

SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE

Department of Industrial and Production Engineering

B. TECH IPE II Year (4YDC)

IP-23011: MANUFACTURING PROCESSES - I

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		MARKS
04	02	00	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE- REQUISITES: NA

COURSE OUTCOMES:

Upon successful completion of course, Students should be able to:

CO1: To illustrate different joining processes used in engineering applications, their defects and remedies.

CO2: To explain patterns, defects and allowances of foundry processes.

CO3: To classify principles of special casting processes and their applications.

CO4: To demonstrate various hot and cold working processes like rolling, wire drawing and extrusion.

CO5: To apply knowledge of press working operations.

COURSE CONTENTS

UNIT-1 :Welding: Classification of the process, Electric arc welding - Joint design, Welding symbols, Arc welding equipment, Characteristic curves, Welding parameters, Electrode classification, Types of metal transfer, Manual metal arc welding. Electrodes used and their nomenclature, TIG welding, MIG welding, Submerged Arc welding, Atomic hydrogen welding. Other Joining & Cutting Techniques: Resistance welding, Thermit welding, Electroslag welding, Electron beam welding and laser beam welding, brazing, Braze welding and soldering, Thermal cutting of metals, Defects in welds and weld distortion.

UNIT-2 :Foundry : Types of patterns and selection of pattern materials, pattern allowances, Moulding and core sands, Moulding sands - their properties and ingredients, Core & mould making, Moulding machines, Fettling and cleaning of castings, Defects in casting.

UNIT-3 :Special Casting Techniques: Gravity die or permanent mould casting, Pressure die casting, Centrifugal die casting, CO₂ moulding, Investment mould casting, Shell moulding, Plaster mould casting and continuous casting.

UNIT-4 : Mechanical Working of Metals: Rolling - Principle, Rolling stand arrangement (Rolling mills).

Forging - Forging operations, Drop, Press and Machine forging, forging defects.

Extrusion - Principles, hot and cold extrusion processes, tube extrusion, wire, rod and tube drawing.

UNIT- 5: Press working : Types of presses, Classification and specifications, press working operations as Blanking, piercing, shearing, bending, forming, embossing, coining drawing and deep drawing, operations. Elements of dies and punches, Clearance, Compound, combination, progressive and inverted dies and their operations, Blank layout, Metal spinning.

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IP-23011: MANUFACTURING PROCESSES - I

PRACTICALS

LIST OF PRACTICALS

1. To study CO₂ moulding process
2. To study shell moulding process
3. To prepare a corner joint as per given drawing by manual arc welding
4. To prepare MS square chisel as per given diagram
5. To prepare AV black pattern as per given diagram
6. To study MMA welding equipment

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THEORY ASSESSMENT:

(1) End Semester Exam: 70% weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT

(1) Sessional: 40%Weightage (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) End semester practical viva: 60% weightage

TEXT BOOKS RECOMMENDED:

S.NO	BOOK	UNIT
1.	Rao P. N., Manufacturing Technology, McGraw Hill Publication	1-5
2.	Lindberg, Manufacturing Process., Allyn and Bacon Publication	1-5
3.	Campbell, Principles of Manufacturing materials & Process.	1-5

REFERENCES RECOMMENDED:

S.NO	BOOK	UNIT
1.	Parmar R. S., Welding Processes and Technology.	1-5
2.	Jain P. L., Principle of Foundry Technology	1-5

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B. TECH IPE II Year (4YDC)

IP 23006: PRINCIPLES AND PRACTICE OF MANAGEMENT

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		MARKS
03	00	00	03	00	-	CW	END SEM	SW	END SEM	100
						30	70	-	-	

PRE- REQUISITES: NA

COURSE OUTCOMES

This course is designed to enable students in their learning for the following:

CO1: To interpret and compare the fundamental managerial thoughts and concepts of organisation theory.

CO2: To analyse the personnel management problems and devise possible solutions.

CO3: To explain the practices related to manpower selection, training as well as to comprehend the leadership and motivation theories.

CO4: To illustrate the importance of effective communication and managerial control methods.

CO5: To discuss the fundamental labour legislation and employer-employee relations for business growth.

COURSE CONTENTS

UNIT-1: Introduction: Origin of management concept: Management functions, roles, and principles, Schools of Management Thought, Organization theory: its role and importance, Organization structures, Departmentation, Delegation of authority, Span of control, line and staff relationship.

UNIT-2:Personnel Management: Role and functions of personnel management, Organization of personnel dept., Personnel problems and their solution, welfare techniques, Management by Objectives (MBO), Benefits and Weaknesses of MBO.

UNIT-3: Manpower Selection and Development: Sources of recruitment, Selection methods, Interviewing and testing, Training methods, Performance appraisal and its methods. Motivation and Leadership: Need analysis, theories of motivation, Leader v/s Manager, Leadership theories.

UNIT-4: Managerial Control: Meaning, Process and Evaluations, Developing and compensating employees, Feedback & Feed forward System, Control Methods, Effective Communication.

UNIT-5: Employee Employer Relations and Labour Legislation: Employee - Employer relations, Industrial conflicts, conciliation, Arbitration, Adjudication, collective bargaining, strikes and lockouts, Grievances, Procedures, Trade Unions and their functions. Principle and practice of labour legislation.

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THEORY ASSESSMENT:

(1) **End Semester Exam:** 70% weightage,

(2) **Continuous assessment:** 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

TEXT BOOKS RECOMMENDED:

S.NO	BOOK	UNIT
1	Koontz H. and O'Donnel H., <i>Essential of Management</i> , 8 th ed., McGraw-Hill, New Delhi, 2009.	1-5
2	Robbins, S. <i>Fundamentals of Management</i> . 5th ed., Pearson Education, Canada, 2008.	1-5

REFERENCES RECOMMENDED:

S.NO	REFERENCE BOOKS	UNIT
1	Terry & Francklin, <i>Principles of Management</i> , Richard – Erwin.	1-5
2	Anil Bhat, Arya Kumar , <i>Principles of Management: Competencies, Processes, Practices</i> , Oxford University Press India, 2019	1-5

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MA 23003: MATHEMATICS III

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	00	01	04	00	-	CW	END SEM	SW	END SEM	100
						30	70	-	-	

PRE-REQUISITES: NA

COURSE OUTCOMES

Upon successful completion of this course the student should be able to:

CO1: To Solve linear homogeneous partial differential equations of nth order and their applications.

CO2: To illustrate the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.

CO3: To explain the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

CO4: To Solve the problems based on interpolation, numerical differentiation and integration.

CO5: Define principal concepts about sampling, explain and advantages of sampling, lists the stages of sampling process and categorizes the sampling methods.

COURSE CONTENTS:

UNIT-1: Advance Calculus: Jacobians, Taylor's and Maclaurin's series of two variables, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers and their applications, Elementary ideas of multiple integrals, Change of order of integration, and change of variables in double integrals using Jacobians, beta and gamma functions, Vector Calculus, Gauss Divergence Theorem, Stoke's Theorem.

UNIT-2: Fourier Series and Partial Differential Equations: Expansion of functions 111 a Fourier series, Half range series Sine and Cosine series and change of interval. Fourier Integral. Formation of partial differential equations, partial differential equations of first order and first degree $1.., e Pp + Qq = R, Kg$.Linear homogeneous partial differential equation of nth order with constant coefficient, separation of ' variables, Application to Simple problems of vibrations of strings and beam and heat conduction é equation. .

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UNIT-3: Laplace and Fourier Transforms: Definition of LT, LT of elementary and periodic functions, C properties of LT including LT of derivatives, Inverse Laplace Transform and its properties. Convolution Theorem Application of LT to ordinary differential equations with constant and variable coefficients, Simultaneous differential equations Fourier transforms: sine and cosine transforms and their application to solution of linear PDE.

UNIT-4: Calculus of Finite Differences: Difference table, Operators E and A, Newton's forward and backward interpolation formula, Lagrange's interpolation formula, differentiation and integration, difference equations with constant coefficients.

UNIT-5: Statistics: Brief idea of sampling, t, F and χ^2 distributions and their applications, ANOVA, Statistical Quality Control (SQC), Control Charts, Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O. C. curve, Taguchi method. .

THEORY ASSESSEMENT

Students will be assessed as following theory Paper:

(1) **End Semester Exam:** 70% Weightage,

(2) **Continuous assessment:** 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

TEXT BOOKS RECOMMENDED:

S. NO.	BOOKS	UNIT
1	Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.	1-5
2	Jain, R.K and S K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi, 2006.	1-5
3	Ramesh Sircar, Statistical Techniques & Applications New Control Book Agency, Calcutta.	1-5

REFERENCE BOOKS RECOMMENDED:

S. NO.	BOOKS	UNIT
1	Erwin Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications 1999.	1-5
2	Balagurusamy E , Numerical Methods, Tata McGraw-Hill Publishing Company Ltd. ,New Delhi	1-5

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B. TECH IPE II Year (4YDC)

ME 23008: MECHANICS OF SOLIDS

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	01	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES

Having successfully completed the module the students will be able:

CO1: To explain about mechanics of materials and importance of elasticity constants in solid mechanics

CO2: Illustrate the calculation of various stresses and strains in shafts and beams for given loading conditions along with ability to represent that in diagrammatic form

CO3: Illustrate and calculate deflection and curvature of deflected beam by various methods

CO4: To analyze the problems related to mechanics of materials using energy methods

CO5: To apply the concepts of mechanics of materials to understand the behavior of thick and thin cylinders and column under different loading conditions.

COURSE CONTENTS

UNIT-1: Stress and Strain: Tension, compression and shear, Complementary shear stresses. Modulus Elasticity, Modulus of Rigidity, Bulk Modulus, Poisson's Ratio, Relations among the moduli, Stress due to temperature, statically indeterminate system, Shear stress in a Circular member due to Torsion.

UNIT-2: (a) Bending Moment and Shear Forces: Diagrams of Shear Forces and bending moment for cantilevers beams simply supported beams with or without over hanging ends. Relation between Loads and Shearing Forces and Bending Moments.

(b) Bending Stress : Theory of Bending, bending and shearing Stress in beams and their distribution with varied load, modulus of section and modulus of rupture, beams of varying cross section, _ uniform strength

(c) Introduction to Composite Beams

UNIT-3: Stress on oblique section of a bar subjected to axial stress, Complex Stresses, Principal stress and strain, Mohr's Circle, Combined direct and bending stress

UNIT-4: (a) Deflection: Uniform Curvature, Relation between curvature and deflection, cantilevers and simply supported beams of varying cross-section, MacCauley's Method, Deflection due to Shear, Propped Beam

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(b) Parts subjected to column action with and without lateral loadings, Euler's theory of columns.

UNIT-5: (a) Elastic strain energy: Resilience, Proof Resilience. Materials under tension, Static, Sudden and Falling Loads, Strain Energy due to Direct Shear, and torsion, Castigliano's theorem.

(b) Introduction to thin and thick cylinder

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ME 23008: MECHANICS OF SOLIDS

PRACTICAL

LIST OF PRACTICALS

1. To conduct impact test (Izod and Charpy test)
2. To conducting the cross shear test on the specimen
3. To conduct the tensile test on ductile material.
4. To conduct the torsion strength of the specimen
5. To find out deflection of beam under different conditions
6. To determine the critical buckling load with following supports and calculate the % error.
7. To conduct the fatigue test and determine the fatigue strength of the material.
8. To study Brinell Hardness test
9. To study Rockwell Hardness test.

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ME 23008: MECHANICS OF SOLIDS

THEORY ASSESSMENT

Students will be assessed as following theory Paper:

(1) **End Semester Exam:** 70% Weightage,

Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

2) **PRACTICAL ASSESSMENT**

(1) **Sessional: 40% Weightage** (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) **End semester practical viva: 60% weightage**

TEXT BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Popov, E P, Mechanics of solids, Prentice-Hall India	1-5
2	Ramamrutham, Mechanics of solids, Dhanpat Rai Publication, India	1-5

REFERENCE BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Beer and Johnson, Mechanics of Material, Tata McGraw Hill.	1-5

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ME 230XX: DESIGN OF MACHINE ELEMENTS

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	00	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE- REQUISITES: Engineering Drawing

COURSE OUTCOMES:

This course is designed to help students achieve the following outcomes:

CO1: To design basics of machine drawing of mechanical components including assemblies.

CO2: To develop transmission elements such as clutches, brakes and screw nut pairs.

CO3: To design power transmission elements such as Belts, Rope, Chain and gear device.

CO4: To design process of elements subjected to combined loading, dynamic loading and stress concentration.

CO5: To construct internal combustion engine parts.

COURSE CONTENTS:

UNIT-1: Stress concentration and parts subjected to dynamic loading, Theories of failure

UNIT-2: Design of transmission and arresting elements such as clutches, brakes and screw nut pairs

UNIT-3: Design of helical and leaf springs, Design philosophy of power transmission elements such as Belts, rope, chain and gear device.

UNIT-4: a) Design of Journal Bearings and selection of Anti- friction bearings

b) Selection of hooks and wire ropes

UNIT-5: Design of I C Engine parts

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B. TECH IPE II Year (4YDC)

ME 230XX: DESIGN OF MACHINE ELEMENTS

PRACTICALS

LIST OF PRACTICALS

1. Drawing cross sectional view of Knuckle Joint using AUTOCAD
2. Drawing cross sectional view of Cotter joint using AUTOCAD
3. Drawing cross section view of Bush bearings using AUTOCAD

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ME 230XX: DESIGN OF MACHINE ELEMENTS **THEORY ASSESSEMENT**

Students will be assessed as following theory Paper:

(1) End Semester Exam: 70% Weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT

(1) Sessional: 40% Weightage (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) End semester practical viva: 60% weightage

TEXT BOOKS RECOMMENDED:

S. NO.	BOOKS	UNIT
1	Pandya and Shah, Machine Design, Charotar Publication	1-5
2	Black P., Machine Design, Tata McGraw Hill Publication, India	1-5

REFERENCE BOOKS RECOMMENDED:

S. NO.	BOOKS	UNIT
1	Bhandari V B, Design of Machine Elements, 4 th edition, MHE Publication India.	1-5
2	Shigley and Mischke, Mechanical Engineering Design, McGraw Hill Publication, India.	1-5

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B. TECH IPE II Year (4YDC)

IP-23515: OPERATIONS RESEARCH

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	01	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE- REQUISITES: NA

COURSE OUTCOMES:

After successful completion of this course students will be able to:

CO1: To solve real life problems of linear programming with limited constraints and depicts it in a model form and convert the problem into a mathematical model and solve.

CO2: To illustrate problems such as assignment and transportation.

CO3: To extend the knowledge about Integer Programming, Dynamic and Computer Applications in Operations Research.

CO4: To relate queuing situations and infer the optimal solutions with the help of models.

CO5: To apply the real-life model of Game Theory and Simulate different real-life probabilistic situations.

COURSE CONTENTS:

UNIT-1: Introduction: History and Development of O.R. present trend& Linear Programming - Simplex method, Big-M-Method, Two-phase method, Degeneracy, Unrestricted variables, Duality in LP, Revised simplex, Sensitivity Analysis.

UNIT-2: Allocation:

(i) Assignment Model.

(ii) Transportation - Optimality Test, Degeneracy Unbalanced Problems, Trans-shipment.

UNIT-3: Introduction to Integer Programming. Branch and Bound Algorithm. Dynamic Programming: Characteristics of Dynamic optimization Model Bellman's Principle problem, Salesmen problem, Forward and Backward recursion. Non Linear Programming: Introduction, Computer Application in Operations Research.

UNIT-4: Waiting Line Models: Introduction, Classification, States in queue, Probability distribution of arrivals and service times, Single server model (M/M/1). Multiple server model (M/M/S). Single server model with finite capacity.

UNIT-5: Game Theory : Rectangular, Two persons Zero sum games, Maximin and Minimax Principles, Saddle point, Dominance, Graphical and Algebraic methods of solution, Solution by transforming into Linear Programming Problem. Simulation: Building a simulation model, Monte Carlo simulation as applied to discrete system.

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B. TECH IPE II Year (4YDC)

IP-23515: OPERATIONS RESEARCH

PRACTICALS

LIST OF PRACTICALS

1. Solving problems using LINGO and LINDO software
2. Solving problems using TORA and MS EXCEL software
3. Solving problems on Assignment model
4. Solving problems on Integer Programming
5. Solving problems on Inventory models
6. Solving problems on Queuing model

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IP-23515: OPERATIONS RESEARCH

THEORY ASSESSMENT

(1) End Semester Exam: 70% weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT:

(1) Sessional: 40%Weightage (Continuous assessment of experiments and lab manual 50% weightage,final viva25%weightage, regularity25%weightage.)

(2) End semester practical viva: 60% weightage.

TEXT BOOKS RECOMMENDED:

S.NO	BOOK	UNIT
1.	Taha H. A., Operation Research, Mc Millian.	1-5
2.	Banerjee B., Operation Research, Business Publicity, Bombay.	1-5
3.	Hira & Gupta, Operation Research, S. Chand.	1-5
4.	Chitale A. K., J. Negi, Text Book of Operation Research, Jain Bros., Delhi.	1-5
5.	Sharma S. D., Kedarnath, Operation Research, Ramnath & Co., Meerut.	1-5

REFERENCES RECOMMENDED:

S. No.	BOOK	UNIT
1	Rao S. S., Optimization, Jain Bros., New Delhi, India	1-5

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IP- 23512: MANUFACTURING PROCESSES – II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	00	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES

After successful completion of this course students will have:

CO1: To apply fundamental knowledge about basic mechanism of metal cutting, conventional machine tools and estimation and relationship between performance measures and machining parameters.

CO2: To explain Shaping, Milling and Broaching operation and their importance.

CO3: To illustrate Grinding functions and processes on grinding machines.

CO4: To demonstrate Gear elements and gear manufacturing and finishing processes.

CO5: To infer the surface finishing, super finishing and polishing processes and their importance.

COURSE CONTENTS

UNIT-1: Principle of generation of surface, classification of machining processes and machine tools, cutting tool materials, their properties & types of single point cutting tools. Type of lathe and operation such as turning, taper turning, thread cutting, grooving, parting off. Use of multiple tool for manufacturing of simple components, Concepts of feed, speed and depth of cut. Machining time estimation: Evaluation of machining time for turning, facing, drilling, milling and shaping operations.

UNIT-2: Shaping, Planning and slotting operation and machines, Quick return mechanism, Hydraulic system for shaper. Drilling and drilling machines, Types of drills, tapes and reamers, Geometry of drills, reamers and taps, Tapping and Spot facing operations. Milling machines, Types and operations. Types of milling cutters, Up and Down milling, gang cradle milling. Broaching operation, types of broaching machines and broaches design of broaching tools.

UNIT-3: Grinding process and grinding machines, Grinding wheel, Types nomenclature and their selection. Centreless grinding and job feeding arrangement, Dressing and trueing of grinding wheels. Super finishing processes: Honning, lapping, super-finishing, polishing and buffing.

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UNIT-4: Gear and their types, elements of gears, different method of producing gears, gear cutting on milling m/c and by generating methods viz, hobbing, shaping, and rack cutting, gear finishing by shaving and grinding.

UNIT-5: Super finishing processes: Honning, lapping, super-finishing, polishing and buffing. Short Pinning and sand blasting.

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IP- 23512: MANUFACTURING PROCESSES – II

PRACTICALS

LIST OF PRACTICALS

1. Study various measuring instruments
2. Study of various types of Lathe Machines
3. Manufacturing job on the lathe as per drawing
4. Study of Milling machine and Indexing machine
5. Manufacturing of gear on milling machine as per drawing
6. To study Shaper machine and various mechanisms of Shaper.
7. Prepare a job on shaper machine as per the drawing
8. Study of Grinding machine and tool cutter
9. Do study of Super finishing process
10. Study various press working operations.

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IP- 23512: MANUFACTURING PROCESSES – II

THEORY ASSESSMENT

(1) End Semester Exam: 70% weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT

(1) Sessional: 40% Weightage (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) End semester practical viva: 60% weightage.

TEXT BOOKS RECOMMENDED:

S.NO	BOOK	UNIT
1.	Campbell J. S., Principles of Manufacturing Materials & Processes.	1-5
2.	Lindberg, Manufacturing Processes.	1-5
3.	Chapman W. A. J., Workshop Technology part II and III.	1-5

REFERENCES RECOMMENDED:

S. No.	BOOK	UNIT
1	ASME, Fundamentals of Tool Design	1-5

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B. TECH IPE II Year (4YDC)

HU 23504: ENGINEERING ECONOMICS AND FINANCIAL ANALYSIS

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	00	00	03	00	-	CW	END SEM	SW	END SEM	100
						30	70	-	-	

PRE-REQUISITES: NA

COURSE OUTCOMES:

Upon successful completion of the course the student should be able to:

CO1: Explain economic cyclic flow and estimate the demand and demand elasticity for a product.

CO2: Plan the production and analyze the production-cost-profit-relation and select the suitable project for investment.

CO3: Estimate price and the equilibrium for a firm/ organization in different competitive market situations.

CO4 : Prepare and review the financial statements of an accounting entity.

CO5: Apply Financial ratio technique for financial analysis and to prepare Fund Flow Statement.

COURSE CONTENTS :

UNIT-1: Nature and scope of economics, Economic cyclic flow, Central Economic Problems, macro and micro economics, Laws of demand and supply, Demand curve and demand function, Cardinal and ordinal utility analysis of consumer equilibrium, price and income relations of consumer's equilibrium, Demand derivation, Elasticity of demand.

UNIT-2: Production, Cost and Price: Equilibrium price, Production function, Laws of returnsto variable proportions, Laws of returns to scale, Cost concepts, cost functions and their inter-relations, break-even point

UNIT-3: Pricing and Market: Equilibrium of firms and industry. Price determination underperfect competition, Imperfect competition and monopoly. '

UNIT-4: Accountancy and Business Organization: Book keeping and Accountancy, Tradingaccount, Profit and loss account and balance sheets, Business and Industrial organization - Types, features, merits and demerits

UNIT-5: Financial management and Analysis: Concept, Scope and functions and goals offinancial management, Financial analysis, Ratio analysis, Fund flow analysis, Break even analysis.

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HU 23504: ENGINEERING ECONOMICS AND FINANCIAL ANALYSIS

THEORY ASSESSMENT

Students will be assessed as following theory Paper:

(1) End Semester Exam: 70% Weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

TEXT BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Dwivedi and Dwivedi: Engineering Economics, Vikas Publishing House, New Delhi India.	1-5
2	Truett and Truett, Managerial Economics, Wiley India, New Delhi, India. , Ghose, B .N., Managerial Economics and Business decisions, Ane Books Pvt. Ltd, New Delhi, India	1-5
3	Pandey I. M., Financial Management, Vikas Publishing House, New Delhi, India	1-5

REFERNECES RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Maheshwary, Maheshwary and Maheshwary: Accounting for management, Vikas Publishing House, New Delhi, India.	1-5
2	James C. Van Home, Financial Management and Policy, Pearson Education Inc., New Delhi.	1-5

SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE

Department of Industrial and Production Engineering

B. TECH IPE II Year (4YDC)

ME 23555: THEORY OF MACHINES

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
4	02	00	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES:

After successful completion of this course students are expected to have:

CO1: Describe basic four link mechanisms and draw their velocity and acceleration diagrams.

CO2: Calculate the power transmission by belt and rope drives

CO3: Analyse power transmitted/lost by friction devices using uniform pressure and uniform wear theory.

CO4: Analyse gear motion and find out velocity ration in gear trains

CO5: To explain Balance rotating machines and determine natural frequencies of single degree of freedom systems.

COURSE CONTENTS

UNIT-1: (a) Motion and Force Analysis : Plane motion, Kinematic concept of links, Basic terminology and definitions, Inversion of kinematic chains, Absolute and relative motion, Vector diagram, Instantaneous center, Velocity and Acceleration Polygons, Special Graphical Methods for Slider Crank Mechanism.

(b) Concept of Free Body and its Equilibrium, Kinematic and dynamic quantities and their relationships, Static Force Analysis, Piston Effort, Dynamic Force Analysis, Equivalent Dynamical Systems

UNIT-2: Power Transmission: The Kinematic design of pulleys, Flat belts and V-belt, Transmission of power by belts, Conditions for maximum power transmission, Efficiency of power transmission. .

UNIT-3: Friction Devices, Coulomb friction, Pivot and Collars, Power screw, Plate clutch and Cone clutch, Band and Block Brakes

UNIT-4: Gears : Fundamental laws of gearing, Classification and basic terminology, Involute tooth profile and Kinematic consideration, Spur gears, other types of Gears, Standards in tooth forms, Gear trains, Simple, Compound and Epicyclic Gear Trains.

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B. TECH IPE II Year (4YDC)

UNIT-5; (a) Balancing: Static and Dynamic Balancing or Rotating Masses in Same and Different Planes.

(b) Vibrations: Degree of Freedom, Natural Frequency of Single Degree of Freedom Systems, Damped and un-damped systems, Forced Vibration, Whirling of Shafts-and Critical Speeds

SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE

Department of Industrial and Production Engineering

B. TECH IPE II Year (4YDC)

ME 23555: THEORY OF MACHINES

PRACTICAL

LIST OF PRACTICALS

1. To verify Grashof's Law
2. To study and draw the displacement, velocity and acceleration diagram of slider crank mechanism and to study the effect of crank radius.
3. To study and draw the displacement, velocity and acceleration diagram of crank and slotted lever quick return mechanism
4. To study the properties of involute teeth in contact
5. To generate the involute profile of a gear tooth
6. To determine the coefficient of friction between belt and pulley.
7. To determine the natural frequency of a system.
8. Study of whirling of shaft and determination of critical speed.

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B. TECH IPE II Year (4YDC)

ME 23555: THEORY OF MACHINES

THEORY ASSESSMENT

Students will be assessed as following theory Paper:

(1) **End Semester Exam:** 70% Weightage,

(2) **Continuous assessment:** 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT:

(1) **Sessional: 40% Weightage** (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) **End semester practical viva: 60% weightage**

TEXT BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Bevan T., Theory of Machines, CBS Publication	1-5
2	Ambekar A. G., Mechanisms and Machine Theory, PHI, India	1-5

REFERNECES RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Myszka David H., Machines and Mechanisms, PHI, India	1-5

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B. TECH IPE II Year (4YDC)

ME 23516: FLUID MECHANICS AND THERMAL ENGINEERING

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	00	03	01	–	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES:

After successful completion of this course students will have

CO1: Illustrate the basics and importance of mechanics in fluid mechanics in fluid flow and various applications of fluid kinematics.

CO2: Explain the Dimensional analysis and physical significance of dimensionless numbers.

CO3: To demonstrate the concept of Boundary Layer theory, drag and lift force for the viscous flow and losses due to friction and sudden enlargement/contraction in pipes.

CO4: Explain the basic concepts of thermodynamics and its laws as well as the properties of gases and thermodynamic cycles

CO5; Illustrate the concepts of thermodynamics in heat transfer, refrigeration and air conditioning.

COURSE CONTENTS:

UNIT-1: Fundamentals: Types of Flows, One and Two Dimensional Flows, Irrotational and Rotational Flows, Stream and Potential Functions. Basic Laws of Fluid Flow: Continuity, Momentum and (Energy Equations as Applied to System and Control Volume. Euler's and Bernoulli's 5 Equations. ' Application to Flow through Orifice, Venturimeter, Pitot Tube, Moment of Momentum Theorem C and its Application to Fixed and Moving Vanes.

UNIT-2: Dimensional Analysis: Buckingham's Theorems, Similarities, Physical Significance of Reynold's, Mach and Froude Numbers etc.

UNIT-3: Viscous Flow: Concept of Boundary, Drag, Lift, Flow through Pipes, Hydraulic Gradient and Losses due to Friction and Sudden Enlargement/Contraction, Pipes in Series and Parallel.

UNIT-4: (a) Fundamentals: Application of Mass and Energy Equation to Steady Flow System, Heat and Work Transfer in Flow and Non-Flow Processes. Second law, Kelvin Planck's and Clausius Statement, Concept of Entropy, Clausius Inequality; Entropy Changes in Non-Flow processes, Properties of Gases and Vapours, Rankine Cycle.

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B. TECH IPE II Year (4YDC)

(b) Air Cycles and Compressors: Otto, Diesel, Dual Combustion and Brayton Cycle, Air Standard Efficiency. Mean Effective Pressure, Introduction to Reciprocating Compressors.

UNIT-5: (a) Heat Transfer: Conduction in Parallel, Radial and Composite Walls, Convective Heat Transfer with Laminar and Turbulent Flows, Overall Heat Transfer Coefficient, Thermal Boundary Layer, Important Correlations, Flow Through Heat Exchanger, Fin Analogy, Fundamentals of Radiative Heat Transfer and Shape Factors.

(b) Refrigeration and Air Conditioning: Principles of Refrigeration, A/C Cycles, Coefficient of Performance and Properties of Refrigerants.

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B. TECH IPE II Year (4YDC)

ME 23516: FLUID MECHANICS AND THERMAL ENGINEERING

PRACTICAL

LIST OF PRACTICALS

1. To study the Flow through a 2-D converging- diverging duct and verifying
 - a. Bernoulli's equation as applied to incompressible flow
2. To calibrate measuring device viz. Venturimeter and Orificemeter
3. To study the frictional characteristics of fully developed flow through pipes of different materials
4. To study the minor losses in pipe fittings
5. To study the velocity distribution across a wind tunnel using a Pitot static tube
6. Thermal conductivity of pipe insulation (By Lagged pipe method)
7. Thermal conductivity of insulating powder (Spherical shell method)
8. To study vapour compression cycle and domestic refrigerator
9. To study the vapour absorption system based on Electrolux refrigeration.

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B. TECH IPE II Year (4YDC)

ME 23516: FLUID MECHANICS AND THERMAL ENGINEERING

THEORY ASSESSMENT

Students will be assessed as following theory Paper:

(1) End Semester Exam: 70% Weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT

(1) **Sessional: 40% Weightage** (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) **End semester practical viva: 60% weightage**

TEXT BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Kumar K.L., Engineering Fluid Mechanics, Tata McGraw Hill	1-5
2	Kapoor H. R., Thermal Engineering, Vol.1 and II, Tata McGraw Hill.	1-5
3	Mathur M. L. and Mehta F., Thermal Engineering, Vol.1 and II , Jain Brothers Publication	1-5

REFERNECE BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Irwing Shames, Fluid Mechanics, Tata McGraw Hill Publication, New Delhi, India.	1-5
2	Nag, P.K. Engineering Thermodynamics, Tata McGraw Hill Publication, New Delhi, India.	1-5

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Department of Industrial and Production Engineering

BE IPE II Year (4YDC)

CO230XX: OBJECT ORIENTED PROGRAMMING SYSTEM

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	00	03	01	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES:

CO1: Describe the knowledge and programming skills in Java/C++ language.

CO2: Apply various concepts of object oriented terminology in programming.

CO3: Analyze object oriented methodology and modeling techniques such as object, dynamic and functional modeling.

CO4: Design system using interfaces and various UML diagrams.

CO5: Design quality programs using exception handling and solve the real world business problems as per specifications.

COURSE CONTENTS:

UNIT-1: Review of object oriented programming concepts using C++ or Java.

UNIT-2: Basic of Objective Orientation: Objects and Classes. Identifying candidates for classes and OPEC: Attributes and Methods, Abstraction, Encapsulation, Inheritance, Polymorphism.

Relationships-Association, Aggregation, Composition, Generalization and Specialization.

UNIT-3: Object Oriented Analysis: Basic concepts, Comparison With Structural methodology, Modelling Techniques: Object, Dynamic and Function Models, CRC, Introduction to Rational Umfrel Process method.

UNIT-4: Object Oriented Design and, Programming: Basic concept, Comparison with Structural Methodologies; Concepts of Interface, Components (packages), OOD Method, Introduction to UML Class diagram consideration: Reusability, extensibility, robustness (Exception Handling), Programming language support for object orientation in Java (or C++).

UNIT-5: Rapid Prototyping: introduction to conventional Testing, Object Oriented Testing.

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Department of Industrial and Production Engineering

BE IPE II Year (4YDC)

CO230XX: OBJECT ORIENTED PROGRAMMING SYSTEM PRACTICAL

LIST OF PRACTICALS

1. Write a C Program to display no from 1 to 9?
2. Write a C Program to count even and odd no. in a list of nos. using if-__ else and using array?
3. Write a C Program to print multiplication table using do__ while loop?
4. Write a C Program to compute the “power of 2” using for loop?
5. Write a C Program to check whether given year is leap year or not?
6. Write a C++/ java Program to display no from 1 to 9?
7. Write a C++/ java Program to count even and odd no. in a list of nos. using if-__ else and using array?
8. Write a C++/ java Program to print multiplication table using do__ while loop?
9. Write a C++/ java Program to compute the “power of 2” using for loop?
10. Write a C++/ java Program to check whether given year is leap year or not?
11. Design a class to represent a bank account. Include the following members:
 - a. Data Members:
 - i. Name of the depositor
 - ii. Account no
 - iii. Type of account
 - iv. Balance amount
 - b. Methods:
 1. To assign initial values
 2. To deposit an amount
 3. To withdraw an amount
 4. To display the name
12. Modify the above program to incorporate constructor to provide initial values.
13. Assume that bank maintains two kind of accounts for customers, one called as saving account and other as customer account. The saving account provides compound interest and withdrawl facilities but no cheque book facility. The current account provides cheque book facility but no interest current account holders should also maintain a minimum balance and if the balance falls below this level a service charge is imposed.
14. Create a class account that stress customer name account numbers and type of account from this device the classes current account and saving account to make them more specific to their requirements include necessary members functions in order to achieve the following tasks:-
 - a. Accept deposits from a customer and update the balance.
 - b. Display the balance.
 - c. Compute and deposit interest.
 - d. Permit withdrawl and update the balance.
 - e. Check for the minimum balance impose penalty and update the balance.

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15. A mini project to each student for the concept of Object Oriented Analysis and Design

CO230XX: OBJECT ORIENTED PROGRAMMING SYSTEM **THEORY ASSESSMENT**

Students will be assessed as following theory Paper:

(1) End Semester Exam: 70% Weightage,

(2) Continuous assessment: 30% weightage (Two midterm tests: 50% weightage, Assignment: 16.5% weightage, Quiz: 16.5% weightage, and regularity 16.5% weightage)

PRACTICAL ASSESSMENT

(1) **Sessional: 40% Weightage** (Continuous assessment of experiments and lab manual 50% weightage, final viva 25% weightage, regularity 25% weightage.)

(2) **End semester practical viva: 60% weightage**

TEXT BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Atul Kahate, "Object, Oriented Analysis and Design", Tata McGraw Hill Publishing Company	1-5
2	R.S. Pressman, "Software Engineering, A Practitioner's Approach" 'Tata McGraw Hill Book , Company, New York, USA	1-5
3	Clayton Walnum, "Java by Example", Oue Corporation, USA. ' .	1-5

REFERNECE BOOKS RECOMMENDED:

SR. NO.	BOOKS	UNIT
1	Grady Booch, "Object Oriented Analysis and Design", 2nd edition, Pearson Education.	1-5
2	James Martin, "Principles of Object Oriented Analysis and Design".	1-5
.3	Peter Cad and Edward Yourdon, "Object Oriented Analysis", Person Education"	1-5

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BE IPE II Year (4YDC)

ME-23005: MECHANICAL METALLURGY

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
04	02	00	04	02	-	CW	END SEM	SW	END SEM	200
						30	70	40	60	

PRE-REQUISITES: NA

COURSE OUTCOMES:

After successful completion of this course students will have

CO1: Analyze and apply knowledge of different crystal structures, atomic bonds, and crystal defects to predict and explain the properties and behavior of materials.

CO2: Analyze and evaluate the significance of mechanical properties of materials in engineering design, and propose appropriate material selections based on specific design requirements.

CO3: Evaluate the effects of various heat treatment processes on the microstructure of metallic materials and propose suitable heat treatment methods for desired material properties.

CO4: Analyze how the composition, microstructure, properties, and applications of steels, cast irons and various non-ferrous alloys influence their performance across various applications.

CO5: Select appropriate destructive and non-destructive testing techniques for various materials apply powder metallurgy theory and techniques in the manufacturing process.

COURSE CONTENTS

Unit-1: Metal Structures and Crystallization: Atomic structure, Atomic bonding, Crystal structure, Allotropic structure of alloys, Dislocations, Edge dislocation, Screw dislocation, slip planes. Stress fields of dislocations, Grain boundaries, Dislocation densities, Strengthening mechanism of alloys, solidification & grain growth.

Unit-2: Mechanical properties and Mechanical working of metals: Elastic and plastic deformation, Strength, Stiffness, Ductility, Hardness, Impact strength, Malleability, Brittleness, Toughness, Resilience etc. Hot and Cold working of metals and their effects on properties and microstructure of metals.

Unit-3: Heat Treatment of Metals and Alloys: Phase diagrams, Phase rule, Lever's rule Iron and Iron carbide metastable diagram, TTT diagram, Continuous cooling curves, Annealing, Normalizing, Spheroidizing, Hardening, Tempering, Austempering, Martempering, Case Carburizing, Nitriding, Cyaniding, Carbonitriding, Induction Hardening, Flame Hardening, Age Hardening, and Hardenability.

Unit-4: Ferrous and non ferrous metals and alloys: Modern Trends in the manufacture of iron and steel, Cast steel composition, microstructure, properties and applications of Plain

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Carbon Steels and Cast Irons. Effect of Impurities in Ferrous Metal. Effect of common Alloying Elements on properties of plain Steels. Common Alloy Steels, High Speed Steel, Hard field Mn Steel, Stainless Steel, Corrosion and its Prevention, Composition Micro Structure, Properties and Application of Aluminium and its Principle Alloys, Copper and its Principle Alloys, Bearing Metals.

Rare Metals: A brief discussion of the properties and application of Rare Metals Viz. Platinum, Uranium, Beryllium and Zirconium.

Unit-5: Destructive and Non-destructive testing: Tensile test, Compression, Hardness, Impact test, Shear, Fatigue test, Dye penetration testing, magnetic particle inspection, Eddy current testing, Ultrasonic test and radiographic test etc.

Powder Metallurgy: Theory of powder metallurgy, Manufacturing of metal powders, sintering and secondary operations, Properties of finished parts, Design consideration and application.

Books & References Recommended:

1. Material Science and Engineering by William D. Callister; Wiley
2. Lakhtin, Engineering Physical Metallurgy, MIR.
3. Elements of Material Science and Engineering by Lawrence H. Van Vlack; Pearson Education.
4. Introduction to Physical Metallurgy by Sidney H. Avner, McGraw Hill.
5. Mechanical Metallurgy by George E. Dieter; McGraw Hill.
6. The Science and Engineering of Materials by Donald R. Askeland; Cengage India Pvt. Ltd.
7. Material Science by V. Raghvan; Prentice Hall of India.
8. Material Science by G. K. Narula, K.S. Narula, V.K Gupta; Tata McGraw Hill Pub. Company
9. Nayak S. P., Metallurgy for Engineers, Chatotar Publication.