



**INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDHALAYA**

(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO: 3 OF 2009)

**DEPARTMENT OF MECHANICAL ENGINEERING
STUDY & EVALUATION SCHEME**

W.E.F. SESSION 2010-2011

Year: B.Tech. II year

Semester: III

S No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			Credits
			L	T	P	INTERNAL ASSESSMENT*	ESE	SUB TOTAL	
(THEORY)									
1.	ME- 231	Statistical Methods	3	1	-	40	60	100	4
2.	ME- 232	Kinematics of Machine	3	1	-	40	60	100	4
3.	ME- 233	Mechanics of Solids-I	3	1	-	40	60	100	4
4.	ME- 234	Material Science and Metallurgy	4	0	-	40	60	100	4
5.	ME -235	Applied Thermodynamics	3	1	-	40	60	100	4
Total			16	04		200	300	500	20

(PRACATICALS)									
6.	ME- 236	Kinematics of Machine Lab	-	-	06	45	30	75	3
7.	ME- 237	Material Testing Lab	-	-	06	45	30	75	3
Total					12	90	60	150	06

Total Credits: 26

Total Contact Hour: 32

Total Marks: 650

***INTERNAL ASSESSMENT**-(MSE- Mid Semester Examination of 20 Marks, Two Class

Test/Assignment/Quizzes/Group Discussion etc.)

L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Mechanical Engg. B. TECH-III Sem	ME-231	STATISTICAL METHODS	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

ME-231 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 Ogive 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 cliagram’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

Text book:

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

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Mechanical Engg. B. TECH-III Sem	ME-232	KINEMATICS OF MACHINES	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

ME-232 KINEMATICS OF MACHINES

UNIT-1 Mechanism and Machines

Links, kinematics pair, classification of kinematics pair, kinematics chain, degree of freedom & constrained motion, mechanism, inversion problem of slider crank mechanism & its inversion, four bar chain etc, equivalent linkage, mechanism with lower pairs, pantograph, Davis & Ackerman's steering mechanism.

UNIT-2 Velocity and Acceleration in Mechanism

Plane motion, absolute and relative motion, velocity and acceleration of a point velocity and acceleration of a mechanism by relative velocity diagram, Klein's construction, and Coriolis components.

UNIT-3 Friction

Clutch: single plate and multi plate clutch, cone clutch

Brakes: Analysis & simple brakes assuming uniform pressure and uniform wear, band brake, block brake, internal shoe brake.

UNIT-4 Gear and Gear Train

Classification of gears, spur, helical, bevel, worm gears, spur gear, conjugate action, law of gearing, involutes and cycloidal tooth's profiles, interference and under cutting, contact ratio, gear train, simple, compound and epicyclical gear trains.

UNIT-5 Cams and Followers

Classification of cam and followers, types of follower motion uniform simple, harmonic parabolic, cycloid, Cams profile by graphical method.

Governors: Types of governor, centrifugal governor, spring controlled governor, Watt, Porter and Proell, Hartnell, Hartung governor.

Recommended books:

1. Mechanism of machines By Ghosh and Mallick East West Press
2. Theory of machine By Ratan Lal TMGH
3. Theory of Machine By Thomas Beven, C.B.S. Publications

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Mechanical Engg. B. TECH-III Sem	ME-233	MECHANICS OF SOLIDS-I	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

ME-233 MECHANICS OF SOLIDS-I

UNIT-I

State of stress and strain at a point; Engineering stress and strain, Two dimensional and one dimensional state of stress as a particular case of three dimensional stress system, Members under axial compression and tension, temperature stresses in composite members, Principal stresses and Principal planes for Two dimensional stress system, Mohr's stress circle, Hooke's law and stress strain relation, Ductile and Brittle materials, Relationship between elastic constants.

Theories of failure, thin cylinders under pressure.

UNIT-II

Bending of beams; shear force and bending moment diagram in beams, normal and shear stresses, composite beams, initially curved beams, leaf spring.

UNIT-III

Deflection of beams; double integration, area moment method, Macaulay's methods, Conjugate beam, method of superposition.

UNIT-IV

Torsion of circular shaft; solid and hollow circular shafts, torsion of thin hollow sections, Torsion beyond elastic limit, closed coil helical spring

UNIT-V

Stability of structure; buckling of columns and beams, eccentrically loaded columns/beams and columns with initial curvature, empirical relations of column design.

Text Books:

- Mechanics of material by F.P. Beer & E.R. Johnson Jr. Tata McGraw Hill.
- Engineering Mechanics of solids by Egor P. Popov., PHI
- Introduction of solid mechanics by I.H.Shames.
- An Introduction of mechanics of solid by Crandall, Dahl & Lardnee Tata McGraw Hill.
- Advance Strength of Materials By L.S. Srinath
- Strength of Materials Part-I By Timoshenko
- Strength of Materials Part-II By Timoshenko

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Mechanical Engg. B. TECH-III Sem	ME-234	MATERIAL SCINCE AND METALLURGY	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

ME- 234 MATERIAL SCINCE 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, peristaltic and peritectoid systems, iron –carbon diagram, and simplified IC diagram.

UNIT III- Heat Treatment

Isothermal transformation of austenite(TTT diagram), Transformations of austenite upon continuous cooling, annealing, normalizing, hardening, tempering, hardenability of steel, Surface hardening, tempering, harden ability of steel, surface hardening, case hardening, Jominy test for hardenability, quenching ,recovery, recrystallization an grain growth, Age hardening.

UNIT IV

Corrosion: Cost Iron, Gray, White, Malleable, Ductile, 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.

UNIT V- 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.

Recommended Books:

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

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Mechanical Engg. B. TECH-III Sem	ME-235	APPLIED THERMODYNAMICS	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

ME -235 APPLIED THERMODYNAMICS

UNIT-I Introduction to Thermodynamic Systems

Review of basic concepts working fluids (air, steam, refrigerants) and calculation of their properties for various thermodynamic processes; Thermodynamic processes and cycles.

First Law of Thermodynamics.

Quantity of energy and its measurements; First law energy equations for closed and open systems under Study State and Unstudy flow conditions; Application of SFEE to thermodynamic system components such as boiler, turbine, compressor, nozzle, expander, pump, condenser.

UNIT-II Second Law of Thermodynamics

Quality of energy and its measurement; Reversible and irreversible processes, Carnot cycle; Applications of Second law to various thermodynamic systems, thermodynamic temperature scale.

Clausius Inequality: Entropy and its significance, principle of increase of entropy of the universe, Entropy relation for closed and open systems under study and Unstudy flow conditions, Availability and irreversibility.

UNIT-III

Thermodynamic (PVT) relations of Working Fluids Equation of state for ideal gas; Behaviour of real gases and compressibility factor; Generalized, empirical and theoretical equations of state for real gases; Law of corresponding states and use of generalized compressibility chart; Helmholtz and Gibbs functions; Maxwell's relations; Enthalpy, entropy, internal energy, and specific heat relations; Clausius- Clapeyron's equation; Applications to ideal and real gases Joule- Thomson coefficient.

UNIT-IV Vapour power cycles

Property of steam, P-V chart, T-S chart, H-S chart and application of these charts

Carnot and Rankine cycles; Reheating and regenerative feed heating Rankine cycles; Binary vapour cycle; Thermal efficiency and work ratios; Factors affecting efficiency and work output. Condenser, classification, vacuum efficiency, cooling towers, types and application.

UNIT-V -- Gas Power Cycle: Simple Gas Turbine, Power Plant & Brayton Cycle, Optimum Pressure Receiver

Text Books:

- Nag, P.K., "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi
- Thermal Engg. By C.P. Arora Tata McGraw-Hill, New Delhi
- Engg. Thermodynamic & Approach, Cengel & Boles, TMH
- Engg. Thermodynamic, John Hawkins