarayanan |
| 2. | Principles of Modern Company Law; Stevens & Sons Ltd., London by L.C.B. Gower |
| 3. | Guide to the Companies Act; Lexis Nexis, Butterworths Wadhwa, Nagpur by A. Ramaiya |
| **Web References:** | |
| 1. | https://www.youtube.com/user/icsicompaniesact2013 |
| 2. | https://swayam.gov.in/nd2_cec20_hs23/preview |
| 3. | https://enhelion.com/product/Certificate-in-Introduction-to-Mergers-and-Acquisitions-and-the-Law |
| 4. | https://www.coa.gov.in/index1.php?&lang=1&level=0&linkid=13&lid=14 |

## Elective 7 (VIVA)

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|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Leadership development Business environment** | |
| Course Code: | **ARC 391/ ARC 574/ ARC 24574 / AP AR 5154** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To enable students to prepare themselves to become leaders of organizations and embark on paths of personal leadership development. | |
| **Description of Contents in brief:** | | |
| 1. | Study of motivational capabilities, building support teams, purpose-driven, empowering leadership, and improving leadership effectiveness through style and use of power. | |
| 2. | Understand the leadership journeys of great leaders by reflecting upon and framing their life stories and experiences to date. | |
| 3. | To participate fully in open, intimate small-group discussions about the reflective exercises they have completed on their own. To gain clarity about their leadership principles, values, and ethical boundaries, and how they will respond under pressure when challenged. To understand what is motivating them, both extrinsically and intrinsically, and to find leadership paths that will enable them to utilize their motivated capabilities. | |
| 4. | To explore how to build support teams and lead an integrated life. To understand the purpose of their leadership and empower other leaders, while they are optimizing their leadership effectiveness. To create Personal Leadership Development Plans to guide them throughout their lives. | |
| **Course Outcomes:** | | |
| 1. | Motivate towards becoming leaders. | |
| 2. | To develop team building qualities. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 7 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Remote Sensing and GIS** | |
| Course Code: | **ARC 392/ARC 562/ARC 24562/ AP AR 5162** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** To make students understand | | |
| 1. | Basic Understanding of Remote sensing and GIS techniques | |
| 2. | To introduce application of remote sensing and GIS for object identification and spatial analysis | |
| 3. | Preparation of base maps, Landuse / landcover analysis | |
| **Description of Contents in brief:** | | |
| 1. | Introduction of GIS platform. Basic principal of GIS. Remote Sensing and Sensors. Methods of photo interpretation and techniques of data collection through satellite data. | |
| 2. | Classification techniques using satellite data, Digital image processing, enhancement techniques in urban information extraction. | |
| 3. | Aerial photography as a tool for collection of data and preparation of maps, its application in planning and preparation for a project, orientation concept and methodology transformation and adjustment techniques. | |
| 4. | Detection, identification and description of defined objects. Use of auxiliary features for object identification. Systematic scanning of a photograph, and object identification. Recognition on aerial photograph of objects indicated on ground photographs. | |
| 5. | Application of RS and GIS. Identification of land use with a given classification. Monitoring urban changes and Mosaic preparation. Base map preparation, elementary data analysis using satellite data. Classification, interpretation and delineation of various land use on satellite data. Future application in planning field. | |
| **Course Outcomes:** Students will be able to | | |
| 1. | Prepare database and layers in GIS for shadow analysis, crowd simulations, high-density high-rise planning, parking analysis, Urban monitoring etc. | |
| 2. | Conduct image interpretation and spatial analysis | |
| 3. | Use photogrammetry in extraction of feature information Apply RS and GIS techniques in real world situations for decision making and planning | |
| **Lecture Schedule:** | | |
| 1. | Introduction to principles of GIS | |
| 2. | Demonstration of GIS platform and applications | |
| 3. | Understand map projections and coordinate systems | |
| 4. | Basic tools like data frames, view, scale and layers | |
| 5. | Data types- vector and raster | |
| 6. | Types of Feature class- Point, line, polygon etc. | |
| 7. | Lab exercises | |
| 8. | Working and creating features Toolbars – Digitising features, add, modify etc. | |
| 9. | Editing and Typology building | |
| 10. | Lab exercises | |
| 11. | Data structures, storage and models | |
| 12. | Data Management tools | |
| 13. | Geoprocessing tools - Buffer analysis, near, proximity analysis etc | |
| 14. | Lab Exercises | |
| 15. | Spatial Analytics tools like cluster analysis | |
| 16. | Lab Exercises | |

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| 17. | Data queries– attribute, spatial query |
| 18. | Lab Exercises |
| 19. | Introduction to Remote Sensing (RS) |
| 20. | Data types and data acquisition sources |
| 21. | Types of images and types of resolutions – Radiometric, spectral, spatial |
| 22. | Types of bands and application |
| 23. | Application of Remote sensing in qualitative and qualitative assessment |
| 24. | Digital image processing |
| 25. | Classification techniques using satellite data and enhancement techniques in urban information extraction. |
| 26. | Lab exercises |
| 27. | Monitoring of resources – spatio temporal analysis |
| 28. | Lab exercises |
| 29. | Introducing Aerial photography as a tool for collection of data and preparation of maps |
| 30. | Its application in planning and preparation for a project, orientation concept and methodology transformation and adjustment techniques. |
| 31. | Detection, identification and description of defined objects |
| 32. | Use of auxiliary features for object identification. |
| 33. | Systematic scanning of a photograph, and object identification. |
| 34. | Lab Exercises for making overlays and computation of photo scale. |
| 35. | Lab exercises on recognition of objects on ground on aerial photographs |
| 36. | Application of RS and GIS for monitoring urban changes , growth analysis |
| 37. | Base map preparation using RS and GIS |
| 38. | Mosaic preparation for spatial analysis |
| 39. | Classification, interpretation and delineation of various land use on satellite data. |
| 40. | Land use landcover classification |
| 41. | Lab Exercises |
| 42. | Feature extraction for mapping of built form, vegetation , road etc |
| 43. | Class Assignment |
| 44. | Continue on exercise |
| 45. | Discussions on application in architecture and planning |
| **Book References:** | |
| 1. | Fundamentals of Spatial Information Systems Robert Laurini and Derek Thompson , Academic Press |
| 2. | Introduction to Remote Sensing by James B Campbell |
| 3. | Remote Sensing and Image Interpretation- Lillesand, T.M. and Kiefer, R.W.,Willey. |
| 4. | Basics of Remote Sensing and GIS by S. Kumar |
| **Web References:** | |
| 1. | https://gisgeography.com/remote-sensing-earth-observation-guide/ |
| 2. | https://ieeexplore.ieee.org/document/5418168 |
| 3. | https://uark.libguides.com/c.php?g=78901&p=508734 |

## Elective 7 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Sustainable Building Design** | |
| Course Code: | **ARC 393/ARC 558/ARC 24558/ AP AR 5158** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | Aim is the creation and operation of a healthy built environment based on ecological principles and resource efficiency. Objective of this course is to develop an understanding to design a building or group of buildings or a campus which is self-dependent. | |
| 2. | The course explained the process of design a building to achieve eco-friendly with minimum impact on surrounding environment, exploring maximum natural energy, optimising energy usage in building, optimising natural resource consumption and minimising waste. | |
| **Description of Contents in brief:** | | |
| 1. | Study of basics of building form in response to climate and orientation. | |
| 2. | Fabrics of envelopes for natural control of climate in built environment. | |
| 3. | Sustainable structural systems and resource efficient construction methods. | |
| 4. | Techniques of climate control systems. | |
| 5. | Integration of renewable energy systems in building and energy efficient services and lighting. | |
| 6. | Landscape design and solid & liquid waste management. | |
| **Course Outcomes:** | | |
| 1. | In today's context of conservation of resources and energy, this course will give an insight to learner the process of sustainable building design. A building which will explore maximum natural forces, offer optimum consumption of resources such as water and energy. A building which will design to produce minimum waste and will recycling the waste. | |
| **Lecture Schedule:** | | |
| 1. | Review of type of climate, climate characteristics and climate change phenomenon | |
| 2. | Climate responsive building forms | |
| 3. | Study of Bio – Climatic tools | |
| 4. | Roll of wall, roof and window in a building in response to surrounding environment | |
| 5. | Basics of daylight and ventilation | |
| 6. | Phenomenon of heat transfer in buildings in different season | |
| 7. | Appropriate / alternative structural systems | |
| 8. | Appropriate material and technology for bricks | |
| 9. | Appropriate alternative to concrete and mortars | |
| 10. | Glass and glazing of window | |
| 11. | Prefabricated materials and building components | |
| 12. | Construction techniques for low water consumption | |
| 13. | Construction with less man power | |
| 14. | Recyclability of construction waste | |
| 15. | List of efficient water supply services and gadgets | |
| 16. | List of water efficient sanitary services and gadgets | |
| 17. | List of low carbon emission building systems | |
| 18. | List of Low energy lighting fixtures and efficient layout of fixtures | |
| 19. | Daylight integrated lighting system and controls. | |

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| 20. | Available passive cooling and heating techniques and suitability to buildings |
| 21. | Terrace rain water harvesting |
| 22. | Disposal, collection, treatment and Recycle of Sewage |
| 23. | Techniques for recycle of domestic organic solid waste |
| 24. | Techniques of environmentally safe methods for disposal of plastic and electronic waste |
| 25. | Solar energised lighting systems |
| 26. | Solar energised air conditioning system |
| 27. | Solar energised pumping systems |
| 28. | Solar energised domestic gadgets |
| 29. | Roof top solar energy plants |
| 30. | Active solar cooling and heating building systems |
| 31. | Integration of solar cells within building components |
| 32. | Solar water heating systems |
| 33. | Market survey for available solar systems |
| 34. | Study of contours and Zoning of site |
| 35. | Landscape scheme |
| 36. | Locational aspect of STP, substation and water storage tank |
| 37. | Locating captive solar power or wind power plant in site / campus |
| 38. | List of sensors used in buildings, Locational aspect of sensors |
| 39. | Control devices and control system software |
| 40. | Case study of energy efficient independent buildings |
| 41. | Case study of energy efficient buildings in group or campus |
| 42. | Market survey for energy efficient materials and construction technology |
| 43. | Survey for available systems and techniques for solar energy operated gadgets and equipment |
| 44. | Standards and guideline for sustainable building design |
| 45. | Survey of Commercially available solar water heating systems |
| 46. | Case study of sustainable buildings international |
| 47. | Online case study of buildings in India |
| **Book References:** | |
| 1. | |
| **Web References:** | |
| 1. | https://www.calrecycle.ca.gov/greenbuilding/materials |
| 2. | https://epdf.pub/green-building-handbook-a-companion-guide-to-building-products-and-their-impact-.html |
| 3. | https://doi.org/10.11129/detail.9783955532215 |
| 4. | https://www.sciencedirect.com/book/9780123851284/handbook-of-green-building-design-and-construction |
| 5. | https://link.springer.com/article/10.1186/s40594-019-0171-6 |
| 6. | https://www.sciencedirect.com/science/article/abs/pii/S2210670719309503 |
| 7. | https://issuu.com/unhabitat/docs/sustainable_building_design_for_tro |
| 8. | https://www.slideshare.net/mirandazadeng/green-building-ppt-53285881 |
| 9. | https://www.teriin.org/sites/default/files/2019-04/Making-Indian-Cities-Energy-Smart_UNSW-TERI.pdf |
| 10 | http://www.gbpn.org/sites/default/files/08.India_TechnicalReport_0.pdf. |

## Elective 7 (VIVA)

| | | |
|---|---|---|
| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Internet of Things in Buildings** | |
| Course Code: | **ARC 394** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand the techniques and concept of Internet of Things, its uses and applicability to various businesses and built environments. | |
| **Description of Contents in brief:** | | |
| 1. | Fundamentals of IoT: Business and Technology Drivers and Evolution of IoT; Understanding IoT Business Models and Design Processes; Key topics pertaining to the Internet of Things (IoT) from both business and technical aspect; Impacts of IoT and its Utilization in different Industries; Introduction to essential IoT concepts, models and technologies and their relations to fundamental IoT characteristics and functions; End-User Devices, Sensors, embedded beacons, RFIDs, Data analytics & visualization tools. | |
| 2. | IoT in Different Domains and Industries; Concept of B-IoT (Building-Internet of Things); Everything-as-a-Service (XaaS); IoT for Facilities; Building Automation; Smart Building Technologies; Building Information Modelling; Integration of internet in Building management systems; Different Applications of IoT in Navigation, HVAC Systems, Energy Efficiency, Water Supply and Sanitation; Air Quality Monitoring, Smart Lighting, Space Management, Security, Vibration Sensing, Fire and Life Safety. | |
| 3. | IoT Enabling Technologies; Introduction to Cloud Computing and Big Data; Types of Big Data; Big Data for Urban Informatics; Urban Sensing: Its context, currently available datasets; 'Real-Time' Planning; Pervasive Technologies and Digital Footprint; Urban Dynamics; Applications of Urban Sensing: Mobile Phone Network Data, Event Driven Network Data; Urban Sensing Applications, Monitoring Land Use and Land Use Inferences, Sensing Urban Mobility and other urban issues; IoT Security and Privacy Challenges. | |
| 4. | Machine Learning and Artificial Intelligence: Machine Learning; Defining Data; The terminologies of AI; What machine learning can and cannot do; Non-technical explanations of deep learning; A realistic view of AI; Biases and Discriminations in AI; Adversarial attacks on AI | |
| **Course Outcomes:** | | |
| 1. | The subject would develop a comprehensive understanding of the techniques and concept of Internet of Things, its uses and applicability to various businesses, and particularly for the built environments at the building, community and settlement levels. | |
| 2. | This course also focuses of analysing existing structures by gathering data remotely, which can lead to making better decisions in the future designs. | |
| 3. | Also the students should be able to familiarize themselves with the contemporary technologies of Cloud Computing, Big Data Analytics, Machine Learning and Artificial Intelligence. | |
| **Lecture Schedule:** | | |
| 1. | Fundamentals of IoT: Business and Technology Drivers | |
| 2. | Evolution of IoT | |
| 3. | Understanding IoT Business Models and Design Processes | |
| 4. | Key topics pertaining to the Internet of Things (IoT) from both business and technical aspects | |
| 5. | Impacts of IoT and its Utilization in different Industries | |

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| 6. | Introduction to essential IoT concepts |
| 7. | Introduction to different IoT models and technologies |
| 8. | Relation of IoT Technologies to fundamental IoT characteristics and functions |
| 9. | End-User Devices, Sensors, embedded beacons, RFIDs, Data analytics & visualization tools (cont.) |
| 10. | (cont.) End-User Devices, Sensors, embedded beacons, RFIDs, Data analytics & visualization tools |
| 11. | IoT in Different Domains and Industries |
| 12. | Concept of B-IoT (Building-Internet of Things) |
| 13. | Concept of Everything-as-a-Service (XaaS) |
| 14. | IoT for Facilities |
| 15. | Building Automation |
| 16. | Smart Building Technologies |
| 17. | Building Information Modelling |
| 18. | Integration of internet in Building management systems |
| 19. | Different Applications of IoT in Navigation, HVAC Systems |
| 20. | Different Applications of IoT in Energy Efficiency, Water Supply and Sanitation |
| 21. | Different Applications of IoT in Air Quality Monitoring, Smart Lighting |
| 22. | Different Applications of IoT in Space Management, Security |
| 23. | Different Applications of IoT in Vibration Sensing, Fire and Life Safety |
| 24. | IoT Enabling Technologies |
| 25. | Introduction to Cloud Computing and Big Data |
| 26. | Types of Big Data; Big Data for Urban Informatics (cont.) |
| 27. | (cont.) Types of Big Data; Big Data for Urban Informatics |
| 28. | Urban Sensing: Its context, currently available datasets |
| 29. | 'Real-Time' Planning |
| 30. | Pervasive Technologies and Digital Footprint |
| 31. | Urban Dynamics |
| 32. | Applications of Urban Sensing: Mobile Phone Network Data |
| 33. | Applications of Urban Sensing: Event Driven Network Data |
| 34. | Urban Sensing Applications |
| 35. | Monitoring Land Use and Land Use Inferences |
| 36. | Sensing Urban Mobility and other urban issues |
| 37. | IoT Security and Privacy Challenges (cont.) |
| 38. | (cont.) IoT Security and Privacy Challenges |
| 39. | Introduction to Machine Learning and Artificial Intelligence (cont.) |
| 40. | (cont.) Introduction to Machine Learning and Artificial Intelligence |
| 41. | Defining Data |
| 42. | The terminologies of AI |
| 43. | What machine learning can do |
| 44. | What machine learning cannot do |
| 45. | Non-technical explanations of deep learning |
| 46. | A realistic view of AI |
| 47. | Biases and Discriminations in AI (cont.) |
| 48. | (cont.) Biases and Discriminations in AI |
| 49. | Adversarial Attacks on AI |
| 50. | Concluding Class and Doubts Solving |
| **Book References:** | |
| 1. | "The Internet of Things" by Samuel Greengard |

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| 2. | Learning Internet of Things by Peter Waher |
| 3. | Getting started with Internet of Things by Cuno Pfister |
| 4. | IoT Disruptions: The Internet of Things – Innovation & Jobs by Sudha Jamthe |
| 5. | Big Data and The Internet of Things by Robert Stackowiak, Art Licht, Venu Mantha and Louis Nagode |
| 6. | "The Fourth Industrial Revolution" by Klaus Schwab |
| 7. | "Precision: Principles, Practices and Solutions for the Internet of Things" by Timothy Chou |
| 8. | Designing Connected Products by Claire Rowland, Elizabeth Goodman, Martin Charlier and Alfred Lui |
| 9. | The Silent Intelligence by Daniel Kellmereit and Daniel Obodovski |
| 10. | The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies by Erik Brynjolfsson and Andrew McAfee |
| 11. | Meta Products: Building the Internet of Things by Wimer Hazenberg, Menno Huisman and Sara Cordoba Rubino |
| 12. | Everyware: The dawning age of ubiquitous computing by Adam Greenfield |
| 13. | Trillions by Peter Lucas and Joe Ballay |
| 14. | The Design of Everyday Things by Don Norman |
| 15. | Python Data Science Handbook by Jake VanderPlas |
| 16. | Neural Networks and Deep Learning by Michael Nielsen |
| 17. | Machine Learning & Big Data by Kareem Alkaseer |
| 18. | Automate the Boring Stuff with Python by Al Sweigart |
| **Web References:** | |
| 1. | |

## Elective 7 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Security systems** | |
| Course Code: | **ARC 395/ARC 586/ARC 24586/ AP AR 5176** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand basic design concepts and emerging technologies of modern buildings. | |
| 2. | To acquire comprehensive base of knowledge required to understand and apply the principles, techniques and relevant guidelines for planning and design of security systems in buildings. | |
| **Description of Contents in brief:** | | |
| 1. | Study of Fire Alarm System - fundamentals, fire modes, history, components, and principles of operation. FAS Components - different fire sensors, smoke detectors and their types, fire control panels, design considerations for the FA system. Field components, panel components, applications. FAS Architectures, FAS loops: classification of loops, examples. Fire Standards – FAS. | |
| 2. | Design procedure in brief, NFPA 72A, BS 5839, IS Concept of IP enabled fire & alarm system, design aspects and components of PA system. Access Control System - access components, access control system design. | |
| 3. | CCTV Camera - operation & types, camera selection criteria, camera Applications, DVR-based system, DVM, network design, storage design. Components of CCTV system like cameras, types of lenses, typical types of cables, controlling system. CCTV Applications. Perimeter Intrusion - concept, components, technology, advanced applications. | |
| 4. | Security Design - security system design for verticals. Concept of automation in access control system for safety, physical security system with components, RFID enabled access control with components, Computer System Access Control – DAC, MAC, RBAC. EPBX System – Design consideration of EPBX system and its components, integration of all the above systems to design BMS. | |
| **Course Outcomes:** | | |
| 1. | Application of various security systems in building. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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## Elective 7 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Services in tall buildings** | |
| Course Code: | **ARC 396/ARC 582/ ARC 24582/ AP AR 5172** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To have knowledge about the special service requirements of tall buildings and to introduce the present systems, equipment and materials that are commonly employed in high rise buildings. | |
| **Description of Contents in brief:** | | |
| 1. | Introduction to the various special services required in tall buildings. Introduction to passenger elevator, local elevators, sky lobbies etc. | |
| 2. | Study of elevator equipments, control systems and spatial requirements. Escalators and capsule elevators stairways & ramps. | |
| 3. | Understanding the Designing for fire safety with NBC code for high-rise buildings - fire alarm systems, smoke detectors, firefighting support systems, fire rating of materials, fire escape stairs & ramp & other safety regulations such as lightning protection, earthing, etc | |
| 4. | Basic planning for water supply - calculation of capacity for sumps and water tanks, skip stage pumping etc., rainwater harvesting methods, sanitation arrangements in high rise structures, service floors, ducts and vertical shafts, waste treatment etc. Planning transformer & amp, generator rooms, etc. | |
| 5. | Preparation of electrical layouts for tall buildings like spatial requirements of electrical rooms, ducts, etc. Introduction to intelligent systems for electrical and illumination. | |
| 6. | Calculation for heating and cooling loads. Selection of suitable HVAC system, special equipment and systems for heating and cooling, spatial requirements for HVAC plants design of duct layouts etc. | |
| **Course Outcomes:** | | |
| 1. | Students will be familiarized all norms and standards of services in tall buildings and design efficient water supply, sanitation, electrical and mechanical services with detail calculation to achieve functional, economical and aesthetical aspect in building design. | |
| **Lecture Schedule:** | | |
| 1. | Introduction to the various special services required in tall buildings | |
| 2. | Continue…. | |
| 3. | Introduction to passenger elevator, local elevators, etc. | |
| 4. | Role and function of sky lobbies in tall buildings | |
| 5. | Study of elevator equipments and control systems | |
| 6. | Design and calculation of capacity of elevators | |
| 7. | Spatial requirements | |
| 8. | Circulation design | |
| 9. | Continue… | |
| 10. | Escalators and capsule elevators | |
| 11. | Continue… | |
| 12. | Stairways & Ramps | |
| 13. | Understanding the Designing for fire safety with NBC code for high-rise buildings | |
| 14. | Safety measures and remedies for fire safety in high-rise buildings | |
| 15. | Fire alarm systems and smoke detectors | |
| 16. | Firefighting support systems | |
| 17. | Continue… | |

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| 18. | Fire rating of materials |
| 19. | fire escape stairs & Ramp for multi-storied buildings |
| 20. | Continue… |
| 21. | Safety regulations : lightning protection, earthling, etc |
| 22. | Continue… |
| 23. | Basic planning for water supply - |
| 24. | Calculation of capacity for sumps and water tanks and skip stage pumping |
| 25. | Supply of water and distribution network in tall building |
| 26. | Plumbing and Stacking system in high-rise building |
| 27. | Rainwater harvesting: Methods and Techniques |
| 28. | Case studies and site visits |
| 29. | Continue… |
| 30. | Sanitation arrangements in high rise structures, |
| 31. | Continue… |
| 32. | Service floors, ducts and vertical shafts, |
| 33. | Continue… |
| 34. | Waste treatment in tall buildings |
| 35. | Planning of transformer, amp and generator rooms in tall buildings |
| 36. | Continue… |
| 37. | Preparation of electrical layouts for tall buildings |
| 38. | Continue… |
| 39. | Spatial requirements of electrical rooms, ducts, etc. |
| 40. | Introduction to intelligent systems for electrical and illumination |
| 41. | Continue… |
| 42. | Introduction of HVAC in high-rise buildings |
| 43. | Calculation for heating and cooling loads in high-rise buildings |
| 44. | Continue… |
| 45. | Selection of suitable HVAC system |
| 46. | Special equipment and systems for heating and cooling |
| 47. | spatial requirements for HVAC plants design of duct layouts etc. |
| 48. | Quiz and feed back |
| **Book References:** | |
| 1. | Water Supply by Alan C Twort |
| 2. | Tall Buildings by Guy Nordenson |
| 3. | Handbook of Designing and Installation of Services in High Rise Building by V K Jain |
| 4. | High-rise building structures by Wolfgang Schueller |
| 5. | Services in Vertical building by Nidhi Lathi - issuu |
| 6. | Water Supply and Sewerage by Steel E W, McGraw-Hill Publisher |
| 7. | Textbook of Water Supply and Sanitary Engineering by S. K. Hussain |
| **Web References:** | |
| 1. | https://www.slideshare.net/san17/high-rise-structural-systems-and-services |
| 2. | https://cpwd.gov.in/Publication/Compendium_of_High_Rise_Buildings_December_2019.pdf |
| 3. | https://issuu.com/nidhilathi/docs/final_dissertation_nidhi_lathi |
| 4. | https://core.ac.uk/download/pdf/83574285.pdf |
| 5. | https://www.academia.edu/9721197/THE_STUDY_OF_SERVICE_CORE_IN_A_TALL_HOTEL_BUILDING |
| 6. | Coursera |
| 7. | Udemy |

## Elective 7 (VIVA)

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| Name of Program: **B.Arch.** | Semester: **X** | Year: **V** |
| Name of Course: | **Graphic design** | |
| Course Code: | **ARC 397/ ARC 457/ARC 24457/ AP AR 4157** | |
| Core/Elective/Other | **Elective** | |
| Prerequisite: | | |
| **Course Objectives:** | | |
| 1. | To understand various aspects of design in graphics. | |
| 2. | To understand presentation skills, logos and ad making with Computer graphics. | |
| **Description of Contents in brief:** | | |
| 1. | Study fundamentals of graphic design, history, career options, works of prominent designers & the graphic design process. | |
| 2. | Study overview of design basics color, harmony, rhythm, balance, proportion, etc. Study visual perception& graphical thinking. Study of tools of graphic expression. Study of styles of expression, developing manual presentation skills. Computer graphics. | |
| 3. | Study overview of current packages, their potentials & applications such as 3DStudio Max, adobe series, Corel draw, flash etc. Study printing, lettering & typography. Exercises on design of books, posters, promotional materials, stationery, trade marks & corporate logos. Evolve comprehensive corporate identity program. | |
| 4. | Developing environmental graphics / signage Brand promotion, packaging design & ad making for both the print & electronic media. | |
| **Course Outcomes:** | | |
| 1. | Develop use of graphics as tool of presentation and 3D visualization in architectural works. | |
| **Lecture Schedule:** | | |
| 1. | As per syllabus | |
| **Book References:** | | |
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| **Web References:** | | |
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