

# BACHELOR OF TECHNOLOGY

Mechanical Engineering Department

Semester - III

Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 192001	Introduction to sociology	3	0	0	3
MA 192001	Mathematics-III (Complex Analysis and Differential Equations II)	4	2	0	6
ME 192001	Engineering mechanics	3	2	0	5
ME 192002	Thermodynamics	3	1	0	4
ME 192501	Metrology (honors)	0	1	2	2
ME 192003	Engineering Materials	3	1	2	5
	<b>Total</b>	<b>16</b>	<b>7</b>	<b>4</b>	<b>25</b>

# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>HS 192001</b>			
II	Course Title	<b>Introduction to Sociology</b>			
III	Credit Structure	L	T	P	C
		3	0	0	3
IV	Prerequisite(If any for the student )	Nil			
V	Course Coordinators	Dr. Shukkoor. T			
VI	Course Content	<p><b>Unit- 1</b>  <b>Sociology:</b>  Origin and Development; Nature, Scope and Significance; Founders of Sociology; Sociological Perspectives</p> <p><b>Unit-2</b>  <b>Basic Concepts:</b>  Society, Community, Social Structure, Status and Role; Culture, Norms and Values, Socialization; social stratification, Groups- Types of group, Social organisations; Social control; Deviance, Social change, Social protests, Social movements</p> <p><b>Unit-3</b>  <b>Social Institutions- Features and Functions:</b>  Family, Education, Economy, Religion, State</p> <p><b>Unit-4</b>  <b>Social Problems- definition and characteristics:</b>  Corruption, Unemployment, Poverty</p> <p><b>Unit- 5</b>  <b>Sociology of Science and Technology:</b> Society and Technology: Technology and Development, The Social Construction of Technology, Technology and Social Relations, Social responsibilities of scientists and technocrats, Gender and Technology</p>			

VII	Text/References	<ol style="list-style-type: none"> <li>1. Giddens, Anthony (2013): Sociology (seventh edition), Cambridge, Polity Press</li> <li>2. Das, Veena (2005): Handbook of Indian Sociology, New Delhi: Oxford University Press</li> <li>3. Harlambos, M. (2014): Sociology: Themes and Perspectives, London: Harper Collins</li> <li>4. MacIver and Page (1974): Society: An Introductory Analysis, New Delhi: Macmillan &amp; Macmillan</li> <li>5. Inkeles, Alex (1987): What is Sociology? New Delhi: Prentice-Hall of India</li> <li>6. Johnson, Harry M. (1995): Sociology: A Systematic Introduction, New Delhi: Allied Publishers</li> <li>7. Ahuja, Ram (2001): Indian Social System, New Delhi: Rawat Publication.</li> <li>8. Ahuja, Ram (2003): Society in India, New Delhi: Rawat Publication.</li> <li>9. Abercrombie, N., Hill, S., Turner, B.S: Dictionary of Sociology (2005): Penguin Reference</li> </ol>
VIII	Evaluation scheme for the course	<p>Assignments : 25 % (First assignment-10 %, second assignment-15%)</p> <p>Mid semester examination: 25 %</p> <p>End semester examination: 50%</p>

# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>MA 192001</b>			
II	Course Title	<b>Mathematics-III (Complex Analysis and Differential Equations II)</b>			
III	Credit Structure	L	T	P	C
		4	2	0	6
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Complex Analysis: Definition and properties of analytics functions; Cauchy-Riemann equations, Harmonic functions; Power series and their properties;Elementary functions; Cauchys theorem and its applications; Taylor series andLaurent expansions; Residues and the Cauchy residue formula; Evaluation ofimproper integrals; Conformal mappings.</p> <p>Differential Equations:Laplace transforms, Shifting theorems, Convolution theorem,Review of power series and series solutions of ODEs; Legendres equationand Legendre polynomials; Regular and irregular singular points, method ofFrobenius; Bessels equation and Bessels functions; SturmLiouville problems;Fourier series; DAlembert solution to the Wave equation; Classification oflinear second order PDE in two variables; Vibration of a circular membrane;Fourier Integrals, Heat equation in the half space</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Kreyszig, E., Advanced Engineering Mathematics, 8th Edition, John Wiley &amp; Sons, 1999.</li> <li>2. Boyce, W.E., and DiPrima, R., Elementary Differential Equations, 8thEdition, John Wiley &amp; Sons, 2005.</li> <li>3. Churchill, R.V., and Brown, J.W., Complex variables and applications, 7thedition, McGrawHill, 2003.</li> <li>4. Churchill, R.V., and Brown, J.W., Fourier series and boundary value Problems, 7th Edition, McGraw-Hill, 2006.</li> <li>5. Howie, J.M., Complex Analysis, Springer-Verlag, 2004.</li> <li>6. Ablowitz, M.J., and Fokas, A.S., Complex variables: Introduction and Applications, Cambridge University Press, 1998(Indian Edition).</li> </ol>			

# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>ME 192001</b>			
II	Course Title	<b>Engineering Mechanics</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p><b>Course contents:</b></p> <p><b>Unit-I: Introduction</b> Introduction to engineering mechanics, assumptions, methods of analysis- scalars and vectors, Force system-coplanar and non-coplanar forces, collinear-non-collinear forces, concurrent forces, and non-concurrent forces, moment of force and couple, free body diagram.</p> <p><b>Unit-II: Forces in Engineering Systems</b> <b>Forces in beams:</b> Types of loading-Concentrated load, Uniformly distributed load, Uniformly varying load, Random loads, Types of Support: Free, Fixed, Hinged, SFD, BMD, Truss Analysis: Assumptions, analysis of forces in truss-method of joints, method of sections, conditions of equilibrium, nature of force system. <b>Friction:</b> Introduction, laws of friction, angle of repose, cone of friction, friction on plane and inclined surfaces, wedge, belt friction, application of friction to engineering problem.</p> <p><b>Unit-III: Centroid, Center of gravity and Moment of Inertia</b> Definitions: Center of gravity, centroid, center of mass, Centroid of standard sections, centroid of composite sections, centroid of wires, moments of inertia, parallel axis theorem, perpendicular axis theorem, radius of gyration, moment of inertia for standard and composite sections.</p> <p><b>Unit-IV: Motion</b> Introduction to dynamics-kinematics and kinetics, <b>Rectilinear motion:</b> Determination of position, distance travelled, uniform motion, effect of increasing/decreasing velocity/acceleration, motion under gravity, relative motion, <b>Curvilinear motion:</b> Resolution of velocity and acceleration, tangential and normal components, radius of curvature, radial and transverse components of acceleration, <b>Projectile Motion:</b> Independence of horizontal and vertical motion, properties of projectile motion, projectile on inclined surfaces.</p> <p><b>Unit-V: Kinetics of Particles</b> <b>D'Alemberts Principle:</b> D'Alemberts principle, D'Alemberts principle in normal and tangential components, motion of connected bodies, simple machines, circular motion, centripetal force, motion of vehicle on a level circular track, motion of vehicle on a banked circular track. <b>Work and Energy:</b> work of force, energy, work of constant force in rectilinear motion, work of force exerted by spring, mechanical efficiency.</p>			

VI	Text/References	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Mechanics-Statics and Dynamics, S Rajasekaran and G Sankara Subramanian, 3rd Edition, Vikas Publishing House Pvt. Ltd.</li> <li>2. A Textbook of Engineering Mechanics, R K Bansal, Laxmi Publications</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Mechanics-Statics and Dynamics, Irving Shames and G. Krishna Rao, 4thEdition, Pearson.</li> <li>2. Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt Limited, 2009</li> </ol>
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# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>ME 192002</b>			
II	Course Title	<b>Thermodynamics</b>			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p><b>Introductory Concepts and Definitions:</b> Areas of Application of Thermodynamics, Different Approaches in the study of Thermodynamics, System, Surroundings, Types of Systems, Intensive and Extensive Properties, Thermodynamic equilibrium, Energy, Heat &amp; Work.</p> <p><b>First Law of Thermo-dynamics:</b> Path and point Function, Perpetual Motion Machine, Analysis of Closed Systems. Constant Pressure Process, Constant Volume Process, Specific Heat, Constant Temperature Process, Adiabatic Process. Polytropic Process, First Law of Thermodynamics for a Continuous System, Steady-state Flow Processes, Application of Steady State Flow Processes, Throttling Process, Application of Throttling Process.</p> <p><b>Properties of Pure Substances:</b> Thermodynamic Properties of Fluids, Pure substance, Equations of State, Ideal Gas, The Van der Waals Constants, Phase-Change Process of Pure Substances, Steam Tables.</p> <p><b>Second Law of Thermodynamics, Entropy and Availability:</b> Limitations of First Law of Thermodynamics, Heat Engine, Heat Pump, Refrigerator, KELVIN PLANCK STATEMENT, Clausius Statement of the Second Law, Reversibility, Irreversibility and Carnot cycle, Carnot Engine, Carnot's Principles (Theorems), Clausius Inequality, Entropy, Principle of Entropy Increase, calculation of entropy change. Temperature Entropy Diagram &amp; Second Law Analysis of a Control Volume, TdS Equations, Entropy change of an incompressible substance, criterion of equilibrium, Thermodynamic definition of temperature, pressure and chemical potential, Thermodynamic potentials, Availability &amp; Irreversibility, Availability Function and Irreversibility.</p> <p><b>Introduction to Combustion</b> Introducing Combustion, Fuels, Modeling Combustion Air, Products of Combustion, Energy and Entropy Balances for Reacting Systems, Conservation of Energy. Enthalpy for Reacting Systems, Enthalpy of Combustion and Heating Values, Adiabatic Flame Temperature, Absolute Entropy and the Third Law of Thermodynamics, Evaluating Gibbs Function for Reacting Systems.</p> <p><b>Thermodynamic Cycles:</b> Overview of thermodynamics, Carnot Cycle, limitation of Carnot cycle, Steam Power Cycles: Rankine Cycle, Reheat Cycle, Regenerative Cycle, Binary Vapor Cycle. Gas Power Cycles: Air standard Cycles; Otto Cycle, Diesel Cycle, Dual Cycle, Comparison of Otto, Diesel &amp; Dual Cycles, Brayton Cycle, gas power cycles with reheat, intercooling, regenerative cycle, and various combinations. Gas Turbine-Steam Turbine (GT-ST) Combine Cycle.</p>			

VI	Text/References	<ol style="list-style-type: none"><li>1. Thermodynamics:An Engineering Approach: Cengel Y and Boles M. McGraw Hill India, 2011.</li><li>2. Fundamentals Of Engineering Thermodynamics: Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, and Margaret B. Bailey, Willey Publication, Eighth Eddition, 2014.</li><li>3. Introduction to Thermodynamics: Rao Y V C. Orient Longman, 2009.</li><li>4. Engineering Thermodynamics: Nag P K. McGraw Hill India, 2013.</li><li>5. Fundamentals of Thermodynamics: Borgnakke C and Sonntag R E. Wiley, 2009.</li></ol>
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# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>ME 192501</b>			
II	Course Title	<b>Metrology Lab</b>			
III	Credit Structure	L	T	P	C
		0	1	2	2
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p><b>List of Experiments::</b></p> <ol style="list-style-type: none"> <li>1. Measurement of linear / Angular dimensions of a part using precision/non precision measuring instruments</li> <li>2. Measurement of angle using Sine bar</li> <li>3. Measurement of alignment using Autocollimator.</li> <li>4. Measurement of Screw threads Parameters using Two wire or Three-wire method.</li> <li>5. Measurement of gear tooth profile using gear tooth Gear tooth micrometer</li> <li>6. Calibration of Micrometer using slip gauges</li> <li>7. Calibration of Pressure Gauge</li> <li>8. Calibration of Thermocouple</li> <li>9. Calibration of LVDT</li> <li>10. Calibration of Load cell</li> <li>11. Determination of modulus of elasticity of a mild steel specimen using strain gauges.</li> <li>12. Measurement of coordinate using CMM.</li> </ol>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Doeblein, E.O., “Measurement Systems, Application Design”, McGraw Hill.</li> <li>2. Mahajan M. S., “Textbook of Metrology”, Dhanpatrai publication.</li> <li>3. Kumar, D.S., “Mechanical Measurements and Control”, Metropolitan, New Delhi</li> </ol>			

# Mechanical Engineering Department

## Semester : III

I	Course Code	<b>ME 192003</b>			
II	Course Title	<b>Engineering Materials</b>			
III	Credit Structure	L	T	P	C
		3	1	2	5
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p><b>Introductory Concepts and Definitions</b> Introduction, Materials in Engineering design, the evolution of engineering materials, the families of engineering materials, modern materials, properties of engineering materials; Fundamentals, Atomic bonding, Crystalline structure-perfection/imperfection, diffusion in solids.</p> <p><b>Engineering Materials:</b> Structural materials and their behavior: Metals and alloys, ceramics and glasses, polymers, composites, conductors, semiconductors, optical and magnetic materials, mechanical and thermal behavior, electrical behavior, optical behavior, magnetic behavior; Corrosion and degradation of engineering materials;</p> <p><b>Phase transformation and Heat treatments of steels:</b> Classification of steels with applications, Theory of Heat Treatment, Phase diagram and phase transformation, TTT, CCT diagram and its implication to heat Treatment, Different heat treatments- Annealing, Normalizing, Hardening, Tempering surface treatment etc. Strengthening Mechanisms.</p> <p><b>Material selection and design consideration:</b> materials and industrial design, material property charts, material selection strategy and procedure, economic, advanced materials, environmental and societal issues related to engineering materials; case studies related to few engineering products/equipments.</p> <p><b>Laboratory Experiments:</b></p> <ol style="list-style-type: none"> <li>1. Tension test</li> <li>2. Three point bending test</li> <li>3. Compression test</li> <li>4. Impact test</li> <li>5. Hardness test</li> <li>6. Microscopy</li> <li>7. Group Project</li> </ol>			

VI	Text/References	<ol style="list-style-type: none"><li data-bbox="529 219 1419 286">1. Callister: Materials Science and Engineering: An Introduction, 6th Edition.</li><li data-bbox="529 315 1114 349">2. Mechanical Metallurgy by George E Dieter</li><li data-bbox="529 376 1491 443">3. Mechanical Behaviour and Testing of Materials by A K Bhargava and C P Sharma.</li></ol>
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