



**C.V.Raman College of Engineering,
(An autonomous Institute affiliated to BPUT, Odisha)
Bidyaganagar, Mahura, Janla, Bhubaneswar - 752 054 (Orissa)**

First Year B.Tech. Structure with effect from Academic Year 2016-17

MODULE – 1

PATTERN B-16 ANNEXURE – II (a)

Sl. No.	Code	Subject	Type	Teaching Scheme			Assessment Scheme			Credits	
				L	P	T	ISA	Teacher's Assessment	Mid-Sem		
S1	MA10101	Mathematics – I (Differential and Integral Calculus, Fourier Transform)	Theory – Core	3	-	1	20	20	-	60	4
S2	PH10101	Engineering Physics	Theory – Core	3	-	1	20	20	-	60	4
S3	ME10101/ ME10103	Engineering Graphics / Basic Thermodynamics	Theory – Core	3	-	-	20	20	-	60	3
S4	CS10101	Computer Programming	Theory – Core	3	-	-	20	20	-	60	3
S5	CY16103	Environmental Science and Engineering	Theory – OE	2			20	20	-	60	2
P1	PH10302	Engineering Physics Lab	Lab – Core	-	2	-	-	-	70	30	1
P2	ME10305	Engineering Workshop	Lab – Core	-	2	-	-	-	70	30	1
P3	CS10302	Computer Programming Lab	Lab – Core	-	2	-	-	-	70	30	1
MP	IN17701	Mini Proj. *	Project	-	4	-	-	-	50	50	1
			Total:	14	10	2	-	-	-	-	20



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MODULE – 2

ANNEXURE – II (b)

Sl. No.	Code	Subject	Type	Teaching Scheme			Assessment Scheme			Credits	
				L	P	T	Teacher's Assessment	ISA	Mid-Sem		
S1	MA10102	Mathematics – II (Linear Ordinary Differential Equations and Laplace Transform)	Theory – Core	3	-	1	20	20	-	60	4
S2	ME10104	Engineering Mechanics	Theory – Core	3	-	1	20	20	-	60	4
S3	CY10101	Engineering Chemistry	Theory – Core	3	-	-	20	20	-	60	3
S4	EE10101	Basic Electrical Engineering	Theory – Core	3	-	-	20	20	-	60	3
S5	HS16104/ P1	Engineering Economics and Costing / CY10302	Theory – OE Engineering Chemistry Lab	2	-	-	20	20	-	60	2
P2	EE10302	Basic Electrical Engineering Lab	Lab – Core	-	2	-	-	-	70	30	1
P3	ME10302	Engineering Graphics Lab	Lab – Core	-	2	-	-	-	70	30	1
MP	IN17702	Mini Proj. *	Project	-	4	-	-	-	50	50	1
Total:				14	10	2	-	-	-	-	20



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A student can clear Module-1 and Module-2 within the course completion of Semester-I and Semester-II.

Semester – I (Irrespective of Module)

ANNEXURE – II (c)

ANNEXURE - II (c)



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Semester – II (Irrespective of Module) ANNEXURE – II (d)

Sl. No.	Code	Subject	Type	Teaching Scheme			Assessment Scheme			Credits	
				L	P	T	ISA	Teacher's Assessment	Mid-Sem		
S6	HS16114 HS16115	English – II / French – II /	Theory – Language	2	-	-	20	20	-	60	2
P4	HS14319	Business Communication Presentation Skill	Lab – Comm. Skill	-	2	-	-	-	70	30	1
P5	HS153xx	General Proficiency #	Lab – GP	-	2	-	-	-	70	30	1
				Total:	2	4	-	-	-	-	4

HS153xx: General Proficiency Courses are shown separately

Total Credit: $(20 + 4) + (20 + 4) = 24 + 24 = 48$.



REF NO: To be filled by CD office

PH10101 :: ENGINEERING PHYSICS

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: NIL

Objectives:

1. To enhance the fundamental knowledge in Basic Physics and its applications, relevant to various streams of Engineering and Technology.
2. The aim of the first unit is to familiarize the students with oscillatory systems and waves. The topics included in this unit should be treated qualitatively. Also, this unit covers the concept of interference of light waves by different mechanisms.
3. The second unit emphasizes on various kinds of diffraction and its formation by various optical devices and it covers elementary features of polarization of light waves and also includes various methods of production of polarized light.
4. Third unit deals with elementary concepts of quantum physics formulation to deal with physical systems and it deals with applications of quantum Mechanics to specific one-dimensional problems (Sketch, Schrodinger equation for different regions, Boundary conditions, final expressions and physical interpretations only, no derivations).
5. Fourth unit provides a basis for understanding the behaviour of electrons in the crystal, formation of energy bands and statistics of charge carriers in semiconductors. It also covers introductory idea about superconductors and their applications
6. Fifth unit covers applications of semiconductors in optical devices such as lasers etc. and it also covers introduction to Nanoscience and Nanotechnology.

Course Details:

Unit 1: Oscillation and waves and Interference: (10 Hrs)

- U1.1. Oscillation and waves:** Simple harmonic oscillation, Damped harmonic oscillation, Forced vibration, Resonance, Coupled oscillation, Waves and Wave equation, Reflection and transmission of waves at boundary of two media, Wave packet, Phase and group velocity, Superposition of waves, multiple beam superposition, coherent and incoherent superposition.
- U1.2. Interference:** Double slit experiment, Fresnel's biprism, Newton's ring, Determination of wave length of light and refractive index of liquid by Newton's ring experiment.
- U1.3. Self Study:** Estimation of acceleration due to gravity using compound pendulum, Application of Resonance in Sonometer, Interference in wedge-shaped film, Michelson's Interferometer, Determination of wave length of monochromatic source and refractive index of a transparent thin film by Michelson's Interferometer.



Unit 2: Diffraction and Polarization:

(08 Hrs)

- U2.1. Diffraction:** Huygen's principle, Fresnel and Fraunhofer Diffraction, Zone plate, Fraunhofer Diffraction due to single slit, Diffraction due to multiple slit, Determination of wavelength of light using plane transmission grating.
- U2.2. Polarization:** Polarization of waves, Plane, circularly and elliptically polarized light, polarization by reflection, refraction, Brewster's law, Double refraction, Malus law, Nicol prism (Construction and use), Quarter-wave plate and Half wave plate.
- U2.3. Self Study:** Diffraction at circular aperture, Dispersive power of Diffraction Grating, Bragg's X-ray Diffraction, Production and analysis of circular and elliptically polarized light (only concepts), Specific rotation (Concept with example).

Unit 3: Elementary Quantum mechanics and applications:

(10 Hrs)

- U3.1. Elementary Quantum mechanics:** Historical overview (failure of classical physics and need of Quantum Mechanics), wave aspect of particles: matter waves, de-Broglie Hypothesis, Heisenberg's Uncertainty principle (statement and interpretation), Basic features of quantum mechanics : States of system, wave function, probability density, Schrödinger's equation - Time dependent and time independent, observables and operators, Eigen value and Eigen functions, Expectation values.
- U3.2. Application of Quantum Mechanics:** Solutions of one dimensional problems, Free particles, Infinite deep potential well (particle in a box), Potential step, Quantum mechanical tunnelling.
- U3.3. Self Study:** Black body radiation-Rayleigh-Jean's law, Stefan's law, Wien's displacement law and Plank's Quantum theory of Black body radiation, Particle nature of light: Photoelectric effect, Compton Effect (no derivation), Applications of Tunnelling Effect, Tunnel Diode.

Unit 4: Semiconductor Physics and Superconductivity:

(06 Hrs)

- U4.1. Semiconductor Physics:** Band theory of solids, Classifications of solids in terms of band theory, Types of semiconductor (intrinsic and extrinsic), Fermi-Dirac probability distribution function, Fermi level in intrinsic and extrinsic semiconductors, Energy band diagram of n-type and p-type semiconductors, p-n junction diode (basic structure and working principle).
- U4.2. Superconductivity:** Introduction and properties of superconductors (zero resistance, Meissner effect, critical field, London penetration depth), BCS theory of superconductivity and applications.
- U4.3. Self Study:** Carrier transport in semiconductor, Four probe and Hall-Effect, Photovoltaic effect, Solar Cell working and Characteristics, applications of pn junction diode and bipolar junction transistor, Type I and Type II Superconductors, High Tc Superconductors, Applications; Superconducting Magnets.

Unit 5: Lasers and application and Nanoscience and Nanotechnology: (06 Hrs)

- U5.1. Lasers and application:** Stimulated absorption, spontaneous and stimulated emission, population inversion, basic principles of lasing action, types of laser and



- its applications (in medical, in communication system i.e. fiber optics).
- U5.2. Nanoscience and Nanotechnology:** Introduction, Nanoscience and Nanomaterials, quantum size effects: Zero, One, Two-dimensional structures and applications.
- U5.3. Self Study:** Principle of He-Ne Laser, Semiconductor Diode Laser, Carbon Dioxide Laser, Nanomaterials properties (Carbon Nanotubes: optical, electrical, magnetic, structural, mechanical properties).

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1. Engineering Physics, H.K.Malik and A.K.Singh, Tata McGraw Hill.
- T2. Engineering Physics, D.K. Bhattacharya and Poonam Tandon, Oxford University Press.
- T3. Concepts of Modern Physics, Arthur Beiser, Tata McGraw- Hill.

Reference Books

- R1. Engineering Physics, D. Joshi, Tata McGraw –Hill.
- R2. Semiconductor Physics and Devices, Donald A. Neamen, 3rd Edition, Tata McGraw-Hill, 2007.
- R3. Quantum Physics, Stephen Gasiorowicz, 3rd Edition, Wiley International.
- R4. Introduction to Quantum Mechanics, M. Das and P. K. Jena, Srikrishna Prakashan.
- R5. Optics, A.K. Ghatak, Tata McGraw Hill Publishing Company Limited, New Delhi.
- R6. Fundamentals of Physics, Resnick and Halliday, John Wiley and Sons.



REF NO: To be filled by CD office

PH10101 :: ENGINEERING PHYSICS

Credits: 01

Teaching Scheme: Tutorial 01 Hrs/Week

Prerequisites: NIL

Objectives:

1. To understand fundamental principles of physics specifically concern to waves, optics and quantum physics and their engineering applications,
2. To provide problem solving experience in oscillation, optics and quantum physics, in both the classroom and the laboratory learning environment,
3. To motivate the students through practical examples that demonstrates the role of physics in progress of engineering disciplines so as to inculcate the interdisciplinary academic environment.

List of Tutorials:

Tutorial No. 1: Problems on SHM, Damped oscillation, Forced vibration, Resonance, Coupled oscillations.

Tutorial No. 2: Introduction to Waves, Superposition Principle, Phase Difference, Coherence.

Tutorial No. 3: Methods of production of Coherent Sources, Division of Amplitude, Division of Wave front, Interference, Introduction to Diffraction.

Tutorial No. 4: Problems on Interference, Bi prism, Double Slit, Fringe Width.

Tutorial No. 5: Problems on Newton's Ring Experiment.

Tutorial No. 6: Problems on Zone plate, Intensity due to Fresnel's Diffraction, Comparison between Zone plate and convex lens.

Tutorial No. 7: Problems on Diffraction due to Single Slit, Problems on Diffraction Grating, Problems on Resolving Power of Grating.

Tutorial No. 8: Problems on Polarization, Malus Law, Brewster's Law, Retardation Plates.

Tutorial No. 9: Problems on de-Broglies Hypothesis, Uncertainty principles, Black body radiation.

Tutorial No. 10: Problems on Eigen Value and Eigen function, Probability density, Expectation value.

Tutorial No. 11: Problems on Semiconductor Physics: Conductivity, Hall Effect,



Problems on Superconductivity: Critical Field.

Tutorial No. 12: Numerical on superconducting materials, Penetration Depth, He-Ne laser construction and working.

Text Books:

- T1.** Engineering Physics, H.K.Malik and A.K.Singh, Tata McGraw Hill.
- T2.** Engineering Physics, D.K. Bhattacharya and Poonam Tandon, Oxford University Press.
- T3.** Concepts of Modern Physics, Arthur Beiser, Tata McGraw- Hill.
- T4.** University Physics with Modern Physics, Young and Freedman – 12th Ed. (Pearson Education),
- T5.** Lectures on Physics Volume 1, 2 and 3 by Richard P. Feynman, Narosa Publishers / Pearson Education.
- T6.** Physics for Engineers, Dr. S.N. Jena and Dr. H.R. Pattnaik, University Science Press

Reference Books:

- R1.** Engineering Physics, D. Joshi, Tata McGraw –Hill.
- R2.** Semiconductor Physics and Devices, Donald A. Neamen, 3rd Edition, Tata McGraw-Hill, 2007.
- R3.** Quantum Physics, Stephen Gasiorowicz, 3rd Edition, Wiley International.
- R4.** Introduction to Quantum Mechanics, M. Das and P. K. Jena, Srikrishna Prakashan.
- R5.** Optics, A.K. Ghatak, Tata McGraw Hill Publishing Company Limited, New Delhi.
- R6.** Fundamentals of Physics, Resnick and Halliday, John Wiley and Sons.
- R7.** University Physics with Modern Physics, Young and Freedman – 12th Ed. (Pearson Education),
- R8.** Lectures on Physics”, Volume 1, 2 and 3 by Richard P. Feynman, Narosa Publishers / Pearson Education.



REF NO: To be filled by CD office

PH10302 :: ENGINEERING PHYSICS LABORATORY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: NIL

Objectives:

1. To learn the proper methods and techniques utilized in gathering experimental data.
2. To become familiar with the proper use of basic measuring instruments commonly found in physics laboratory.
3. To develop the ability to recognize and apply the appropriate physics introduced in the lecture course to actual experimental situations by taking mini projects.
4. To learn how to analyse data and then reach scientific conclusions based on analysis.

Course Details:

List of Experiments:

- Experiment No 1:** Determination of Acceleration due to Gravity by Bar/Kater's pendulum.
- Experiment No 2:** Verification of Laws of Vibration of strings using Sonometer.
- Experiment No 3:** Determination of Wavelength of Light by Newton's rings Apparatus.
- Experiment No 4:** Determination of wave length of light of light by Biprism.
- Experiment No 5:** Determination of Grating element of a Plane diffraction grating.
- Experiment No 6:** Determination of wavelength of Laser source by Diffraction method.
- Experiment No 7:** Plotting of characteristic curves of a P-N junction Diode.
- Experiment No 8:** Plotting of characteristic curves of BJT.
- Experiment No 9:** Study of Hall Effect.
- Experiment No 10:** Determination of band gap of semiconductor by Four Probe method.



Experiment No 11: Determination of Planck's constant by Photoelectric effect.

Experiment No 12: Determination of specific rotation of sugar solution by using a polarimeter

Additional Experiments (Beyond syllabus):

Experiment No 13: Determination of Young's Modulus by Searle's Method.

Experiment No 14: Determination of Rigidity Modulus by Static Method.

Experiment No 15: Determination of Thermal Conductivity by Lee's disc method.

Experiment No 16: Determination of Surface Tension by Capillary Rise Method.

Out of the 16 experiments, 10 numbers of experiments will be performed in each semester.

Text Books:

- T1. "Engineering Physics", Hitendra K. Malik & A. K. Singh, Tata McGraw Hill, New Delhi, 2010,
- T2. "Physics for Scientists and Engineers with Modern Physics", Raymond J. Serway & John W. Jewett, Seventh Edition, Thomson / Cengage Learning, New Delhi, 2010.
- T3. "Concepts of Modern Physics", Beiser Arthur, (6th) New, Tata McGraw Hill Pub. Co, 2005.

Reference Books

- R1. "University Physics with Modern Physics", Young and Freedman – 12 th Ed. (Pearson Education),
- R2. "Lectures on Physics", Volume 1, 2 and 3 by Richard P. Feynman, Narosa Publishers / Pearson Education.
- R3. "Engineering Practical Physics-S. Panigrahi and B. Mallick, S. Publishers
- R4. "A Manual of Practical Engineering Physics and material Science, A. S. Vasudeva, S. Chand



REF NO: To be filled by CD office

ME10101 :: ENGINEERING GRAPHICS

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: The Students should be able to:

1. Draw Square, Rectangle, Triangle, Pentagon, Hexagon etc.
2. Draw Tangent and Normal to a plane figure
3. Bisect the angles

Course Outcomes: The students will be able to

1. Develop adequate competence in visualization, interpretation and expression of drawing of engineering parts and objects.
2. Perform free hand sketching of basic geometrical constructions and multiple views of objects.
3. Gain knowledge on universally accepted conventions and symbols for their usage in technical drawings.
4. Draw orthographic projection of lines and plane surfaces.
5. Draw projection of solids and perform development of surfaces.

Course Details:

Unit 1: Introduction and Orthographic Projections (09 Hrs)

- U1.1. Introduction to Engineering Drawing:** Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, Lettering, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, different type of scale (Plain and Diagonal scale).
- U1.2. Curves used in Engineering Practice:** Explain conic sections with illustration, Explain terms like focus, vertex, directrix and eccentricity, Draw conics sections by eccentricity method- Ellipse, Parabola and Hyperbola.
- U1.3. Orthographic Projections:** Reference planes, pictorial projection, orthographic projections – 1st, 2nd, 3rd, 4th angle projections, symbol of first and third angle projection, methods of obtaining orthographic views by First angle projection, full & half sectional views, offset section, revolved section, aligned section, removed section.
- U1.4.** Draw Ellipse by Concentric circle method, Arc method, Oblong method, Draw the parabola by Rectangle method and Tangent method.

Unit 2: Points, Lines and Planes: (09 Hrs)

- U2.1. Projections of Points and Lines:** Projection of Points in different quadrants (1st, 2nd, 3rd, 4th), projections of lines (parallel to both reference planes, parallel to one and perpendicular to other, parallel to one and inclined to the other and inclined to both the reference planes).
- U2.2. Projection of planes:** Projection of planes (Perpendicular to one plane and



parallel to the other, perpendicular to the one plane and inclined to the other, perpendicular to both the reference planes).

- U2.3.** Projection of planes (Plane inclined to both the reference planes, traces of planes).

Unit 3: Solids and Section of Solids: (08 Hrs)

- U3.1. Projections of Solids:** Introduction of solids, projections of solids such as cube, tetrahedron, prism, pyramid, cylinder, cone & Sphere (with axes parallel to both the reference plane, axis perpendicular to one reference plane).

- U3.2. Sections of Solids:** Section planes, Sectional views, True shape of Sections for Prism, Cylinder, Pyramid, Cone & Sphere (sectional plane parallel to one reference plane, sectional plane perpendicular to one reference plane inclined to other reference plane).

- U3.3.** Projections of Solids (axis inclined to one reference plane and parallel to the other reference plane).

Unit 4: Development and Intersection of Solid Surfaces: (08 Hrs)

- U4.1. Development of Lateral Surfaces of Solids and Intersection of Surfaces:** Introduction to Development of surfaces of various solids (Prism, Cylinder, Pyramid, Cone & Sphere). Development of Lateral Surface-concept, methods, applications, Inter-penetration of solids such as prism-prism, prism-pyramid.

- U4.2. Isometric Projections:** Draw isometric view & isometric projection of prism, pyramid, cone & cylinder with axis vertical with construction of isometric scale.

- U4.3.** Inter-penetration of solids such as cylinder-cylinder and cylinder-cone. Draw isometric view & isometric projection of prism, pyramid, cone & cylinder with axis horizontal with construction of isometric scale.

Unit 5: Computer-Aided Drafting and Solid Modelling: (06 Hrs)

- U5.1. Introduction to Computer-Aided Drafting (CAD):** Advantages of using Computer Aided Drafting (CAD) packages, applications of CAD, Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; basic operation of drafting packages, use of various Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline, Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display Commands: Zoom, Pan, Redraw, and Regenerate for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives, Simple exercises.

- U5.2. Solid Modelling:** Basics of 2-D and 3-D solid modelling, orthographic, isometric projection drawing and sectional views of simple machine elements.

- U5.3.** Exercise on Basic Editing Commands and Display Commands.

Text Books:

- T1. Engineering Drawing by N.D.Bhatt & V.M.Panchal, Charotar publishing House, 50th Edition, 2012
- T2. Text Book on Engineering Drawing by Narayana / Kannaiah, Scitech publications, 9th Edition, 2012



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- T3.** Engineering Drawing with an Introduction to AutoCAD by Dhanjay A. Johle, Tata McGraw Hill publications, 1st Edition 2007

Reference Books:

- R1.** Machine Drawing (Includes AutoCAD) by Ajeet Singh, Tata McGraw Hill publications, 1st Edition, 2010
- R2.** Engineering Drawing by Shah and Rana, Pearson Education, 2nd Edition, 2009
- R3.** Engineering Drawing and Graphics by K.Venugopal, New Age International publications, 5th Edition, 2004



REF NO: To be filled by CD office

ME10302 :: ENGINEERING GRAPHICS LABORATORY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: The Students should be able to:

1. Draw Square, Rectangle, Triangle, Pentagon, hexogen etc.
2. Draw Tangent and normal to a plane figure
3. Bisect the angles

Course Outcomes: The students will be able to

1. Develop adequate competence in visualization, interpretation and expression of drawing of engineering parts and objects.
2. Perform free hand sketching of basic geometrical constructions and multiple views of objects.
3. Gain knowledge on universally accepted conventions and symbols for their usage in technical drawings.
4. Draw orthographic projection of lines and plane surfaces.
5. Draw projection of solids and perform development of surfaces.

Course Details:

Sheet No. I: Projections of Points and Lines (10 problems) (04 Sessions)

Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, lettering, dimensioning, scale, concept of orthographic projections, symbol of first and third angle projection, projection of points, projections of lines (parallel to both reference planes, parallel to one and perpendicular to other, parallel to one and inclined to the other, and inclined to both the reference planes).

Sheet No. II: Projections of Planes and Solids (08 problems) (02 Sessions)

Projection of planes (perpendicular to one plane and parallel to the other, perpendicular to the one plane and inclined to the other, perpendicular to both the reference planes, plane inclined to both the reference planes, traces of planes).

Introduction to solids, projections of solids such as cube, tetrahedron, prism, pyramid, cylinder, cone & sphere (with axes parallel to both the reference plane, axis perpendicular to one reference plane, axis inclined to one reference plane, and parallel to the other reference plane).

Sheet No. III: Sections of Solid and Development of Surfaces (05 problems) (02 Sessions)

Section planes, sectional views, true shape of sections for prism, cylinder, pyramid, cone & sphere (sectional plane parallel to one reference plane, sectional plane perpendicular to one reference plane inclined to other reference plane).



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Introduction to development of surfaces of various solids (prism, cylinder, pyramid, cone & sphere), concept of development of lateral surface, methods, applications.

Sheet No. IV: Intersections of Surfaces (02 problems) (02 Sessions)

Intersection to solids such as prism-prism, prism-pyramid, cylinder-cylinder and cylinder-cone etc.

Sheet No. V: Isometric Views and Projections (05 problems) (02 Sessions)

Isometric view & isometric projection of prism, pyramid, cone & cylinder with axis horizontal and vertical with construction of isometric scale.

Introduction to AUTOCAD (02 Sessions)

Advantages of using Computer Aided Drafting (CAD) packages, applications of CAD, Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; basic operation of drafting packages, use of various Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Poly line, **Basic Editing Commands**: Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror. **Display Commands**: Zoom, Pan, Redraw, and Regenerate for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Exercise on Basic Editing Commands and Display Commands.

Text Books:

- T1. Engineering Drawing by N.D.Bhatt & V.M.Panchal, Charotar publishing House, 50th Edition, 2012
- T2. Text Book on Engineering Drawing by Narayana / Kannaiah, Scitech publications, 9th Edition, 2012
- T3. Engineering Drawing with an Introduction to AutoCAD by Dhanjay A. Johle, Tata McGraw Hill publications, 1st Edition 2007

Reference Books:

- R1. Machine Drawing (Includes AutoCAD) by Ajeet Singh, Tata McGraw Hill publications, 1st Edition, 2010
- R2. Engineering Drawing by Shah and Rana, Pearson Education, 2nd Edition, 2009
- R3. Engineering Drawing and Graphics by K.Venugopal, New Age International publications, 5th Edition, 2004



REF NO: To be filled by CD office

ME10103 :: BASIC THERMODYNAMICS

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites:

1. Basic knowledge of high-school physics and chemistry.
2. Ability to do college calculus (differentiation, integration, partial derivatives, and exact differentials).

Course Outcomes: The students will be able to:

1. Understand about thermodynamic systems (open, closed or isolated).
2. Analyze the Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic processes.
3. Apply P-V-T relations for ideal gases and mixture of gases.
4. Apply the steady-flow energy equation or the First Law of Thermodynamics to a system of thermodynamic components (Nozzle, Diffuser, Compressor, Turbine, Throttling device, Heat Exchanger etc.) to estimate required balances of heat, work and energy
5. Apply the Second Law of Thermodynamics and relating the concepts to the Heat engine, Refrigerator and Heat pump.
6. Determine the properties (Pressure, Temperature, Sp. Volume, Enthalpy, Entropy etc.) of pure substance with the help of steam table.
7. Apply the concepts of thermodynamics to real life applications (Air compressors, Steam power plant, Refrigerators and Heat pump, I.C. Engines etc.)

Course Details:

Unit 1: Basic Concepts, Ideal Gas and Properties of Gas Mixtures: (10 Hrs)

- U1.1.** Scope of Thermodynamics, Macroscopic and Microscopic approaches; Definition of Fixed mass (closed systems) and Control volume(open system), Properties (extensive and Intensive), State and its representation on a property diagram, Process and its representation, Cyclic process (or cycle) and its representation, Characteristics of properties (point and path function); Reversible and Irreversible processes; Thermal, mechanical and Chemical equilibrium, Thermodynamic equilibrium, Zeroth Law of Thermodynamics and temperature, Measurement of temperature and calibration of thermometers, the ideal gas temperature scale, Measurement of pressure, gauge and absolute pressure, Bourdon pressure gage and U-tube manometers, Ideal gases and their P-V -T relations, Gas mixtures
- U1.2.** Temperature scale problem, gas laws.

Unit 2: Energy Transfer and First Law of Thermodynamics: (8 Hrs)

- U2.1.** Work Transfer (definition and calculation), Different modes of work, Displacement Work for various process, Heat Transfer; Modes of heat transfer, Basic laws in conduction, convection and radiation, combined modes of heat transfer with



examples. Formal statement of First law (using cyclic processes for a closed systems) and introduction of internal energy as a thermodynamics property, Introduction of enthalpy as a thermodynamic property; Definition of specific heats and their use in calculation of internal energy and enthalpy with emphasis on ideal gages. Application of First Law to control volumes; Nozzle, Diffuser, Compressor, Turbine, Throttling device, Heat Exchanger. (Only steady flow need to be considered).

- U2.2.** Problem on different modes of work transfer, Problems on Conduction, Convection and Radiation

Unit 3: Second Law of Thermodynamics: (8 Hrs)

- U3.1.** Kelvin- Planck and Clausius statements of Second Law, Reversibility and irreversibility, Carnot cycle, Reverse Carnot cycle, Carnot theorem, Absolute temperature scale, Definition of entropy, Clausius theorem, Clausius Inequality, Entropy Principle and applications.

- U3.2.** Third law of thermodynamics, Problems on Entropy.

Unit 4: Properties of Pure Substances: (6 Hrs)

- U4.1.** P-v, T-v, P-T, T-s, h-s diagram for steam, different types of steam, Introduction to steam tables with respect to specific volume, pressure, temperature, enthalpy and entropy.

- U4.2.** P-v-T Surface, Vapour Pressure.

Unit 5: Applications of Thermodynamics: (4 Hrs)

- U5.1.** Air compressors, steam power plant, Refrigerators and Heat pump, I.C. Engines (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only)

- U5.2.** Rotary Compressors.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1.** "Engineering Thermodynamics", P K Nag, Tata McGraw Hill, 5th Edition, 2013.
T2. "Thermodynamics: An Engineering Approach", Yunus A. Çengel and Michael A. Boles, McGraw Hill, 7th Edition, 2011.

Reference Books:

- R1.** "Engineering Thermodynamics" Van Wylen and Sontang, John Wiley, 7th Edition, 2009.
R2. "Fundamental of Engineering Thermodynamics", E. Rathakrishnan, PHI, 2nd Edition, 2005.
R3. "Engineering Thermodynamics", P. Chattopadhyay, Oxford University Press, 1st revised Edition, 2011.
R4. "Steam Tables" K K Ramalingam, Scitech, 1st Edition, 2009.
R5. "Engineering Thermodynamics", M.Achuthan, PHI, 2nd Edition, 2009.



REF NO: To be filled by CD office

CS10101 :: COMPUTER PROGRAMMING

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites:

1. Knowledge of computer fundamentals.
2. Knowledge of basic mathematics.
3. Ability to apply logic.

Objectives: The objectives of this course are:

1. To provide a comprehensive study of the C programming language.
2. To utilize the strengths of C to enable the students for writing efficient codes.
3. To learn and acquire art of computer programming.
4. To model physical problems in to relevant programs.

Course Details:

Unit 1: Introduction to Programming: **(10 Hrs)**

- U1.1.** Basic functional units of a computer and their utility. Problem solving using computers and logic design. Algorithms and their representations: flowcharts, pseudo code. Designing algorithms. Efficient algorithm writing techniques. Concept of programming languages for implementing algorithms – levels of languages. Role of assemblers, compilers, linker, loader, interpreter in program execution.
- U1.2.** Introduction to C: "Hello World" in C – editor, compiler, execution environment. C as a middle level language. Basic structure of C program, standard library and header files, Syntax and Semantics. Input-output statements, Formatted input/output statements. Variable, constant (literal and named), Data types, variable declaration. Assignment Operators: Arithmetic, logical, relational, Expressions, Precedence & Associativity. Input and output statements, escape sequences.
- U1.3.** Bits and bytes – importance of digital representation in computers. Number System and algorithms for inter conversions. C programming environments.

Unit 2: Flow of Control: **(10 Hrs)**

- U2.1.** Selection Statement: if, nested if-else, Conditional Expression, Switch statements. Iteration Statements: for loop, while loop, do -while loop, nested loop. Statements: go to, break & continue. Common programming errors. Application of C constructs in solving problems like generating arithmetic and geometric progression.
- U2.2.** Arrays: Concept, declaration and initialization of arrays, accessing individual elements of array. Use of arrays in sorting, searching. Concept of 2-D array (Matrix), row major and column major representation of array, address calculation for accessing the individual element. Stacks & Queue.



U2.3. Concepts of Sparse Matrix, Multi Dimensional array.

Unit 3: Functions: (10 Hrs)

- U3.1.** Need of functions, function declaration, definition and call. Inbuilt functions and user defined functions. Passing arguments to a function, returning values from a function. Scope of variable, local and global variable. Access specifiers. Passing arrays to functions.
- U3.2.** Recursive Functions: Need of Recursion, direct recursion, indirect recursion, impact of recursion on local& global variables, examples of recursive programs – factorial, progressions, towers of Hanoi. Recursive vs Iterative solutions. Disadvantages of recursion.
- U3.3.** Preprocessor and preprocessor directives: macro substitution, difference between macro and functions.

Unit 4: Pointers & Strings: (10 Hrs)

- U4.1.** Concept of pointers, relevance of data type in pointer variable, pointer arithmetic. Pointer to pointer. Pointers and functions (passing pointers to functions, returning pointers from functions). Pointers and arrays. Constant Pointer. Array of pointers, pointer to array. Array accessing using pointers.
- U4.2.** Strings: Strings as arrays, character array versus strings, reading and writing strings, String handling functions, user defined functions for string operations – copy, concatenate, length, reverse, converting case, appending, comparing two string, extracting a substring. Pointers and strings. Array of strings.
- U4.3.** String matching and implementation.

Unit 5: Structures & File Handling in C: (10 Hrs)

- U5.1.** Structures: Declaration and initialization, structure variables, accessing and assigning values of the fields, "sizeof" operator, functions and structures, arrays of structures, nested structures, pointers and structures, passing structure to a function and returning structure from function.
- U5.2.** Dynamic memory allocation, type casting, Introduction to self referential structures, Linked List.
- U5.3.** File Handling in C: file types, file opening modes, file handling I/O – fprintf, fscanf, fwrite, fread, fseek. File pointers. Implementing basic file operations in C.
- U5.4.** Typedef keyword. Union, Nesting of Structure and Union. Enumerated data types.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1.** "Programming language – ANSI C", Brian W Kernighan and Dennis Ritchie, Second edition ISBN 0-13-110370-9
- T2.** "C Programming", Balagurusamy, Tata McGraw-Hill
- T3.** "Programming with C- Schaum's outline Series", B. Gottfried, Second edition, Tata McGraw Hill Publication, ISBN 0-07-463491-7



Reference Books:

- R1. "A first book of C- Fundamental of C Programming", Gary Bronson and Stephen Menconi, ISBN: 0314073361 (At&T Professional Series)
- R2. "Computer fundamentals and Programming in C", Reema Thareja, Oxford University Press, ISBN:0-19-807888-9
- R3. "Let us C", Y. Kanetkar, Second Edition, BPB Publication. ISBN: 8176566217.



REF NO: To be filled by CD office

CS10302 :: COMPUTER PROGRAMMING LABORATORY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites:

1. Basic knowledge to handle a computer system.
2. Basic knowledge of Linux and Windows Operating System.
3. Fundamental knowledge about flow chart and algorithm .

Objectives: The objectives of this laboratory course are:

1. Acquire knowledge about the basic concept of writing a program.
2. Understand the basic concept of C Programming, and its different modules .
3. Role of Functions involving the idea of modularity.
4. Concept of Array and pointers dealing with memory management.
5. Structures and unions through which derived data types can be formed
6. File Handling for permanent storage of data or record.
7. To make students familiar with programming using gcc compiler in Linux.

Course Details:

1. Study of important DOS/UNIX commands.
2. Study of Formatted input/output statements.
3. Study of Selection, Switch and Iteration Statements.
4. Study of Concept of Functions & Recursion.
5. Study of Concept of Arrays.
6. Study of Concepts of Pointers & Strings.
7. Study of Concepts of Structures, Unions and Files.

List of Sample Programs:

1. Study of most important DOS/UNIX commands.
2. Write a program in C to find largest element / average of given N elements / sum / reverse of a given integer.
3. Write a program in C to implement a simple mathematical calculator
4. Write a program in C to read an integer and display each of the digits of an integer in English.
5. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
6. Write a program in C to perform Addition / Subtraction / Multiplication of two Matrices. Also determine whether the matrix is symmetric / skewed.
7. Write a program in C to carry out following operations on strings using string library
 - (a). Length of a string
 - (b). Copy a string.
 - (c). Concatenation of strings.



8. Write a program in C to carry out following operations on strings without using string library functions
 - (a). Compare two strings.
 - (b). Reverse given string.
 - (c). To check if the given string is a palindrome or not
9. Write a program in C to carry out following operations on strings using pointers.
 - (a). Length of a string.
 - (b). Concatenation of strings.
 - (c). Copy of string
 - (d). Compare two strings
10. Write a C program that works with complex numbers using a structure. Perform the following operations:
 - (a). Reading a complex number.
 - (b). Addition of two complex numbers.
 - (c). Writing a complex number.
 - (d). Multiplication of two complex numbers.
11. Write a C program to create a database of students by using array of structure and perform following operations on it.
 - (a). Accept/modify record of student
 - (b). Search a particular record
 - (c). Display all records
12. Write a program in C that use both recursive and non-recursive functions to find the Factorial / GCD (greatest common divisor) of two given integers / Fibonacci series.
13. Write a program in C to sort n integers using bubble / merge sort.
14. Write a program in C to search a number in a given list using linear / binary search.

Text Books

- T1. "Programming with C- Schaum's outline Series", B. Gottfried, Second edition, Tata McGraw Hill Publication, ISBN 0-07-463491-7,
- T2. "Let us C", Y. Kanetkar, Second Edition, BPB Publication. ISBN: 8176566217.

Reference Books

- R1. "Programming language – ANSI C", Brian W Kernighan and Dennis Ritchie, Second edition ISBN 0-13-110370-9,
- R2. "A first book of C- Fundamental of C Programming", Gary Bronson and Stephen
- R3. "Projects using C", P V N Varalakshmi, Sci-tech Publications (2009)



REF NO: To be filled by CD office

CY16103 :: ENVIRONMENTAL SCIENCE AND ENGINEERING

Credits: 02

Teaching Scheme: Theory 02 Hrs/Week

Prerequisites: NIL

Objectives:

1. To develop the basic knowledge in environmental science.
2. To understand the environmental consequences of the industries.
3. To understand the methods of minimizing the environmental pollutants

Course Details:

Unit 1: Ecological Concepts: **(08 Hrs)**

- U1.1.** Structure of ecosystem - Biotic components and their organization; Function of ecosystem – Ecosystem processes including energy flow, food chain & food web; Biogeochemical cycles- H_2O -, O_2 -, CO_2 - and N_2 – cycle; Environmental gradients, Tolerance levels of environment factor. E.I.A., Environmental auditing and Environmental laws.
- U1.2.** **Self Study:** Environmental laws and case studies related to environmental pollution

Unit 2: Water Pollution: **(05 Hrs)**

- U2.1.** Water quality and standards and parameters; Sources of water pollution; Water treatment- pre-, primary -, secondary- and advanced water treatment processes.
- U2.2.** **Self study:** Water treatment methods adopted by different industries and municipal water supply system.

Unit 3: Waste water treatment: **(05 Hrs)**

- U3.1.** COD and BOD of waste water; pre-, primary- and secondary- waste water treatment (over view); Reactor configuration, anaerobic digestion, methane production and its applications
- U3.2.** **Self Study:** Numerical problems on BOD calculation, waste water treatment method used in different industries.

Unit 4: Air Pollution: **(06 Hrs)**

- U4.1.** Atmospheric chemistry; Sources of air pollution, primary and secondary pollutants, criteria and non criteria pollutants; Acid deposition mechanism, Global climate change – greenhouse gases; Industrial air emission control, flue gas desulphurization, NOx removal, fugitive emissions
- U4.2.** **Self Study:** Air Pollution equipments used in power plants and steel plants.



Unit 5: Noise pollution and Solid waste Management: (06 Hrs)

- U5.1.** Sources of noise pollution, sound properties; Noise standard, measurement and control.
- U5.2.** Solid and hazardous waste management: Solid waste – sources and integrated solid waste management; hazardous waste : sources and management.
- U5.3.** **Self Study:** Problems based on sound and method for the solid waste management in different industries

Text Books:

- T1.** "Environmental Engineering", G. Kiely, Tata McGraw Hill, New Delhi, Special Indian Edition, 2007.

Reference Books:

- R1.** "Waste Treatment and Disposal" Paul T Williams, Wiley, 2nd edition 2005.
- R2.** "Wastewater Engineering, Treatment and reuse", Metcalf & Eddy, Tata McGraw Hill Publishers Co. Ltd, New Delhi, 4th Edition, 2003
- R3.** "Principles of Environmental Engineering and Science" M. L. Davis and S. J. Masen, McGraw Hill International Edition, 2004



REF NO: To be filled by CD office

ME10104 :: ENGINEERING MECHANICS

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: The Students should have knowledge of

1. Scalars and vectors
2. Newton's laws of motion
3. Concept of physical quantities, their units and conversion of units
4. Concept of differentiation and integration

Course Outcomes: The students will be able to

1. Calculate the resultant and apply condition of equilibrium using different principles.
2. Analyze the problems involving dry friction.
3. Determine the centroid, centre of gravity and moment of inertia of various surfaces.
4. Analyze the forces in members of trusses, frames.
5. Apply the concept of rectilinear and curvilinear motion to solve the problem.
6. Apply the concept of dynamic forces to solve rigid body problems.
7. Use D'Alembert's Principle, work and energy principle, impulse and momentum principle for particle.

Course Details:

Unit 1: Basics of Statics and Concurrent Forces: (15 Hrs)

- U1.1. Statics of Particles:** Force System: Force, classification & representation, force as a vector, composition and resolution of forces, principle of superposition and transmissibility of forces.
- U1.2. Statics of Rigid bodies:** Equilibrium of coplanar force system, free body diagrams, determination of reactions, equilibrium of a body under three forces, Lami's theorem. Moment of a force about a point and an axis, moment of coplanar force system, Varignon's theorem.
- U1.3. Friction:** Introduction to wet and dry friction, laws of dry friction, cone of friction, block friction, ladder friction, wedge friction.
- U1.4.** Basic concepts, definitions, basic assumptions, scalar & vector quantities, parallelogram law, angle of friction, angle of repose.

Unit 2: Parallel and Distributed forces: (07 Hrs)

- U2.1.** Parallel forces in a plane, Distributed Parallel forces in a plane, couple, resolution of a force into a force and a couple, moment of a couple.
- U2.2. Centroid and Moment of Inertia:** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, area moment of inertia of composite plane figures and mass moment of inertia, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of



inertia.

- U2.3.** Derivation of formulae for centroidal distances of standard areas and lines by integration method.

Unit 3: Basic Structural Analysis and virtual work:

(06 Hrs)

- U3.1. Basic Structural Analysis:** Plane truss, difference between truss and frame, perfect and imperfect truss, assumptions and analysis of plane truss, zero force members, analysis of perfect plane trusses by the method of joints, method of section.
- U3.2. Virtual work:** Virtual displacement, principle of virtual work.
- U3.3.** Concept of work, knowledge of frame, knowledge of determinant

Unit 4: Kinematics of Particles:

(06 Hrs)

- U4.1. Rectilinear Motion:** Variable acceleration, Motion curves, concept of relative motion and simple dependent motion.
- U4.2. Curvilinear Motion:** Curvilinear motion, Projectile motion.
- U4.3. Rectilinear Motion:** Concept of position, displacement, distance, speed, instantaneous and average velocity and acceleration, uniform motion, uniformly accelerated motion, motion under gravity.
- U4.4. Curvilinear Motion:** Derivation of component of velocity and acceleration in three systems, Projectile on horizontal ground- derivation of equations of trajectory, time of flight, maximum range, maximum height.

Unit 5: Kinetics of Particles:

(06 Hrs)

- U5.1.** D'Alembert's Principles, Work and energy, impulse and momentum, impact of bodies.
- U5.2.** Force and acceleration, derivation of coefficient of restitution

Text Books:

- T1.** Engineering Mechanics, Timoshenko, Young & Rao, Tata McGraw Hill, 5th Edition, 2013.
- T2.** Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press, 2009.
- T3.** Engineering Mechanics Statics and Dynamics, A. K. Tayal, Umesh Publications, 14th Edition, 2010.

Reference Books:

- R1.** Engineering Mechanics [Vol-I & II], Meriam & Kraige, Wiley India, 5th Edition, 2009
- R2.** Engineering Mechanics, R. C. Hibbeler, Pearson Education Inc., 11th Edition, 2009.
- R3.** Vector Mechanics for Engineers, F. P. Beer, E. R. Johnston Jr & E. R. Eisenberg, McGraw Hill, 8th Edition, 2007.
- R4.** Engineering Mechanics, S. Ramamrutham, Dhanpatrai Publication, 9th Edition, 2010



REF NO: To be filled by CD office

ME10104 :: ENGINEERING MECHANICS

Credits: 01

Teaching Scheme: Tutorial 01 Hrs/Week

Prerequisites: The Students should have knowledge of

1. Scalars and vectors
2. Newton's laws of motion
3. Concept of physical quantities, their units and conversion of units
4. Concept of differentiation and integration

Course Outcomes: At the end of the course, students will be able to:

1. Understand the fundamentals of statics and dynamics.
2. Analyze a given problem and solve it confidently.
3. Calculate the unknown parameters/quantities involved in physical phenomena.
4. Apply the principles, laws and fundamental equations of mechanics for particles & rigid bodies.

Course Details:

List of Tutorials:

Tutorial No.1: Revision of basic Mathematical and Computing Skills

- Fundamentals on properties of circle, lines, triangles
- Fundamentals on basic trigonometry

Tutorial No.2: Revision of fundamental principles of mechanics

- Numerical on scalars, vectors expressing force as a vector
- Addition/ Subtraction of vectors
- Newton's laws of motion and Newton's law of gravitation

Tutorial No.3: Statics of Particles

- Numerical on resolution and composition of forces
- Resultant or equilibrant of concurrent coplanar force system
- Resultant or equilibrant of non concurrent force system

Tutorial No. 4: Statics of Rigid bodies

- Drawing of free body diagrams
- Numerical on three force equilibrium
- Moments of a force about a point



Tutorial No. 5: Friction

- Numerical related to laws of friction
- Numerical related to block friction
- Numerical related to ladder friction and wedge friction

Tutorial No. 6: Parallel and Distributed forces

- Numerical on parallel forces and couple
- Numerical on equilibrium of simple beams under the action of parallel forces
- Numerical on hydrostatic pressure force

Tutorial No. 7: Centroid & Moment of Inertia

- Numerical on Centroid of one dimensional plane curve
- Numerical on Centroid of composite area
- Numerical on Moment of Inertia of composite plane figures

Tutorial No. 8: Analysis of truss and frames

- Analysis of plane trusses by method of joint
- Analysis of plane trusses by method of section
- Numerical on principle of virtual work

Tutorial No. 9: Kinematics of particles

- Numerical on constant acceleration, variable acceleration
- Numerical on kinematic curve

Tutorial No. 10: Projectile Motion

- Numerical on Projectile motion

Tutorial No. 11: Kinetics of particles

- Numerical on application of work energy principle involving spring force, friction force externally applied force

Tutorial No. 12: Kinetics of particles

- Numerical on direct impact
- Numerical on impulse and momentum



Text Books:

- T1.** Engineering Mechanics, Timoshenko, Young & Rao, Tata McGraw Hill, 5th Edition, 2013.
- T2.** Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press, 2009.
- T3.** Engineering Mechanics Statics and Dynamics, A. K. Tayal, Umesh Publications, 14th Edition, 2010.

Reference Books:

- R1.** Engineering Mechanics [Vol-I & II], Meriam & Kraige, Wiley India, 5th Edition, 2009
- R2.** Engineering Mechanics, R. C. Hibbeler, Pearson Education Inc., 11th Edition, 2009.
- R3.** Vector Mechanics for Engineers, F. P. Beer, E. R. Johnston Jr & E. R. Eisenberg, McGraw Hill, 8th Edition, 2007.
- R4.** Engineering Mechanics, S. Ramamrutham, Dhanpatrai Publication, 9th Edition, 2010.



REF NO: To be filled by CD office

CY10101 :: ENGINEERING CHEMISTRY

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: NIL

Objectives:

1. To develop the basic knowledge in chemistry.
2. To impart pure chemistry principles.
3. To understand the concepts of chemistry for industrial processes

Course Details:

Unit 1: Chemical Bonding and Co-ordination Chemistry: (11 Hrs)

- U1.1.** Schrödinger equation, interpretation of wave functions, molecular orbital theory of diatomic molecules, metallic bonding, Werner's theory, types of ligands, nomenclature of coordination complex, isomerism in co-ordination complexes. Theories of co-ordination compounds (VBT and CFT).
- U1.2.** **Self Study:** Formation of O_2^+ , O_2^- , HF molecules by M.O.T and Calculation of bond order, magnetic property.

Unit 2: Phase rule and Solid State: (10 Hrs)

- U2.1.** Phase diagram of one & two component systems, H_2O , S, Cd-Bi and Fe-C systems. Crystal systems, Bravais lattices, closed packed structures, ionic solids, and crystal defects including Schottky and Frenkel defects.

- U2.2.** **Self Study:** Calculation of degree of freedom, number of phases and components for decomposition of $CaCO_3$, mixture of ideal gases and KCl-NaCl- H_2O system. Numerical for calculation of density, cell parameter for different metals and oxides

Unit 3: Reaction Kinetics & Catalysis: (07 Hrs)

- U3.1.** Rate law, order & molecularity, determination of order of reaction, kinetics of zero, 1st and 2nd order reactions, collision theory, theory of absolute reaction rates, energy of activation, homogeneous & heterogeneous catalysis (a general idea)

- U3.2.** **Self Study:** Calculation of rate constant, half life for different reactions

Unit 4: Thermodynamics: (07 Hrs)

- U4.1.** Thermo chemistry, thermo-chemical calculations based on Hess's law and Born-Haber cycle, second law of thermodynamics, entropy, the free energy concepts, applications to gases, Gibbs Helmholtz equation, free energy change and criterion of spontaneity and Maxwell's relations.

- U4.2.** **Self Study:** Numericals on thermo-chemical reactions, entropy and enthalpy



Unit 5: Molecular Spectroscopy:

(05 Hrs)

- U5.1.** Absorption laws, principle, instrumentation and applications of Microwave, IR and UV-Visible Spectroscopy
- U5.2.** Self Study: Numericals on UV-Visible and IR spectroscopy.

Text Books:

- T1. "Selected topics in Inorganic Chemistry" W.U. Malik, G.D. Tuli and R.D. Madan, S. Chand & Company Ltd, New Delhi, 17th Edition, 1976.
- T2. "Principle of Physical Chemistry", B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal Publishing Co., 46th Edition, 2013
- T3. "Fundamental of Molecular Spectroscopy", C.N. Banwell and E.M. McCash, Tata McGraw-Hill Education, 4th Edition, 1994.
- T4. "Atkins Physical Chemistry", P. Atkins, J. Paula, Oxford University Press, 10th Edition, 2014

Reference Books

- R1. "Engineering Chemistry", P. C. Jain and M. Jain, Dhanpat Rai publishing company (P) Ltd. New Delhi, 16th Edition, 2013.
- R2. "Physical Chemistry" G.M. Barrow, Tata Mc-Graw Hill Edition, New Delhi, 5th Edition, 1992



REF NO: To be filled by CD office

CY10302 :: ENGINEERING CHEMISTRY LABORATORY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: NIL

Objectives:

1. To develop an analytical ability
2. To integrate chemistry fundamentals knowledge with practical applications.
3. To understand the chemistry reactions in industrial processes

Course Details:

List of Practicals: (Any Ten)

- Experiment No. 1:** Estimation of hardness in water sample.
- Experiment No. 2:** Determination of percentage of available chlorine in water/bleaching powder sample.
- Experiment No. 3:** Determination of dissolved oxygen in water.
- Experiment No. 4:** Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
- Experiment No. 5:** Determination of Ferrous iron in Mohr's salt by potassium permanganate.
- Experiment No. 6:** Standardization of potassium permanganate using primary standard
- Experiment No. 7:** Determination of Kinematic Viscosity of lubricating oil by Redwood viscometer.
- Experiment No. 8:** Determination of flash point of given oil by Pensky Marten's flash point apparatus.
- Experiment No. 9:** Verification of Beer-Lamberts Law and determination of concentration of a coloured substance by spectrophotometer
- Experiment No. 10:** Estimation of Calcium in limestone.
- Experiment No. 11:** Determination of partition coefficients of iodine between benzene and water.
- Experiment No. 12:** Determination of rate constant of acid catalysed hydrolysis



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reaction.

Experiment No. 13: Preparation of Aspirin.

Experiment No. 14: Preparation of benzoic acid from ethyl benzoate.

Experiment No. 15: Preparation of tris-(1,2-diaminoethane)chromium(III) chloride,
[Cr(en)3]Cl₃ complex

Text Books:

T1. "Laboratory Manual Chemistry", Department of Chemistry, C.V. Raman College of Engineering, Tenth Edition, 2015.

Reference Books

R1. "Vogel's Textbook of Quantitative Chemical analysis" Revised by G. H. Jeffery, J. Bassett, J. Mendham & R. C. Denney, 5/E, ELBS (English Language Book Society) Longman. 7th Edition, 1996



REF NO: To be filled by CD office

EE10101 :: BASIC ELECTRICAL ENGINEERING

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: Basic knowledge of Physics and Mathematics of 10+2 level

Course Objectives: At the end of the Course, the students will be able to

1. Apply knowledge about, the source of electrical energy, the behavior of different electrical quantities and circuit elements and their utilization in practical electrical networks for further studies in engineering.
2. Implement and gain knowledge of solving numerical problems related to electrical circuits with DC and AC excitation
3. Understand basic concept about conversion of energy from one form to another and their utilization in real life cases
4. Apply concepts of generation/ Transmission/ Distribution and utilization of Electrical energy in industrial application.
5. Know about storage and reuse of electricity and their maintenance and aware about the electrical safety.

Course Details:

Unit 1: Network fundamentals and Theorem: (8 Hrs)

- U1.1.** Ohm's law, simplification of networks using series-parallel combinations and star-delta transformations, current and voltage sources, basic parameters related to electrical circuit and their relation with voltage and current, Kirchhoff's laws, Superposition theorem, Thevenin and Norton's theorem.
- U1.2.** Maximum power transfer theorem

Unit 2: Single Phase AC Circuits: (8 Hrs)

- U2.1.** Single phase EMF generation, average and effective values of sinusoids, peak factor, form factor, j operations, complex representation of impedances, phasor diagrams, power factor, power in complex notation, solution of series and parallel circuits.
- U2.2.** Concept of AC quantities, concepts of cycle, period, frequency, phase difference as related to sinusoidal voltages and currents.

Unit 3: Three Phase AC Circuit and Magnetic Circuits: (8 Hrs)

- U3.1.** Concept of three phase supply, phase sequence, line, phase, neutral etc., Delta, Star connection, Line, Phase quantities. Solution of 3phases circuits with balanced load. B-H Curve, Hysteresis, Permeability, reluctance, Analogy between magnetic and electric circuits, solution of simple magnetic circuits, Hysteresis, Eddy current losses.



U3.2. Power factor improvement in a three phase circuits

Unit 4: Work, Power and Energy: (8 Hrs)

- U4.1.** Energy conversions from one from to another such as electrical, heat, potential, kinetics, linear, rotational, solar, wind etc. and numerical problems based on different energy conversions in real life cases.
- U4.2.** Collection of data related to energy scenario in India, study of a domestic electric bill.

Unit 5: Electrical energy scenario, batteries and electrical safety: (8 Hrs)

- U5.1.** Electrical power generation scenario in India, grid system, different terms associated with energy and its utilizations. Electrical cells and batteries, different terms associated with cells and batteries, types, construction, chemicals used maintenance procedures. Electrical safety, different terms associated with safety, safety gadgets. Concept of earthing, conservation of electrical energy
- U5.2.** Types and procedure of earthing

Note: Five assignments to be given to the students on self study (U1.2, U2.2, U3.2, U4.2, U5.2), comprising of one assignment from each unit (U1.1, U2.1, U3.1, U4.1, U5.1)

Text Books:

- T1.** "Basic Electrical engineering", C.L. Wadhwa, New Age International, 4th Edition reprint 2012.
- T2.** "Hughes Electrical Technology", Edward Hughes, Pearson Education, 7th Edition.
- T3.** "Electrical technology-vol-I and II", B.L.Theraja, S.Chand, 5th edition 2012 reprint

Reference Books

- R1.** "Basic Electrical Engineering", T.K. Nagsarkar & M.S. Sukhija, Oxford,2nd edition,2011
- R2.** "Basic Electrical engineering", D.P Kothari & I.J Nagrath, TMH, Third Edition,2009
- R3.** "Basic Electrical and Electronics Engineering", Authors Name Ravish R Singh, TMH Education, 2nd Edition 2012.



REF NO: To be filled by CD office

EE10302 :: BASIC ELECTRICAL ENGINEERING LABORATORY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: Basic knowledge of physics and mathematics of 10+2 level and theory of Basic Electrical Engineering.

Course Objectives: At the end of the Course, the students will be able to

1. Apply knowledge of theorems to practical network, Determine characteristics and different electrical parameter's inter-relationship of various electrical elements so that they will be able to apply the knowledge in electrical circuits and appliances with different combinations (series/parallel)
2. Study about illuminating devices like fluorescent lamp to measure the consumption of electric power in practical field know about three phase circuit like star-delta connections for higher studies.
3. Use different magnetic materials according to performance requirement of an electrical network, know about storage, measurement and deliver of electricity and their safety as an electrical engineer.

Course Details:

List of Experiment:

(Select any 7 experiments from the list of 12 experiments)

Experiment No. 1: Verification of superposition theorem.

Experiment No. 2: Verification of Thevenin and Norton theorem.

Experiment No. 3: Calculation of current, voltage, power and power factor in series R-L-C circuit excited by single-phase AC supply.

Experiment No. 4: Calculation of current, voltage, power and power factor in parallel R-L-C circuit excited by single-phase AC supply.

Experiment No. 5: Connection and measurement of power consumption and power factor of a fluorescent lamp.

Experiment No. 6: Study of three phase balanced star / delta circuits.

Experiment No. 7: To study of B-H curve in ferromagnetic material.

Experiment No. 8: Study of batteries and cell

Experiment No. 9: Study of earthing and safety equipments.



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Experiment No. 10: Connection and testing of a single-phase energy meter and study of electric bill.

Experiment No. 11: Study of wires and wiring components and

Experiment No. 12: Design of single phase extension board

Text Books:

- T1. Electrical technology-vol-I and II", B.L.Theraja, S.Chand, 5th edition 2012 reprint
T2. "Wiring,estimation and costing by S.L.Uppal,Khana Publication ,1987.

Reference Books

- R1. Basic Electrical Engineering", T.K. Nagsarkar & M.S. Sukhija, Oxford,2nd edition 2011.



REF NO: To be filled by CD office

HS16104 :: ENGINEERING ECONOMICS AND COSTING

Credits: 02

Teaching Scheme: Theory 02 Hrs/Week

Prerequisites: Basic Analytical ability of higher secondary level.

Objectives: The objective is to impart the students the fundamentals of economic theory and equip them with the analytical reasoning that would help them understand the nuances of business and investment decisions.

Course Details:

Unit 1: Introduction to Engineering Economics & Theory of Demand: (05 Hrs)

- U1.1.** Engineering Economics – Nature and scope, The Theory of demand, Demand function, Law of demand and its exceptions, Price Elasticity of demand
U1.2. Self Study Topics: Income & Cross Elasticity of Demand

Unit 2: Theory of Supply: (05 Hrs)

- U2.1.** Law of supply, Exceptions to Law of Supply, Elasticity of supply
U2.2. Self Study Topics: Factors affecting Elasticity of Supply

Unit 3: Title Project Evaluation Techniques: (05 Hrs)

- U3.1.** Time value of money: Simple and compound interest, Present worth method, Future worth method, Annual worth method, internal rate of return method
U3.2. Self Study Topics: Costbenefit analysis in public projects

Unit 4: Title Break-Even Analysis (04 Hrs)

- U4.1.** Break-even analysis-Linear approach, Simple numerical problems on Break even analysis
U4.2. Self Study Topics: Limitations of Break-Even Analysis

Unit 5: Title Cost Sheet & Depreciation (05 Hrs)

- U5.1.** Preparation of cost sheet, Depreciation of capital assets, Causes of depreciation, Straight line method & declining balance method
U5.2. Self Study Topics: Elements of Cost

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1.** "Engineering Economics & Costing", Sasmita Mishra, PHI, 2nd Edition, 2011.
T2. "Engineering Economics", J.L.Riggs, McGraw-Hill, 1st Edition, 1982



T3. "Managerial Economics", H.L.Ahuja, S.Chand, 2nd Edition, 2008.

Reference Books

- R1. "Engineering Economics & Costing", Mahendra P. Agastya, SCITECH, 2nd Edition, 2011.
- R2. "Engineering Economics", R. Panneerselvam, PHI, 1st Edition, 2001.
- R3. "Engineering Economic Principles", H.M. Steiner, McGraw-Hill, New York, 2nd Edition, 1992.



REF NO: To be filled by CD office

ME10305 :: ENGINEERING WORKSHOP

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites:

1. The students should have knowledge about various measuring instruments like steel rule, vernier caliper etc.
2. The students should have idea about different geometric shapes and sizes.

Course Outcomes: After learning the course the students will be able to

1. Perform different metal fitting works.
2. Perform basic welding works.
3. Understand the operations of machine tools.
4. Select the appropriate tools required for specific operation.
5. Comprehend the safety measures required to be taken while using the tools.

Practical Details:

- 1. Fitting:** Introduction, use of measuring, marking and hand tools such as steel rule, vernier caliper, marking gauge, try squares, files, punch etc., safety precautions.

Job: Preparing a male and female joint of mild steel or making a paper weight of mild steel

- 2. Welding:** Introduction, principle of manual metal arc welding, equipments and their operations, welding electrodes, welding joints, welding symbols, safety precautions.

Job: One job on mild steel

- 3. Machining:** Introduction, different parts of the lathe, shaper machine, milling machine, machining operations, safety precautions.

Job:

- (i) Facing, stepped turning and thread-cutting in the cylindrical job in lathe.
- (ii) Preparation of hexagonal headed bolt in shaper machine.
- (iii) Preparation of rectangular slot in milling machine.

Demonstrations:

- 1. Fire Safety:** Introduction, fire prevention precautions, necessity of fire fighting, fire extinguishers, rules of fire fighting, risk elements in fire fighting and demonstration of use of fire extinguishers.
- 2. Gas Welding:** Introduction, principle, equipment and its operation, safety



precautions and demonstration of Oxy-Acetylene Gas welding process.

Note: Students should wear safety apron and safety shoes during the practicals.

Text book:

- T1.** Elements of Workshop Technology, Vol. I and II by Hajra choudhary, Khanna Publishers, 15th Edition, 2012
- T2.** Manufacturing Engineering Handbook, Hwaiyu Geng, McGraw Hill Publishing Co.Ltd., 1st Edition, 2004

Reference books:

- R1.** A Textbook of Production Technology, P.C.Sharma, S.Chand, 7th Edition, 2006
- R2.** Workshop Manual, Kannaiah and Narayana, Scitech, 2011



REF NO: To be filled by CD office

MA10101 :: MATHEMATICS – I

[DIFFERENTIAL CALCULUS, INTEGRAL CALCULUS, FOURIER METHODS]

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: Elementary idea of Sets, Functions, Trigonometry, Two –dimensional coordinate Geometry, Fundamentals of differential and integral calculus of 10+2 standard

Objectives:

1. To make students aware on applications of differential calculus in finding asymptotes and curvature of Cartesian and polar curves.
2. To make students aware of differential calculus concepts involving functions of several variables.
3. To introduce the concept of Vector differentiation and integration that finds applications in solid mechanics, fluid flow, heat problems and potential theory etc.
4. To introduce the concept of Vector differentiation and associated concepts such gradient, divergence, and curl and their physical interpretation.
5. To make students aware of definite integrals, Beta and Gamma integrals (functions).
6. To make students aware of line, double, volume and surface integrals and their applications in mechanics and finding length, area, volume and surface area of regions.
7. To learn how and under what conditions one can represent periodic functions/signals by Fourier series and Fourier integrals.
8. To find Fourier and inverse Fourier transforms of variety of functions and some properties of Fourier transforms.

Course Details:

Unit 1: Differential Calculus: (08 Hrs)

- U1.1.** Mean Value Theorems [Rolle's Theorem, Cauchy and Lagrange's Mean Value Theorems], Asymptotes [Cartesian and Polar forms], Curvature [Cartesian and Polar forms]. **[T₂]**
- U1.2.** **Self Study Topics:** Intersections between curve and asymptotes, Curvilinear Asymptotes, Center and Chord of Curvature

Unit 2: Functions of Several Variables and Vector Differential Calculus: (08 Hrs)

- U2.1.** **Functions of Several Variables** [Limit, Continuity and Differentiability, Homogenous functions and Euler's Theorem, Higher Order Partial Derivatives and Taylor's series, Maximum and Minimum Value and Lagrange's Method of Multiplier] **[T₃]**
- U2.2.** **Vector Differential Calculus** [Derivatives of Vector valued functions, Vector equations of curves, Tangents of a curve, Gradient, Directional Derivative, Divergence and Curl] **[T₁]**



- U2.3. Self Study Topics:** Approximation by total differentials, Error estimates for approximations of functions of two or more variables.

Unit 3: Integral Calculus: (08 Hrs)

- U3.1.** Applications of definite integrals in finding arc length and area bounded by a curve (Cartesian cases only), Beta and Gamma Functions. [T₄]
U3.2. Line and Double Integrals. [T₁]
U3.3. Self Study Topics: Area and Length of Polar curves.

Unit 4: Vector integral calculus: (08 Hrs)

- U4.1.** Volume Integrals, and Surface Integrals, Green Theorem, Gauss Divergence Theorem and Stokes Theorem. [T₁]
U4.2. Self Study Topics: Applications of Divergence Theorem.

Unit 5: Fourier Series and Fourier Transforms: (08 Hrs)

- U5.1.** Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range expansion, Fourier transform and Fourier Integral. [T₁]
U5.2. Self Study Topics: Complex form of Fourier series , Fourier SeriesHalf Wave-Rectifier Wave, Rectangular Pulse, Periodic Square Wave., Fourier transforms of some fundamental functions.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1. Advanced Engineering Mathematics, Erwin Kreyszig, John Willy and Sons, 8th Edition, 1999. **Chapters:** 8 (8.4, 8.5, 8.9 – 8.11), 9 (9.1 – 9.9), 10 (10.1 – 10.4, 10.8 – 10.10).
- T2. Differential Calculus, Santi Narayan and Mittal, S. Chand, 15th Edition, 2005. **Chapters:** 8 (8.1 – 8.5), 14 (14.1 – 14.4), 15 (15.1 – 15.4, 15.8).
- T3. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publishing House, 4th, 2014 (Reprint). **Chapters:** 1 (1.5.4), 2 (2.1 – 2.5)
- T4. Integral Calculus, Santi Narayan and Mittal, S. Chand, 10th Edition, 2009- Reprint. **Chapters:** 8 (8.1 – 8.2), 9 (9.1 – 9.3).

Reference Books

- R4. Engineering Mathematics, S. Pal and S.C. Bhunia Oxford Publishers, 1st Edition, 2014.
- R5. Higher Engineering Mathematics, B. V. Ramana, TMH, 1st Reprint, 2007.
- R6. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.
- R7. Text Book of Differential Calculus, G. Prasad, Pothisala, 17th Edition, 2006.
- R8. Text Book of Integral Calculus, G. Prasad, Pothisala, 14th Edition, 2004.
- R9. Calculus, James Stewart, Thomson, 6th Edition, 2008



REF NO: To be filled by CD office

MA10201 :: MATHEMATICS – I

[DIFFERENTIAL CALCULUS, INTEGRAL CALCULUS, FOURIER METHODS]

Credits: 01

Teaching Scheme: Tutorial 01 Hrs/Week

Prerequisites: Elementary idea of Sets, Functions, Trigonometry, Two –dimensional co-ordinate Geometry, Fundamentals of differential and integral calculus of 10+2 standard

Objectives:

1. To make students aware on applications of differential calculus in finding asymptotes and curvature of Cartesian and polar curves.
2. To make students aware of differential calculus concepts involving functions of several variables.
3. To introduce the concept of Vector differentiation and integration that finds applications in solid mechanics, fluid flow, heat problems and potential theory etc.
4. To introduce the concept of Vector differentiation and associated concepts such gradient, divergence, and curl and their physical interpretation.
5. To make students aware of definite integrals, Beta and Gamma integrals (functions).
6. To make students aware of line, double, volume and surface integrals and their applications in mechanics and finding length, area, volume and surface area of regions.
7. To learn how and under what conditions one can represent periodic functions/signals by Fourier series and Fourier integrals.
8. To find Fourier and inverse Fourier transforms of variety of functions and some properties of Fourier transforms.

List of Tutorials:

Tutorial No. 1: Summary of Mean Value Theorems and problem solving.

Tutorial No. 2: Summary of Asymptotes and Curvature and problem solving.

Tutorial No. 3: Some additional problems for practice on limit and continuity of functions of Several variables and Euler formula.

Tutorial No. 4: Some problems for practice on maxima and minima of functions of several variables and Lagrange's multiplier method.

Tutorial No. 5: Some problems involving Gradient, Divergence and Curl.

Tutorial No. 6: Some problems for practice on Beta and Gamma Functions.

Tutorial No. 7: Some problems for practice on Applications of Double Integral



Tutorial No. 8: Some problems for practice on finding area and length of curves.

Tutorial No. 9: Some problems for practice on Surface and Volume Integrals

Tutorial No. 10: Some problems for practice involving Green's Theorem, Guass Divergence Theorem and Stoke's Theorem.

Tutorial No. 11: Some problems for practice on Fourier Series.

Tutorial No. 12: Some problems for practice on Fourier Transform.

Text Books:

- T1.** Advanced Engineering Mathematics, Erwin Kreyszig, John Willy and Sons, 8th Edition, 1999. **Chapters:** 8 (8.4, 8.5, 8.9 – 8.11), 9 (9.1 – 9.9), 10 (10.1 – 10.4, 10.8 – 10.10).
- T2.** Differential Calculus, Santi Narayan and Mittal, S. Chand, 15th Edition, 2005. **Chapters:** 8 (8.1 – 8.5), 14 (14.1 – 14.4), 15 (15.1 – 15.4, 15.8).
- T3.** Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publishing House, 4th, 2014 (Reprint). **Chapters:** 1 (1.5.4), 2 (2.1 – 2.5)
- T4.** Integral Calculus, Santi Narayan and Mittal, S. Chand, 10th Edition, 2009- Reprint. **Chapters:** 8 (8.1 – 8.2), 9 (9.1 – 9.3).

Reference Books

- R1.** Engineering Mathematics, S. Pal and S.C. Bhunia Oxford Publishers, 1st Edition, 2014.
- R2.** Higher Engineering Mathematics, B. V. Ramana, TMH, 1st Reprint, 2007.
- R3.** Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.
- R4.** Text Book of Differential Calculus, G. Prasad, Pothisala, 17th Edition, 2006.
- R5.** Text Book of Integral Calculus, G. Prasad, Pothisala, 14th Edition, 2004.
- R6.** Calculus, James Stewart, Thomson, 6th Edition, 2008



REF NO: To be filled by CD office

HS16108 :: ENGLISH – I

Credits: 02

Teaching Scheme: Theory 02 Hrs/Week

Prerequisites: Students should have tolerable proficiency in listening and speaking skills, study skills and grammar as envisaged in the higher secondary courses.

Objectives: The English course is a register based course specifically designed to prepare the professional/technical students to meet their profession related communication needs in English both at national and international levels. The course aims at accuracy and precision in expressions without sacrificing fluency. The broad objective of the course is accent neutralization and international intelligibility, both aural and oral. The course is designed to lead the learners from sound theoretical underpinnings to the acquisition of the nuances involved in international intelligibility through rigorous practice and exposure.

Course Details:

Unit 1: Communication: (4hrs)

- U1.1. Process and factors of communication in outlines : sender, receiver, channel, code, topic, message, context, feedback, 'noise', filters and barriers
- U1.2. Self study on non verbal communication

Unit 2: Sounds of English: (6hrs)

- U2.1. Consonants, consonant clusters, their IPA symbols, Vowels, diphthongs, their IPA symbols
- U2.2. Self study on IPA chart with at least 5 words from each sound

Unit 3: Phonemic Transcription: (4hrs)

- U3.1. Dictionary use [for phonemic transcription], Problem sounds
- U3.2. Self study on phonemic transcription of at least 30 words

Unit 4: Review of English Grammar: (6hrs)

- U4.1. The auxiliary system ; finite and non-finite verbs, Stative and dynamic verbs,
- U4.2. Self study on Modality and Concord.

Unit 5: Review of Sentence Patterns: (4hrs)

- U5.1. Voice: active and passive, Conditionals
- U5.2. Self study on Relative and reduced relative clause

Note: The teaching of grammar in units – 4 and 5 should be treated as a diagnostic and remedial activity and integrated with communication practice. The areas of



grammar in which errors are common should receive special attention when selecting items for review. Teaching need not be confined to the topics listed above.

Textbook:

- T1.** An Introduction to Professional English and Soft Skills, B.K.Das et al., Cambridge University Press, 2012
- T2.** Business Communication Today, Bovee et al , Pearson, 2012

Reference Books:

- R1.** English Phonetics and Phonology, Peter Roach, CUP, 2006
- R2.** Ship or Sheep, Ann Becker, CUP, 2008
- R3.** Oxford Practice Grammar, J Eastwood, CUP, 2008
- R4.** Effective Technical Communication, Rizvi, Tata Mc Graw-Hill, 2008



REF NO: To be filled by CD office

HS14313 :: COMMUNICATION SKILL

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: Students should have tolerable proficiency in listening and speaking skills, study skills and grammar as envisaged in the higher secondary courses.

Objectives:

List of Practicals:

- Experiment No. 1:** ear-training, segmental sounds
- Experiment No.2:** ear-training ,stress, weak forms, intonation
- Experiment No.3:** Note-taking on the basis of listening to the teacher
- Experiment No.4:** Pronunciation practice of problem sounds
- Experiment No.5:** Practicing primary and secondary stress with the dictionary
- Experiment No.6:** Reading aloud dialogues, poems, excerpts from plays, speeches etc.
- Experiment No.7:** Practicing tone group division and marking tone
- Experiment No.8:** Time, tense and Aspect
- Experiment No.9:** Negation, Interrogation
- Experiment No.10:** Error correction
- Experiment No.11:** Prepositions
- Experiment No.12:** phrasal verbs

Text Books:

- T1. English Phonetics and Phonology, Peter Roach, CUP, 2006

Reference Books:

- R1. Ship or Sheep, Ann Becker, CUP, 2008
- R2. Oxford Practice Grammar, J Eastwood, CUP, 2008
- R3. Listening – 3, Collie and Slater, CUP, 2005
- R4. Listening – 4, Doff and C.Jones, CUP, 2004



REF NO: To be filled by CD office

MA10102 :: MATHEMATICS – II

[LINEAR ALGEBRA , DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS]

Credits: 03

Teaching Scheme: Theory 03 Hrs/Week

Prerequisites: Elementary idea of differential and integral calculus of 10+2 standard.

Objectives:

1. To make students aware of basic concepts involving matrix algebra and its applications in solving systems of linear equations.
2. To enlighten the students with the different analytical techniques of solving ordinary differential equations with emphasis on problems involving engineering applications such as modeling of electric circuits [LC, CR, LR, LCR circuits], Orthogonal trajectories of the curves, modeling of mass spring systems, modeling of forced oscillations
3. To make students aware of Laplace and inverse Laplace transforms of variety of functions and their applications in solving ordinary linear differential equations.

Course Details:

Unit 1: Matrix Algebra:

(08 Hrs)

- U1.1.** Basic concepts of Matrices and Determinants, Symmetric, skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew-hermitian matrices, Unitary matrices, triangular and diagonal matrices, Rank of a Matrix, Linear systems of equations – Existence and uniqueness of solutions , Gauss Elimination, Cramer's Rule, Matrix Inversion Method, Guass Jordan elimination, LU factorization of matrices. **[T₁]**

- U1.2. Self Study Topics:** Geometry of Linear Equations.

Unit 2: Vector Space and Eigen Values:

(08 Hrs)

- U2.1.** Basic concepts involving Vector space, Dimension and Basis, Orthogonal bases and Gram-Schmidt Orthogonalization Eigen values and Eigen vectors of matrices, Similarity of matrices and Diagonalization. **[T₁]**

- U2.2. Self Study Topics:** Linear Transformations

Unit 3: Ordinary Differential Equations Of First Order:

(08 Hrs)

- U3.1.** First order differential equations, Separable equation, exact differential equation, linear differential equation, Bernoulli's equation and application to Electrical circuits and Orthogonal Trajectories. System of differential equations. **[T₂]**

- U3.2. Self Study Topics:** Existence and Uniqueness of solutions of First order ODE.

Unit 4: Ordinary Differential Equations Of Second Order:

(08 Hrs)



- U4.1.** Linear differential equation of second and higher order, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modeling of electric circuits **[T₂]**
- U4.2.** **Self Study Topics:** Higher Order homogenous and non-homogeneous ordinary differential equations with constant coefficient.

Unit 5: Laplace Transforms: (08 Hrs)

- U5.1.** Definition, Basic properties of Laplace transforms – Linearity property, Scaling, Shifting property, Initial and Final Value Theorems, Derivative and Integral of Laplace transform and Transform of derivative and Integral of a function, Laplace transforms of some commonly used functions, Convolution Theorem, Applications of Laplace transforms in solving initial value problems involving ordinary differential equations, Integral equations. **T₂**
- U5.2.** **Self Study Topics:** Method to solve system of ordinary linear differential equations with constant coefficients.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

- T1.** Linear Algebra and Its Applications, Gilbert Strang, Cengage Learning, Fourth Edition, **Chapters:** 1 (1.1, 1.3 – 1.6), 2 (2.1 – 2.4), 3 (3.1, 3.4), 4 (4.1 – 4.4), 5 (5.1, 5.2, 5.5, 5.6)
- T2.** Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 8th Edition, 1999. **Chapters:** 1 (1.1, 1.3 – 1.8), 2 (2.1 – 2.12), 3 (3.3), 5 (5.1 – 5.6).

Reference Books

- R1.** A First course in Differential Equations with Modelling Applications, Dennis G.Zill, Cengage Learning, 10th Edition, 2013.
- R2.** A Course on Ordinary and Partial Differential Equations, J. Sinha Roy and S. Padhy, Kalyani Publishers, 4th Edition, 2014.
- R3.** Higher Engineering Mathematics, B. V. Ramana, TMH, 1st Reprint, 2007.
- R4.** Engineering Mathematics, S. Pal and S.C. Bhunia Oxford Publishers, 1st Edition, 2014.
- R5.** Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.
- R6.** Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publishing House, 4th Edition, 2014-Reprint.



REF NO: To be filled by CD office

MA10102 :: MATHEMATICS – II

[LINEAR ALGEBRA , DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS]

Credits: 01

Teaching Scheme: Tutorial 01 Hrs/Week

Prerequisites: Elementary idea of differential and integral calculus of 10+2 standard.

Objectives:

1. To make students aware of basic concepts involving matrix algebra and its applications in solving systems of linear equations.
2. To enlighten the students with the different analytical techniques of solving ordinary differential equations with emphasis on problems involving engineering applications such as modeling of electric circuits [LC, CR, LR, LCR circuits], Orthogonal trajectories of the curves, modeling of mass spring systems, modeling of forced oscillations
3. To make students aware of Laplace and inverse Laplace transforms of variety of functions and their applications in solving ordinary linear differential equations.

List of Tutorials:

- Tutorial No. 1:** Some problems for practice on basics of matrices and determinant
- Tutorial No. 2:** Some problems for practice on solutions of systems of linear equations.
- Tutorial No. 3:** Some problems for practice on Vector Space, Bases and Dimensions of Vector Spaces.
- Tutorial No. 4:** Some problems for practice on Gram-Schmidt Orthogonalization and Diagonalization of Matrices
- Tutorial No. 5:** Some problems for practice on first order ordinary differential equations.
- Tutorial No. 6:** Some problems for practice involving applications of first order ordinary
- Tutorial No. 7:** Some problems for practice on second order ordinary differential equations.
- Tutorial No. 8:** Some problems for practice on second order ordinary differential equations.



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- Tutorial No. 9:** Some problems for practice involving applications of second order ordinary Differential equations.
- Tutorial No. 10:** Summary of Laplace Transforms and Inverse Laplace Transforms and some additional problems
- Tutorial No. 11:** Some additional problems for practice on Laplace and Inverse Transforms.
- Tutorial No. 12:** Some problems involving solution of differential and integral equations using Laplace Transforms.

Text Books:

- T1.** Linear Algebra and Its Applications, Gilbert Strang, Cengage Learning, Fourth Edition, **Chapters:** 1 (1.1, 1.3 – 1.6), 2 (2.1 – 2.4), 3 (3.1, 3.4), 4 (4.1 – 4.4), 5 (5.1, 5.2, 5.5, 5.6)
- T2.** Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 8th Edition, 1999. **Chapters:** 1 (1.1, 1.3 – 1.8), 2 (2.1 – 2.12), 3 (3.3), 5 (5.1 – 5.6).

Reference Books

- R1.** A First course in Differential Equations with Modelling Applications, Dennis G.Zill, Cengage Learning, 10th Edition, 2013.
- R2.** A Course on Ordinary and Partial Differential Equations, J. Sinha Roy and S. Padhy, Kalyani Publishers, 4th Edition, 2014.
- R3.** Higher Engineering Mathematics, B. V. Ramana, TMH, 1st Reprint, 2007.
- R4.** Engineering Mathematics, S. Pal and S.C. Bhunia Oxford Publishers, 1st Edition, 2014.
- R5.** Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.
- R6.** Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publishing House, 4th Edition, 2014-Reprint.



REF NO: To be filled by CD office

HS16114 :: ENGLISH – II

Credits: 02

Teaching Scheme: Theory 02 Hrs/Week

Prerequisites: Students should have tolerable proficiency in reading and writing skills, study skills and vocabulary building as envisaged in the higher secondary courses.

Objectives: This course in English is a need based course which is communicative in nature. It seeks to improve the reading and writing skills of students. The modules aim at addressing their future job related communication needs – both oral and written. As top executives, they have to read through piles of correspondence everyday and retrieve key information accurately at a fast rate. For this, they need to develop effective reading strategies. In addition, for success in the business/ professional world, there is a need for them to communicate with people around them orally and in writing. Lastly, the syllabus also provides ample opportunity to the learners to improve their vocabulary. Hence, the course aims at shaping their personality and improving their reading, speaking and writing skills to a level expected of international players in the field of business.

Course Details:

Unit 1: Cross-cultural Communication: (4hrs)

- U1.1.** Importance of cross-cultural communication in business situations.
U1.2. Self study: on bias free language and formal and informal language

Unit 2: Sub-skills of Reading: (4hrs)

- U2.1.** Understanding the main idea and supporting details - reading between the lines : inferential reading, making predictions, guessing the meanings of unfamiliar words, skimming and scanning, note-making and summarizing
U2.2. Self study: on a passage given to students to test the sub- skills of reading

Unit 3: Vocabulary Building: (4hrs)

- U3.1.** Synonym, Antonym and one word substitution, Collocations, Word formation, derivation and conversion
U3.2. Self study: on Foreign words and phrases used in English

Unit 4: Writing: (6hrs)

- U4.1.** Forms of written business communication: Business Letters, short reports, Memos, Advertisements
U4.2. Self study: on Notices and e-mails



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Unit 5: Qualities of Writing: (6hrs)

U5.1. The qualities of effective writing: coherence, cohesion, logical structuring and organization, clarity of language, stylistic variation, etc.

U5.2. Self study: on paragraph writing

Note: Five assignments to be given to the students on self study, comprising one assignment from each unit.

Textbooks:

- T1.** An Introduction to Professional English and Soft Skills, B.K. Das et al., Cambridge University Press, 2012
- T2.** Business Communication Today, Bovee et al., Pearson, 2012

Reference Books:

- R1.** Business Communication, Meenakshi Raman and Prakash Singh, Oxford, 2012
- R2.** Reading-4, S. Greenall and D. Pye, CUP, 1995
- R3.** Writing-4, Little John, CUP, 1994
- R4.** Brush Up your English, S.T. Imam, Bharati Bhawan Publishers, 1994
- R5.** Word Power Made Easy, Norman Lewis, Rupa India, 2010



REF NO: To be filled by CD office

**HS14319 :: BUSINESS COMMUNICATION & PRESENTATION SKIL
[COMMUNICATION SKILL]**

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

Prerequisites: Students should have tolerable proficiency in listening and speaking skills, study skills and grammar as envisaged in the higher secondary courses.

Objectives:

List of Practicals:

- Experiment No. 1:** Reading comprehension skills and vocabulary enrichment
 - Experiment No.2:** Study skills and reference skills
 - Experiment No.3:** Note making, summarizing
 - Experiment No.4:** Reading Aloud: Integrating reading with speaking 1
 - Experiment No.5:** Reading Aloud: Integrating reading with speaking 2
 - Experiment No.6:** Writing short paragraphs
 - Experiment No.7:** Business letters
 - Experiment No.8:** Memos, notices and e-mails
 - Experiment No.9:** Reporting news and messages
 - Experiment No.10:** Process Writing'
 - Experiment No. 11:** Post-writing revision, making a presentation ; discussion and feedback
- Experiment No.12:** Presentation of the projects

Textbooks:

- T1. An Introduction to Professional English and Soft Skills, B.K. Das et al., Cambridge University Press, 2012
- T2. Business Communication Today, Bovee et al., Pearson, 2012

Reference Books:

- R1. Business Communication, Meenakshi Raman and Prakash Singh, Oxford, 2012
- R2. Reading-4, S. Greenall and D. Pye, CUP, 1995
- R3. Writing-4, Little John, CUP, 1994
- R4. Brush Up your English, S.T. Imam, Bharati Bhawan Publishers, 1994
- R5. Word Power Made Easy, Norman Lewis, Rupa India, 2010



REF NO: To be filled by CD office

IN17701 / IN17702 :: MINI PROJECT

Credits: 01

Teaching Scheme: Laboratory 2 Hrs/week

Prerequisites: Nil

Objectives: Upon completion of this course, student should be able to:

- Scope for creativity
- Hands on experience
- Academic occupancy
- Group Activity

Course Guidelines:

1. The First Year students will carry out one Mini Project in every Semester based on all subjects registered in that Semester except GP.
2. The Semester Mini Project will be for a group of 3 to 5 students. Dean, First Year in consultation with the Dean, Academic will appoint Mini Project Guides.
3. Group formation, discussion with faculty advisor, formation of the Semester Mini Project statement, resource requirement, if any should be carried out in the earlier part of the Semester.
4. The students are expected to utilize the laboratory resources before or after their contact hours as per the prescribed module.
5. 2 credits will be awarded to the candidate after the viva-voce and project demonstration at the End of Semester.
6. The Assessment Scheme will be as follows:
 - (i). 50 marks are awarded as continuous assessment for various activities during the Semester by the Mini Project Guides.
 - (ii). Based on the submitted Mini-Project report, Oral Presentation and demonstration before a panel of examiners at the end of the semester, 50 marks are awarded as End Semester Assessment.
 - (iii). Overall score out of 100 is considered for allocation of appropriate grade.



Annexure I

REF NO: To be filled by CD office

HS153xx :: GENERAL PROFICIENCY

Credits: 01

Teaching Scheme: Laboratory 02 Hrs/Week

List of General Proficiency Courses offered to F.Y. B.Tech. AY 2015-16

Course Code Name of Course

HS15320	Flute
HS15321	Guitar
HS15322	Tabla
HS15323	Bharat Natyam
HS15324	Odishi
HS15325	Classical Vocal
HS15326	Yoga
HS15327	Pranayam
HS15328	Aerobics
HS15329	French-I
HS15330	Digital Photography
HS15331	Film Appreciation
HS15332	Volleyball
HS15333	Chess
HS15334	Taekwondo
HS15335	Swimming
HS15336	Fundamentals of Banking
HS15337	Nutrition and Fitness
HS15338	German-I
HS15339	Japanese-I