Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Technology

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Structure & Syllabus of

Department of Engineering, Sciences & Humanities (DESH)

Pattern 'B-14'
F. Y. B. Tech. (Common)
Effective from Academic Year 2015-16

Prepared by: - Board of Studies in Engineering, Sciences & Humanities

Approved by: - Academic Board, Vishwakarma Institute of Technology, Pune

Signed by,

Chairman – BOS **Chairman – Academic Board**

Content

@ Please Refer GP/OE/Language Course Booklet for Structure & Syllabi

FF No. 653 Issue 05 : Rev No. 0 : Dt. 22/11/14

F.Y. B. Tech. Structure with effect from Academic Year 2015-16

Module 1

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS10109	Linear Algebra and Random Variables	Theory - Core	3	-	1	10	20	5	5	-	60	4
HS10103	Modern Physics	Theory – Core	3	-	1	10	20	5	5	-	60	4
CH10101	Chemistry	Theory – Core	3	-	-	15	20	5	-	-	60	3
CH10301	Science Lab	Lab – Core	-	2	-	-	-	-		70	30	1
ME10101	Engineering Graphics	Theory – Core	3	-	-	15	20	5	-	-	60	3
ME10301	Engineering Graphics Lab	Lab – Core	-	2	-	-	-	-		70	30	1
HS16101 HS16103 HS16105 HS16107	Sociology Psychology Philosophy EVS	Theory – OE	2	-	-	15	20	5	-	-	60	2
HS17401	Mini Project	Project	-	4	-	-	-	-		70	30	2
		TOTAL	**14**	**08**	**2**							**20**

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F.Y. B. Tech. Structure with effect from Academic Year 2015-16
Module 2

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS10102	Differential Integral and Calculus	Theory - Core	3	-	1	10	20	5	5	-	60	4
HS10104	Engineering Mechanics	Theory – Core	3	-	1	10	20	5	5	-	60	4
HS10108	Electrical Engineering Fundamentals	Theory – Core	3	-	-	15	20	5	-	-	60	3
HS10306	Engineering Lab	Lab – Core	-	2	-	-	-	-		70	30	1
CS10102	Computer Programming	Theory – Core	3	-	-	15	20	5	-	-	60	3
CS10302	Computer Programming	Lab – Core	-	2	-	-	-	-		70	30	1
HS16102 HS16104 HS16106 HS16108	Economics Management Technology Cost & Acc. Business Law	Theory – OE	2	-	-	15	20	5	-	-	60	2
HS17402	Mini Proj.	Project	-	4	-	-	-	-		70	30	2
		TOTAL	**14**	**08**	**2**							**20**

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F.Y. B. Tech. Structure with effect from Academic Year 2015-16

Semester I – Irrespective of Module

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS10107	Communication Skill	Comm. Skill	-	2	-	-	-	-		70	30	1
HS153xx	General Proficiency	GP	-	2	-	-	-	-		70	30	1
HS15301 HS15302 HS15303 HS15304 HS15305	English I French I German I Spanish I Japanese I	Language	-	2	-	-	-	-		70	30	1
HS14301	Engineering Workshop	Workshop	-	2	-	-	-	-		70	30	1
TOTAL			**-**	**8**	**-**							**4**

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F.Y. B. Tech. Structure with effect from Academic Year 2014-15

Semester II – Irrespective of Module

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS17301	General seminar I	Comm. Skill	-	2	-	-	-	-		70	30	1
HS153xx	General Proficiency	GP	-	2	-	-	-	-		70	30	1
HS15306 HS15307 HS15308 HS15309 HS15310	French II German II Spanish II Japanese II English II	Language	-	2	-	-	-	-		70	30	1
HS14302	Trade Workshop	Workshop	-	2	-	-	-	-		70	30	1
TOTAL			**-**	**8**	**-**							**4**

HS153xx : General Proficiency Courses [Please see Annexure I]

MODULE I

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F.Y. B. Tech. Structure with effect from Academic Year 2015-16

Module 1

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS10109	Linear Algebra and Random Variables	Theory - Core	3	-	1	10	20	5	5	-	60	4
HS10103	Modern Physics	Theory – Core	3	-	1	10	20	5	5	-	60	4
CH10101	Chemistry	Theory – Core	3	-	-	15	20	5	-	-	60	3
CH10301	Science Lab	Lab – Core	-	2	-	-	-	-		70	30	1
ME10101	Engineering Graphics	Theory – Core	3	-	-	15	20	5	-	-	60	3
ME10301	Engineering Graphics Lab	Lab – Core	-	2	-	-	-	-		70	30	1
HS16101 HS16103 HS16105 HS16107	Sociology Psychology Philosophy EVS	Theory – OE	2	-	-	15	20	5	-	-	60	2
HS17401	Mini Project	Project	-	4	-	-	-	-		70	30	2
		TOTAL	**14**	**08**	**2**							**20**

HS10109 :: LINEAR ALGEBRA AND RANDOM VARIABLES

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit 1: Vector spaces **(8 Hours)**

Part A:

Rank of a Matrix, Systems of linear equations, Vectors in n-dimension, Vector spaces and subspaces, Spanning sets and Linear independence, Basis and dimension, Column space, Null Space, Row space.

Part B:

Applications of systems of linear equations: Electrical Network Analysis.

Unit 2: Inner product spaces and Linear Transformations **(8 Hours)**

Part A:

Inner Product spaces, Euclidean spaces, Norms, Construction of Orthogonal sets, The Gram–Schmidt process. Linear Transformation, Orthogonal transformations and its geometrical interpretation.

Part B:

Orthogonal Matrix.

Unit 3: Eigen values and Eigen vectors **(8 Hours)**

Part A:

Eigen values and Eigen vectors. Cayley-Hamilton theorem and its applications. Diagonalization, symmetric matrices and orthogonal diagonalization. Application of eigen values and eigen vectors to rotation of axes, Quadratic forms and reduction of quadratic forms to canonical form.

Part B:

Inverse and power of matrix using modal matrix.

Unit 4: Complex Numbers **(8 Hours)**

Part A:

Complex numbers and Argand Diagram. Polar form of a complex number. De Moivre's theorem and roots of a complex number. Exponential functions of a complex variable. Circular functions of a complex variable. Hyperbolic and inverse hyperbolic functions. Separation of real and imaginary parts of functions of complex variables.

Part B:

Logarithm of a complex number.

Unit 5: Probability and Statistics **(8 Hours)**

Part A:
Random variables, Probability distributions, Mathematical Expectation and variance. Binomial, Poisson, and Normal distributions. Joint distribution of discrete Random Variables.

Part B:
Correlation and regression of statistical data.

Text Books:

1. *Ron Larson and David C. Falvo; Linear Algebra: An Introduction; First Indian reprint 2010;Brooke/Cole, a part of Cengage Learning (Indian Edition).*
2. *B.S. Grewal; Higher Engineering Mathematics; 40th Edition 2007; Khanna Publishers.*
3. *Seymour Lipschutz, John Schiller; Introduction to Probability and statistics; 6th reprint 2008; Schaum's Outline, Tata McGraw-Hill.*

Reference Books:

1. *Gilbert Strang; Linear Algebra and its Applications; 10th Indian reprint 2011;Cengage Learning (Indian Edition).*
2. *David C. Lay ; Linear Algebra and its Applications; 12th impression 2011; Pearson Education Inc,.*

FF No. : 654 C

HS10209 :: LINEAR ALGEBRA AND RANDOM VARIABLES(Tutorial)

Credits: 01	**Teaching Scheme:** Tutorial 1 Hr/Week

Tutorial No. 1: Problems on rank of a matrix, solution of linear systems and its interpretation.

Tutorial No. 2: Problems on vector spaces and subspaces.

Tutorial No. 3: Problems on linear dependence and independence. Basis and dimension.

Tutorial No. 4: Problems on inner products, Gram Schmidt Process.

Tutorial No. 5 Problems on linear transformations, matrices for linear transformations.

Tutorial No. 6: Problems on eigen values and eigen vectors, Cayley-Hamilton theorem and its application.

Tutorial No. 7: Problems on diagonalization and orthogonal diagonalization.

Tutorial No. 8: Problems on reduction of quadratic forms to canonical forms.

Tutorial No. 9: Problems on complex numbers, Argand diagram, polar form of a complex number, De Moivre's theorem roots of complex numbers.

Tutorial No. 10: Problems on exponential and circular functions of complex variables, hyperbolic and inverse hyperbolic functions, separation of real and imaginary parts of functions of complex variables

Tutorial No. 11: Problems on random variables, probability distribution, Binomial and Poisson distribution.

Tutorial No. 12: Problems on Normal distribution and joint probability distribution.

Text Books:

1. *Ron Larson and David C. Falvo; Linear Algebra: An Introduction; First Indian reprint 2010;Brooke/Cole, a part of Cengage Learning (Indian Edition).*

2. *B.S. Grewal; Higher Engineering Mathematics; 40th Edition 2007; Khanna Publishers.*
3. *Seymour Lipschutz, John Schiller; Introduction to Probability and statistics; 6th reprint 2008; Schaum's Outline, Tata McGraw-Hill.*

Reference Books:

1. *Gilbert Strang; Linear Algebra and its Applications; 10th Indian reprint 2011;Cengage Learning (Indian Edition).*
2. *David C. Lay ; Linear Algebra and its Applications; 12th impression 2011; Pearson Education Inc,.*

Course Outcome:

At the end of this course the student will be able to:

1. Setup, solve and interpret linear systems.
2. Analyze finite and infinite dimensional vector spaces and subspaces, use matrix transformations.
3. Compute and apply the knowledge of eigenvalues and eigenvectors.
4. Represent complex numbers algebraically and geometrically, find roots algebraic equations and apply the knowledge of functions of complex numbers in problem solving.
5. Analyze and interpret probability distributions and perform regression analysis for statistical data.

HS10103 :: MODERN PHYSICS

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit I **(8 Hrs)**

[A]

Interference: Coherence, Thin film Interference, Fringe width, Colours in Thin Films (Oil Film, Peacock Feather), Newton's Rings, Michelson's Interferometer, Applications: Wavelength of Light, Resolution of Spectral Lines, Interference Applications: Optically Plane Surface, Antireflection Coatings.

Diffraction: Fresnel and Fraunhofer Diffraction, Fraunhofer Diffraction at Single Slit (Geometrical Method), Conditions for Maxima and Minima, Intensity Pattern, Plane Diffraction Grating (Qualitative Results Only), Dispersive Power of Grating, Resolving Power, Rayleigh's Criterion of Resolution, Resolving Power of Grating and Telescope**,** X - Ray Diffraction from Crystals, Braggs Law.

[B] Self Study

Applications of Newton's Rings for Determination of (i) Radius of Curvature of Plano Convex Lens (ii) Refractive Index of Liquid, Applications of Michelson's Interferometer for Determination of (i) Wavelength of a Monochromatic Source (ii) Refractive Index / Thickness of a Transparent Thin Film, Interference Filters.

Diffraction at Circular Aperture (Results Only), Applications: Resolving Power of Microscope, Wavelength Determination using Grating, Braggs X-ray Spectrometer.

Unit II **(7 Hrs)**

[A]

Polarization

Introduction, Malus Law, Double Refraction (Huygen's Theory), Huygen's Construction of Doubly Refracted Wave Fronts for Normal Incidence in Crystal cut with Optic Axis (i) Parallel to Surface, (ii) Inclined to Surface, Retardation Plates**,** Elliptically Polarized Light and its Production, Dichroism, Applications: LCD, Polaroids, Antennas.

Introduction to Special Theory of Relativity

Frames of References, Galilean Relativity, Michelson Morley Experiment (Results only), Physical Event, Lorentz Transformations of Space and Time, Einstein's Formulation of Special relativity, Length Contraction, Time Dilation.

[B] Self Study

Brewster's Law, Geometry of Calcite Crystal, Huygen's Construction of Doubly Refracted Wavefronts for Normal Incidence in Crystal cut with Optic Axis Perpendicular

to Surface, Quarter Wave Plate (QWP), Half wave plate (HWP), Nicols Prism, Circularly Polarized Light, Detection of Light (PPL, CPL, EPL, Upl, Par PL).

Relative Velocity, Relativistic Mass and Momentum, Mass and Energy.

Unit III **(9 Hrs)**

[A]

Elementary Quantum Mechanics

Limitations of Classical Mechanics and Need of Quantum Mechanics, Wave Particle Duality, Quantum Particle, de-Broglie's Hypothesis, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle, Electron Diffraction at Single Slit, Concept of Wave Function (ψ), Max Born's Interpretation of ψ, Physical Significance of ψ and ψ^2.

Quantum Mechanics

Schrödinger's Wave Equations, Applications of Schrodinger's Wave Equations to problems of (i) Particle in Rigid Box (1 D - Infinite Potential Well), Tunneling through a Potential Energy Barrier, Applications of Tunneling Effect, Tunnel Diode.

Nanoscience and Nanotechnology

Introduction, Nanoscience and Nanomaterials, Nanoparticles Properties (Quantum Size Effects: optical, electrical, magnetic, structural, mechanical), Zero, One, Two Dimensional nanostructures, Applications.

[B] Self Study

Rutherford's atomic model, Black body radiation, Photoelectric Effect, Bohr Atom model and its Limitations, Davisson and Germer's Experiment, γ – ray microscope.

Particle in a Non-rigid Box (Finite Potential Well), Qualitative (Results Only), Physical Interpretation of Quantum Numbers.

Techniques of nano-materials synthesis (physical, chemical, biological, mechanical, vapour and hybrid methods), Applications of nanotechnology in textile, cosmetics, electronics, energy, automobiles, space, defence, medical, environmental.

Unit IV **(9 Hrs)**

[A]

Semiconductor Physics

Kronig-Penny Model (Qualitative), Band Theory of Solids, Energy Bands in C (Graphite, Diamond), Ohm's Law (Microscopic), Temperature Dependence of Conductivity, Hall Effect, Fermi Level, Fermi-Dirac Probability Distribution Function, Fermi Level in Intrinsic (derivation) and Extrinsic Semiconductors (Effect of Temperature and Doping Level on Fermi Energy), Working of PN Junction Diode from Energy Band Diagrams, Photovoltaic Effect, Solar Cell Working and Characteristics.

Superconductivity

Introduction, Properties of Superconductors (Zero Resistance, Meissner Effect, Critical Fields, Persistent Currents, Critical Current Density, London Penetration Depth, Isotope Effect), BCS Theory, Preparation of High Tc Superconductors, DC and AC Josephson

Effect, Superconducting Quantum Interference Devices (SQUID), Applications.

[B] Self Study

Hybridization, Energy Bands in Li, Be, Na, Si, Valence Band, Conduction Band, Forbidden Gap, Classification of Solids into Conductors, Semiconductors and Insulators, Electrical Conductivity of Conductors and Semiconductors, PNP and NPN Transistors, Applications of Solar Cell.

Type I and II Superconductors, High Tc Superconductors, Applications: Transmission Lines, Superconducting Magnets, Maglev Trains, Magnetic Resonance Imaging (MRI Scanning), Superconductors in Computing.

Unit V **(7 Hrs)**

[A]

Lasers and Applications

Stimulated Absorption, Spontaneous and Stimulated Emission, Population Inversion, Basic Requirements for Lasing Action, Laser Properties, He-Ne Laser, Semiconductor Diode Laser, Carbon Dioxide Laser (Principle, Construction and Working).

Nuclear Physics

Binding Energy Curve, Nuclear Fission, Q - value of Nuclear Reaction, Nuclear Magnetic Resonance (NMR), Applications, Nuclear Fusion, Controlled Fusion, Ignition Temperature, Fusion Reactors, Confinement Schemes: Gravitational, Magnetic, Inertial, Laser Fusion Reactor.

[B] Self Study

Ruby Laser, Applications of Lasers (Industry : Drilling, Welding and Micromachining, Medical: Laser Eye, Skin, Cosmetic Surgery, Communication: Fibre Optics, Military Applications: Laser range detection, Laser Guided Missiles)

Nuclear constituents, Atomic Mass Unit, Mass Defect and Packing Fraction, Binding Energy, Uranium Chain reaction, Distinction between Nuclear Fission and Fusion, Fusion: Future Source of Energy, Fusion reactions.

Note: Five assignments on self study, comprising of one assignment from each unit.

FF No. : 654 C

HS10203 :: MODERN PHYSICS (Tutorial)

Credits: 01	**Teaching Scheme: -** 1 Hr/Week

List of Contents

Tutorial No. 1: Introduction to Waves, Superposition Principle, Phase Difference, Coherence, Methods of production of Coherent Sources, Division of Amplitude, Division of Wavefront, Interference, Introduction to Diffraction,

Tutorial No. 2: Problems on Thin Film Interference, Fringe Width,

Tutorial No. 3: Problems on Newton's Ring Experiment, Problems on Michelson's Interferometer, Antireflection Coatings, Interference Filter

Tutorial No. 4: Problems on Diffraction due to Single Slit, Problems on Diffraction Grating, Problems on Resolving Power of Grating, Telescope and Microscope.

Tutorial No. 5 Problems on Polarization, Malus Law, Brewster's Law, Retardation Plate etc.

Tutorial No. 6: Problems on Special Theory of Relativity: Length Contraction, Time Dilation, Relative Velocity etc.

Tutorial No. 7: Problems on Special Theory of Relativity: Relative Mass, Kinetic energy, Momentum, Mass Energy relation etc.

Tutorial No. 8: Problems on de-Broglies Hypothesis, Davisson & Germer Experiment,

Tutorial No. 9: Problems on Heisenberg's Uncertainty Principle, Problems on Normalization and 1 D – Infinite Potential Well,

Tutorial No. 10: Problems on Semiconductor Physics: Conductivity, Hall Effect, Fermi Function

Tutorial No. 11: Problems on Superconductivity: Critical Field, Isotope Effect, Penetration Depth,

Tutorial No. 12: Problems on Nuclear Physics : Q Value, BE, BE / A, Power of Nuclear reactor etc.

Text Books

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

Reference Books

1. *"University Physics with Modern Physics", Young and Freedman – 12th Ed. (Pearson Education),*
2. *"Lectures on Physics", Volume 1, 2 and 3 by Richard P. Feynman, Narosa Publisers / Pearson Education.*

Additional Readings

1. *"Fundamentals of Optics", Jenkins & White, M Hill Book Co, 1983,*
2. *"Fundamentals of Physics", Resnick and Halliday, John Wiley and Sons.*

Course Outcome :

At the end of this course the student will be able :

1. To understand and experience the fundamental principles of modern physics through an academic experience of "thinking, learning and doing."
2. To develop the intellectual capacity, critical thinking, creativity, and problem solving ability by undertaking the modern physics course.
3. To develop the ability to recognize and apply the appropriate physics introduced in the lecture course to actual experimental situations.
4. To learn the proper methods, techniques utilized in gathering experimental data, it's analysis to reach to scientific conclusion and to effectively communicate results in standard scientific ways using basic instrumental facility in modern physics laboratory.
5. The student will be able to design and demonstrate simple engineering applications based on modern physics concepts.

CH10101 :: CHEMISTRY

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit I **(9 Hrs)**

[A]

Chemical Bonding and Co-ordination Chemistry

Types of Bonds, Valance Bond Theory, Concept of Hybridization, Molecular Orbital Theory, MO Diagrams for Homogeneous and Heterogeneous molecules, Interpretation of Bond Order and Magnetic properties of molecules. Types of ligands, Nomenclature of Co-ordination complexes, Isomerism in Co-ordination complexes. Theories of Co-ordination compounds (VBT and CFT).

[B] Self Study: M.O. Diagram for N_2 and NO, Calculation of bond order and magnetism,

Unit II **(9 Hrs)**

[A]

Molecular Spectroscopy

Absorption Laws, Principle, Instrumentation and applications of UV-Visible, IR and NMR Spectroscopy, Woodward- Fieser Rule for calculating λ max. General idea of Mass spectroscopy, Numerical on all the three types of spectroscopy.

[B] Self Study: Additional numerical on UV-visible, IR and NMR spectroscopy.

Unit III **(8 Hrs)**

[A]

Thermodynamics

Basic terms in Thermodynamics, First law of thermodynamics, concept of enthalpy, Limitations, Second law of thermodynamics, Clausius and Kelvin statement, Concept of Entropy, Change in entropy for isothermal, reversible and irreversible process. Free energy, Physical significance and application of Gibbs-Helmholtz equation, Vant Hoff's Isotherm and Isochore. Numerical.

[B] Self Study: Numericals on first law of thermodynamics, entropy and enthalpy.

Unit IV

(7 Hrs)

[A]

Chemical Kinetics

Rate of reaction, experimental determination, Rate law and rate constant, Order and molecularity of reaction, Integrated rate equation for first and second order kinetics, Half life for first and second order kinetics, Arrhenius equation, Numericals on activation

energy, Half life, rate constant for first and second order kinetics.

[B] Self Study: Characteristics of rate constant, comparison between rate of reaction and rate constant, comparison between order and molecularity of reaction.

Unit V **(7 Hrs)**

[A]

Structure and Reactivity of Organic Molecules

Explanation and application of inductive, electromeric, mesomeric and hyperconjugative effect, Structure and stability of carbocation, carbanian, and free radical, Types of organic reactions (Substitution, Addition and Elimination), Optical isomerism, Geometrical isomerism, Conformational analysis of ethane.

[B] Self Study: Types of Bond cleavage, study of named reactions.

Note: Five assignments on self study, comprising of one assignment from each unit.

Text Books

1. "Engineering Chemistry", Dr. B. S. Chauhan, University Science Press, New Delhi, 3rd edition,
2. "Engineering Chemistry", Jain and Jain, Dhanpat Rai Publication.

Reference Books

1. "Principle of Physical Chemistry", B.R. Puri, L.R. Sharma, M.S. Pathania, S. Chand and Co. Ltd., New Delhi,
2. "Organic Chemistry- Vol 1", I L Finar, Pearson, 6th Edition,
3. "Selected Topics in Inorganic Chemistry" W. U. Malik, G. D. Tuli, R. D. Madan S. Chand and Co. Ltd., New Delhi.

Course Outcomes :

At the end of this course the student will be able to:

1. Draw the molecular orbital diagrams of Homonuclear and Heteronuclear diatomic molecules, name the coordination compounds and write the formulae of the same.
2. Operate scientific equipments that provide basic spectroscopic information and interpret the data obtained.
3. Derive the expressions for internal energy, enthalpy, entropy, free energy, rate constant, half life period and activation energy.
4. Apply appropriate technique, solve problems and arrive at solution based on the instrumental analytical principles, thermodynamic properties and kinetic equations.
5. Acquire the knowledge of organic reaction mechanisms and use in specific named reactions.

FF No. : 654 B

CH10301 :: SCIENCE LABORATORY (HS10103 + CH10101)

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

List of Practical (Experiments to be performed as per following code of conduct)

Sr. No.	**Name of the Experiment**	**Mode of Conduct**
1.	Newton's rings experiment (Wavelength, radius, refractive index)	**Experiment no 1:** Any one of two to be performed by students and other for demonstration of working principle.
2.	Michelson's Interferometer.	
3.	Use of diffraction grating for the determination of wavelength of spectral line.	**Experiment no 2:** Any one of four to be performed by the students and any two of remaining for demonstration of working principle.
4.	Determination of thickness of wire using LASER.	
5.	Determination of wavelength of a given laser source.	
6.	Resolving power of a telescope / Grating.	
7.	To verify cosine square law of Malus for plane polarized light using photocell.	**Experiment no 3:** Any one of four to be performed by the students and any two of remaining for demonstration of working principle.
8.	Determination of Brewster's angle for glass surface and refractive index of glass.	
9.	Determination of refractive indices for ordinary, extraordinary rays for a quartz crystal / Prism.	
10.	Demonstration of Lissajous figures using a CRO (Principle of interference) concepts of polarization	
11.	Determination of band gap of a semiconductor.	**Experiment no 4 and 5:** Any two of five to be performed by the students and any two of remaining for demonstration of working principle.
12.	Characteristics of solar cell, calculation of fill factor.	
13.	Hall Effect, determination of Hall coefficient.	
14.	Study of diode characteristics (PN, Zener, Tunnel)	
15.	Characteristics of a photocell.	

Text Books

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

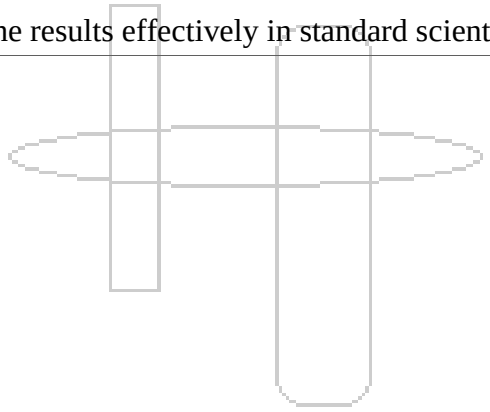
Reference Books

1. *"University Physics with Modern Physics", Young and Freedman – 12th Ed. (Pearson Education),*
2. *"Lectures on Physics", Volume 1, 2 and 3 by Richard P. Feynman, Narosa Publisers / Pearson Education.*

Course Outcome :

At the end of this course the student will be able :

1. To recognize and apply the appropriate physics introduced in the lecture course to actual experimental situations e.g. basic experiments on Optics, Semiconductor physics and lasers.
2. To use the proper methods, techniques utilized in gathering experimental data; it's analysis to reach to scientific conclusion.
3. To communicate the results effectively in standard scientific ways.



CHEMISTRY LABORATORY

List of Practical (any five):

1.	Experimental verification of Beer-Lambert's law by determining unknown concentration of solution of ferric ammonium sulphate using colorimeter.
2.	To find out the heat of neutralization of sodium hydroxide and hydrochloric acid.
3.	To determine the value of rate constant (k) for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.
4	Preparation of acetanilide from aniline.
5.	Preparation of benzoic acid from ethyl benzoate.
6.	Preparation of *tris*- (ethylenediamine) nickel thiosulphate.

Text Books

1. *"Lab manual on Engineering chemistry", Dr. S Rani, Dhanpat Rai Publication,*
2. *"Applied Chemistry Theory and Practical", O P Virmani and A K Narola New Age International Publication.*

Reference Books

1. *"Practical Inorganic Chemistry", Vogel, Prentice Hall Publication,*
2. *"Practical Organic Chemistry", Vogel, Prentice Hall Publication.*

Course Outcome :

At the end of this course the student will be able :

1. To synthesize in-organic and organic compound on laboratory scale in chemistry laboratory.
2. To calculate parameters like heat of neutralization and rate of reaction for certain physio-chemical reaction.
3. To determine unknown concentration of given colored solution of complex compound.

FF No. : 654 A

ME10101 :: ENGINEERING GRAPHICS

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit I: **(9 Hrs)**

A: Engineering Curves
Conic sections, Cycloid, Involutes, Archimedean spiral, Helix on cylinder and cone.
Orthographic Projections
Reference Planes, Types and Methods of projections with symbols, Projections of various objects, Full and half sectional views.

B: Epi-Cycloid, Hypo-Cycloid, Trochiods, offset section, revolved section, aligned section, removed section.

Unit II: **(9 Hrs)**

A: Projections of points, lines and planes
Projections of points in various quadrants, Projections of lines inclined to both reference planes (lines in first quadrant only), locating traces of lines. Projections of planes inclined to both reference planes, inclination of given plane with HP & VP, obtaining true shape, Distance of point from a given plane.

B: Distance between skew lines. Angle between two planes. Composite planes.

Unit III: **(8 Hrs)**

A: Projections of Solids and Sections of Solids
Classification of solids, Projections of solids such as Prism, Pyramids, Cylinder, Cone, Cube, tetrahedrons inclined to both reference planes. Types of section planes, Projections of above solids cut by various section planes, True shape of section.

B: Projections of Composite solids
Locating section planes for obtaining given sectional views and drawing sectional views i.e. Reverse sections.

Unit IV: **(8 Hrs)**

A: Development of Lateral Surfaces of Solids (DLS) and Inter-penetration of Solids
Development of Lateral Surface-concept, methods, applications. Inter-penetration of solids such as Prism-Prism, Prism-Pyramid, Cylinder-cylinder and Cylinder- cone;

B: Anti-development of lateral surfaces of cut solids. Interpenetration of prism cylinder.

Unit V: **(8 Hrs)**

A: Isometric Drawing

Isometric Projections and Isometric views, Construction of Isometric views from given orthographic views.

B: Isometric views of Sphere with other solids.

Note: Five assignments on self study, comprising of one assignment from each unit.

Text Books:

1. *"Engineering Drawing", N. D. Bhatt, 50th edition, Charotar Publication.*
2. **"***Engineering Drawing with an introduction to AUTOCAD" by Dhananjai A. Jolhe, 5th edition, Tata McGraw Hill education pvt.ltd., New Delhi.*
3. *"Engineering Graphics",by C. M. Agawal, Basant Agrawal, 2nd edition,Tata McGraw Hill education pvt.ltd., New Delhi.*

Reference Books:

1. **"***Fundamental of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi.*
2. **"***Engineering Drawing and Graphics", by Venugopal K., New Age Internation Publishers.*
3. *"Text book of Engineering Drawing", K. L. Narayana & P. Kannaiah, Scitech Publications, Chennai.*

Course outcome :

At the end of this course the student will be able to:

1. To learn standard practices of lines, lettering and dimensioning in Engineering Drawing.
2. Visualize and draw orthographic projections of 3D objects manually and with the help of CAD software.
3. To plot the projection of lines and planes.
4. To draw the projection & section of solids and truncated solids.
5. To sketch penetration curves of two intersecting solids and develop lateral surfaces of solids.
6. Visualize the object and draw isometric views for simple machine components.

FF No. : 654 B

ME 10301 :: ENGINEERING GRAPHICS LABORATORY

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

List of Practicals:

1. **Lines, Lettering, Dimensioning** **(2 Sessions)**
   Various types of lines and applications, Various standard practices of dimensioning and Lettering.

2. **Orthographic Projections.** **(2 Sessions)**
   a. Orthographic projections of a given Machine Component. (2 Problems)
   b. Orthographic projections with sectional views. (1 Problem)

3. **Projections of Lines, Planes.** **(2 Sessions)**
   a. Projections of line inclined to both the reference plane. (3 Problems)
   b. Projections of plane inclined to both the reference plane. (2 Problems)

4. **Projections & Sections of Solids.** **(2 Sessions)**
   a. Projections of Solids inclined to both the reference plane. (2 Problems)
   b. Projections of Solids with sectional views. (2 Problems)

5. **Development of Lateral Surfaces & Inter-Penetration of Solids.** **(2 Sessions)**
   a. Development and anti Development of lateral surface. (2 Problems)
   b. Interpenetration of solids. (2 Problems)

6. **Isometric Drawings.** (3 Problems) **(2 Sessions)**

7. **Introduction to AUTOCAD** **(2 Sessions)**
   Minimum one drawing to be completed using basic commands of AUTOCAD.

Text Books:

1. *"Engineering Drawing", N. D. Bhatt, 50th edition, Charotar Publication.*
2. ***"****Engineering Drawing with an introduction to AUTOCAD" by Dhananjai A. Jolhe, 5th edition, Tata McGraw Hill education pvt.ltd., New Delhi.*
3. *"Engineering Graphics", by C. M. Agawal, Basant Agrawal, 2nd edition,Tata McGraw Hill education pvt.ltd., New Delhi.*

Reference Books:

1. **"***Fundamental of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi.*
2. **"***Engineering Drawing and Graphics", by Venugopal K., New Age Internation Publishers.*
3. *"Text book of Engineering Drawing", K. L. Narayana & P. Kannaiah, Scitech Publications, Chennai.*

Course Outcome:

The student will be able to:

1 Learn to use various drawing instruments for sketching Engineering Drawings.
2 Learn standard practices of lines, lettering and dimensioning in Engineering Drawings.
3 Visualize and draw orthographic and isometric projections of various objects with the drawing instruments.
4 Learn various commands of a CAD software (AUTOCAD) to plot Engineering Drawings.
5 Plot projection of lines, planes and solids.
6 Sketch truncated solids, penetration curves of two intersecting solids and develop lateral surfaces of solids.

FF No. : 654 A

HS 16101:: SOCIOLOGY

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit I: Nature and Scope of Sociology
Definition of Sociology,Brief review of development of Sociology - Brief, introduction to Western and Indian thinkers.Is Sociology a science? Importance and use of Sociology.

Unit II: Basic Concepts.
Society and community - meaning and difference., Association and institution: Family, Religion, education, marriage, Social system,Class and Caste

Unit III: Socialization
Definition, meaning and essential elements of socialization, Adult socialization and Re-socialization, Socialization and social control - values and norms, olkways and mores,customs, Agencies of socialization and social control.

Unit IV: Culture and civilization
Meaning and nature,Difference between Culture and Civilization, Characteristics of culture, Ethnocentrism and cultural relativism.

Unit V: Indian social problems
Women's issues, Poverty, Education and youth problems, Old Age problems.

Part B of all the above units will involve a project, class test, orals or a class activity. It may involve a field trip and then a project based on it.

Text Books:

1. *An Introduction to Sociology: Vidya Bhushan*
2. *Foundations of classical sociological theory: Paramjit S Judge*
3. *Changing Indian Society: Yogesh Atal*
4. *Indian Social Problems: G.R.Madan*

Course Outcome

An engineering student will

1	have a nuanced understanding of Indian society
2	develop understanding of various social issues
3	be prepared to understand cultural aspects in local and global perspective
4	be equipped understand Indian society in global perspective
5	be able to design their plans and solutions according to the needs of a society

FF No. : 654 A

HS 16103:: PSYCHOLOGY

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit 1 : The Science of Psychology **8 Hrs**

Part A:-

What is Psychology? Definition, goals, branches, different professions., Importance of Psychology for improvement in quality of life,Approaches to psychology—Psychoanalytic approach, behavioural approach., Scientific methods of Psychology- Experimental methods, Psychological assessment, Application- How to enhance your academic performance?

Part B:- Practical Course Work

No. of Assignments in journal -5 (based on all the applications given in all chapters.)

Unit 2 : Personality- Important aspect of Psychology **8 Hrs**

Part A:-

Definition and Nature,Types of Personality and their importance, Factors affecting personality development, Personality testing- 16PF and Big Five Model of Personality, Application – Increasing self- efficacy through goal setting.

Part B:- Practical Course Work

No. of Assignments in journal -5 (based on all the applications given in all chapters.)

Unit 3 : Family Dynamics **8 Hrs**

Part A:-

Family – nature, definitions and Importance, Importance of family in psychological wellbeing of an individual, Interpersonal relations and Communication, Parenting and Psychological growth, application- Reviewing and developing self through family relations

Part B:- Practical Course Work

No. of Assignments in journal -5 (based on all the applications given in all chapters.)

Unit 4 : Study Skills **8 Hrs**

Part A:-

Learning- definition, nature, Application of the concept of Conditioning in daily life, Creativity- nature, definition and stages, Creative thinking and Positive attitude, Application- Using learning creativity and attitude while dealing with your customers

Part B:- Practical Course Work

No. of Assignments in journal -5 (based on all the applications given in all chapters.)

Unit 5 : Stress Management **8 Hrs**

Part A

Nature and definition of stress, Causes of stress and types of stress, Consequences of stress, Stress management, Application- Dealing with stress in your own life and bringing about the desired change

Part B:- Practical Course Work

No. of Assignments in journal -5 (based on all the applications given in all chapters.)

Text Books:

1 *Feldman, R.S. (8th ed)(2008). Understanding Psychology*

2 *Ciccarelli, S & Meyer, G.E. (2006). Psychology. New Delhi: Pearson Education*

3 *Morgan and King and others: Introduction to Psychology*

4 *Postman, L. and Egan, J. P (1949) Experimental Psychology- an Introduction. Kalyani publication.*

5 *A.K. Singh: Psychological Testing Baron & Baron: Social Psychology*

Course outcome:

At the end of this course the student will be able to:

1 Students will be able to evaluate human behavior using the various subfields of psychology including neuroscience, sensation, perception, and states of consciousness, learning, memory, thinking and intelligence, motivation, personality, psychological disorders.

2 Students will understand and apply psychological principles to personal, social, and organizational issues.

3 Students will develop insight into their own and others' behavior and mental processes and apply effective strategies for self-management and self-improvement.

4 Students will be able to weigh evidence, tolerate ambiguity, act ethically, and reflect other values that are the underpinnings of psychology as a discipline.

5 Students will respect and use critical and creative thinking, skeptical inquiry, and, when possible, the scientific approach to solve problems related to behavior and mental processes.

FF No. : 654 A

HS 16105:: PHILOSOPHY

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit 1 Western Philosophy **5 hrs**

Part A: Introduction: What is philosophy? Two broad divisions: Western and Indian Philosophies,Western Philosophy, Pre Christ era: Includes natural Philosophers like Homer and Democritus, and classical philosophers like Socrates, Aristotle and Plato, After Christ era: Hellenism, rise of Christianity, Semitic religions (Judaism, Christianity and Islam), Middle Ages: The fall of the Roman Empire, rise of Islam, Modern era: The Renaissance, Kant, Hegel, Karl Marx, Darwin, Freud, Max Muller and other Indologists.
Part B Self Study: Natural philosophers like Hesoid, Empedocles, Anaxagoras, Democritus, Thales, Anaximander, Anaximenes, Parmenidus, Heraclitus and modern philosophers like Copernicus, Kepler, Rationalists like Descartes, Spinoza, Empiricists like Locke, Hume, Berkeley.

Unit 2 : **5 hrs**

Indian Philosophy:
Part A: Vedas- Privilege of humanity, what are the Vedas, origin of Vedas, unique position of human race, vedic process of learning – parampara system, qualifications of teacher and qualifications of disciple, the 4 vedas, vedic history, Vedanta sutra, Bhagavad Gita.
Part B: Self Study: Divisions of Vedas into sruti and smrti, upanishads, itihasas, puranas

Unit 3 : **5 hrs**

Essential elements of Vedic philosophy
Part A : Existence of soul, case studies, three aspects of absolute truth (Brahman, paramatma and bhagavan), three energies of absolute truth (cit, jiva, maya), material and spiritual worlds, reincarnation, concept of sin and karma, the wheel of samsara – life and death, prakrti and 3 modes of material nature.
Part B: Self Study: NDE, OBE, past life memories, phobias

Unit 4 : **5 hrs**

Teachings of Indian philosophers
Part A: Teachings of the famous philosophers in India: Sankara, Ramanuja, Madhva, Caitanya and comparison of philosophies, Impersonalism versus personalism, Different yoga processes, yoga ladder.
Part B: Self Study: Commonality in the philosophy of different religions.

Unit 5 : **5 hrs**

The vedic social structure
Part A: Hinduism, god-centred society, varnashrama dharma, 4 goals – dharma, artha, kama and moksha, 4 social and 4 spiritual orders, glory of ancient India, evidence of a global vedic

civilisation, meditation and mantra power.

Part B: Self Study: Vedic mathematics, major achievements/ contributions of ancient and contemporary Indian scientists, astrology, vaastu sastra, ayurveda.

	Text Books
1	*"Readings in Vedic literature" by Satsvarupa Dasa Goswami ,Bhaktivedanta Book Trust*
2	*"Searching for Vedic India" by Devamrita Swami, Bhaktivedanta Book Trust*
	Reference Books
1	*"Sophies World - A Novel about the History of Philosophy" by Jostien Garder, Berkeley Books, New York, USA, 1996*
2	*"Forbidden Archaeology -The hidden history of human race" by Micheal A Cremo and Richard L Thompson, Torchlight Publishing, 1993*
3	*"Where reincarnation and biology intersect" by Ian Stevenson, professor and head of dept. Of psychiatry, University of Virginia, Praeger publishers, 1997.*
	Course outcome: Upon completion of the course, graduates will be able to -
1	Understand prominent philosophical concepts
2	Systematically present challenges of doctrines like Darwin's theory, Big Bang theory and Aryan Invasion theory.
3	To identify essential elements of Vedic thought and it's applicability in modern times
4	Adopt philosophical principles in day to day lifestyle
5	Compare, debate and critically analyze core principles of Vedic and Abrahamic thought

FF No. : 654 A

HS 16107 :: ENVIORMENTAL STUDIES

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit 1:The Multidisciplinary Nature of Environmental Studies (05 Hours)

Definition, scope and importance, Need for public awareness.

Unit 2: Renewable and Non-renewable Resources (05 Hours)

Definition and types of resources based on different heads, Natural resources and associated problems, Classification of resources: renewable and non renewable resources, advantages and disadvantages, need for harnessing renewable resources, erosion and desertification, role of an individual in conservation of natural resources, equitable use of resources in achieving sustainable development.

Unit 3: Ecosystems (05 Hours)

Concept of an Ecosystem, Structure and Function of various components of an Ecosystem, Producers, Consumers and decomposers, Energy Flow in an Ecosystem, Ecological Succession, Ecological Pyramids for different types of Ecosystems, food chain, food web, interdependency of components of ecosystem over each other.

Unit IV: Biodiversity and its conservation (05 Hours)

Introduction, Definition, genetic, species and ecosystem diversity, Biogeographical classification of India, Value of Biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Unit V: Environmental Pollution (05 Hours)

Part A: - Definition of Pollution, various terms related to pollution, types of pollution, pollutants, types of pollutants, causes, effects and remedial measures of different types of pollution, solid waste management, role of an individual to prevent the pollution.

Part B: - Pollution case studies, disaster management, social issues and the environment, Human population and the environment.

Reference Books:

1 *Environmental Studies- Bharucha-UGC Publications*

	Course Outcome
1	Realize different issues related to environment
2	Plan different activities and programs to create awareness among the people and hence to preserve the nature by minimizing degradation of environment.
3	Understand interdependency of various factors of environment and hence to maintain equilibrium of nature.
4	Understand different types of ecosystems and their importance in balancing the nature.
5	Understand concept of biodiversity and need to preserve it.

MODULE II

FF No. 653 Issue 05 : Rev No. 0 : Dt. 22/11/14

F.Y. B. Tech. Structure with effect from Academic Year 2015-16
Module 2

Code	Subject	Type	Teaching Scheme			Assessment Scheme						Credits
			L	P	Tut.	ISA					ESA	
						Test 1	Test 2	HA	Tut.	CA	ESE	
HS10102	Differential Integral and Calculus	Theory - Core	3	-	1	10	20	5	5	-	60	4
HS10104	Engineering Mechanics	Theory – Core	3	-	1	10	20	5	5	-	60	4
HS10108	Electrical Engineering Fundamentals	Theory – Core	3	-	-	15	20	5	-	-	60	3
HS10306	Engineering Lab	Lab – Core	-	2	-	-	-	-		70	30	1
CS10102	Computer Programming	Theory – Core	3	-	-	15	20	5	-	-	60	3
CS10302	Computer Programming	Lab – Core	-	2	-	-	-	-		70	30	1
HS16102 HS16104 HS16106 HS16108	Economics Management Technology Cost & Acc. Business Law	Theory – OE	2	-	-	15	20	5	-	-	60	2
HS17402	Mini Proj.	Project	-	4	-	-	-	-		70	30	2
		TOTAL	**14**	**08**	**2**							**20**

HS10102 :: DIFFERENTIAL AND INTEGRAL CALCULUS

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit 1: Differential calculus **(8 Hours)**

Part A

Successive differentiaon and Leibnitz theorem for nth derivative of product of two functions. Sequence and Infinite series, tests for convergence (Comparison test, Ratio tests). Power series and its region of convergence. Taylor and Maclaurin's series.

Part B:

Indeterminate forms, L'Hospital rule.

Unit 2: Partial Derivatives **(8 Hours)**

Part A:

Functions of two or more variables. Partial derivatives. Differentiation of composite functions. Total Differential. Euler's theorem on homogeneous functions. Jacobian and its properties. Maxima and minima of functions of two variables.

Part B:

Method of Lagrange's undetermined multipliers for finding stationary values of functions of several variables.

Unit 3: Integral Calculus **(8 Hours)**

Part A:

Introduction to special functions: Gamma function and Beta function. Introduction to curve tracing. Tracing of Cartesian curves and its rectification. Standard Polar and Parametric curves (equations and diagram).

Part B:

Tracing and rectification Standard Polar and Parametric curves.

Unit 4: Multiple Integrals **(8 Hours)**

Part A:

Double Integrals. Triple Integrals and Transformation of multiple integrals. Areas by double integration and volume of solids by triple integration.

Part B:

Centroid and moment of Inertia of plane lamina and solids.

Unit 5: Ordinary differential equations **(8 Hours)**

Part A:

Exact differential equations and reducible to exact differential equations. Linear differential equations and equations reducible to linear form.

Part B:

Application of ordinary differential equations to orthogonal trajectories and Electrical Circuits.

FF No. : 654 C

HS10202 :: DIFFERENTIAL AND INTEGRAL CALCULUS
(Tutorial)

Credits: 01	**Teaching Scheme: - -** Tutorial 1 Hr/Week

Tutorial 1: Problems on successive differentiation and Libnitz's Rule.

Tutorial 2: Problems on Taylor and Mclaurin's series.

Tutorial 3: Problems on sequence and infinite series and test for its convergence, comparison, ratio test, power series and its convergence.

Tutorial 4: Problems on partial derivatives, theorem on differentials, Euler's theorem on homogeneous functions.

Tutorial 5: Problems on Jacobians and their applications, maxima and minima.

Tutorial 6: Problems on Beta and gamma functions.

Tutorial 7: Problems on tracing and rectification of curves in Cartesian, parametric and polar form.

Tutorial 8: Problems on double integration.

Tutorial 9: Problems on triple integration, transformation of multiple integrals (Jacobian).

Tutorial 10: Problems on application of multiple integration.

Tutorial 11: Problems on Exact Differential Equations, reducible to Exact Differential Equations.

Tutorial 12: Problems on Linear Differential Equations, Bernoulli's Differential Equations and its applications.

Text Books:

1. *Ron Larson and Bruce H. Edwards; Text book of Calculus; (Indian Edition), 1st Indian reprint 2010; Brooke/Cole, a part of Cengage Learning*
2. *B.S. Grewal; Higher Engineering Mathematics ; 40th Edition 2007; Khanna Publishers*

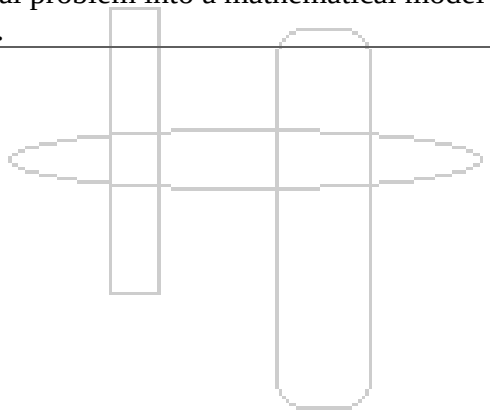
Reference Books:

1. *Tom M. Apostal; Calculus, Volume I: One Variable Calculus with an Introduction to Linear Algebra; 2nd Edition, Reprint 2011; Wiley.*
2. *Tom M. Apostal; Calculus, Volume II: Multi Variable Calculus and Linear Algebra with Application to Differential Equations and Probability; 2nd Edition, Reprint 2011; Wiley.*
3. *Robert T. Smith and Roland B Minton; Calculus; 4th Edition; Mc Graw Hill Education (Indian Edition).*
4. *B. V. Ramana; Higher Engineering Mathematics; 5th reprint 2012; Tata McGraw Hill.*

Course outcome :

At the end of this course the student will be able to:

1. Acquire the knowledge of higher order derivatives, power series, co-ordinate systems, partial differentiation, curves and surfaces, methods of integration.
2. Recognize, identify and analyze the geometric and physical interpretation of the problem and select suitable solution technique.
3. Apply the concepts of higher order derivatives, power series, co-ordinate systems, partial differentiation, curves and surfaces, methods of integration to solve mathematical and engineering problems.
4. Translate a physical problem into a mathematical model and solve with the appropriate mathematical tool.



FF No. : 654 A

HS 10104:: ENGINEERING MECHANICS

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit 1: Basics of Statics **(8 Hrs)**

Part A

Introduction to Engineering Mechanics: definition (of force, units of force, particle, body, mass, weight), force systems, characteristics of force, effect of force, Newton's three laws of motion.

Coplanar force system: resolution of force into rectangular and skew components, composition of force, Resultant, Equilibriant, Equilibrium of particle.

Moment of force, Varignon's theorem of moment, couple, properties of couple, resultant of parallel and non concurrent non parallel force system.

Non coplanar force system: vector, unit vector, direction angles, direction cosines, rectangular components of force vector, resultant and equilibrium of concurrent force system,

Moment of a force about a point and about an axis, resultant and equilibrium of parallel force system.

Part B:

Six fundamental principles of mechanics, numerical on Part A.

Unit II: Equilibrium of Rigid Bodies: **(7 Hrs)**

Part A

Equilibrium : Conditions of equilibrium for particle and body in coplanar and non coplanar force system, concept of free body diagrams, concept of two and three force equilibrium, types of supports and support reactions, types of loadings, equilibrium of simple beams and simple mechanisms.

Centroid: concept of centroid, center of mass, center of gravity, use of Varignon's theorem of moment to find centroid, Use of standard formulae to find centroid of area and line.

Part B:

Derivation of centroid of standard geometric lamina and line segments, numerical on part A

Unit III: Analysis of Structures and Friction

(8 Hrs)

Part A:

Plane truss: Concept of plane and space truss, two force and multi force member, perfect, imperfect, deficient, redundant plane truss, assumptions in analysis of truss, method of joints and method of section.

Frames: FBD of frames, concept of internal hinge, analysis of plane frames (maximum number of unknowns 09).

Friction: concept of friction, Coulumb's laws of dry friction, limiting force of friction, coefficient of friction, angle of friction, angle of repose, cone of friction, variation of frictional force for various conditions (no friction, no motion, impending motion and motion conditions), numerical on inclines planes, wedges, ladder.

Part B:

Difference between truss and frame, numerical on Part A

Unit IV: Kinematics of particles **(10 Hrs)**

Part A:

Types of motion (translation, rotation, GPM)

Rectilinear motion: concept of position, displacement, distance, speed, instantaneous and average velocity and acceleration, uniform motion, uniformly accelerated motion, Motion under gravity, primary and secondary equations of motion, constant acceleration equations, gravity motion equations, variable acceleration.

Motion curves: definition, necessity, limitations, types of motion curves, properties of motion curves, numerical to draw motion curves.

Curvilinear motion: concept of position, displacement, velocity and acceleration vectors, concept of curvature, radius of curvature, point of inflexion, component of velocity and acceleration in three systems (i) rectangular coordinate (x-y) system (ii) normal and tangential(n-t) system (iii) radial and transverse (r-θ) system.

Part B:

Curvilinear motion: derivation of component of velocity and acceleration in three systems (x-y, n-t and r-θ) Numerical on part A.

Unit V: Kinetics of Particles **(7 Hrs)**

Part A:

Force and acceleration: introduction to kinetics, Newton's second law of motion, D-Alembert's principle, dynamic equilibrium, concept of FBDE, application of $F = ma$ in rectangular coordinate system.

Work energy: concept of work, work done by (externally applied, gravity, friction, spring) force, power, efficiency, derivation of work energy principle and impulse momentum principle, conservative and non conservative forces, principle of conservation of energy.

Impact: concept of impact, impulse, coefficient of restitution, types of impact (elastic, plastic, elasto-plastic, with fixed surfaces), numerical on direct central impact.

Part B:

Derivation of coefficient of restitution, numerical on part A.

Note: Five assignments on self-study, comprising of one assignment from each unit.

Text Books:

1. *F. P. Beer and E. R. Johnston; Vector Mechanics for Engineers STATICS; McGraw-Hill Publications.*
2. *F. P. Beer and E. R. Johnston; Vector Mechanics for Engineers DYNAMICS; McGraw-Hill Publications.*
3. *N. H. Dubey; Engineering Mechanics Statics and Dynamics; McGraw-Hill Education Private Limited (India).*
4. *S. S. Bhavikatti; Engineering Mechanics; New Age International (P) Limited Publishers.*

Reference Books:

1. *R. C. Hibbler; Engineering Mechanics Statics and Dynamics; Pearson Publications.*
2. *A. P. Boresi, R. J. Schmidt; Engineering Mechanics Statics and Dynamics; Thomson/Cangage Publications.*

FF No. : 654 C

HS10204 :: ENGINEERING MECHANICS (TUTORIAL)

Credits: 01	**Teaching Scheme: -** Theory 1 Hr/Week

Tutorial 1: Problem solving on basic mathematical and computing skills.

Tutorial 2: Problem solving on coplanar concurrent force system.

Tutorial 3: Problem solving on finding resultant and equilibriant of coplanar general force system.

Tutorial 4: Problem solving on non coplanar concurrent and parallel force system.

Tutorial 5: Problem solving on reactions of beams,& mechanisms.

Tutorial 6: Problem solving on centroid of area and line segments.

Tutorial 7: Problem solving on analysis of truss and frames.

Tutorial 8: Problem solving on friction applied to inclined plane, wedge, and ladder.

Tutorial 9: Problem solving on variable acceleration and motion curves.

Tutorial 10: Problem solving on kinematics of curvilinear motion.

Tutorial 11: Problem solving on application of Newton's second law of motion.

Tutorial 12: Problem solving on work energy principle and direct central impact.

Text Books

1. *"Vector Mechanics for Engineers", F. P. Beer and E. R. Johnston, 9th Edition –Mc Graw Hill Publications,*
2. *"Engineering Mechanics Statics and Dynamics", R. C. Hibbler, Ashok Gupta, 11th Edition – Pearson Publications,*

Reference Books

1. *"Engineering Mechanics Statics", J. L. Meriam, L. G. Kraige – 5th Edition, John Wiley & Sons,*
2. *"Engineering Mechanics Dyanamics", J. L. Meriam, L. G. Kraige – 5th Edition, John Wiley & Sons.*

3. *"Engineering Mechanics Statics and Dynamics", E.W. Nelson, C. L. Best, W. G. McLean, 5th Edition – Tata McGraw Hill.*
4. *"Engineering Mechanics Statics and Dynamics", A. P. Boresi, R. J. Schmidt,– Thomson/Cangage Publications,*

Course outcome :

At the end of this course the student will be able to:

1 Evaluation of resultant of force system and to draw proper free body diagram for application of equilibrium equations to particle .

2 Apply equilibrium equations to solve support reactions on determinate beams, simple mechanisms. Calculating centroid of area and lines.

3 Evaluation of internal forces in simple plane truss and in simple plane frames and to solve mechanics problems associated with frictional forces

4 Analysis of kinematics motion of the particle in different frames of references viz. rectangular, path variables and radial transverse systems.

5 Application of Newton's second law of motion, work energy, impulse momentum principle and impact for particle.

HS10108 : ELECTRICAL ENGINEERING FUNDAMENTALS

Credits: 03	**Teaching Scheme: -** Theory 3 Hrs/Week

Unit I – Network Theorems **(8 Hrs)**

[A] Ohm's law, simplification of networks using series - parallel combinations and star - delta transformations, current and voltage sources, Kirchhoff's laws, superposition theorem, Thevenin's theorem, Norton's Theorem.

[B] Self Study: Maximum power transfer theorem.

Unit II – AC Circuits – I **(8 Hrs)**

[A] Concept of phasor representation of AC quantity, concept of instantaneous, peak, average and RMS value of AC quantity, peak factor, form factor, study of AC through purely resistive, inductive and capacitive circuits, concept of impedance, concepts of active, reactive and apparent power, power factor.

[B] Self Study: Concept of AC quantities, concepts of cycle, period, frequency, phase difference as related to sinusoidal voltages and currents.

Unit III - AC Circuits – II **(8 Hrs)**

[A] Study of single phase RLC series and RLC parallel circuits, concept of three phase supply, phase sequence, concepts of line, phase, neutral etc., power relations in a three phase balanced star and delta connections, three phase phasor diagrams.

[B] Self Study: Power factor improvement in a three phase circuit.

Unit IV - Work, Power and Energy **(8 Hrs)**

[A] Energy conversions from one form to another such as electrical, heat, potential, kinetic, linear, rotational, solar, wind etc. and numerical problems based on different energy conversions in real life cases.

[B] Self Study: Collection of data related to energy scenario in India, study of a domestic electricity bill.

Unit V – Electrical Energy Scenario, Batteries and Electrical Safety **(8 Hrs)**

[A] Electrical power generation scenario in India, grid system, different terms associated with energy and its utilization. Electrical cells and batteries, different terms associated with cells and batteries, types, construction, chemicals used maintenance procedure.
Electrical safety, different terms associated with safety, safety gadgets, concept of earthling. Conservation of electrical energy.

[B] Self Study: Types and procedure of earthing.

Note: Five assignments on self-study, comprising of one assignment from each unit.

Text Books :

1. *Electrical Technology by Edward Hughes, 7th Edition,*
2. *Electrical Technology - vol.- I and II by B. L. Theraja.*

Reference Books :

1. Basic Electrical Engineering by Nagarath and Kothari.
2. Principals of Electrical Engineering by Vincent Del Toro, PHI publications.
3. Basic electrical Engineering by V.K.Mehta, S. Chand Publications.

Course Outcome :

At the end of this course the student will be able to:

1. solve an electrical network using different theorems such as superposition theorem, Thevenin's theorem etc.
2. Solve numerical problems using fundamental concepts of AC circuits.
3. Solve numerical problems based on AC series, AC parallel and three phase circuits.
4. Solve numerical problems based on energy conversions related to electrical energy.
5. Collect and analyze latest data about electrical energy scenario in India.
6. Compare different types of cells and batteries.
7. Know the aspects about electrical safety.

FF No. : 654 B

HS10306 :: ENGINEERING LABORATORY (HS10104 + HS10108)

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

ENGINEERING MECHANICS LABORATORY

	LIST OF EXPERIMENTS
1	Verification of Lami's theorem
2	Verification of Varignon's theorem
3	Equilibrium of concurrent space force system
4	Equilibrium of parallel space force system
5	Reacting forces in simple beams
6	Reacting forces in compound beams
7	Study of curvilinear motion
8	To find Coefficient of restitution
9	Solution of two problems from statics using computer application software
10	Solution of two problems from dynamics using computer application software
11	Exercise on Multiple Choice Questions using Computer Application Software

Text Books:

1. *F. P. Beer and E. R. Johnston; Vector Mechanics for Engineers STATICS; McGraw-Hill Publications.*
2. *F. P. Beer and E. R. Johnston; Vector Mechanics for Engineers DYNAMICS; McGraw-Hill Publications.*
3. *N. H. Dubey; Engineering Mechanics Statics and Dynamics; McGraw-Hill Education Private Limited (India).*
4. *S. S. Bhavikatti; Engineering Mechanics; New Age International (P) Limited Publishers*

Reference Books:

1. *R. C. Hibbler; Engineering Mechanics Statics and Dynamics; Pearson Publications.*
2. *A. P. Boresi, R. J. Schmidt; Engineering Mechanics Statics and Dynamics; Thomson/Cangage Publications.*

Course Outcome :

At the end of this course the student will be able to:

1 Conduct experiment on verification of Lami's theorem and Varignon's theorem of moments.

2 Conduct experiment on equilibrium of space forces for concurrent and parallel

	force system.
3	Conduct experiment on determination of support reactions for simple and compound beams.
4	Conduct experiment on calculation of coefficient of restitution and to study concept of curvilinear motion.
5	Use of computer softwares to solve Engineering Mechanics problems.

ELECTRICAL ENGINEERING FUNDAMENTALS LABORATORY

List of Practical – (Any 6 experiments from the list below.)

1	Study of wires and wiring components.
2	Wiring Exercise - 1.
3	Wiring Exercise - 2.
4	Making of a single phase extension board.
5	Study of RLC series circuit.
6	Study of three phase circuits.
7	Study of a domestic electricity bill.
8	Study of batteries and cells.
9	Study of earthing and safety equipments.

Text Books

1. *Electrical Technology - vol.- I and II by B. L. Theraja.*
2. *Wiring, estimation and costing by S. L. Uppal*

Reference Books

1. *Fractional and sub fractional horse power electrical motors - C.E. Veinou and J.E. Martits , McGraw Hill*

Course Outcome:

The learner will be able to:

1 Identify different electrical components and understand the use of them in electrical systems.

2 Connect electrical components for different electrical domestic circuits.

3 Verify different concepts of ac single phase and three phase circuits.

CS 10102 :: COMPUTER PROGRAMMING

Credits: 3	**Teaching Scheme:** - 3 Hrs/Week

Unit I **(8 Hrs)**

Part A.

Introduction to Programming: Problem solving using computers and logic design. Algorithms and their representations: flowcharts, pseudo code. Designing algorithms for problems like finding min-max, mean, median, mode, mensuration and roots of a quadratic equation. Concept of programming languages for implementing algorithms – levels of languages. Role of assemblers, compilers, linker, loader, interpreter in program execution.

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. Variable, constant (literal and named), Data types, variable declaration. Assignment. Operators: Arithmetic, logical, relational, Expressions, Precedence & Associativity. Input and output statements, escape sequences.

Part B.

Bits and bytes – importance of digital representation in computers. Number System and algorithms for inter conversions.C programming on Linux and Windows.

Unit II – **(8 Hrs)**

Part A.

Flow of Control: 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, prime numbers.

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.

Part B.

Static variables and constants in C language.

Unit III **(8 Hrs)**

Part A.

Functions: 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.

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.

Part B.
Preprocessor and preprocessor directives: macro substitution, difference between macro and functions.

Unit IV **(8 Hrs)**

Part A.

Pointers: 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. Pointers and strings. Pointer constants. Array of pointers, pointer to array. Various alternatives of accessing arrays (1-D and 2-D) using pointers.

Strings: Strings as arrays, character array versus strings, reading strings, writing strings, user defined functions for string operations – copy, concatenate, length, reverse, converting case, appending, comparing two string, extracting a substring. Array of strings.

Part B:
Const keyword in C, standard string library functions in string.h for string manipulation.

Unit V **(8 Hrs)**

Part A.

Structures: Notion, declaration and initialization, structure variables, accessing and assigning values of the fields, "size of" operator, functions and structures, arrays of structures, nested structures, pointers and structures, passing structure to a function and returning structure from function. Dynamic memory allocation, type casting, Introduction to self referential structures, linked list as a dynamic alternative to arrays.

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.

Part B.
Typedef keyword. Union, Nesting of Structure and Union. Enumerated data types

Note: Five assignments on self-study, comprising of one assignment from each unit.

Text Books

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

Reference Books

1. *"Programming language – ANSI C", Brain W Kernighan and Dennis Ritchie, Second edition ISBN 0-13-110370-9*

Additional Reading

1. *"A first book of C- Fundamental of C Programming", Gary Bronson and Stephen Menconi, ISBN: 0314073361,*

Course Outcome :

At the end of this course the student will be able to:

1. List procedural programming benefits to construct concise solutions .
2. Interpret and develop naturo-visual representation of problem in hand.
3. Apply available algorithmic principles to general efficient solutions.
4. Justify modular programming approach by making use of elementary as well as superior data structures.
5. Apply programming fundamentals with generic prototype.
6. Evaluate and manipulate given solutions in reengineered view

FF No. : 654 B

CS10302 :: COMPUTER PROGRAMMING LAB

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

List of Practical

1. Study of DOS/UNIX commands.
2. Write a program in C to accept a character from user and display it in opposite case/ to generate a simple mathematical calculator.
3. Write a program in C to find largest element / average of given N elements/ sum/reverse of a given integer.
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 that use both recursive and non-recursive functions to find the Factorial / GCD (greatest common divisor) of two given integers / Fibonacci series etc.
7. Write a program in C to sort n integers using bubble / merge sort.
8. Write a program in C to search a number in a given list using linear / binary search.
9. Write a program in C to perform Addition / Subtraction / Multiplication of two Matrices. Also determine whether the matrix is symmetric / skewed.
10. Write a program in C to carry out following operations on strings using library function.
    a. Length of a sting. b. Copy of string. c. Concatenation of strings.
11. Write a program in C to carry out following operations on strings without using library function.
    a. Compare two strings. b. Reverse given string.
    c. To check if the given string is a palindrome or not.
12. Write a program in C to carry out following operations on strings using pointers.
    a. Length of a sting. c. Copy of string.
    b. Concatenation of strings. d. Compare two strings.
13. Write a C program that represents complex number using a structure. Perform the following operations:
    a. Reading a complex number. c. Writing a complex number.
    b. Addition of two complex numbers. d. Multiplication of two complex numbers.
14. Write a C program to create a database of students by using array of structure and perform following operations on it.
    a. Accept record of student c. Display all records
    b. Search a particular record d. Modify a particular record.
15. Write a C++ program to demonstrate the use of constructor, destructor.
16. Write a C++ program to demonstrate multi-level inheritance and multiple inheritance.
17. Write a C++ program to demonstrate polymorphism

Note: Faculty members should frame 14 assignments from the above list.
First assignment and any two C++ assignments in the list are compulsory.

Text Books

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

Reference Books

1. *"Programming language – ANSI C", Brain W Kernighan and Dennis Ritchie, Second edition ISBN 0-13-110370-9,*
2. *" Object Oriented Programming with C++", E. Balaguruswamy, Tata McGraw Hill Publication, ISBN 0-07-462038-x.*

Additional Reading

1. *"A first book of C- Fundamental of C Programming", Gary Bronson and Stephen Menconi, ISBN: 0314073361,*
2. *"C++ Program Design: An introduction to Programming and Object-Oriented Design", Cohoon and Davidson, 3rd Edition, Tata McGraw Hill. 2003, ISBN-13: 978-0-07-122649-3.*

FF No. : 654 A

HS 16102 :: ECONOMICS

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit-1

Part A: What is Economics? Scope of Economics given by different definitions of Economics. Meaning of Micro and Macro Economics. Methods of Economic study and their limitations. Meaning of positive and normative economics. Basic economic problems .Allocation and distribution of resources. Opportunity cost

PartB: Production Possibility Curve

Unit-2

Part A: Meaning of demand. Law of Demand. Exceptions to the Law of Demand. Determinants of Demand. Meaning of supply. Law of Supply. Assumptions of Law of Supply. Factors determining Supply. Elasticity of Demand. Theory of Consumer Behavior.

Part B: Marginal Utility approach, Indifference Curve approach

Unit-3

Part A: Theory of Production, Law of Returns to Scale. Meaning of Market, Classification of Market forms: Perfect Competition, Monopolistic Competition, Oligopoly, Monopoly. Marginal Productivity Theory of Distribution. Labour Exploitation. Role of Trade Unions and Collective Bargaining in wage determination

Part B: Role of government in economy

Unit-4

Part A: Functions of Money, Demand and Supply of Money. Concepts of national income accounting, GNP, NNP, GDP, NDP. Problems of Indian economy. Causes of inflation.

Part B:Population explosion

Unit-5

Part A: Basis of International Trade. Theory of Absolute Advantage. Theory of Comparative Advantage. Free Trade Vs Protection. Determination of Foreign

Part B:Exchange and major exchange rate systems

Text Books

1. *Principles of Microeconomics by Dr. H. L. Ahuja*
2. *Managerial Economics byDr. D.M. Mithani*
3. *Indian economyby A.N.Agrawal*
4. *Indian Economy byDatta, Sundaram*
5. *Economics by Samuelson*

Course outcome :

At the end of this course the student will be able to:

1 Make efficient use of resources.

2 Use tools of economic analysis in his/ her presentations or reports.

3 Take right economic decisions.

4 Make changes in his production activity according to changes in demand, rate of interest or tax structure.

5 Set up a new enterprise.

FF No. : 654 A

HS 16104 :: MANAGENENT TECHNOLOGY

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit 1: **(8 Hrs)**
Part A: - Development of Management thought, Nature and functions of Management, Planning, Decision making

Unit 2: **(8 Hrs)**
Part A: - Organization, Formal &Informal organization Authority, Delegation and Decentralization

Unit 3: **(8 Hrs)**
Part A: - Communication, Staffing, Training & Development, Direction & Supervision, Performance appraisal, Wage payment plans

Unit 4: **(8 Hrs)**
Part A: - Leadership ,Managerial control ,Management of organizational change

Unit 5: **(8 Hrs)**
Part A: - Social responsibilities of Business and Corporate governance

Part B of all the above units will involve a project, orals or a class activity and may involve a field visit and then a case study based on it.

Text Books:

1 *Production & Operations Management – Chary*
2 *Principles of Management – Tripathi & Reddy*
3 *International Business Environment & Management – Bhalla & Shivaram*

Course Outcome:

An engineering student will be able to

1 Do SWOT analysis
2 Base decisions on Cost Benefit analysis and knowledge of human behaviour
3 Take decisions individually and in a group
4 Plan
5 Adopt an Organizational Structure
6 Learn the importance of Effective Communication, Unbiased performance appraisal, recruitment tests, promotions and Rewards
7 Have insights to motivational theories.
8 Learn the importance of Leadership qualities like taking long term view of everything, leading from front and doing everything to shape future of enterprise against all odds.
9 Learn the importance of good governance and Corporate Social Responsibility.

FF No. : 654 A

HS 16106 :: COST AND ACCOUNTING

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit - I **08 Hours**

Introduction of Accounting

A] Basic accounting concepts, types of accounts, double entry system of accounting, basic books of accounts, trial balance, final accounts of sole proprietary concern.

B] Self study- Numerical problem solving on(A)from text book prescribed.

Unit - II **06 Hours**

Cost Accounting

A] Cost Accounting - Nature , importance, methods, techniques of costing, elements of cost, rheads, preparation of cost sheet.

B] Self study- Numerical problem solving on(A)from text book prescribed.

Unit - III **06 Hours**

Standard Costing

A] Standard cost, application, advantages and limitation of standard costing, Variance analysis, material & labour cost variance.

B] Self study- Numerical problem solving on(A)from text book prescribed.

Unit - IV **05 Hours**

Budgetary Control

A] Budgetary Control -nature, scope, importance, classification of budgets,various functional budget & preparation of master budget.

B] Self study- Numerical problem solving on(A)from text book prescribed.

Unit - V **5 Hours**

Marginal Costing

A] Marginal Costing - nature, scope, various concepts , Break Even Analysis, BEP Chart, key factor considerations, application of Marginal costing in decision making.

B] Self study- Numerical problem solving on(A)from text book prescribed.

Text Books

1 *Book-Keeping & Accountancy - M.G.Patkar*
2 *Management Accounting - A.P. Rao*
3 *Cost & Management Accounting - Satish Inamdar*

Reference Books

1 *Introduction to Management Accounting - Horn green & Sunlem*
2 *Principles of Management Accounting - Manmohan & Goyal*
3 *Cost Accounting - Khan & Jain*

Course outcome :

1 At the end of the course engineering student will be familiar with basic accounting terminology and learn how to interpret financial statements.
2 Student will identify and use general cost terms. And able to find out different cost involved in manufacturing goods.
3 Student will know application of standard costing and variance analysis as a tool of cost control and performance evaluation of their actual performance.
4 Engineering student will develop the habit of planning and controlling all their personal / business activities in quantitative terms, and able to take remedial action in real life situations.
5 With the help of marginal costing techniques student will be able to snap out of various key business decisions like fixing the selling price, make or buy, keep or drop, etc.

FF No.: 654 A

HS 16108 :: BUSSINESS LAW

Credits: 2	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Unit 1: Intellectual Property Rights **08 Hours**

Part A: Meaning of IPR, The Indian Patents Act, 1971- Meaning of Patent, Procedure to get a patent in India, International Patents, The Trade Marks Act, 1999- Meaning of a Trade Mark, Infringement of a Trade Mark, Registration of a Trade Mark, The Indian Copyrights Act, 1958- Meaning of a copyright, creative work, author, protection to a copyright, The Design Act, 2000- Meaning of a Design, copyright of a Design

Part B: Case Study

Unit 2: The Indian Partnership Act, 1932 **08 Hours**

Part A: Nature and Test of Partnership, Types of Partners and Partnerships, Registration of Firms and effects of Non-registration, Rights, Duties, Liabilities of Partners, Admission, Retirement and Death of Partners, Dissolution of Partnership

Part B: Meaning of LLP, Features of LLP, Advantages of LLP

Unit 3: The Companies Act, 2013 **08 Hours**

Part A: Features of a company, Types of companies, Formation of a company, Kinds of share capital, Company Management: Directors of the Company, their rights, duties and liabilities, Company Meetings: Notice, Agenda, Quorum, Types of meetings

Part B: Provisions relating to Managing Director and Manager, Comparison between a Partnership Firm, a LLP and a Company

Unit 4: The Consumer Protection Act, 1986 **08 Hours**

Part A: Definition of a consumer, complaint and complainant, goods, services, defect, deficiency. Power, functions and procedure of consumer dispute Redressal agencies, Procedure to file a complaint, Reliefs available

Part B: Case Study

Unit 5: The Competition Act, 2002 **08 Hours**

Part A: Objectives, Competition Commission, Dominant Position, Anti-competitive Agreements, Relevant Markets, Cartel, Abuse of Dominant Position, Regulation of combinations

Part B: Understand the working of the competitive market, Adverse effect of completion and benefits of a healthy competition with the help of market study.

Text Books:

1 *Business law (B.B.A. SEMESTER III): Sharad D. Geet and Mrs. Asmita A. Deshpande- Nirali Prakashan*

Reference Books :

1 *Business Law- Bulchandani- Himalaya Publications*

2 *Business Law- Tulsian- TMH*

Course Outcomes:

Upon Completion of the course:

1 Students will be able to apply for a patent under the Indian Patents Act, 1971.

2 Students will be able to differentiate between original Trade Mark or Design and infringement of these.

3 Students will be able to protect their original creative work under law.

4 Students will know the exact differences between various types of organisations like a partnership firm, a LLP and a company. Since they shall know the nuances of working of major types of organizations, if they want to float their own organization in future, they will be able to make a choice on their own.

5 Students will be able to fight for their right as a consumer in a competitive market.

FF No. : 654 A

HS10107 :: COMMUNICATION SKILL

Credits: 01	**Teaching Scheme: -** Theory 2 Hrs/Week

Unit I **(4 Hrs)**

[A] Self introduction, eight parts of speech, Use of Phrases, Clauses, Use of abbreviations and acronyms, Forms of sentences

[B] To find phrases, abbreviations, acronyms and clauses used in any science subject (10 each)

Unit II **(5 Hrs)**

[A] Revision of basic rules related to grammar with respect to:

a) ***nouns and pronouns*** followed by exercises (min 20 sentences),
b) ***determiners and adjectives*** followed by exercises (min 20 sentences),
c) ***prepositions and conjunctions*** followed by exercises (min 20 sentences)

[B] Home Assignments related to the above topics (minimum 25 sentences on each topic).

Unit III **(5 Hrs)**

[A] Revision of basic rules related to grammar with respect to**:**

a) ***verbs and adverbs*** followed by exercises (min 20 sentences)
b) ***tense*** followed by exercises (min 20 sentences)
c) ***subject verb agreemen***t followed by exercises (min 20 sentences)

[B] Home Assignments related to the above topics (minimum 25 sentences on each topic).

Unit IV **(5 Hrs)**

[A] Developing Language Skills:

a) Developing Reading Skills, To read, take notes and interpret the given information (text / diagrams / flow chart etc)
b) Developing listening skills, How to be a good listener. Exercises with respect to listening,
c) Developing writing skills, To compose emails, Business correspondence
d) Developing formats.

[B] Home Assignments related to the above topics (Read the newspaper and write the gist of topic given by teacher, Listen to BBC, Doordarshan English News, Assignments related to non technical writing).

Unit V **(5 Hrs)**

[A] Vocabulary Building. Glimpses of tests / exams organized by UPSC / Bank for Probationary officer/ TOEFL/IELTS

[B] Home Assignments related to the above topics (Puzzles, Quizzers, Previous years question papers of UPSC, Bank, TOEFL, IELTS).

Text Books

1. *"Business communication" K.K.Sinha 2001 Revised Edition GALGOTIA Publishing Company, Delhi.*
2. *"Communication Skills" by Dr PC Pardeshi 2005 Nirali Prakashan Pune*
3. *"Funcations of English "Student's edition Leo Jones , 2nd edition Cambridge University press Delhi*

Reference Books

1. *"High School English Grammar " with key Renin Martin 1989 S Chand & Co ltd Mumbai*
2. *"Punctuation Book " Nidhi Pathak 2010 published by Lotus Press Delhi*
3. *"English for competitive examinations " Swarna Chawla , Vikas publishing house pvt ltd , UBS Publisher's distributors – Pune*

Course Outcome:

At the end of this course the student will be able to:

1. Express themselves using proper vocabulary.
2. Know the basic concepts of grammar to write and speak correct sentence
3. Grasp an unknown passage by note taking exercise
4. Listen with concentration and respond to the question correctly
5. Will learn how to expand their vocabulary

FF No. : 654 A

HS 14301 :: ENGINEERING WORKSHOP

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Practical Details:

1. Carpentry

Introduction, use of marking tools and hand tools such as marking gauge, try squares, steel rules, saws, jackplane, chisels, etc. Use of power tools, safety precautions.

Practical

One job involving different operations such as sawing, planning, chiseling, etc.

2. Welding

Introduction, principle of manual metal arc welding, equipment and it's operation, welding electrodes, welding joints, welding symbols, safety precautions.

Practical

One job on mild steel.

3. Mini Project

Besides the above jobs, students in groups will make an article / gadget / model / setup involving the work of above work trades and / or other work trades.

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 Cutting

Introduction, principle, equipment and it's operation, safety precautions and demonstration of Oxy-Acetylene Gas cutting process.

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

Text Books

1. *S. K. Hajra Choudhary, Elements of Workshop Technology, Media Promoters and Publishers Pvt. Ltd.,*
2. *K.T. Kulkarni, Introduction to Industrial Safety, K.T. Kulkarni, Pune.*

Reference Books

1. *Hwaiyu Geng, Manufacturing Engineering Handbook, McGraw Hill Publishing Co. Ltd.,*
2. *Lawrence E. Doyle, Manufacturing Processes and Materials for Engineering, Prentice Hall Inc.*

HS 17301 :: GENERAL SEMINAR I

Credits: 01	**Teaching Scheme: -** Theory 2 Hrs/Week

List of Demonstration and Practical Sessions

Sr. No.	**Name of the Experiment**	**Mode of Conduct**
1.	Phonetics – vowels and diphthongs,	Demonstration and practice sessions
2.	Phonetics – consonants,	
3.	Elements of good presentation skills,	
4.	Elements of communication process, barriers and how to overcome barriers,	
5.	Presentations by 6 – 7 students **(1st Topic)**	**Student activities in groups:** Each student must present any topic for 10 min followed by an evaluation by the teacher for 5 min using evaluation criterion. All other non participating must attend and can give suggestions. Each student will give minimum of two presentations per semester.
6.	Presentations by 6 – 7 students **(1st Topic)**	
7.	Presentations by 6 – 7 students **(1st Topic)**	
8.	Presentations by 6 – 7 students **(1st Topic)**	
9.	Presentations by 6 – 7 students **(2nd Topic)**	
10.	Presentations by 6 – 7 students **(2nd Topic)**	
11.	Presentations by 6 – 7 students **(2nd Topic)**	
12.	Presentations by 6 – 7 students **(2nd Topic)**	

Text Books

1. *"Developing communication skills " – Krishna Mohan & Meera Banerji , 2008 Mcmilan Publishers Delhi*
2. *"Speaking and writing for effective business communication " Francis Sounderaraj 2009 , Mcmilan Publishers India ltd, delhi*

Reference Books

1. *" Cambridge English for engineering " Mark Ibbotson , Cambridge university press Delhi*
2. *" Professional presentations Malcolm Goodale ", Cambridge university press 2009*

Course Outcome:

At the end of this course the student will be able to:

1. Pronounce correctly any English word
2. To participate in group discussion effectively
3. Give effective group presentation
4. Be aware of the importance and non verbal communication

FF No. : 654 A

HS 14302 :: TRADE WORKSHOP

Credits: 1	**Teaching Scheme: -** Laboratory 2 Hrs/Week

Practical Details:

Students from various groups of engineering disciplines like group of Mechanical, Industrial, Production, Chemical / Computer, Information Technology / Electronics, Electronics & Telecommunication, Instrumentation will perform different jobs / exercises / mini projects in Workshop out of which, one would essentially involve application of Workshop trades in their respective group of discipline. The jobs / exercises / mini projects etc. will be done individually or in group in consultation with the Workshop staff.

Demonstrations

1. **Plastic Injection Moulding:** Introduction, principle, equipment and it's operation, mould introduction and settings, safety precautions and demonstration of plastic injection moulding process.
2. **Electroplating:** Introduction necessity, principle, safety precautions and demonstration of electroplating process.
3. **Press Work:** Introduction, die and punch, basic operations such as punching, bending, shearing, etc. safety precautions and demonstration of press working.

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

Text Books

1. *S.K. Hajra Choudhary, Elements of Workshop Technology, Media Promoters and Publishers Pvt. Ltd.,*
2. *K.T. Kulkarni, Introduction to Industrial Safety, K.T. Kulkarni, Pune.*

Reference Books

1. *Hwaiyu Geng, Manufacturing Engineering Handbook, McGraw Hill Publishing Co. Ltd.,*
2. *Lawrence E. Doyle, Manufacturing Processes and Materials for Engineering, Prentice Hall Inc.*

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

Course Code	Name of Course
HS15311	Flute
HS15312	Guitar
HS15313	Tabla
HS15314	Bharat Natyam
HS15316	Classical Vocal
HS15317	Yoga
HS15318	Pranayam
HS15319	Aerobics
HS15321	Photography
HS15322	Digital Photography
HS15323	Volleyball
HS15324	Chess
HS15325	Taekwondo
HS15326	Film Appreciation
HS15327	Shares and Stocks
HS15328	Fundamentals of Banking
HS15329	Nutrition and Fitness
HS15330	Spirit of Entrepreneurship
HS15331	memory techniques
HS15332	sanskrit sambhashanam
HS 15330	Numerology