

**B.TECH ELECTRICAL ENGINEERING SYLLABUS
IV SEMESTER**

ELECTROMECHANICAL ENERGY CONVERSION (EMEC-II)

Subject Code: E-251

UNIT I

3-phase Induction Machines -Constructional features, classification, Production of rotating magnetic field, working principle phasor diagram, equivalent circuit, slip, rotor e.m.f., current, torque and power equations, torque-slip characteristics, No-load and blocked rotor test, condition for maximum torque and maximum power, efficiency, performance by circle diagram.

UNIT II

Starting & speed control of Induction Machines (with & without emf injection in the rotor ckt.), deep bar & double cage induction motors, cogging and crawling, operation under unbalanced supply, induction generator.

UNIT III

Synchronous Generators- Constructional features, armature windings, e.m.f. equation, winding coefficients, distribution factor, pitch factor, harmonics in the induced e.m.f., armature reaction, OC & SC tests, voltage regulation : synchronous impedance method, m.m.f. method, potier's triangle method & ASA method, parallel operation, operation on infinite bus.

UNIT IV

Synchronous Machine II-Two reaction theory, power expressions for cylindrical and salient pole machines, OCC & SC characteristics.

Synchronous motor : Principle of operation, starting methods, phasor diagram, torque angle characteristics, V-curves, power factor control of synchronous motor, hunting & damping, synchronous condenser, determination of x_d and x_q by slip test.

UNIT V

Single Phase Induction Motor-Double revolving field theory, equivalent circuit, no load & block rotor tests, starting methods.

AC Commutator motors :Emf induced in commutator windings, single phase AC motors.

Reference Books :

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| 1. Electrical Machines | - P.S.Bhimbra |
| 2. Performance & design of A.C. Machines | - M.G. Say |
| 3. Electrical Machines | - Fitzgerald Kingsley |
| 4. Electrical Machines | - Nagrath & Kothari |

ELECTRONICS-I
Subject Code : E-252

UNIT I

Special Purpose Diodes- Diode Applications, Clipping, Clamping circuits, Voltage doublers, Shunt, Series & Zener voltage regulators, photodiode, LED, tunnel diode, Varactor diode, pin diode.

UNIT II

Transistor Biasing -Purpose of biasing, dc operating point, dc load line, different biasing techniques – Base bias, Emitter bias, Voltage divider bias, Collector feedback bias, Thermal Runaway, Thermal stability.

UNIT III

Small Signal Amplifiers- Transistor as an amplifier, classification of amplifiers, load line, dc equivalent circuit, operating point, RC coupled CE-amplifier, coupling and bypass capacitors, ac equivalent circuits, ac load line, graphical analysis, current, voltage & power gain, input and output impedance, analysis using h-parameters, frequency response, cascading.

UNIT IV

Transistor hybrid model at low frequency, analysis of transistor amplifier and its frequency response, emitter follower at low frequency, cascading, transistor hybrid π model at high frequency. Analysis of transistor amplifier at high frequency, miller theorem, Gain band width product.

UNIT V

FET & MOSFET- The JFET, pinch off voltage, JFET V-I characteristics, FET small signal model, depletion mode MOSFET, enhancement mode MOSFET, low frequency common source and common drain amplifiers, FET biasing, FET as a voltage variable resistor. The common source and common drain amplifier at high frequencies, MOSFET as a switch, MOSFET driver circuits.

Reference Books:

1. Electronic Devices – Millman & Halkias
2. Electronics Principles – A.P.Malvino
3. Electronic Circuit Discrete and Integrated – Donald I. Schilling
4. Electronic Devices – David Bell
5. Electronic Devices & Circuits – Allen Mottershed

ELECTRICAL MATERIALS AND ELECTROMAGNETIC FIELDS (EM & EF)

Subject Code: E-253

UNIT I

Electrostatic Fields -Coulomb's law, units, electric field intensity, electric flux density, Gauss's Law, boundary relations, physical concepts of divergence, gradient and curl. Electric potentials. Electric field in dielectrics and conductors, capacitance, continuity equation, Poisson's and Laplace's equations. Point form of ohms law, concept of vector & scalar fields.

UNIT II

Magnetic Fields - Boit-Savart Law, Magnetic field due to steady currents, force between current carrying elements, Stoke's theorem, vector potential, Ampere's circuital law. Torque on current loops.

UNIT III

Maxwell's Equations and EM Waves Maxwell's equations in various forms, Time varying field, wave equations, Propagation of waves, skin depth, Poynting Theorem.

UNIT IV

Insulating & Dielectric Materials - Properties of insulating materials (electrical, mechanical, thermal & chemical), classification of insulating materials, fibrous insulating materials (wood, paper, cardboard, insulating textiles, asbestos, mica, glass, pressboard etc.), insulating varnishes, coolanised electrical machinery, mineral oils, properties and applications of mineral oils.

UNIT V

A) Conducting Materials :Properties of conductors (electrical and mechanical) characteristic of good conductor materials, properties of copper, aluminium, silver and tungsten, comparison of copper and aluminium as conductor, properties and applications of important conductor material (tungsten, carbon, nichrome, manganin, eureka, platinum) superconductivity.

B) Magnetic Materials: Electron spin and its influence on the properties of materials. Basic concepts and definitions, dia, para, ferro, anti ferro, ferri magnetism, Curie Temperature, Hysterisis and its significance, soft and hard magnetic materials, high permeability steels, ferrites, silicon steel, their properties and uses.

Reference Books :

1. Electromagnetic field - William & Haytt
2. Electromagnetics - J.D. Krous
3. Electromagnetics - P.V.Gupta
4. Electrical Engineering Material - Decker
5. Electrical Engineering Material - C.S. Indulkar
6. Electrical Engineering Material - TTTI, Madras