



COURSE OBJECTIVE:

Understand the nature and role of the following thermodynamic properties of matter: internal energy, enthalpy, entropy, temperature, pressure and specific volume. Recognize and understand the different forms of energy and restrictions imposed by the first law of thermodynamics on conversion from one form to another. Be able to apply the first law to a control mass or control volume at an instant of time or over a time interval. Understand implications of the second law of thermodynamics and limitations placed by the second law on the performance of thermodynamic systems

Unit-I

Basic Concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth Law of Thermodynamics, Statement and Significance, Concept of an Ideal Gas, Gas Laws, Avogadro's Hypothesis, Heat and Work Transfer. First Law of Thermodynamics: First Law For a Closed System Undergoing a Cycle and Change of State, Energy,

Unit-II

Second Law of Thermodynamics, Heat Engine, Heat Reservoir, Refrigerator, Heat Pump, COP, EPR, Available Energy, Carnot's Theorem, Carnot's Cycle, Efficiency of Carnot's Cycle, Statement of Second Law Reversible and Irreversible Processes, Consequence of Second Law.

Unit-III

Entropy: Clausius Theorem, Property of Entropy, Inequality of Clausius, Entropy Change in an Irreversible Process, Principle of Increase of Entropy, T-S Diagrams, Availability and Irreversibility. Gibbs and Helmholtz Functions.

Unit IV

Pure Substance, Phase, Phase-Transformations, Formation of Steam, Properties of Steam, PVT Surface, HS,TS,PV,PH,TV Diagram, Processes of Vapor Measurement of Dryness Fraction, Use of Steam Table and Mollier Chart.

Unit V

Vapor Power Cycles: Carnot Vapor Cycle, Rankine Cycle, Calculation of Cycle Efficiencies, Reheat Cycle, Regenerative Cycle, Reheat-Regenerative Cycle, Feedwater Heaters.

Gas Power Cycles: Otto and Diesel Cycle, Dual Cycle, Comparison of Otto, Diesel and Dual Cycles, Air Standard Efficiency, Mean Effective Pressure, Brake Thermal Efficiency, Relative Efficiency.

OUTCOME: A fundamental understanding of the first and second laws of thermodynamics and their application to a wide range of systems. Understanding of the first law of thermodynamics and various forms of work that can occur.

List of Experiments (Expandable)

1.To Find Mechanical Equivqlent of Heat Using Joules Apparatus

- 2.To Study Working of Impulse and Reaction Steam Turbine by Models.
- 3.To Study Working of Gas Turbines by Models and to Identify Various Processes of Brayton Cycle.
- 4.To Calculate COP of Vapour Compression Refrigeration System and to Plot on T-s, p-H Diagrams.
- 5.To Plot Specific Fuel Consumption Versus rpm Diagrams for Diesel and Petrol Engines Theory Classes must be Supplemented with Laboratory Classes.

Reference Books:

1. Engineering Thermodynamics by P.K. Nag, McGraw-Hill Education.
2. Fundamentals of Thermodynamics by Borgnakke & Sonntag, 7th Ed. Wiley India (P) Ltd.
3. Thermodynamics – An Engineering Approach by Yunus Cengel & Boles, McGraw-Hill Education.
4. Engineering Thermodynamics by Gordon Rogers and Yon Mayhew, Pearson Education Ltd.
5. Thermodynamics by Arora CP TMH.
6. Thermal Engineering by R Yadav
7. Engineering Thermodynamics by Omkar Singh New Age International.
8. Engineering Thermodynamics by Ratha Krishanan PHI India Pvt. Ltd..
9. ऊष्मा गतिकी एवं अंतर्दहन इंजन , सुधीन्द्र शर्मा, संजीव जाखड, पब्लिशर सी बी सी .



SEMESTER: IV

Objectives :

1. To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyze electrical and electronics problems
2. Understand the basic concepts of magnetic circuits, AC & DC circuits.
3. Explain the working principle, construction, applications of DC & AC machines.
4. Understand the basic concepts of digital electronics circuits and its components.

UNIT I

FUNDAMENTALS OF DC & AC CIRCUITS

DC CIRCUITS-

Introduction to DC and AC Circuits, Active and Passive Two Terminal Elements, Ohms Law, Voltage-Current Relations for Resistor, Inductor, Capacitor, Kirchoff's Laws, Mesh Analysis, Nodal Analysis, Ideal Sources –Equivalent Resistor, Current Division, Voltage Division

AC CIRCUITS-

Sinusoids, Generation of AC, Average and RMS Values, Form and Peak Factors, Concept of Phasor Representation, J Operator. Analysis of R-L, R-C, R-L-C Circuits. Introduction to Three Phase Systems - Types of Connections, Relationship Between Line and Phase Values.

UNIT-II

MAGNETIC CIRCUITS-

Review of Laws of Electromagnetism, mmf, Flux, and their Relation, Analysis of Magnetic Circuits. Transformers-Single-Phase Transformer, Basic Concepts and Construction Features, Voltage, Current and Impedance Transformation, Equivalent Circuits, Phasor Diagram, Voltage Regulation, Losses and Efficiency, OC and SC Test.

UNIT-III

ELECTRICAL MACHINES-

D.C. Motor & D.C. Generator, Three Phase Induction Motor and Synchronous Machines, Their general Construction, Working Principle, emf Equation and Applications. Types of Losses Occurring in Electrical Machines.

Unit IV

DIGITAL ELECTRONICS-

Number Systems used in Digital Electronics, Decimal, Binary, Octal, Hexadecimal, Their Complements, Operation and Conversion, Floating Point and Signed Numbers, Demorgan's Theorem, AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR Gates and Their Representation, Truth Table, Half and Full Adder Circuits, R-S Flip Flop, J-K Flip Flop.

UNIT - V

DIODE AND ITS CIRCUITS-

Introduction to Semiconductor Theory-
Classification of Materials- Insulators, Conductors and Semiconductors and Their Energy Bands, Types of

Semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and Operation of PN Diode, V-I Characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode. Bipolar Junction Transistors (BJT) and their Working, Introduction to CC, CB & CE Transistor Configurations, Different Configurations and Modes of Operation of BJT, DC Biasing of BJT.

Outcomes:

1. Ability to understand and apply basic science, circuit theory, Electromagnetic field theory control theory and apply them to electrical engineering problems.
2. Ability to understand and analysis, linear and digital electronic circuits.

REFERENCES :-

1. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
2. Kothari.D.P and Nagrath.I.J, “Basic Electrical Engineering”, Second Edition, Tata McGraw - Hill, 2009.
3. Basics of Electronics Engineering, Wiley India Pvt. Ltd.
4. J. B. Gupta, “ A Textbook Of Basic Electrical And Electronics Engineering” 2nd Edition, S. K. Kataria & Sons.

Experiment List

1. To Verification of Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To Verification of the Thevenin's Theorem and Superposition Theorem.
3. To study the R-L-C series circuit and find its power factor.
4. To Study of Voltages and Current relations in 3- Φ Star configuration & Delta configuration.
5. To study the open circuit and short circuit test on 1- Φ transformer.
6. To study the constructional features of DC machine.
7. To study the constructional features of AC machine.
8. To study various type of electrical and electronics components.
9. To study the characteristics of PNP transistor in common emitter Configuration and to determine Input resistance, Output resistance and Current gain.
10. To study & verify OR, AND, NOT, XOR and XNOR gates using ICs.
11. To study and verify S-R Flip-Flop.
12. To study and verify Demorgan's theorem.
13. To Study and Verify the Universal gates.



MANDSAUR
UNIVERSITY
MAKING FUTURE READY!

Mandsaur University, Mandsaur
Mhow-Neemuch By-Pass Road, Sh. 31, Mandsaur 458001 (M.P.)
Syllabus of Examination w.e.f. (Session 2017-18)
Mechanical Engineering Diploma(03YDC)
Production Engineering (MEC380)

SEMESTER: III

COURSE OBJECTIVE:

It knowledge to students in the latest technological topics on Production Engineering and to provide them with opportunities in taking up advanced topics in the field of study.

Unit 1

Jigs and Fixtures: General, Locating and Clamping, Design Principles Common to Jigs and Fixtures, Drilling Jigs, Milling Fixtures, Lathe Fixtures, Grinding Fixtures, Broaching Fixtures, Assembly Fixtures, Inspection Fixtures, Boring Fixtures, Planning and Shaping Fixtures, Indexing Jigs and Fixtures, Automated Jigs and Fixtures, Fundamental of Jig and Fixture Design, Jig and Fixture Construction, Material for Jig and Fixtures, Tolerance and Error Analysis, Analysis of Clamping Forces.

Unit 2

Limit, Tolerances and Fits: General, Terminology for Limits and Fits, Meaning of Limits, General Limit Tolerance, Limit Systems, Selective Assembly, Solved Examples.

Unit 3

Press Tool Design: General, Press Operation, Press Working Equipments, Press Selection, Press Working Terminology, Types of Dies, Clearance, Cutting Forces, Method of Reducing Cutting Forces, Minimum Diameter of Piercing, Blanking Die Design, Piercing Die Design, Drawing Dies, Bending Dies, Design Procedure for Progressive Dies, Material and Manufacture of Sheet Metal Working Dies.

Unit 4

Cost Estimations: Definitions, Cost Accounting or Costing, Elements of Cost, Estimation of Cost Elements, Methods of Cost Estimating, Data Requirement for Cost Estimating, Steps in

Making a Cost Estimates, Chief Factors in Cost Estimating, Numerical Examples, Calculation of Machining Times, Estimation of Total Unit Time, Problems.

Unit 5

Process Planning: Generals, Contents of Process Plan, Process Operations, Steps of Process Planning, How Process Plan are Expressed, Planning and Tooling for Low Cost Processing, Problems.

Outcome:

Fundamental knowledge and understanding of Production Engineering, acquire abilities and capabilities in the areas of advanced manufacturing methods, quality, assurance and shop floor management.

REFERENCES

1. A Textbook of Production Engineering; P.C.Sharma
2. A Text Book on Production Engineering; Swadesh Singh
3. Production Planning and Control: Text and Cases 2015; S.K. Mukhopadhyay
4. Textbook of Production Engineering; K.C.Jain
5. Industrial Engineering and Production Management; Martand T. Telsang



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Syllabus of Examination w.e.f. (Session 2017-18)
Mechanical Engineering Diploma(03YDC)
Mechanism of Machine (MEC390)

SEMESTER: III

Course objective:

1. Understand the fundamentals of the theory of kinematics and dynamics of machines.
2. Understand techniques for studying motion of machines and their components.
3. This includes relative motion analysis and design of gears, gear trains, cams, and linkages, simultaneous graphical and analytical analysis of position, velocity, and acceleration, considering static and inertial forces.

Unit 1:

Mechanisms and Machines: Mechanism, Machine, Plane and Space Mechanisms, kinematic Pairs, kinematic Chains and their Classification, Degrees of Freedom, Grubler's Criterion, kinematic Inversions of Four Bar Mechanism.

Unit 2:

Gears: Classification of Gears, Nomenclature, Arc of Contact, Path of Contact, Contact Ratio, Interference and Undercutting, Helical, Spiral, Bevel and Worm Gears.

Gear Trains: Simple, Compound, Epicyclic Gear Trains; Determination of Gear Speeds Using Vector, Analytical and Tabular Method; Torque Calculations in Simple, Compound and Epicyclic Gear Trains.

Unit 3:

Cams: Classification of Followers and Cams, Radial Cam Nomenclature, Analysis of Follower Motion (Uniform, Modified Uniform, Simple Harmonic, Parabolic, Cycloidal).

Unit 4 :

Friction:

Concept and Laws of Friction, Appreciate The Role of Friction in Thrust, Bearing, Pivot Bearing and Collars Considering - Uniform Pressure and Uniform Wear Condition.

Unit 5 :

Friction Devices: Clutches and Brakes

Classification of Clutches, Single Plate and Multi-Plate Clutch, Centrifugal Clutch, Energy Equation and Thermal Considerations.

Classification of Brakes, Braking Effect, Analysis of Brakes: Block Brake, Band Brake, Band and Block Brake, Internal Expansion Shoe Brake;

Outcome:

1. Distinguish kinematic and kinetic motion.
2. Identify the basic relations between distance, time, velocity, and acceleration.
3. Apply vector mechanics as a tool for solving kinematic problems.

List of experiments (expandable)

1. To Study all Inversions of Four-Bar Mechanisms Using Models.

2. To Plot Fall and Rise of the Follower Versus Angular Displacement of Cam and Vice Versa.
3. Analysis of Clutch.
4. Analysis of Brakes.
5. Power Measurement Using Dynamometers.

ACTIVE LEARNING ASSIGNMENTS:

Preparation of Power-Point Slides, Which Include Videos, Animations, Pictures, Graphics for Better Understanding Theory and Practical Work – The Faculty will Allocate Chapters/ Parts of Chapters to Groups of Students so that the Entire Syllabus to be Covered.

Reference Books:

1. S S Rattan , Theory of Machines, McGraw-Hill.
2. J.Uicker , Gordon R Penstock & J.E. Shigley, Theory of Machines and Mechanisms, Oxford.
3. A G Ambekar, Mechanism and Machine Theory, PHI.
4. R L Norton, Kinematics and Dynamics of Machinery, McGraw-Hill.
5. Kenneth J Waldron , Gary L Kinzel, Kinematics, Dynamics and Design of Machinery, Wiley.
6. Meriam, J L and Kraige, L G, Engineering Mechanics: Dynamics, Wiley.
7. Dr. Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi
8. Rao JS and Dukkupati; Mechanism and Machine Theory; NewAge Delhi.
9. Sharma CS; Purohit K; Theory of Mechanism and Machines; PHI.
10. Thomas Bevan; Theory of Machines; Pearson/ CBS PUB Delhi.
11. मशीनों के सिद्धांत, संजय कुमार गुप्ता , वायु एजुकेशन ऑफ़ इंडिया.



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Syllabus of Examination w.e.f. (Session 2017-18)
Mechanical Engineering Diploma (03YDC)
CAD Practices (MEC420)

SEMESTER: IV

Course outcomes:

The main objective of the subject is to make the students competent in the field of Design software and its applications. Which is demand of modern industries

Drafting practice using computer: Starting a New Drawing/Opening an existing drawing ssetting up a drawing starting from scratch, ssetting up a drawing using a Wizard , Using and creating a template file Opening an existing drawing Screen layout ,Pull-down menus , Screen icons ,Command line status bar Dialogue boxes.

Drawing Commands: Lines, Ray, Construction Line, Multiline and polylines Rectangles Arc, Circle and Ellipse Polygon, Spline Co-ordinate input methods (directive, absolute, relative and polar) Hatching Text, multi-line & single line ,and Formatting Text Styles , View Commands Zoom, Pan, Dynamic, Zoom Previous ,Zoom real-time. Drawing Settings and Aids Snap, Grid, OSnap, OTrack

Modify Commands: Erase, Trim, Move, Copy, Mirror, Offset, Fillet and Chamfer, Array Extend Stretch, Rotate, Break, Scale and Explode

Dimension Command: Formatting Dimension Style and Multi-leader Style Drawing **Settings and Aids:** Layers, Load Linetypes, match properties, World UCS and User-defined UCS.

Saving and Plotting: Paper space, Layout space and Viewports, Pen assignments and Printer setup.

Sectional views: Exercise: Knuckle, Gib and Cotter Joint - Foot step bearing.

Refrence Books:

- 1.Introduction to AutoCAD 2012, 2D and 3D Design (Special Indian Edition), By [Alf Yarwood](#).
- 2.Engineering AutoCAD by [A. P. Gautam](#) , Khanna Publishing.
3. Autocad Training Guide, by Linkan Sagar, BPB Publication.
4. Learn AutoCAD in a Easy Way by [Sunil K. Pandey](#) , Unitech books.
5. Advanced AutoCAD by [R. Cheryl](#), IP Industrial Press.

Course outcome :

The study and practice of this syllabus will enhance the understanding of the student about AutoCAD and its applications in Mechanical Engineering.



SEMESTER: VI

Course objective : The concepts of this subject will explore the facts of fluid flow its kinematics and dynamics and the applications of these basic fundamentals in the development and working of Hydraulic Machines.

Unit : 1 Properties of Fluids and Fluid Statics : Fluid Definition and properties, Newton's law of viscosity , physical properties of fluids, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure, **Fluid Statics:** Definition of body and surface forces, Pascal's law, Basic hydrostatic equation, Forces on surfaces due to hydrostatic pressure, Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, Atmospheric and Vacuum Pressure, Piezometer, Simple Manometers and differential Manometers, Total Pressure and center of Pressure on plane and curved surfaces, Submerged in a liquid.

Unit 2 : Fluid kinematics and dynamics: Fluid kinematics: stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow. Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Unit : 3 Flow through Closed conduit:: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line - hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle.

Unit : 4 Fundamentals of Hydraulic Machines: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes, Hydal Power Plants : Elements of hydro electric power station,

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube- theory- functions and efficiency.

Performance of hydraulic turbines: Unit and specific quantities, Model Analysis, characteristic curves, governing of turbines, selection of type of turbine, capitation, surge tank

Unit :5 Reciprocating and Centrifugal pumps: classification, Differences in Reciprocating and centrifugal Pumps , working Principles, work done – manometer head, static head- losses and efficiencies specific speed- Model analysis, pumps in series and parallel-performance characteristic curves, NPSH, water hammer

Outcomes: Learner should be able to

1. Understand properties of fluids and Working of Hydraulic Machines
2. Formulate and solve equations of the control volume for fluid flow systems
3. Understand the concepts of fluid flow and its measurement.

List of Experiments:

1. To measure the velocity of flow at different points in a pipe..
2. Determination of losses due to friction during flow of fluid in a pipe.
3. To determine the discharge of liquid through orifice and Mouthpiece.
4. To study the working of Impact of jet apparatus
5. The study of the working of Pelton Turbine.
6. The study of the working of Francis Turbine.
7. Analysis of discharge on centrifugal pump test rig.

Course outcomes: The study of the subject will enhance the understanding about hydraulic machines and fluid flow concepts.

- References:** (i) Fluid Mechanics : K.L. Kumar
(ii) Fluid Mechanics : Seth and Modi
(iii) Fluid Mechanics : Dr. R.K. Bansal
(iv) Fluid Mechanics: B.M.Massey
(v). Fluid Mechanics: Cengel and Cimbala
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