Mechanical Engineering Department

Semester : 3

Teaching Scheme for Mechanicall Engineering – Semester III

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 2001	Introduction to Sociology	3	0	0	4
MA 2001	Mathematics III (Complex Analysis and Differential Equations II)	3	2	0	4
CE 2001	Mechanics of Solids	3	2	0	4
ME 2002	Fluid Mechanics	3	2	2	5
EE 2003	Introduction to Analog & Digital Electronics	3	1	0	4
EE 2103	Electronics Engineering lab	0	0	3	2
	Total	**15**	**7**	**5**	**23**

Mechanical Engineering Department

Semester : 3

I	Course Code	**HS 2001**			
II	Course Title	**Introduction to Sociology**			
III	Credit Structure	L	P	T	C
		3	0	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	Orientations to the discipline of Sociology: Primary concepts, Methodology, Sociological perspectives. Key Thinkers: August Compte, Herbert Spenser, Emile Durkheim, Max Weber, Karl MarxSocial Structure and Social Change: Social Stratification, Agrarian Societies, Social Interaction, Culture, Socialization: Agencies of Socialization, Theories of Socialization, Social Control, Social Protest: Forms of social protest, Theories of social movements, Social movements in India, Sociology of Organizations: Formal and informal Organizations, Individuals in Organizations, Power and conflict in organizations, Culture in Organizations.Sociology of Science and Technology: Technology and Society, Technology and Development, Social context of production of scientific knowledge, social responsibilities of scientists and technocrats			
VI	Text/References	1. Das, Veena (2005): Handbook of Indian Sociology, New Delhi: Oxford University Press 2. Giddens, Anthony (2009): Sociology, Polity Press 3. Harlambos, M. (1998): Sociology: Themes and Perspectives, London: Harper Collins 4. Inkeles, Alex (1987): What is Sociology? New Delhi: Prentice-Hall of India 5. Johnson, Harry M. (1995): Sociology: A Systematic Introduction, New Delhi: Allied Publishers 6. MacIver and Page (1974): Society: An Introductory Analysis, New Delhi: Macmillan & Macmillan. 7. Abercrombie, N., Hill, S., Turner, B.S: Dictionary of Sociology (2005): Penguin Reference 8. Ahuja, Ram (2001): Indian Social System, New Delhi: Rawat Publication. 9. Ahuja, Ram (2003): Society in India, New Delhi: Rawat Publication. 10. Bottomore, T.B. (1972): Sociology			

Mechanical Engineering Department

Semester : 3

I	Course Code	**MA 2001**			
II	Course Title	**Maths III - Complex Analysis and Differential Equations II**			
III	Credit Structure	L	P	T	C
		3	0	2	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	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 and Laurent expansions; Residues and the Cauchy residue formula; Evaluation of improper integrals; Conformal mappings. Differential Equations:Laplace transforms, Shifting theorems, Convolution theorem,Review of power series and series solutions of ODEs; Legendres equation and Legendre polynomials; Regular and irregular singular points, method of Frobenius; Bessels equation and Bessels functions; SturmLiouville problems; Fourier series; DAlembert solution to the Wave equation; Classification of linear second order PDE in two variables; Vibration of a circular membrane; Fourier Integrals, Heat equation in the half space.			
VI	Text/References	1. Kreyszig, E., Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons, 1999. 2. Boyce, W.E., and DiPrima, R., Elementary Differential Equations, 8th Edition, John Wiley & Sons, 2005. 3. Churchill, R.V., and Brown, J.W., Complex variables and applications, 7th edition, McGrawHill, 2003. 4. Churchill, R.V., and Brown, J.W., Fourier series and boundary value Problems, 7th Edition, McGraw-Hill, 2006. 5. Howie, J.M., Complex Analysis, Springer-Verlag, 2004. 6. Ablowitz, M.J., and Fokas, A.S., Complex variables: Introduction and Applications, Cambridge University Press, 1998 (Indian Edition).			

Mechanical Engineering Department

Semester : 3

I	Course Code	**CE 2001**			
II	Course Title	**Mechanics of Solids**			
III	Credit Structure	L	P	T	C
		3	0	2	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	Free body diagram, Modelling of supports, Conditions for Equilibrium, Friction Force-deformation relationship and geometric compatibility (for small deformations) with illustrations through simple problems on axially loaded members and thin walled pressure vessels, Axial force, shear force, bending moment, and twisting moment diagrams of slender members, Concept of stress and strain at a point, Transformation of stresses and strain at a point, Principal stresses and strains, Mohrs circle (only for plane stress and strain case), Displacement field, Strain Rosette, Modelling of problem as a plane stress or plane strain problem, Discussion of experimental results on 1-D material behaviour. Concepts of elasticity, plasticity, strain-hardening, failure (fracture/yielding), idealization of 1-D stressstrain curve, Concepts of isotropy, orthotropic, anisotropy, Generalized Hookes law, (without and with thermal strains), Notions of elasticity, Torsion of circular shafts and thin-walled tubes, Bending of beams with symmetric cross-section (normal and shear stresses),Combined stresses, Yield criteria, Deflection due to bending, Integration of the moment-curvature relationship for simple boundary conditions, Superposition principle, Concepts of strain energy and complementary strain energy for simple structural elements (those under axial load, shear force, bending moment, and torsion), Castiglianos theorems for deflection analysis and indeterminate problems, Concept of elastic instability and a brief introduction to column buckling and Eulers formula.			
VI	Text/References	1. Mechanics of Solids by Beer, Johnston, DeWolf & Mazurek (McGraw Hill) 2. Strength of Materials by Purushothama Raj & Ramasamy (Pearson) 3. Mechanics of Solids by Abdul Mubeen (Pearson)			

Mechanical Engineering Department

Semester : 3

<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">ME 2002</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Fluid Mechanics</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>P</td><td>T</td><td>C</td></tr>
<tr><td>3</td><td>2</td><td>2</td><td>5</td></tr>
<tr><td>IV</td><td>Prerequisite(If any for the student)</td><td colspan="4">Nil</td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">Properties of Fluids, Pressure and its measurement, hydrostatic forces on surfaces, buoyancy and floatation, Analysis of fluid flow by control volume approach and differential approach, kinematics of flow and ideal (potential) flow, dynamics of fluid flow, orifices and mouthpieces, notches and weirs, turbulent flow, flow through pipes, dimensional and model analysis, boundary layer flow, forces on submerged bodies.
Laboratory experiments:
1. Determination of coefficient of discharge for Venturimeter.
2. Determination of coefficient of discharge for Orificemeter.
3. Determination of friction factor of a given pipe of circular cross section.
4. Determination of loss of head due to sudden enlargement of pipe.
5. Determination of loss of head due to sudden contraction of pipe.
6. Determination of type of flow by Reynoldss number.
7. Verification of Bernoullis equation for an incompressible fluid flow.
8. Determination of coefficient of discharge for rectangular, triangular and trapezoidal notch.
9. Determination of coefficient of discharge Cd, coefficient of contraction Cc & coefficient of velocity Cv for an orifice.
10. Determination of force exerted on stationary plate by impact of jet.
11. Determination of surface profile of free and forced vortex flow.
12. Study of hydraulic jump.</td></tr>
<tr><td>VI</td><td>Text/References</td><td colspan="4">1. Fluid mechanics and hydraulic machines, R.K. Bansal.
2. Fluid Mechanics, Douglas, J. Gasiorek, J. Swaffield, L. Jack.
3. Introduction to Fluid Mechanics, Fox and McDonald.</td></tr>
</table>

Mechanical Engineering Department

Semester : 3

<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">EE 2003</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Introduction to Analog & Digital Electronics</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>P</td><td>T</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>IV</td><td>Prerequisite(If any for the student)</td><td colspan="4">Nil</td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">Introduction to signals and spectra, analog and digital signals, basic amplifier characterization, frequency characteristics and Bode plots; Ideal operational amplifiers, inverting and no-inverting amplifier circuits, instrumentation amplifier, integrators, differentiators; effects of finite (frequency dependent) gain, DC imperfections, and slew rate on performance; terminal characteristics of ideal and practical diodes, rectifiers, limiters and clampers, voltage doublers, Zener diodes; terminal characteristics of MOSFETs and BJTs; biasing, small signal analysis, simple amplifier circuits; basic feedback theory, simple oscillators; number systems; Boolean algebra and logic gates, minimization with Karnaugh maps; adders, comparators, decoders, encoders, multiplexers; sequential circuits basic flip-flops, asynchronous and synchronous counters, registers; programmable devices PLA, PAL and ROM; Memories.</td></tr>
<tr><td>VI</td><td>Text/References</td><td colspan="4">1. Op-Amp and Linear integrated Circuit technology- Ramakant A Gayakwad, PHI Publication
2. Digital Fundamentals by Morris and Mano, PHI Publication
3. Fundamental of digital circuits by A. Anandkumar, PHI Publication
4. Micro Electronics Circuits by Sedar/Smith. Oxford Pub
5. Operational Amplifier and Linear integrated Circuits By Robert Coughlin, Frederick F. Driscoll
6. Operational Amplifier and Linear integrated Circuits By K. Lal Kishore. Pearsons
7. Digital Fundamentals by Floyd & Jain, Pearsons Pub
8. Fundamentals of Logic Design by Charles H. Roth Thomson
9. Introduction to Operational Amplifier theory and applications by J. V. Wait, L. P. Huelsman and GA Korn, 2nd edition, McGraw Hill, New York, 1992.
10. Microelectronics by J. Millman and A. Grabel, 2nd edition, McGraw Hill, 1988.</td></tr>
</table>

Mechanical Engineering Department

Semester : 3

I	Course Code	**EE 2103**			
II	Course Title	**Electronics Engineering Lab**			
III	Credit Structure	L	P	T	C
		0	3	0	2
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	1. Characteristics of diodes/Zener diode/Rectifier Circuits 2. Clipper/Clamper Circuits 3. Characteristics of BJT and MOSFET/BJT Amplifier 4. Oscillator and Astable multivibrator using BJT 5. Filter and Oscillator design using operational amplifiers 6. Design of half and full adders 7. Study of flip-flops and shift registers 8. Design of 4-bit Johnson and ring counters 9. Monostable and Astable multivibrators using 555 10. Study of multiplexer/de-multiplexer circuits			
VI	Text/References	1. S. D. Conte and Carl de Boor, Elementary Numerical Analysis- An algorithmic Approach (3rd edition), McGraw Hill, 1980. 2. C. E. Froberg, Introduction to Numerical Analysis (2nd edition), Addison-Wesley, 1981. 3. E. Kreyszig, Advanced Engineering Mathematics (Latest Edition) Wiley India. 4. K. Atkinson and W. Han, Elementary Numerical Analysis (3 rd Edition), Wiley India, 2004			