JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	4	-/-/-	4

(54013) PRODUCTION TECHNOLOGY

UNIT – I

CASTING : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment.

Methods of Melting : Crucible melting and cupola operation, steel making processes, special.

UNIT – III

A) Welding : Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.

B) Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

UNIT – IV

Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT – V

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces

in rolling and power requirements.

UNIT - VI

Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT- VII

EXTRUSION OF METALS : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects.

UNIT - VIII

Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection modeling)

TEXT BOOKS :

1. Manufacturing Processes for Engineering Materials - Serope Kalpakjian and Steven R Schmid, Pearson Pub.
2. Manufacturing Technology - P.N. Rao, TMH
3. Production Technology - Sarma P C, S. Chand Pub.

REFERENCES :

1. Production Technology / R.K. Jain
2. Process and materials of manufacturing –Lindberg/PE
3. Principles of Metal Castings - Roenthal.
4. Welding Process - Paramar
6. Production Engineering – Suresh Dalela & Ravi Shankar / Galgotia Publications Pvt. Ltd.
7. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Edu.

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	3	1/-/-	3

(54014) KINEMATICS OF MACHINERY

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

MACHINES : Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II

STRAIGHT LINE MOTION MECHANISMS : Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT – III

KINEMATICS : Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms : Analysis of slider crank chain for displacement , velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body : Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – IV

STEERING Mechanisms : Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

HOOKE'S JOINT : Single and double Hooke's joint – Universal coupling – application – problems.

UNIT – V

CAMS : Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers : Roller follower – circular cam with straight, concave and convex flanks.

UNIT – VI

Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VII

Belt Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of belt drives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

UNIT – VIII

GEAR TRAINS: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS :

1. Theory of Machines by Thomas Bevan, CBS
2. Theory of Machines - R.K Bansal
3. Theory of Machines R.S Khurmi & J.K Gupta

REFERENCES :

1. Theory of machines – Rattan .S.S., TMH, 2009 Edition
2. Theory of machines – PL. Ballaney / khanna publishers.
3. Theory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
5. Theory of Machines / Shigley / Oxford.

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem

L	T/P/D	C
3	1/-/-	3

(54015) APPLIED THERMODYNAMICS - I

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles Of CI Engines.

UNIT-II

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT – III

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT IV

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – V

Testing and Performance : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – VI

COMPRESSORS – Classification –positive displacement and roto dynamic

machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating : Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VII

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors : Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

UNIT-VIII

Axial Flow Compressors : Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:

1. I.C. Engines - V. GANESAN, TMH
2. IC Engines – Ramalingam, Scietech publishers
3. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGrawHIll.
6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand
7. Thermal engineering data book-B.Srinivasulu Reddy/JK International Pub.

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	4	-/-/-	4

(54016) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

UNIT I

Fluid statics : Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT II

Fluid kinematics : Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three dimensional flows.

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 III

Closed conduit flow: 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: pitot tube, venturimeter, and orifice meter, Flow nozzle

UNIT IV

BOUNDARY LAYER CONCEPTS : Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

UNIT V

Basics of turbo machinery : 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.

UNIT VI

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

UNIT VII

Performance of hydraulic turbines : Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT VIII

Centrifugal pumps : Classification, working, work done – barometric head-losses and efficiencies specific speed- performance characteristic curves, NPSH.

Reciprocating pumps : Working, Discharge, slip, indicator diagrams.

TEXT BOOKS :

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	0	-/-/6	4

(54017) MACHINE DRAWING

Machine Drawing Conventions :

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details - common abbreviations & their liberal usage

e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cottered joints and knuckle joint.

c) Rivetted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE : First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS :

1. Machine Drawing – Ajeet Singh, TMH Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
3. Machine Drawing – N.D. Bhatt.

REFERENCES :

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing - Rajput

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	3	1/-/-	3

(54018) NUMERICAL METHODS

UNIT-I: Roots of Non linear equations

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

UNIT-II: Solution of linear equations:

Existence of solution – Gauss Elimination method – Gauss elimination with Pivoting. Gauss Jordon Method- Ill conditioned systems – Jacobi iterative method – Gauss Seidel Method – Convergence of Iterative methods.

UNIT-III: Interpolation:

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences – Symbolic relations and separation of symbols- Difference Equations - Differences of a polynomial-Newton's formulae for interpolation –Interpolation with unevenly spaced points- Lagrange's Interpolation formula. - Cubic spline.

UNIT-IV: Least squares method:

Linear, Non linear and curvilinear curve fitting – Multiple linear regression

UNIT – V: Numerical differentiation and integration

Numerical differentiation and integration Trapezoidal rule, simpson's 1/3 rule and 3/8th rule.

UNIT – VI : Numerical solution of Initional Value Problems in Ordinary Differential Equations

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods –Predictor-Corrector Methods- Adams- Bashforth Method.

UNIT-VII: Boundary values & Eigen value problems

Shooting method, Finite difference method and solving eigen values

problems, power method.

UNIT-VIII: Solution of partial differential equations

Classification of partial differential equation –Finite difference methods for: Elliptic equations –Laplace equations – Leibmann's iterative method – Parabola equations – Solution of heat equation (One dimensional).

Text Books:

1. Numerical Methods by E. Balaguruswamy by Tata – Mc Graw Hill.
2. An Introduction to Numerical Analysis by S.S.Sastry – PHI Learning
3. Numerical Methods by Jain, Iyengar & Jain.

References:

1. Numerical Methods by S. Armugam & Others Scitech.
2. Introduction to Numerical Analysis by K.E. Aitkinson, Wiley Publications.
3. Numerical Analysis by Scarborough, Oxford IVH.
4. Elements of Numerical Analysis by Radha S.Gupta McMillan.
5. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications.

www.jntuhome.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	0	-/3/-	2

(54604) PRODUCTION TECHNOLOGY LAB

Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB :

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability – 1
3. Moulding Melting and Casting - 1 Exercise

II WELDING LAB :

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III MECHANICAL PRESS WORKING :

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press : Deep drawing and extrusion operation.
3. Bending and other operations

IV PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

REFERENCE BOOK:

1. Dictionary of Mechanical Engineering – G.H.F. Nayler, Jaico Publishing House.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. M.E. - II Sem	L	T/P/D	C
	0	-/3/-	2

(54605) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's Theorems

Note : Any 10 of the above 12 experiments are to be conducted.