



SCHEME OF STUDIES & EXAMINATIONS

Department: Mechanical Engineering – 4th Semester

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT 201 B	ENGINEERING ECONOMICS (Common for all branches Except BT & BME)	4	-		25	75	-	100	4	3
	GES 201 B	(Gr- B) OR ENVIRONMENTAL STUDIES (Common for all branches) (Gr-A)	3	-		-	75*		75*	--	
2	ME 202B	MANUFACTURING TECHNOLOGY	3	1		25	75	-	100	4	3
3	ME 204B	MATERIAL SCIENCE	3	1		25	75	-	100	4	3
4	ME 206B	STRENGTH OF MATERIALS – II	3	1		25	75	-	100	4	3
5	ME 208B	FLUID MACHINES	3	1		25	75	-	100	4	3
6	ME 210B	ENERGY CONVERSION	3	1		25	75	-	100	4	3
7	ME 212B	MATERIAL SCIENCE LAB	-	-	2	20	-	30	50	1	3
8	ME 214B	FLUID MACHINES LAB	-	-	2	20	-	30	50	1	3
9	ME 216B	ENERGY CONVERSION LAB	-	-	2	20	-	30	50	1	3
10	ME 218B	MANUFACTURING PRACTICE (ME, AER)	-	-	3	20	-	30	50	1.5	3
11	GES 203 B	ENVIRONMENTAL STUDIES FIELD WORK (Common for all branches) (Gr-A)	-	-	-	-	-	25*	25*	-	
12	GPME 202B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	3
Total			20	5	9	230	450	195	875	30.5	
			19	5	9	205	375	195	775	26.5	

Note:

- 1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency & Ethics Syllabus.
- 2 *The Environmental studies (GES-201 B & Environment Studies Field work (GES-203B) are compulsory & qualifying courses only.
- 3 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 4 Electronics gadgets including Cellular phones are not allowed in the examination
- 5 Each students has to undergo Professional Training of at least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carries out in the V semester
- 6 All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Engineering Economics

Subject Code: MGT 201B

Detailed Content

UNIT NO.1 Different Economics With Inter Relations

- Topic No.1: Introduction to various definitions of Economic
- Topic No.2: Nature of Economic problem, Micro and macro economics- their feature and scope
- Topic No.3: Production possibility curve
- Topic No.4: Economic laws and their nature, Relation between Science
- Topic No.5: Engineering Technology and Economics
- Topic No.6: Concept and measurement of utility, Law of Diminishing Marginal Utility
- Topic No.7: Law of equi-marginal utility – its practical application and importance

UNIT NO.2 Demand And Costs

- Topic No.8: Meaning of Demand, Individual and Market demand schedule
- Topic No.9: Law of demand, & shape of demand curve
- Topic No.10: Elasticity of demand & measurement of elasticity of demand, Factors effecting elasticity of demand
- Topic No.11: Practical importance & application of the concept of elasticity of demand
- Topic No.12: Various concepts of cost-Fixed cost, Variable cost, average cost, Marginal cost, Money cost, real cost
- Topic No.13: Opportunity cost. Shape of average cost, Marginal cost, total cost etc. in short run and long run.

UNIT NO.3 Production, Economy & Market

- Topic No.14: Meaning of production and factors of production
- Topic No.15: Law of variable proportions, & Law of Return to Scale
- Topic No.16: Lubrication principles, Bearing lubrication
- Topic No.17: Functions of lubricating system
- Topic No.18: Internal and External economics and diseconomies of scale
- Topic No.19: Meaning of Market, Type of Market
- Topic No.20: Perfect Competition, Monopoly, Oligopoly, Monopolistic competition

UNIT NO.4 Supply , Economy And Globe

- Topic No.21: Supply and Law of Supply, Role of Demand & Supply in Price Determination
- Topic No.22: Effect of changes in Demand and supply on prices
- Topic No.23: Nature and characteristics of Indian economy
- Topic No.24: privatization – meaning, merits and demerits
- Topic No.25: Globalization of India economy – merits and demerits
- Topic No.26: Elementary Concept of WTO & TRIPS agreement
- Topic No.27: Monetary Policy & Fiscal Policy

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		P	Credits	Internal Assessment	External Assessment (Examination)		
L	T			Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

TEXT BOOKS:

1. Ahuja H.L "Micro Economic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Economic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P, "Economics for engineers" V.K .Publication ,New Delhi

SUGGESTED BOOKS:

1. Jhingan M.L "Micro Economic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai.
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Environmental Studies

Subject Code: GES 201B

Detailed Content

UNIT NO.1 Introduction To Environment, Natural Resources

- Topic No.28: The Multidisciplinary nature of environmental studies
- Topic No.29: Definition, scope and importance
- Topic No.30: Need for Public awareness
- Topic No.31: Natural resources and associated problems
- Topic No.32: Renewable and Non-renewable resources
- Topic No.33: Forest resources: Use and over-exploitation
- Topic No.34: Deforestation, case studies, Timber exploitation, mining
- Topic No.35: Dams and their effects and forests tribal people
- Topic No.36: Water resources: Use and over-utilization of surface and ground water
- Topic No.37: Floods, Drought, conflicts over water ,Dams-benefits and problems
- Topic No.38: Mineral resources: Use and exploitation
- Topic No.39: Environmental effects of extracting ,And using mineral resources, case studies
- Topic No.40: Food resources: World food problems
- Topic No.41: Changes, caused by agriculture and Overgrazing
- Topic No.42: Effects of modern agriculture, fertilizer-pesticide problems
- Topic No.43: Water logging, salinity, case studies
- Topic No.44: Energy resources: Growing energy needs
- Topic No.45: Renewable and Non-renewable energy sources
- Topic No.46: Use of alternate energy sources; case studies
- Topic No.47: Land as a resource, land degradation
- Topic No.48: Man induced landslides
- Topic No.49: Soil erosion and desertification
- Topic No.50: Role of an individual in conservation of natural resources
- Topic No.51: Equitable use of resources for sustainable lifestyles

UNIT NO.2 Ecosystems, Biodiversity And Its Conservations

- Topic No.52: Concept of an ecosystem
- Topic No.53: Structure and function of an ecosystem
- Topic No.54: Producers, Consumers and decomposers
- Topic No.55: Energy flow in the ecosystem, Ecological Succession
- Topic No.56: Food chains, food webs and ecological pyramids
- Topic No.57: Introduction, types, characteristic features, structure and function of the Following eco-system:
 - A. Forest ecosystem
 - B. Grassland ecosystem, Desert Ecosystem
 - C. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans,Introduction – Definition: Genetic
 - D. species and ecosystem diversity
- Topic No.58: Biogeographically classification of India
- Topic No.59: Value of biodiversity: consumptive use, productive use
- Topic No.60: Social, Ethical aesthetic and option values
- Topic No.61: Biodiversity at global, National and local levels
- Topic No.62: India as a mega-diversity nation
- Topic No.63: Hot-spots of biodiversity
- Topic No.64: Threats : habitat loss, poaching of wildlife,Man-wildlife conflicts
- Topic No.65: Endangered and endemic species of India

UNIT NO.3 Environmental Pollution

- Topic No.66: Definition, causes, effects and control, measures of:Air pollution, Water pollution, Soil pollution
Marine pollution, Noise pollution, Thermal Pollution Nuclear hazards
- Topic No.67: Solid waste management: Causes effects and control, measures of urban and Industrial wastes



Topic No.68: Role of an individual in prevention of pollution

Topic No.69: Pollution case studies

Topic No.70: Disaster management: Floods, earthquake, cyclone and landslides

UNIT NO.4 Social Issues And The Environment, Human Population And Environment

Topic No.71: From unsustainable to sustainable development

Topic No.72: Urban problems related to energy

Topic No.73: Water conservation , rain water harvesting, watershed management

Topic No.74: Resettlement and rehabilitation of people; its problems and concerns

Topic No.75: Environmental ethics: Issues and possible solutions

Topic No.76: Climate change, global warming, acid rain, ozone layer depletion, Nuclear accidents & holocaust, Case std.

Topic No.77: Wasteland reclamation, Consumerism and waste products

Topic No.78: Environment Protection Act, Air (Prevention and Control of Pollution Act,

Water (Prevention and Control of Pollution) Act Wildlife Protection Act, Forest Conservation Act

Topic No.79: Issues involved in enforcement of environmental legislation Public awareness

Population growth, variation among nations

Topic No.80: Population explosion – Family Welfare Programme Environment and human health, Human Rights

Topic No.81: Value Education, HIV/ AIDS, Woman and Child Welfare

Topic No.82: Role of Information Technology in Environment and human health. Case Studies

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	

REFERENCES:

1. Agarwal, K.C. 2001, Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Franch, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India .
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine Pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai. 1195p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment ®.
8. Gleick, H.P., 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ., Press 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
11. H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Helhi 284p.
12. Mckinney, M.L. & Schoch, RM 1996, Environmental Sciences Systems & Solutions, Web enhanced Edition 639p.
13. Mhaskar A.K., Mater Hazardous, Tekchno-Sciences Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Dutta, A.K. 1987, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
17. Sharma, B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Manufacturing Technology (Theory)

Subject Code: ME202B

Detailed Content

Unit No1 Introduction To Foundry, Melting, Cleaning And Testing Of Casting Process, Special Casting Processes

- Topic no 1: Steps involved in casting, advantages
- Topic no 2: Limitations and applications of casting process
- Topic no 3: Molding methods, molding materials and properties
- Topic no 4: Design considerations in casting,
- Topic no 5: Gating system design and Riser design, directional solidification in castings, problem
- Topic no 6: Melting practice: Cupola, charge calculations
- Topic no 7: Cleaning of casting, Fettling, defects in castings and their remedies
- Topic no 8: Methods of testing of castings for their soundness, problems
- Topic no 9: Shell molding
- Topic no 10: Precision investment casting, permanent mold casting
- Topic no 11: Die casting, centrifugal casting, and continuous casting

Unit No2 Theory Of Metal Forming, Powder Metallurgy

- Topic no 12: Classification of metal forming processes
- Topic no 13: Nature of plastic deformation, hot working and cold working, yield criteria and their significance
- Topic no 14: Principles of rolling roll passes roll pass sequences
- Topic no 15: Forging: process and defects, Extrusion and other processes
- Topic no 16: Extrusion principle, wire drawing, swaging, tube making
- Topic no 17: Introduction Production of Metallic Powder
- Topic no 18: Processing methods, Design consideration for powder metallurgy

Unit No3 Introduction To Welding, Other Welding Processes

- Topic no 19: Classification of welding process
- Topic no 20: Selection of a welding process, Effect of welding parameters
- Topic no 21: Selection of electrodes and fluxes, Metal transfer & its importance in arc welding
- Topic no 22: Power sources for arc welding
- Topic no 23: Inspections and defects of weldments
- Topic no 24: Gas welding, Arc welding, Resistance welding
- Topic no 25: Introduction of thermit welding
- Topic no 26: Electro slag welding, electron beam welding
- Topic no 27: Forge welding, friction welding, diffusion welding
- Topic no 28: Brazing and soldering

Unit No4 Sheet Metal Forming Processes, Plastic Processing

- Topic no 29: Classification of sheet metal processes
- Topic no 30: Press tool operations, shearing action
- Topic no 31: Principle, process parameters
- Topic no 32: Equipment and application of the following processes
- Topic no 33: Piercing, blanking, deep drawing, spinning
- Topic no 34: Stretch forming, embossing and coining, heet metal die design, problems
- Topic no 35: Introduction, plastic material
- Topic no 36: Extrusion of plastic, injection moulding, blow moulding

Study Scheme				Evaluation Scheme			Total Marks
L	T	P	Credits	Internal Assessment	External Assessment (Examination)		
				Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100



PM

COLLEGE OF ENGINEERING

A Unit of Puran Murti Educational Society
Approved by AICTE, Ministry of HRD, Govt. of India,
Affiliated to Deenbandhu Chhotu Ram University of Science & Technology

Text Books:

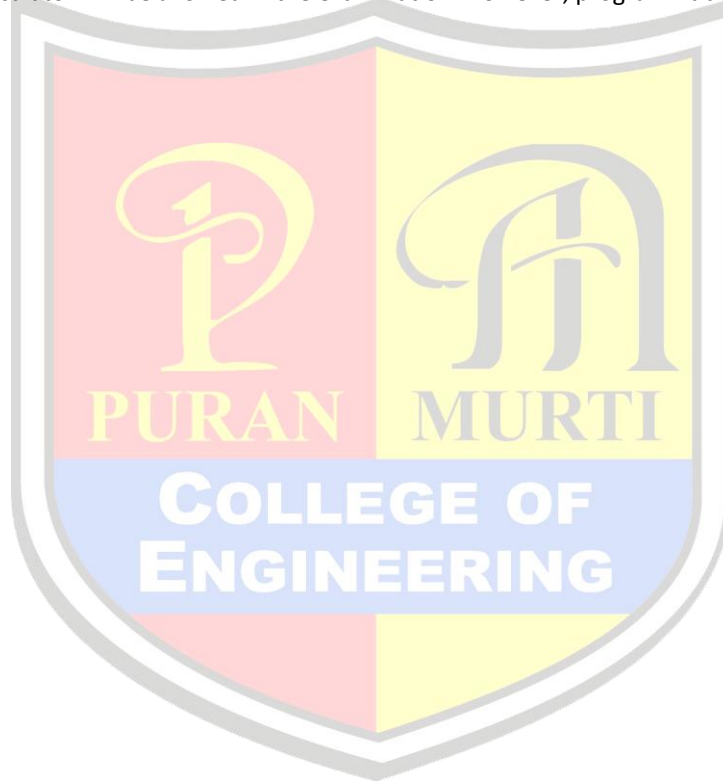
1. Principles of Manufacturing Materials & Processes – Campbell J. S., Publisher – Mc Graw Hill.
2. . Manufacturing Technology-Foundry, Forming and Welding - P.N. Rao, Tata McGraw Hill

Reference Books:

1. Foundry Technology - K.P. Sinha, D.B. Goel, Roorkee Publishing House.
2. Welding and Welding Technology, Richard L. Little Tata McGraw Hill Ltd.
3. Principle of Metal casting - Rosenthal, Tata McGraw Hill, New Delhi
4. Manufacturing Processes and Systems: Ostwald Phillip F., Munoz Jairo, John Wiley & Sons
5. Elements of Manufacturing Processes – B.S. Nagendra Parasher, RK Mittal, PHI N. Delhi

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Material Science (Theory)

Subject Code: ME 204B

Detailed Content

Unit No1 Engineering Material And Crystallography Engineering Materials, Crystal Imperfections

- Topic no 1: Classification of engineering materials
- Topic no 2: Property spectrum of engineering materials
- Topic no 3: Crystal Geometry: space lattice, unit cell
- Topic no 4: Bravais crystal system, atomic packing fraction, Miller indices, interplaner spacing
- Topic no 5: Linear density, planer density, Numerical problem
- Topic no 6: Classification of Imperfections
- Topic no 7: Line imperfection , Mixed dislocations, Characteristics of dislocation
- Topic no 8: Sources of dislocation, their effects and remedies
- Topic no 9: Phenomenon related to behavior of dislocations
- Topic no 10: Surface imperfection, volume imperfection, whiskers.

Unit No2 Phases Diagrams And Heat Treatment, Phase Transformations, Heat Treatment

- Topic no 11: Solid solution, types of solid solution
- Topic no 12: Phases, Gibb's Phase rule, Phase diagrams, unary and binary phase diagrams
- Topic no 13: Eutectic and eutectoid phase diagrams
- Topic no 14: Peritectic and peritectoid phase diagrams, microstructural changes, lever rule, Iron carbon system
- Topic no 15: Terminology, Strengthening mechanism, cold and hot working
- Topic no 16: Precipitation hardening, dispersion hardening, solid solution hardening, Recovery
- Topic no 17: Re-crystallization and grain growth. Diffusion process
- Topic no 18: Types of diffusion, laws of diffusion- Fick's first law and Fick's second law of diffusion
- Topic no 19: Purpose of heat treatment
- Topic no 20: Microstructure of steel and iron, transformation in steel and critical cooling curve
- Topic no 21: Hardening, annealing, normalizing
- Topic no 22: Stress relieving, tempering, carburizing, nitriding, cyaniding, flame and induction hardening

Unit No3 Material Deformation And Failure, Fracture: Ductile Fracture, Corrosion And Oxidation

- Topic no 23: Inelastic deformation, slip systems, critical resolved shear stress (crss) yielding
- Topic no 24: Strain hardening, bauschinger effect, frank read source, Anelastic behaviour, Viscoelastic behavior
- Topic no 25: Brittle fracture, Griffith theory of crack propagation, cleavage fracture
- Topic no 26: Method of protection against fracture , Ductile to brittle transition
- Topic no 27: Corrosion, types of corrosion, laws of corrosion , oxidation and its mechanism
- Topic no 28: Passivity, special type of corrosion, protection against corrosion and oxidation
- Topic no 29: Fatigue, mechanism of fatigue, improving fatigue life
- Topic no 30: Creep, factor affecting creep, mechanism of creep, creep resistant materials

Unit No4 Steel Alloys And Composites

- Topic no 31: Plain carbon steel, cast iron
- Topic no 32: Effects of alloying elements on steel
- Topic no 33: Effects on alloying elements on non-ferrous metals, ferrous alloys, non ferrous alloys
- Topic no 34: Alloys in different applications, materials for special cases
- Topic no 35: Composite materials: introduction
- Topic no 36: Laminates, reinforced composite materials and their classification
- Topic no 37: Particulate composites, flake composites, whisker reinforced composites, hybrid composites
- Topic no 38: Sandwich composites, fibre-reinforced glass and glass ceramic composites
- Topic no 39: Mmc and wood composite, advantages and limitation of composites, application of composites materials



Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	

Text Books:

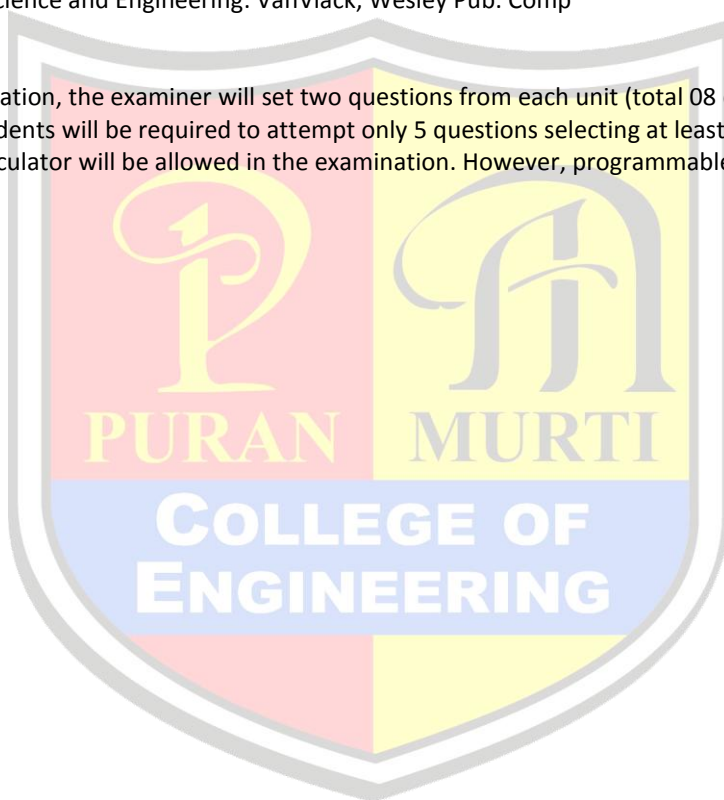
1. Material Science, Metallurgy & Engineering materials-K.M.GUPTA, Umesh Publications
2. Material Science and Engineering-An Introduction - Callister; W.D., John Wiley & Sons., Delhi

Reference Books:

1. Material Science & Engineering –V. Raghvan, Prentice Hall of India Pvt. Ltd, New Delhi
2. Elements of Material Science and Engineering: VanVlack, Wesley Pub. Comp

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Strength Of Materials –I I (Theory)

Subject Code: ME 206B

Detailed Content

Unit No1 Thin Walled Vessels, Thick Cylinders & Spheres:

- Topic No 1: Hoop & Longitudinal stresses & strains in cylindrical & spherical vessels & their derivations under Internal pressure
- Topic No 2: Volumetric strain, Numericals
- Topic No 3: Derivation of Lamé's equations
- Topic No 4: Radial & hoop stresses and strains in thick and compound cylinders and spherical shells subjected to Internal fluid pressure only, Numericals

Unit No2 Strain Energy , Theories Of Elastic Failure

- Topic No 5: Definitions, expressions for strain energy stored in a body when load is gradually, suddenly and with Impact, strain energy of beams due to: bending, pure shear, Horizontal shear and torsion, beam Deflections
- Topic No 6: Castigliano's theorems, Numericals
- Topic No 7: Various theories of elastic failures with derivations and graphical representations
- Topic No 8: Applications to problems of 2-dimensional stress system with combined direct loading and bending, and Combined torsional and direct loading, Numerical

Unit No3 Stresses Due To Rotation, Unsymmetrical Bending

- Topic No 9: Stresses in Rotating Ring, and Disc, hollow disc and solids disc, Stresses in rotating cylinders
- Topic No 10: Hollow cylinders & solids cylinder
- Topic No 11: Rotating discs of uniform strength, Numericals
- Topic No 12: Properties of beam cross section, product of inertia
- Topic No 13: Ellipse of inertia, slope of the neutral axis, stresses & deflections
- Topic No 14: Shear center and the flexural axis for I-section and channel section

Unit No4 Curved Beams, Springs

- Topic No 15: Stresses in beam of initial large radius of curvature
- Topic No 16: Position of neutral axis for rectangular, circular and trapezoidal sections
- Topic No 17: Stresses in crane hooks, stresses in circular rings subjected to tension or compression, Numericals
- Topic No 18: Stresses in open coiled helical spring subjected to axial loads
- Topic No 19: Axial couples and combined action of axial loads and axial couples
- Topic No 20: Leaf springs, and flat spiral springs
- Topic No 21: Energy methods in determining spring deflection Numericals

Study Scheme				Evaluation Scheme			Total Marks
L	T	P	Credits	Internal Assessment	External Assessment (Examination)		
				Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

Text Books:

1. Strength of Materials – G.H.Ryder, Macmillan, India.
2. Mechanics of Materials – (Metric Edition): Ferdinand P. Beer and E. Russel Johnston, Jr. Second Edition, McGraw Hill.

Reference Books :

1. Book of Solid Mechanics – Kazmi, Tata Mc Graw Hill
2. Strength of Materials – Sadhu Singh - Khanna Publication



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Fluid Machines (Theory)

Subject Code: ME 208 B

Detailed Content

Unit No1: Impact Of Free Jets, Impulse Turbines

- Topic No.1: Impulse – momentum principle
- Topic No.2: Jet impingement- on a stationary flat plate
- Topic No.3: Inclined plate and a hinged plate
- Topic No.4: Jet impingement- at the center of a stationary vane
- Topic No.5: Jet impingement- on a moving flat plate, inclined plate
- Topic No.6: Jet impingement- a moving vane and a series of vanes
- Topic No.7: Jet striking tangentially at the tip of a stationary vane and moving vane(s)
- Topic No.8: Jet propulsion of ships
- Topic No.9: Classification – impulse and reaction turbines, water wheels
- Topic No.10: Component parts, construction, operation and governing mechanism of Pelton wheel
- Topic No.11: Work done, effective head, available head and efficiency of a Pelton wheel
- Topic No.12: Design aspects, speed ratio, flow ratio, jet ratio, number of jets, number of buckets
- Topic No.13: Working proportions, Performance Characteristics, governing of impulse turbines

UNIT NO.2 Francis Turbines, Propeller And Kaplan Turbines

- Topic No.14: Component parts, construction and operation of a Francis turbine
- Topic No.15: Governing mechanism, work done by the turbine runner, working proportions and design parameters
- Topic No.16: Slow, medium and fast runners, degree of reaction
- Topic No.17: Inward/outward flow reaction turbines
- Topic No.18: Performance Characteristics, Problems
- Topic No.19: Component parts, construction and operation of a Propeller
- Topic No.20: Kaplan turbine
- Topic No.21: Differences between the Francis and Kaplan turbines, draft tube - its function and different forms
- Topic No.22: Performance Characteristics, Governing of reaction turbine
- Topic No.23: Introduction to new types of turbine, Deriaz (Diagonal), Bulb, Tubular turbines, Problems

UNIT NO.3 Dimensional Analysis And Model Similitude, Hydraulic Systems

- Topic No.24: Dimensional homogeneity
- Topic No.25: Rayleigh's method and Buckingham's π -theorem
- Topic No.26: Model studies and similitude, dimensionless numbers and their significance
- Topic No.27: Unit quantities, specific speed and model relationships for turbines, scale effect
- Topic No.28: Cavitations – its causes, harmful effects and prevention
- Topic No.29: Thomas cavitation factor, permissible installation height
- Topic No.30: Function, construction and operation of Hydraulic accumulator
- Topic No.31: Hydraulic intensifier
- Topic No.32: Hydraulic crane
- Topic No.33: Hydraulic lift and
- Topic No.34: Hydraulic press
- Topic No.35: Fluid coupling and torque converter
- Topic No.36: Hydraulic ram

UNIT NO.4 Centrifugal Pumps, Reciprocating Pumps:

- Topic No.37: Classification, velocity vector diagrams and
- Topic No.38: Work done, manometric efficiency, vane shape, head capacity relationship and pump losses
- Topic No.39: Pressure rise in impeller, minimum starting speed
- Topic No.40: Design considerations, multi-stage pumps
- Topic No.41: Similarity relations and specific speed, net positive suction head
- Topic No.42: Cavitation and maximum suction lift, performance characteristics
- Topic No.43: Brief introduction to axial flow, mixed flow and submersible pumps
- Topic No.44: Construction and operational details, discharge coefficient



- Topic No.45: Volumetric efficiency and slip, work and power input
Topic No.46: Effect of acceleration and friction on indicator diagram
Topic No.47: Separation, air vessels and their utility
Topic No.48: Rate of flow into or from the air vessel
Topic No.49: Maximum speed of the rotating crank, characteristic curves
Topic No.50: Centrifugal vs reciprocating pump
Topic No.51: Brief introduction to screw, gear, vane and radial piston pumps

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	

Text Books:

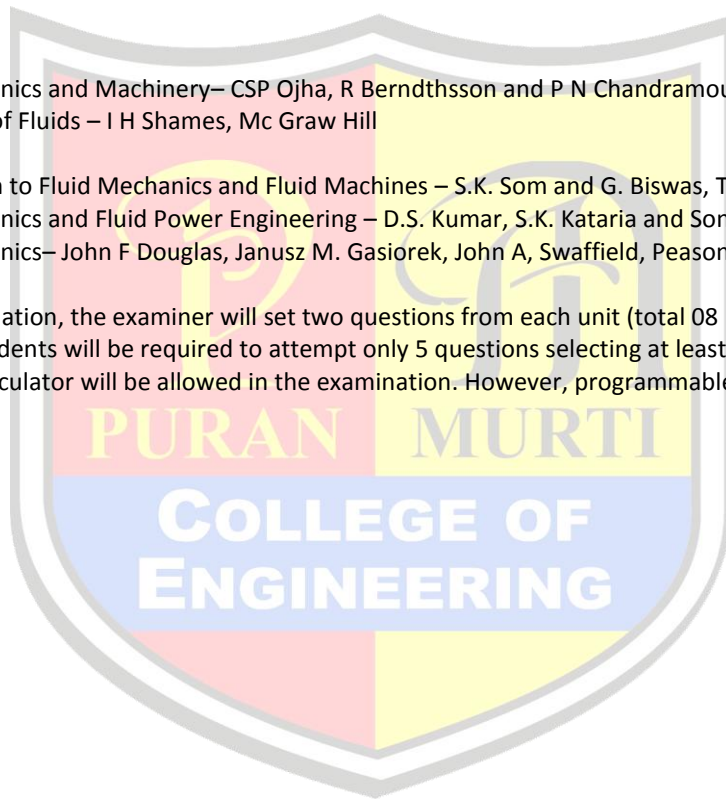
1. Fluid Mechanics and Machinery— CSP Ojha, R Berndthsson and P N Chandramouli, Oxford University Press
2. Mechanics of Fluids – I H Shames, Mc Graw Hill

References Books:

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas, TMH
2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar, S.K. Kataria and Sons
3. Fluid Mechanics– John F Douglas, Janusz M. Gasiorek, John A, Swaffield, Peason Education

Note:

3. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
4. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 4th Semester

Subject: Energy Conversion (Theory)

Subject Code: ME – 210B

Detailed Content

Unit No1 Fuels And Combustion, Steam Boilers And Draft

- Topic no 1: Classification of fuels- solid , Liquid & gaseous fuels
- Topic no 2: Combustion equations , Stoichiometric air-fuel ratio, Excess air
- Topic no 3: Orsat apparatus for exhaust & flue gas
- Topic no 4: Enthalpy and internal energy of combustion
- Topic no 5: Enthalpy of formation, Adiabatic flame temperature
- Topic no 6: Calorific values of fuel, Problems
- Topic no 7: Classification, comparison between fire and water tube boilers
- Topic no 8: Essentials of a good boiler, Constructional and operational details of Locomotive & Lancashire Boilers
- Topic no 9: High pressure boilers- Benson, Lamont
- Topic no 10: Loeffler and Velox boilers, Boiler mountings and accessories, Boiler performance
- Topic no 11: Natural & Artificial drafts, Chimney height, Maximum draft and chimney efficiency
- Topic no 12: Boiler heat balance sheet, Problems

Unit No2 Vapour Power Cycles, Flow Through Nozzles

- Topic no 13: Carnot and Rankine vapour cycles
- Topic no 14: Effect of operating conditions on efficiency of Rankine cycle
- Topic no 15: Rankine cycle with superheat, reheat and regeneration
- Topic no 16: Binary vapour cycle, Problems
- Topic no 17: Velocity and heat drop, mass discharge through a nozzle
- Topic no 18: Critical pressure ratio and its significance
- Topic no 19: Effect of friction and nozzle efficiency
- Topic no 20: Supersaturated flow, relationship between area, velocity & pressure in nozzle flow, Problems

Unit No3 Steam Turbines

- Topic no 21: Classification, Impulse Turbine- Flow through blades
- Topic no 22: Velocity diagram, power output and efficiency
- Topic no 23: Maximum blade efficiency of single stage impulse
- Topic no 24: Blade friction, compounding of impulse turbine
- Topic no 25: Reaction Turbine-Flow through blades
- Topic no 26: Degree of reaction, velocity diagram
- Topic no 27: Power output, blade efficiency and blade height
- Topic no 28: Comparison of impulse and impulse reaction turbines
- Topic no 29: Energy losses in steam turbines, stage efficiency
- Topic no 30: Overall efficiency and reheat factor
- Topic no 31: Condition for maximum blade efficiency for impulse , Governing of steam turbines, Problems

Unit No4 Steam Condensers , Air Compressors

- Topic no 32: Elements of a condensing plant, types of condensers, comparison of jet and surface condensers
- Topic no 33: Condenser vacuum, sources of air leakage & its disadvantages
- Topic no 34: Vacuum efficiency and condenser efficiency
- Topic no 35: Determination of mass of cooling water for jet and surface condensers
- Topic no 36: Cooling ponds and cooling towers, Problems
- Topic no 37: Working of a single stage reciprocating air compressor
- Topic no 38: Calculation of work input with and without clearance
- Topic no 39: Volumetric efficiency; Isothermal efficiency
- Topic no 40: Advantages of multi stage compression; Multi - stage compressor with Inter-cooling
- Topic no 41: Perfect Inter cooling; Optimum intercooler pressure, Problems



Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	

Text Books:

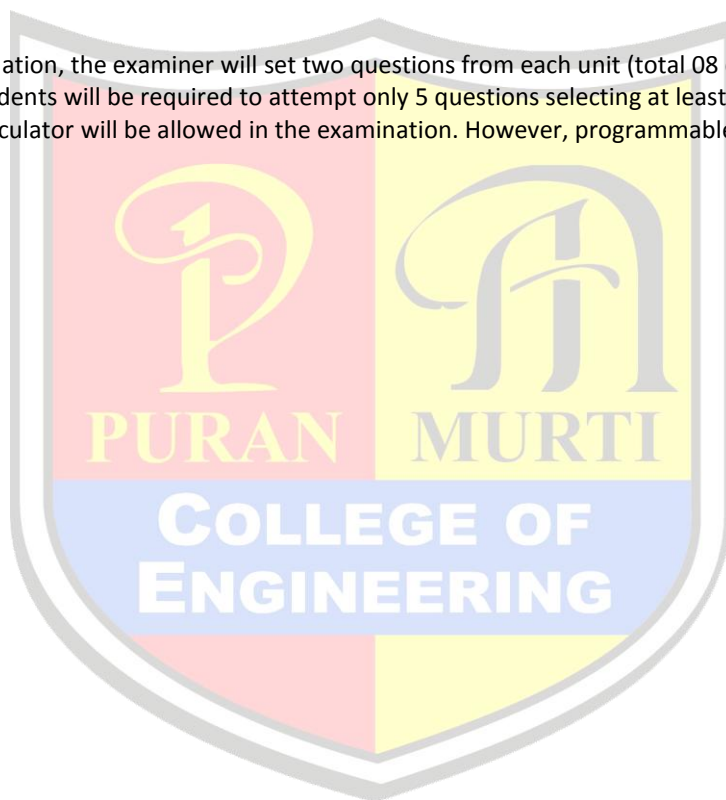
1. Engineering Thermodynamics – P K Nag Tata Mc Graw Hill
2. Thermal Science & Engineering – D S Kumar, S K Kataria & Sons

Reference Books:

1. Applied Thermodynamics for Engineering Technologists – T D Eastop and A McConkey, Pearson Education
2. Thermal Engineering – A S Sarao, Satya Prakashan
3. Thermodynamics and Heat Engines vol. II – R Yadav, Central Publishing House

Note:

5. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
6. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 4th Semester

Subject: Material Science Lab

Subject Code: ME 212B

Detailed Content

List of Experiments:

1. To study crystal structures with the help of ball model.
2. To study crystal structures and crystals imperfections using ball models.
3. To study microstructures of metals/ alloys through microscopic observation.
4. To study hardening (by quenching) of steel specimen by Jominy Test.
5. To observe effect of tempering temperature on the property of given steel specimen.
6. To study microstructure of heat-treated steel through microscopic observation.
7. To study thermo-setting of plastics.
8. To study the creep behavior of a given specimen.
9. To study the mechanism of chemical corrosion and its protection.
10. To study the properties of various types of plastics.
11. To study Bravais lattices with the help of models.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

Note:

1. At least ten experiments are to be performed in the semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 4th Semester

Subject: Fluid Mechanics Lab

Subject Code: ME 214B

Detailed Content

List of Experiments:

1. To study the constructional details of a Pelton turbine and draw its fluid flow circuit.
2. To draw the following performance characteristics of Pelton turbine-constant head, constant-speed and constant efficiency curves.
3. To study the constructional details of a Francis turbine and draw its fluid flow circuit.
4. To draw the constant head, constant speed and constant efficiency performance characteristics of Francis turbine.
5. To study the construction details of a Kaplan turbine and draw its fluid flow circuit.
6. To draw the constant head, speed and efficiency curves for a Kaplan turbine.
7. To study the constructional details of a Centrifugal Pump and draw its characteristic curves.
8. To study the constructional details of a Reciprocating Pump and draw its characteristics curves.
9. To study the construction details of a Gear oil pump and its performance curves.
10. To study the constructional details of a Hydraulic Ram and determine its various efficiencies..
11. To study the model of Hydro power plant and draw its layout.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	

Note:

1. At least ten experiments are to be performed in the semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME208B).



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 4th Semester

Subject: Energy Conversion Lab

Subject Code: ME 216B

Detailed Content

List of Experiments:

1. To study low pressure boilers and their accessories and mountings.
2. To study high pressure boilers and their accessories and mountings.
3. To prepare heat balance sheet for given boiler.
4. To study the working of impulse and reaction steam turbines..
5. To find dryness fraction of steam by separating and throttling calorimeter.
6. To find power out put & efficiency of a steam turbine.
7. To find the condenser efficiencies.
8. To study and find volumetric efficiency of a reciprocating air compressor.
9. To study cooling tower and find its efficiency.
10. To find calorific value of a sample of fuel using Bomb calorimeter.
11. Calibration of Thermometers and pressure gauges.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

Note:

1. At least ten experiments are to be performed in the semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 4th Semester

Subject: Manufacturing Practice Lab

Subject Code: ME 218B

Detailed Content

List of Experiments:

1. To make a pattern for a given casting with all the necessary allowances, parting line, running system details. Prepare the mold and make the casting. Investigate the casting defects and suggest the remedial measures.
2. To make a component involving horizontal and vertical position welding and study the welding defects and suggests their remedies.
3. To prepare a job on surface grinder/cylindrical grinder and measure the various parameters of the finished piece.
4. To cut external threads on a lathe.
5. Manufacture and assembly of a unit consisting of 2 to 3 components to have the concept of tolerances and fits (shaft and bush assembly or shaft, key and bush assembly or any suitable assembly).
6. Leveling of machine tools and testing their accuracy.
7. Disassembly and assembly of small assemblies such as tail stock, bench vice, screw jack etc.
8. Development and manufacture of complex sheet-metal components such as funnel etc.
9. Multi slot cutting on milling machine by indexing.
10. Drilling and boring of a bush.
11. Modeling of 3D runner system and creation of drawing for manufacturing of the casting patterns.
12. Development of blank size for complex sheet metal components using drawing software and compare results with manual calculation method.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

Note:

1. At least ten experiments are to be performed in the semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME 202B).



SYLLABUS: B Tech (ME)

Department: Mechanical Engineering-4th Semester

Subject: Environmental Studies Field Work

Subject Code: GES 203B

Detailed Content

Field Work:

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).
-

Note: The awards of this paper shall not be counted in the award of the Degree/DMC.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	-	0	25	-	-	25



SYLLABUS: B Tech (ME)
Department: Mechanical Engineering–4th Semester

Subject: General Proficiency

Subject Code: GPME- 202B

Detailed Content

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- | | | |
|-----|--|------------|
| I. | Academic Performance | ----- |
| II. | Extra Curricular Activities / Community Service, Hostel Activities | (8 Marks) |
| III | Technical Activities / Industrial, Educational tour | (8 Marks) |
| IV | Sports/games | (14 Marks) |
| V | Moral values & Ethics | (15 Marks) |

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the Committee. (30 Marks)

C. Moral values & Ethics

Syllabus - Process for Value Education, self-evaluation concept and process.

A minor test will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

University Departments:

- | | | |
|---|-------------------------------|----------|
| 1 | Chairperson of the Department | Chairman |
| 2 | Senior Most Faculty Counselor | Member |
| 3 | Vice- Chancellor's Nominee | Member |

Affiliated Colleges:

- | | | |
|---|---|----------|
| 1 | Director/Principal | Chairman |
| 2 | Head of the Department/Sr. Faculty | Member |
| 3 | External Examiner to be appointed by the University | Member |

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	-	2	-	75	-	75



PM

COLLEGE OF ENGINEERING

A Unit of Puran Murti Educational Society
Approved by AICTE, Ministry of HRD, Govt. of India,
Affiliated to Deenbandhu Chhotu Ram University of Science & Technology

