



List of New Course(s) Introduced

Department : Industrial and Production Engineering

Programme Name : B.Tech.

Academic Year : 2016-17

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	IP3TBS01	STATISTICAL METHODS
02.	IP3TES11	STRENGTH OF MATERIALS
03.	IP3TES12	MATERIAL SCIENCE AND METALLURGY
04.	IP3TPC11	THEORY OF MACHINE
05.	IP3TPC12	MANUFACTURING PROCESSES - I
06.	IP3LPC11	THEORY OF MACHINE LAB
07.	IP3LES12	STRENGTH OF MATERIALS LAB
08.	IP3THS11	ENGINEERING ECONOMICS
09.	IP3THS12	WORK STUDY AND ERGONOMICS
10.	IP4TBS02	NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING
11.	IP4TPC21	MACHINE DRAWING
12.	IP4TPC22	INDUSTRIAL ENGINEERING
13.	IP4TPC23	MANUFACTURING PROCESSES-II
14.	IP4TPC24	FLUID MECHANICS
15.	IP4LPC21	NACP
16.	IP4LPC24	FLUID MECHANICS LAB
17.	IP4TPE11	BUSINESS COMMUNICATION AND PRESENTATION SKILL
18.	IP4TPE12	OCCUPATIONAL HEALTH AND SAFETY
19.	IP4TPE13	BUSINESS ETHICS AND CORPORATE GOVERNANCE

New Course Introduced

Criteria - I (1.2.1)



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2016-17

School : School of Studies of Engineering and Technology

Department : Industrial and Production Engineering

Date and Time : June 24, 2016 - 11:00 AM

Venue : G-10 CAD-CAM LAB

The scheduled meeting of member of Board of Studies (BoS) of Department of Industrial and Production Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the B. Tech. Third year (III and IV semesters) scheme and syllabi.

The following members were present in the meeting:

- 1. Prof. B.S. Chawla (External Expert Member BoS, Principal GEC Bilaspur)*
- 2. Prof. Mukesh Kumar Singh (HOD, Professor, Dept. of Industrial and Production Engineering-cum Chairman, BOS)*
- 3. Mr. C.P. Dewangan (Member BoS, Associate Professor, Dept. of Industrial and Production Engineering)*
- 4. Mr. G.P. Shukla (Member BoS, Assistant Professor, Dept. of Industrial and Production Engineering)*

Following points were discussed during the meeting

- 1. In the meeting syllabus of B. Tech. (I.P.E.) from third semester to eight semesters have been discussed in details as per choice based credit system (CBCS). The syllabus of B. Tech. (Industrial and Production Engineering) III semester & IV semester have approved by the BOS members. Syllabus from fifth semester to eight semesters will be put in forthcoming BOS meeting for approval after required corrections.*

The following new courses were introduced in the of B. Tech. Final year (III and IV Semesters):

- ❖ STATISTICAL METHODS (IP3TBS01)*
- ❖ STRENGTH OF MATERIALS (IP3TES11)*
- ❖ MATERIAL SCIENCE AND METALLURGY (IP3TES12)*
- ❖ THEORY OF MACHINE (IP3TPC11)*
- ❖ MANUFACTURING PROCESSES - I (IP3TPC12)*
- ❖ THEORY OF MACHINE LAB (IP3LPC11)*
- ❖ STRENGTH OF MATERIALS LAB (IP3LES12)*
- ❖ ENGINEERING ECONOMICS (IP3THS11)*
- ❖ WORK STUDY AND ERGONOMICS (IP3THS12)*
- ❖ NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING (IP4TBS02)*
- ❖ MACHINE DRAWING (IP4TPC21)*
- ❖ INDUSTRIAL ENGINEERING (IP4TPC22)*

New Course Introduced

Criteria - I (1.2.1)



- ❖ *MANUFACTURING PROCESSES-II (IP4TPC23)*
- ❖ *FLUID MECHANICS (IP4TPC24)*
- ❖ *NACP (IP4LPC21)*
- ❖ *FLUID MECHANICS LAB (IP4LPC24)*
- ❖ *BUSINESS COMMUNICATION AND PRESENTATION SKILL (IP4TPE11)*
- ❖ *OCCUPATIONAL HEALTH AND SAFETY (IP4TPE12)*
- ❖ *BUSINESS ETHICS AND CORPORATE GOVERNANCE (IP4TPE13)*

विभागाध्यक्ष/Head
औद्योगिक एवं उत्पादन अभियांत्रिकी
Industrial & Production Engineering
सौजीयिकी संस्थान/Engineering & Technology
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD

Scheme and Syllabus



INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO: 3 OF 2009)

DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2016-2017

Year: B.Tech. II year

SEMESTER-III

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP3THS...	Elective-HS3	3	0	0	40	60	100	3
2.	IP3TBS01	Statistical Methods	3	1	-	40	60	100	4
3.	IP3TES11	Strength of Materials	3	1	0	40	60	100	4
4.	IP3TES12	Materials Science and Metallurgy	3	0	0	40	60	100	3
5.	IP3TPC11	Theory of Machine	3	0	0	40	60	100	3
6.	IP3TPC12	Manufacturing Processes-I	3	0	0	40	60	100	3
Total			18	02	0	240	360	600	20
PRACTICALS									
1.	IP3LPC11	Theory of Machine	-	-	03	45	30	75	2
2.	IP3LES12	Strength of Materials	-	-	03	45	30	75	2
Total					06	90	60	150	04

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Elective-Humanities Science (HS)	
S.N.	IP3THS...
11.	Engineering Economics
12.	Work Study and Ergonomics



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3THS11 ENGINEERING ECONOMICS (Elective)

Unit 1: Basic Concepts and Definitions, Methodology of Economics, Demand and Supply – elasticity, Theory of the Firm and Market Structure, Price and output determinations in different types of market

Unit 2: Public Sector Economics – Welfare economics, Central and commercial ^{Banks} marks and their functions, Industrial policies, theory of localization, Weber & Sargent Florence theory, investment analysis-NPV, ROI, IRR, Payback period, SWOT analysis.

Unit 3: Monetary and Fiscal Policy; Tools, impact on the economy, Inflation, Business Cycle, Cash Flow-2,3,4 Model.

Unit 4: Business Forecasting – Elementary techniques. Cost and Revenue Analysis, Capital Budget, Break Even Analysis.

Unit 5: Indian economy; Urbanization, Unemployment–Poverty, Regional Disparities, Unorganized Sectors- Role of Plans, Reforms-Post Independent period.

Text Books:

1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
2. V. Mote, S. Paul, G. Gupta (2004), Managerial Economics, Tata McGraw Hill
3. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
4. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers

Recommended Books:

1. Kapila U. Indian economy since Independence. Academic Foundation, New Delhi
2. Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai
3. Dutt R. and Sundharam K. P. M. Indian Economy. S. Chand & Company Ltd., New Delhi.
4. Mathur R. Indian Economic Policy and Reform. RBSA Publisher, Jaipur
5. Jalan B. Indian Economic Policy. Penguin Books Ltd
6. Government of India, Economic Survey (Annual), Economic Division, Ministry of Finance, New Delhi.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3THS12 WORK STUDY AND ERGONOMICS (Elective)

Unit I

Introduction to man machine systems and ergonomics, Human factors in design and engineering, Needs of ergonomics and aesthetic design, Physiological aspects of work.

Unit II

Work measurement through physiological tests, Work physiology, Paced and unpaced work performance, Data logging, data collection, data reduction and analysis techniques, Gross human anatomy, Anthropometry, Bio mechanics, muscle strength and exertion potential of different limbs.

Unit III

Workcapacity, Environmental effects, exercises for evaluation of postural form and work spaces, Environmental conditions including temperature, illumination, noise and vibration.

Unit IV

Perception and information processing, design of displays, hand control, typography, and readability, layout and composition.

Unit V

Exercises in evaluation of human response to product interface, product safety and product liability, Design consideration for appearance, colour, texture and forms.

Recommended Books:

1. D. C. Alexander, *Applied Ergonomics*, Taylor & Francis.
2. Jan Dul, *Ergonomics for Beginners*, Taylor & Francis.
3. David Pye, *The Nature & Aesthetics of Design*, Cambium Press.


Ganesh Chandra
Mishra





DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TBS01 STATISTICAL METHODS

UNIT-I

Introduction to statistics , mathematical statistics , variable , frequency distribution , exclusive and inclusive class intervals type of series graphical representation histogram frequency polygon give measure of central tendency variation type of average, Mean median mode for grouped and un grouped data , geometric mean , harmonic mean , measure of description Skewness and Kurtosis.

UNIT- II

curve fitting and Method of least square – straight line parabola correlation – scatter diagram's Karl Pearson's coefficient of correlation. Limits for correlation coefficient. Coefficient of correlation for bivariate frequency distribution, rank correction. Regression linear regression, Equation to the line of Regression. Regression coefficient, Angle between two lines of Regression

UNIT- III

Theory of Probability – Mathematical and statistical definition of probability Sample space, finite sample space sample point, Events Theorem of total probability. Sample and compound event. Conditional probability. Theorem of compound probability, Boy's theorem. Use of binomial theorem.

UNIT- IV

Theoretically Distribution – Binomial Distribution Mean, Standard deviation and Pearson's β and γ coefficient. Poisson distribution, mean, variance normal Distribution.
Unit V Random and simple sampling – mean and standard deviation in simple sampling of attribute test of significance for large sample test of significance based on Chi square, T, F, and Z Distribution Degree of freedom, condition for applying

UNIT- V

Simulation Basic concept of simulation, applications of simulation, merits and demerits of simulation, Monte Carlo simulation, simulation of Inventory system, simulation of Queuing system.

Recommended Books:

1. Mathematical Statistics by M. Ray
2. S. C. Gupta and Kapoor – Fundamental of Mathematical Statistic
3. A.A. AFFI – Statistic Analysis
4. Probability & Statistics by Biswal, PHI



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3THS13 EMPLOYEE RELATIONS (Elective)

UNIT-I

Conceptual framework of employment relations: Concept, Scope and Approaches to Industrial Relations, Evolution of Industrial Relations and Current Developments, Constitutional and Legal Framework of Industrial Relations :Conventions, ID Act, Trade Union Act

UNIT-II

Trade unionism: Trade Union Development and Functions, Trade Union Structure and Recognition, Managing Trade Unions, Managerial Unionism, Employers' Organisations

UNIT-III

Collective bargaining: Nature and Content of Collective Bargaining, Negotiation Skills, Issues and Trends in Collective Bargaining

UNIT-IV

Employee Involvement: Evolution, Structure and Process, Design and Dynamics of Participative Forums, Strategies for Implementing Participation

UNIT-V

Grievance Handling And Discipline: Grievance Function in Industrial Relations, Conciliation, Arbitration and Adjudication, Discipline in Industry

Recommended Books:

1. Employee Relations Management, Singh P. N., Pearson Education India
2. Personnel Management Theory And Practice, 3 Vols. Set, Arun Kumar, Rachana Sharma, Atlantic Publishers & Distri
3. Industrial Relations And Personnel Management, Simon A George M V Pylee, Vikas Publishing House Pvt Ltd

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TES11 STRENGTH OF MATERIAL

UNIT-I

Simple stresses and strains: Concept of stress and strain: principle of stress and strain diagram, Hooke's law, Young's modulus, Poisson ratio, stress at a point, stresses and strains in bars subjected to axial loading, Modulus of elasticity, Relationship between elastic constants, stress produced in compound bars subjected to axial loading, Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls.

Compound stresses and strains: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr's circle of stress and strain, Two dimensional stress-strain system, principal strains.

UNIT-II

Bending moment and shear force diagrams: Bending moment and shear force diagrams, S F and B M diagram for different types of loading under different conditions with problems.

Theory of bending stresses: Assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite/fletched beams, bending and shear stresses in composite beams.

UNIT-III

Slope and Deflection of beams: Definition, double integration, area moment method, Macaulay's methods, Conjugate beam, method of Superposition.

Strain energy: Resilience stress due to suddenly applied loads, Castigliano's theorem, Maxwell's theorem of reciprocal deflection.

UNIT-IV

Torsion: Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity.

Close-coiled-helical springs: Analysis and derivation of expression of closed coil helical spring and their problems.

Columns and struts: Columns under uni-axial load, Buckling of Columns, Slenderness ratio and conditions. Derivations of Euler's formula for elastic buckling load, equivalent length, Rankine Gordon's empirical formula.

UNIT-V

Thin pressure vessel: Derivation of formulae and calculations of hoop stress longitudinal stress in a cylinder, and sphere subjected to internal pressures increase in Diameter and volume.

Theories of Failure: Various theories with problems.

Recommended Books:

1. Pytel A H and Singer F L, "Strength of Materials", 4th Edition, Harper Collins, New Delhi.
2. Beer P F and Johnston (Jr) E R, "Mechanics of Materials", SI Version, Tata McGraw Hill, India.
3. Popov E P, "Engineering Mechanics of Solids", SI Version 2nd Edition, Prentice Hall of India, New Delhi.
4. Timoshenko S P and Young D H, "Elements of Strength of Materials", 5th Edition, East West Press, New Delhi.
5. Jindal U C, "Introduction to Strength of Materials", 3rd Edition, Galgotia Publishing Private Limited New Delhi.



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6. Strength of materials Ryder, G.H.,
7. Elements of Strength of material Timoshenko, East West press
8. Mechanics of solids, Popov, PHI Publications

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TES12 MATERIAL SCIENCE AND METALLURGY

UNIT-I

Introduction: Classification of engineering Materials, metals, non metals, plastics, ceramics and composites. Crystalline structure of solids: concepts of unit cell and space lattice, miller indices, crystal structure determination by X-ray diffraction. Crystal structure of ferrous and non-ferrous metals, crystal imperfections.

Plastic Deformation: Mechanisms of plastic deformation, role of dislocation, slip and twinning, slip mechanism, strain hardening.

UNIT II

Phase Diagrams, Phases, phase rules, concept of equilibrium, Phase diagram, lever rule, eutectic, eutectoid, peritectic and peritectoid systems, iron-carbon diagram, and simplified IC diagram. Heat Treatment Isothermal Transformation of austenite(TTT diagram), Transformations of austenite upon continuous cooling, annealing, normalizing, hardening, tempering, hardenability of steel, Surface hardening, tempering, case hardening, Jominy test for hardenability, recovery, recrystallization and grain growth, Age hardening.

UNIT III

Corrosion: Principles of corrosion forms of corrosion, factors affecting the rate of corrosion. Corrosive agents and protection against corrosion.

Creep: Introduction to creep mechanism, creep curves, creep resistant materials, introduction to fatigue, cold working of metals and hot working.

UNIT IV

Engineering Materials

Ferrous: Cast irons, carbon and alloy steels and their coding

Non-ferrous: Aluminum, copper, nickel, chromium, zinc, lead, tin, tungsten, etc. and their alloys.

Classification, structure, general properties and applications of polymers, ceramics and composites.

UNIT V

Powder Metallurgy: Characteristics of metal powder, Particle size, shape and size distribution, Characteristics of powder mass such as apparent density, tap density, flow rate, friction conditions. Properties of green compacts and sintered compacts.

Machining, milling, atomization, electro-deposition, reduction from oxide, carbonyl process, production of alloy powders, New development.

Powder rolling, powder forging, powder extrusion and explosive forming technique.

Recommended Books:

- 1 Raghavan. Material Science and Engineering.
2. Swamp. Elements of Metallurgy
3. Vanlack, Elements of Material Science and Engineering.
4. Aagarwal, B.K Introduction to engineering Materials

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TPC11 THEORY OF MACHINE

UNIT-I

Basic Concepts: Kinematics of machine, Kinematic link and their different types, types of kinematic pair, kinematic chain, mechanism and inversions of four bar chain and slider crank mechanism. Degree of freedom, synthesis of linkages – number synthesis, Grashof's criterion and introduction to dimensional synthesis. Brief introduction to mechanism with lower pairs, pantograph, Devis & Ackerman's steering mechanism.

UNIT-II

Velocity Analysis: Motion of a link, velocity of a point on a link by relative velocity method, velocities of slider crank mechanisms, rubbing velocity at a pin joint, velocity of a point on a link by instantaneous center method, properties and types of I-Center, Kennedy theorem and methods of locating I-centers in a mechanism.

Acceleration Analysis: Acceleration of a point on a link, acceleration in slider crank mechanism, Coriolis component of acceleration, Quick-return mechanism.

UNIT-III

Gears: Classification of gears, terminology used in gears, law of gearing, velocity of sliding, forms of teeth, construction and properties of an involute, construction and properties of cycloidal teeth, effect of variation of center distance on the velocity ratio of involute profile tooth gears, length of path of contact, arc of contact, number of pairs of teeth in contact, interference, minimum number of teeth, interference between rack and pinion, undercutting, terminology of helical and worm gears.

UNIT-III

Gear Trains: Definition of simple, compound, reverted and epicyclic gear trains, velocity ratio of epicyclic gear trains.

Clutch: Single plate and multi plate clutch, cone clutch.

Brakes: types and analysis by assuming uniform pressure and uniform wear theory, simple brake, band brake, block brake and internal shoe brake.

UNIT-IV

Cams and Followers: Types of cams and followers, Specified motion of followers. Uniform acceleration & deceleration, S.H.M. and uniform velocity Graphical construction of cam-profile.

Turning Moment of Flywheel:

Function of a flywheel, Crank effort diagrams. Fluctuation of speed and energy: Effect of centrifugal tension of flywheel, Inertia torque and its effects on Crank effort diagrams

UNIT-V

Governors: Distinction between function of a flywheel and governor, types of governor, Watt, porter, Proell, Hartnell governor.

Balancing: Static and dynamic balancing, balancing of several masses in different planes.



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Recommended Books:

1. Bevan T, "*The Theory of Machines*", CBS Publishers and Distributors.
2. Shigley J E and Vickar J J, "*Theory of Machines and Mechanism*", . McGraw Hill, New Delhi.
3. Wilson C and Sadler J, "*Kinematics and Dynamics of Machine*". . Prentice Hall.
4. Ratan S S, "*Theory of Machines*", 1st Edition, Tata McGraw Hill, New Delhi.
5. Rao J S and Dukupati R V, "*Mechanism and Machine Theory*", . New Age International (P) Limited, Delhi.
6. Mechanisms & machines by Ghosh and Mallick, East west Press
7. Theory of machine by Rattan lal T.M.G.H. Publications

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TPC12 MANUFACTURING PROCESSES-I

UNIT-I

Lathe: Lathe design and terminology Specification, types of Lathe: center lathe, capstan and turret lathe, various operations performed on lathe, operating conditions calculation of material removal rate.

Drilling: Fundamental of drilling process, types of drilling machine, types of drills, geometry of twist drill, various operations performed on drilling machine.

Milling: Introduction, types and processes, Milling cutters, up and down milling, different operations on milling, indexing and types, calculation of MRR.

Boring: Introduction to boring, reaming, tapping and taps, other hole making operations.

UNIT-II

Broaching: Introduction, Machines and processes.

Grinding: Classify grinding machines, constructional features and working of various grinding and super-finishing machines.

Honing, lapping, buffing & super-finishing processes with their applications.

Threads Manufacturing: Introduction, thread production processes and machines.

UNIT-III

Planning: Introduction, different operations and calculation of MRR.

Gear Manufacturing: Introduction to gear cutting process, gear forming, gear shaping, gear hobbing and gear finishing along with inspection.

Forming: Mechanism of forming process, elastic and plastic deformation.

UNIT-IV

Rolling: Classification, theories of Hot & Cold rolling, rolling mills & its types, two-hi, four-hi, six-hi and twenty-hi rolling mill, calculation of rolling parameter & rolling defect.

Forging: Classification of forging process, forging equipments, calculation of forging parameters, forging defects.

Extrusion: Types, extrusion equipments & analysis of processes, drawing of rods, wire & tube and their analysis, defects in extrusion & drawing.

UNIT-V

Work Holding Device: Introduction to jigs and fixtures their types, design criteria for jigs and fixtures, economic justification of jigs and fixtures.

Plastic Working: Plastic processing, injection, compression & blow moulding, plastic design principles processes, machines and equipments, parameters and force calculations.

Recommended Books:

1. Raghavan, Material Science and Engineering.
2. Swamp, Elements of Metallurgy
3. Vanlack, Elements of Material Science and Engineering.
4. Aagarwal, B.K Introduction to engineering Materials.

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A large signature, possibly "Anurag", is written across the bottom right. Below it, there are several other signatures and initials, including "M.L." and "Gandhi".



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3LPC11 THEORY OF MACHINE LABORATORY

1. Study of Gyroscopic effect and determination of gyroscopic couple.
2. Determination of jump speed of cam-follower system.
3. Dynamic balancing of the rotating mass system.
4. To determine radius of Gyration "K" of given pendulum.
5. To study the free vibration and to determine the natural frequency of vibration of Tow-Rotor system. 6. To study the torsional vibration and to determine the natural frequency vibration of single rotor system.
6. Study of longitudinal vibration and to determine the frequency of vibration.
7. To study the damped torsional vibration and determine the damping coefficient.
8. To verify the relation $T = 2\pi \sqrt{l/g}$ for a simple pendulum.
9. Determination of whirling speed of shafts.

IP3LES11 STRENGTH OF MATERIALS LABORATORY

1. Determination of Young's modulus, tensile, strength and percentage elongation for steel, aluminum, brass and cast iron specimens on universal testing machine. Also plot the stress strain diagram.
2. To perform the compression test for cast iron specimen on universal testing machine.
3. To determine the deflection for mild steel specimen and verify the beam formula for specimen in bending.
4. To determine the stiffness of the following:
(i) Cantilever beam (ii) Spring under compressive and tensile loading
5. To measure the total energy absorbed in fracturing of the ductile specimen on Charpy and Izod setup.
6. To plot and study the S-N curve for steel, aluminum and fibre reinforced composite material at 25%, 50%, 60% and 75% of ultimate tensile strength of the specimen.
7. Preparation of specimen for hardness test.
8. Testing of prepared specimens for Brinell hardness and Rockwell hardness.
9. To study the behavior of steel and aluminum specimen under torsion.

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Department of Industrial and Production Engineering



INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY-ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO: 3 OF 2009)

DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.F.F. SESSION 2016-2017

Year: B.Tech. II year
SEMESTER-IV

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP4TPE1.	Elective-PE-I	3	0	0	40	60	100	3
2.	IP4TBS02	Numerical Analysis and Computer Programming	3	1	0	40	60	100	4
3.	IP4TPC21	Machine Drawing	3	0	0	40	60	100	3
4.	IP4TPC22	Industrial Engineering	3	0	0	40	60	100	3
5.	IP4TPC23	Manufacturing Processes-II	3	0	0	40	60	100	3
6.	IP4TPC24	Fluid Mechanics	3	1	0	40	60	100	4
Total			18	02		240	360	600	20

PRACTICALS									
1.	IP4LPC21	NACP	-	-	03	45	30	75	2
2.	IP4LPC24	Fluid Mechanics	-	-	03	45	30	75	2
Total					06	90	60	150	04

Elective-Professional Elective (PE)-I	
S.N.	IP4TPE1.
11.	Occupational Health and Safety
12.	Business communication and presentation skill
13.	Business ethics and corporate governance

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TBS02 NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

UNIT-I

Approximation and errors in Computation

Approximation and round of errors, truncation errors and Taylor series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-falsi, secant and Newton-Raphson methods, solution of Linear simultaneous, linear algebraic equations by gauss Elimination Gauss-Jordan and Gauss-Siedel iteration method.

UNIT-II

Empirical Laws, Curve Fitting & Interpolation

Curve fitting linear and non-linear regression analysis (Method of group average and least squares) finite differences, backward, forward and central difference relation and their use in Numerical differentiation and integration and their application in interpolation.

UNIT-III

Numerical Solution of Ordinary Differential Equations

Numerical Integration by Trapezoidal rule, Simpson's (1/3rd & 3/8th) rule and its error estimation. Application of difference relations in the solution of partial differential equations. Numerical solution of ordinary differential equations by Taylor's series, Euler, modified Euler, Runge-Kutta and Predictor-Corrector method.

UNIT-IV

Numerical Solutions of partial differential Equations

Introduction, classification of second order equations, finite difference approximations to partial derivatives, elliptic equations, solution of Laplace equation, solution by Poisson's equation, solution of elliptic equations by relaxation method, parabolic equations, solution of one-dimensional heat equation, solution of two-dimensional heat equation, Hyperbolic equations, solution of wave equation.

UNIT-V Computer Programming

I/O Statement, Mathematical Relational & Conditional statement & Expressions. Switch Loops and Control Statement. Introduction to one dimensional array and two dimensional arrays. Basic of I/O file Handling.

Recommended Books:

1. Numerical Methods in Engineering & Science-Dr. B.S.Grewal-Khanna Publishers.
2. Numerical Methods-P.Kandasamy,K.Thilagavathy & K. Gunavathy-S Chand & Co.
3. Let us C-Yashwant kanitkar
4. Introductory Methods of Numerical Analysis-S.S.Sastry,3rd Edn.-PHI-New Delhi.
5. Numerical Methods Analysis-James B.Scarborough, Oxford & IBH Publishing Co.- New Delhi.
6. Theory & Problem in Numerical Methods-T Veerarajan,T. Ramchandran- TMH.
7. Numerical Methods for Engineers-Steven C. Chapra,Raymond P. Canale.
8. The Spirit of C-Henry Mullish & Herbert L.Cooper-Jaico Pub. House.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPC21 MACHINE DRAWING

Unit-I

Drawing conventions, sectional views and sectioning, representation of machine parts such as external and internal threads, slotted heads, square ends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs, Convention of gears in mesh, representation of geometrical tolerances on drawings.

Unit-II

Rivet heads and riveted joints: Lap and butt joint with single and double straps.

Welding joints and their representation, symbols of different joint.

Machining symbols, Surface roughness, grades, material symbols.

Unit-III

Screw thread and screw fastening, different types of thread profile and nuts, bolts.

Sectional views: keys, cotter joints, knuckle joints

Shaft coupling, flanged coupling, different types of shaft coupling.

Shaft bearing, bushed bearing, plumber block, foot step bearing.

Pulleys: fast & loose pulleys, stepped pulley's belt pulley, rope pulley.

Unit-IV

Assembly drawing of Engine parts like piston, stuffing box, cross-heads, eccentrics, connecting rod:

Assembly drawing of stop valve, feed check valve, safety valve, blow off cock.

Assembly drawing of lathe tail stock post.

Unit-V

Concept of computer aided drafting(CAD), implementation of CAD, atleast five projects from the above specified topics using CAD software.

Recommended Books:

1. Shigley J.E; Machine Design; TMH
2. Sharma and Parohit; Design of Machine elements; PHI
3. Wentzell Timothy H; Machine Design; Cengage learning
4. Mubeen; Machine Design; Khanna Publisher
5. Ganesh Babu K and Srihar k; Design of Machine Elements; TMH
6. Sharma & Aggarwal; Machine Design; Kataria & sons
7. Maleev; Machine Design.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPC22 INDUSTRIAL ENGINEERING

Unit-I Introduction

History & Development of industrial engineering. Productivity definition; means of increasing productivity; work study definition; productivity and work study; Human factor in the fabrication. Work of F.W. Taylor; Frank and Lillian Gilberth and their contribution.

Unit-II Method Study

Definition & basic procedure, selection of jobs, recording technique; micro motion, study; Therbligs; cyclograph and Chronocyclo-graph; principle of motion economy; design of work place layout; analysis in the form of chart; operation chart; flow process chart; flow diagram; string diagram; man machine chart; two hand chart; Simo chart.

Unit-III Work Measurement

Definition, objectives, application, number of cycle to be timed, time study equipment; performance rating; allowances; number of cycle to be studied; determination of standard time; predetermined motion time systems. Conducting work sampling study & establishing standard time.

Unit-IV Wages & Incentives

Characteristics of a good wage or incentive system, method of wage payment. Concept of wage incentive schemes; financial and non financial; Taylor differential piece rate, Halsey premium plane; Merrie's multiple piece rate system. Group incentive scheme.
Ergonomics, work space dimension, design of work place, environmental stresses & impacts on human work.

Unit-V

Value engineering: Introduction, concept of value, value analysis approaches, job plan, value tests.
Industrial safety, analysis of cost of accident, hazards in various fields like fire, electrical shocks, chemical, organization for safety, plant safety, govt. legislation for safety, safety rules.

Recommended Books:

1. I.L.O., "Introduction to work study", Oxford Press.
2. Mundel, "Motion and time study", Prentices Hall India.
3. Ralph M. Barnes, "Motion and Time Study", John wiley and sons.
4. Industrial Engineering by M.I.Khan, New Age International Publication

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPC23 MANUFACTURING PROCESSES-II

UNIT -I

Foundry:

Molding method and materials, Sand-clay-water system, Additives, pattern making and types, Pattern allowances & design considerations, types of molding sand & their properties, testing, cores and sand core boxes, core making, molding machine, Elements & design of gating system.

Melting furnaces and practices: Melting cast iron, steel and non ferrous material, cupola, charge calculation, open furnaces, converter and crucible furnaces, electric, direct arc furnace, inductive furnace.

UNIT -II

Casting: Introduction to pattern and its types, allowances, Centrifugal and investment casting, shell, plastic and mould methods, melting of cast iron, element of gating system, types and design of riser, solidification of casting, clearing of casting, principle of die casting, gravity and pressure die Casting, Die casting consideration, casting defects.

UNIT -III

Welding: Classifications, principle and equipments, different type of welding process and their equipments, features, Arc Welding, Resistance welding, TIG, MIG, Submerged arc welding, friction welding, soldering, brazing and adhesive bonding, Welding defects.

UNIT -IV

Sheet -metal working: Role of sheet metal components, Cutting mechanism, Description of cutting processes like blanking, piercing, lancing etc. Description of forming processes like bending cup drawing, coining, embossing etc. Basic elements of Presses for sheet metal working. Part feeding systems, Punch and die clearances, die elements.

UNIT -V

Non-conventional machining: Introduction, Classification and comparison of different non-conventional machining, theory and analysis, basics, and MRR of EDM, ECM, LBM, AJM, ECG, EBM.

Recommended Books:

1. Rao, P.N., Manufacturing Technology vol.1 TMGH
2. Ghose and Mallick, Manufacturing Science, East West Press
3. Roy, A. Lindberg, Material and Process of manufacturing, PHI
4. Serop Kalpakjian, Manufacturing Engineering & Technology, Pearson.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPC24 FLUID MECHANICS

Unit-I

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets their utility & method of drawing flow nets.

Unit-III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications.

Flow Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.), flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venture-meter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.).

Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

Turbulent Flow: Basics of turbulence, Reynolds stresses, Prandtl's mixing length hypothesis, friction velocity, law of walls.

Recommended Books:

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechanics and machinery; TMH
3. Cengel; Fluid Mechanics; TMH
4. White ; Fluid Mechanics ; TMH
5. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt. (ANSTI)
6. Franiss JRD; A Text Book of fluid Mech. for Engg. Student
7. R Mohanty; Fluid Mechanics; PHI
8. Gupta; Fluid Mechanics; Pearson.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPE11 OCCUPATIONAL HEALTH AND SAFETY (Elective)

UNIT-I

Introduction: Environmental law: Legal control of Hazardous substances and processes, Environmental Issues and judicial trends. Health and safety law, common liabilities and work place injuries, Health and safety at work- the principle legal requirements, Health and safety and Industrial relation law.

UNIT-II

Health and safety Management: Safety Management and policy, Investigation reporting and recording of accidents, Health and safety monitoring, Comprehensive exposure assessment, Principles of evaluating workers exposure, Risk assessment in the work place, Major incidents and procedures, Health and safety training and communication, the cost of accidents. Principles of accident prevention, safe system of work, Surveys and audits.

UNIT-III

Occupational Health and Hygiene: The organization of working environment, temperature, lighting and ventilation, welfare amenity provision, cleaning and hygiene. Toxicology and health, Occupational disease and conditions; Occupational Audiometry, NIHL, Cardiovascular Disease, Physiological and psychological parameters, Occupational health practice, Noise and vibration, Dust and fumes, radiation and radiological protection, personal protection, Occupational hygiene practice, prevention and control strategies in occupational hygiene, manual handling, first aid, human factor and safety, stress, safety technology.

UNIT-IV

Assessment of Exposure: Measurement of noise and vibration exposure. Noise and vibration and control, Heat stress monitoring, dust exposure and respiratory health. Work Posture, Musculoskeletal disorders, Strain Index, Lifting Equation, Maximum acceptable weight limits, Occupational Audiometry, Cardiovascular health, Occupational determinants of heart rate variability, pulmonary functions and respiratory health

UNIT-V

Government schemes and norms related to health and nourishment, Policies of government in special context to Chhattisgarh state

Recommended Books:

1. Jeremy W. Stranks, "Handbook of Health and safety Practice" Pitman Publishing.
2. Dharmendra S Sengar, " Environmental law" Prentice Hall of India, New Delhi.
3. Malcolm J Crocker, "Noise and Noise Control" CRC Press.
4. Marek Malik, " Clinical Guide to cardiac Autonomic Tests" Kulwer Academic Publishers.
5. Marek Malik, "Hear rate variability" Futura Publishing Co. NY
6. Cyril M Harris, "Handbook of Noise control" McGraw-Hill Book Company, NY
7. Maryanne Maltby, "Occupational Audiometry" Butterworth-Heinemann Imprint of Elsevier.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPE12 BUSINESS COMMUNICATION AND PRESENTATION SKILL (Elective)

Unit- I

Business communication covering, Role of communication in information age; concept and meaning of communication; skills necessary for technical communication; Communications in a technical organization; Barriers to the process of communication and so

Unit -II

Style and organization in technical communication covering, Listening, speaking, reading and writing as skills; Objectivity, clarity, precision as defining features of technical communication; Various types of business writing: Letters, reports, notes, memos; Language and format of various types of business letters; Language and style of reports; Report writing strategies; Analysis of a sample report

Unit -III

Communication and personality development covering, Psychological aspects of communication, cognition as a part of communication; Emotional Intelligence; Politeness and Etiquette in communication; Cultural factors that influence communication; Mannerisms to be avoided in communication; Language and persuasion; Language and conflict resolution;

Unit -IV

Language Laboratory emphasizing Listening and comprehension skills; Reading Skills; Sound Structure of English and intonation patterns;

Unit -V

Oral Presentation and professional speaking covering, Basics of English pronunciation; Elements of effective presentation; Body Language and use of voice during presentation; Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech;

Recommended Books:

1. Fred Luthans, *Organizational Behaviour*, McGraw Hill
2. Lesikar and petit, *Report writing for Business*
3. M. Ashraf Rizvi, *Effective Technical Communication*, McGraw Hill
4. Wallace and masters, *Personal Development for Life and Work*, Thomson Learning
5. Farhathullah, T. M. *Communication skills for Technical Students*
6. Michael Muckian, John Woods, *The Business letters Handbook*
7. Herta A. Murphy, *Effective Business-Communication*
8. *MLA Handbook for Writers of Research Papers*

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPE13 BUSINESS ETHICS AND CORPORATE GOVERNANCE(Elective)

UNIT-I

Introduction: Corporation, 'definition and characteristics, history of corporate form and models, corporate objectives, corporations and government, governance, corporate governance, definition, perspectives.

UNIT-II

Theoretical Foundations of Corporate Governance: Notion of conflict of interest, property rights theory, nexus of contracts, agency theory, Berle and Means' theory, concept of separation of ownership and control, shareholder, stakeholder debate.

UNIT-III

Pillars of Governance in Organizations: Owners, ownership structure, types of owners, ownership vs. control, board of directors, types of directors, board roles and board attributes, board committees, executive management, role of CEO, succession planning, managerial myopia, institutional investors, types, categories, features and role.

UNIT-IV

Work Ethos: Values and ethics, model of management in the Indian socio, political environment, need for values in global change, Indian perspective, values for managers, holistic approach for managers in decision making.

UNIT-V

Business Ethics and CSR: Corporation as a social institution, accountability and sustainability, relevance of triple bottom line reporting to CSR, codes of conduct, applications of ethical theories to decision making, ethical issues related to employment, healthcare and advertisement.

Recommended Books:

1. Praveen B. Malla, Corporate Governance: Concept, Evolution and India Story, Routledge, 2010.
2. Sadri, Business Ethics: Concepts and Cases, Tata McGraw Hill, 1998.
3. Robert Monks, Nell Minow, Corporate Governance, Wiley Publications, 2009.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4LPC21 Machine Drawing

List of Experiments:

1. Introduction to Compute Aided Drafting software for 2D and 3D Modeling
2. Computer Aided Drafting of simple machine parts
3. 3D Modeling of simple solid shapes
4. Design and drawing of parts contained in the syllabus

IP4LPC24 FLUID MECHANICS- LAB

List of Experiment (Expandable):

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of C_c , C_v , C_d of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. To study the characteristics of a centrifugal pump.
10. Verification of Impulse momentum principle.

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