

V Semester

INTERNAL COMBUSTION ENGINES

M 301

UNIT I

Internal Combustion Engines – Engine types & their operation, S.I. and C.I. Engine operating parameters & performance characteristics, Valves & valve timing & Fuel air cycles.

I.C. Engine System: Fuel, ignition, cooling, exhaust and lubrication system. Theory of carburation, simple problems on carburetion, SI Engine Fuel Injection. Fuel injection, simple problems on fuel injection.

UNIT II

Combustion in SI Engines: Stages of combustion, effect of engine parameters on combustion, Abnormal Combustion in SI Engines, octane number. Salient features of various types of combustion chambers.

UNIT III

Combustion in C.I. Engines: Stages of combustion in C.I. Engines, effect of engine parameters on combustion, cetane number, CI Engine knock. Salient features of various types of combustion chambers; heat release diagrams for different combustion chambers.

UNIT IV

Alternate Fuels : for I.C. Engines: Hydrogen, bio-gas, alcohols, vegetable oil etc.

Alternate Engines : Rotary combustion I.C. Engine, Stratified charge engine, Principle of working and salient features. Fuel Engines.

Pollutants' Formation & Control : Mechanism of formation of pollutants – CO, HC, NO_x & Particulates. Measurement of Pollutants & their control techniques.

UNIT V

Air compressors: Classification, working & Performance Characteristics: Reciprocating Type & Centrifugal Compressors, Surging and Choking of Compressors. Classification, working of other types of pumps and compressors.

Supercharging in IC engines: Types and classification.

Books and References:

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|----|-------------------------------|---------------------------|
| 1. | A Course in I.C. Engines | M.L. Mathur & R.P. Sharma |
| 2. | Internal Combustion Engines | V. Ganesan |
| 3. | Introduction to I.C. Engines. | Richard Stone. |
| 4. | Fundamentals of I.C. Engines | J.B. Heywood. |
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MANUFACTURING PROCESSES - II

M 302

UNIT I

Mass Production Lathes: Turret lathes, ram type and saddle type, vertical turret lathe, turret lathe tooling, screw machines, single and multi spindle screw machines, automatic lathes, single and multispindle automatic lathe, cycle time.

UNIT II

Milling: Types of milling operations, milling machines, cutter-types, geometry, materials, size specifications, milling machine accessories, dividing heads, simple, compound, differential and angular indexing and calculations for cutting of different types of gears.

UNIT III

Thread and gear manufacturing and machines used for cutting threads and gears. Broaching, geometry of the broaching tool, broaching machines.

Grinding and other abrasive processes, types of abrasives and their properties, selection of grinding wheels, grinding machines, cylindrical and surface grinders, centreless grinding, grinding fluids.

UNIT IV

Modern foundries: Planning and layout of modern mechanised foundries, machine moulding, core moulding, shell moulding, investment moulding, plaster moulding, permanent mould casting, die casting and centrifugal casting, moulding machines.

Forging : Drop, horizontal, press and upset forging, forging hammer and presses, extrusion, piercing, drawing, coining composing, coupling.

UNIT V

Superfinishing Operations: Buffing, polishing, lapping and honing, study of surface finish and their measurement, acceptance test of machine tools.

Hot working of Materials: Hot machine processes, hot rolling, pipe and tube production and extrusion process.

Books and References:

1. Production Technology by R.K.Jain.
2. Manufacturing Sciences by Ghosh & Mallick.

**MECHATRONICS & INSTRUMENTATION
M 303**

UNIT I :

Introduction to Mechatronics and Instrumentation System

Introduction to an interdisciplinary approach, Control Systems, open loop and closed loop control, Measurement Systems, Mechatronics systems, Evolution of Mechatronics, Architecture of Mechatronics, Sensors & Transducers, Performance terminology, Various types of sensors and transducers, signal conditioning, data presentation.

UNIT II :

Actuation Pneumatic and Hydraulic actuators, Mechanical actuators, Electrical actuators. Design of hydraulic and pneumatic systems.

UNIT III :

Logic Building and Processing Logic Gates, combinational and sequential logic, fuzzy logic, microprocessor, programmable logic controller.

UNIT IV :

Instrumentation Introduction to Instruments : application of instrument systems, functional elements of a measurement system, classification of instruments. Measurements, methods and application : Force, Torque and power, pressure, temperature etc. measurements.

UNIT V :

Non Destructive Testing Introduction to NDT, scope and advantage of NDT, Non destructive techniques: Ultrasonic Crack detection, Magnetic particle for various materials, Eddy current, Dye Penetrant, radiography, acoustic emission.

Books & Reference:

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| 1. Mechatronics | W. Bolton |
| 2. Instrumentation, Measurement & Analysis | Nakra and Choudhary |
| 3. Mechanical Measurements | Beckwith & Beck |
| 4. Mechanical Measurements | Sirohi & Radhekrishnan |
| 5. Non – Destructive Examination Book | K.G. Boving Hand |
| 6. Non-Destmetine Testing | R. Halmshaw |
| 7. Mechatronics | HMT |
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PRODUCTION ORGANISATOIN
M 304

UNIT - I

Location planning: Site selection of factory, factors affecting selection of site, advantages and disadvantages of rural and urban sites, single and multistory buildings.

Layout planning: Principles of plant layout, symptoms of a bad layout, types of layout, their merits and demerits, flow patterns and factors affecting them, horizontal and vertical flow lines, use of travel chart.

Introduction to Computer aided layout planning.

UNIT – II

Types of production systems: job, batch and continuous production, flexible production, sales forecasting and selection of job lot size, production planning and control: Routing, scheduling, dispatching and follow up, progress reporting.

Material handling: Economic considerations and selection of material handling devices. Quality concepts and control, TQM.

UNIT - III

Product design and development: need for product design, research and development, diversification, simplification, evaluation, standardization, modern product design and development approach. Design of production system: production, importance, measurement of production, productivity index, improving productivity and its benefits. Concurrent Engineering, various international certifications.

UNIT- IV

Inventory management: function of inventory, inventory control problems, economic order quantity, re-ordering procedure, lead time, types of inventory control. Purchase management, its functions, methods and principles. Stores management, MRP, introduction to supply chain management.

UNIT - V

Capacity planning: Importance of capacity decisions, defining and measuring capacity, determining capacity requirements. Industrial safety, problems of industrial accidents, its causes and remedies, job safety analysis, industrial hazards, noise and its control. Welfare and safety.

Books and References:

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|--|---|-----------------|
| 1. Industrial Engg. and Management | – | O.P.Khanna |
| 2. Industrial Management | – | K.K.Ahuja |
| 3. Elements of production planning and control | – | S.Elion |
| 4. Industrial Engg. & Production Management | – | Martand Telsang |

THERMAL ENGG.-I
M 343

S. No.	Name of Experiment
1.	To find IP of Newage 4 cylinder Petrol Engine by Morse test
2.	To estimate and draw the heat balance sheet for a horizontal Ruston Diesel Engines
3.	To find the effect of Ignition Timing on Newage petrol engine
4.	To perform variable speed load test on Newage petrol engine
5.	To find the effect of Air/Fuel ratio on variable compression petrol engine [TD43] performance at constant throttle.
6.	To find the effect of compression ratio on variable compression petrol engine [TD43] performance
7.	To study a 2 wheeler chassis dynamometer & perform a test on it.
8.	Load Test on Rover's Gas Turbine
9.	Load Test on Steam Turbine

MANUFACTURING TECHNIQUES & MECHATRONICS LAB.
M 344

MANUFACTURING TECHNIQUES LAB.

S. No.	Name of Experiment
1.	Manufacture of a Screw jack for a Car.
2.	Special Bolt for holding Stepney of a Car.
3.	Oil Chamber Bolt of a Car.
4.	Manufacturing of different Items Moulding through Plastic Injection.
5.	Manufacturing of Different Bushes of various Materials.

Note : Any two experiment of above list

MECHATRONICS and INSTRUMENTATION LAB.

S. No	Name of Experiment
1.	Study of Mechatronics training package along with the accessories available with the Lab.
2.	Study of Mechatronics Products Floppy Disk Drive, Dot Matrix Printer & CD Player.
3.	Control of AC Non Servo synchronous motor clockwise & Anticlockwise in manual mode and through programming.
4.	Control of single acting cylinder and double acting cylinder by checking the retract position of the piston and extend position of the piston.
5.	Control of carriage manually and through programming.
6.	Control of Conveyor manually and through programming.
7.	Control of X-Y position table manually and through programming.
8.	Control of Rotary table using digital inputs.
9.	Determination of temperature of 1000W heating element with the help of disappearing element type optical pyrometer.
10.	Measure the viscosity of a given fluid with the help of digital viscometer.
11.	Measurement of table fan speed by stroboscope.
12.	Study of cathode ray oscilloscope (C.R.O.)