

# **COURSES**

**FIRST YEAR B.TECH. (COMMON FOR ALL BRANCHES)**

## First Year B.Tech. (Common for All Branches)

### I-SEMESTER

Course No.	Title	Credit		Hours/Week			Marks		
		Th.	P	L	T	P	Th.	P	MT
BS 111	Mathematics - I	3	0	3	0	0	80	-	20
ME 113	Mechanical Engg. - I	3	0	3	0	0	80	-	20
ME 114	Workshop Practice	0	1	0	0	3	0	80	20
CE 115	Engineering Drawing	0	1	0	0	3	0	80	20
	NCC/NSS/NSO <sup>1</sup>	-	-	0	0	2	-	-	-
<b>GROUP I</b>									
BS 100P	Engineering Physics	2	1	2	0	2	50	30	20
CE 100	Engineering Mechanics	2	1	2	0	2	50	30	20
EE 100	Electrical Engg. - I	3	1	3	0	2	50	30	20
ENVS 100	Environmental Studies	2	1	2	0	2	50	30	20
<b>GROUP II</b>									
BS 100C	Engineering Chemistry	2	1	2	0	2	50	30	20
EC 100	Electronics and Instrumentation	3	1	3	0	2	50	30	20
CS 100	Introduction to Computer Programming and Data Structure	3	1	3	0	2	50	30	20
BS 100E	English and Communication Skill	1	1	1	0	2	50	30	20
	Total	15	6	15	0	16	-	-	-
<b>Total Credits/Hours/Marks</b>		<b>21</b>		<b>31</b>			<b>800</b>		

<sup>1</sup> NCC/NSS/NSO is compulsory and the student will be assessed as satisfactory/ unsatisfactory at the end of IV semester.

<sup>2</sup> The examination (Theory and Lab) shall be conducted internally by the college.

**Note:** The courses BS 100P, CE 100, EE 100, ENVS 100, BS100C, EC 100, CS 100 and BS 100E shall be offered in both the semesters. The students will be divided in two groups in I semester itself and shall remain in the same group in II semester as well. However, they have to offer all the eight courses in first year.

## II-SEMESTER

Course No.	Title	Credit		Hours/Week			Marks		
		Th.	P	L	T	P	Th.	P	MT
BS 121	Mathematics - II	3	0	3	0	0	80	-	20
CE 122	Civil Engineering	1	1	1	0	2	50	30	20
ME 123	Machine Drawing - I	0	1	0	0	3	0	80	20
ME 124	Workshop Technology	2	1	2	0	3	50	30	20
	NCC/NSS/NSO <sup>1</sup>	-	-	0	0	2	-	-	-
<b>GROUP I</b>									
BS 100C	Engineering Chemistry	2	1	2	0	2	50	30	20
EC 100	Electronics and Instrumentation	3	1	3	0	2	50	30	20
CS 100	Introduction to Computer Programming and Data Structure	3	1	3	0	2	50	30	20
BS 100E	English and Communication Skill	1	1	1	0	2	50	30	20
<b>GROUP II</b>									
BS100P	Engineering Physics	2	1	2	0	2	50	30	20
CE 100	Engineering Mechanics	2	1	2	0	2	50	30	20
EE 100	Electrical Engineering - I	3	1	3	0	2	50	30	20
ENVS 100	Environmental Studies	2	1	2	0	2	50	30	20
	Total	15	7	15	0	18	-	-	-
<b>Total Credits/Hours/Marks</b>		<b>22</b>		<b>33</b>			<b>800</b>		

<sup>1</sup> NCC/NSS/NSO is compulsory and the student will be assessed as satisfactory/unsatisfactory at the end of IV semester.

## BS 111 MATHEMATICS – I

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

CO1	Expand function in Taylor's and Maclaurin's series
CO2	Trace the Cartesian and Polar curves
CO3	The student will be able to apply the partial differentiation to compute the minima and maxima of functions of two variables.
CO4	The student will be able compute areas and volumes by integration.
CO5	Solve linear differential equations of higher order and homogenous differential equations with constant coefficients.

**Cr. Hrs. 3 (3 + 0)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>0</b>

### ***Unit-I***

*Differential Calculus* : Taylor's and Maclaurin's expansions. Asymptotes and Curvature (Cartesian Coordinates only). Curve tracing (Cartesian and standard Polar Curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral).

### ***Unit-II***

*Differential Calculus* : Partial Differentiation, Euler's Theorem on Homogeneous Functions. Maxima & Minima of Two Independent Variables. Lagrange's Method of Multipliers. Jacobians.

### ***Unit-III***

*Integral Calculus* : Double Integral, Areas & Volumes by Double Integration. Change of Order of Integration. Triple integrals. Beta Function and Gamma Function (Simple Properties), Relation between Beta and Gamma functions.

### ***Unit-IV***

*Differential Equations* : Linear Differential Equations of Higher Order with constant coefficients. Homogeneous Linear Differential Equations with constant coefficient.

### **Text Books/References**

1. Guar, Y.N. and Koul, C.I. (2013) Engineering Mathematics, Vols. I & II, Jaipur Publishing House, Jaipur.
2. Babu Ram (2011) Engineering Mathematics-I, Pearson Education, India.
3. B.V. Ramana (2012) Higher Engineering Mathematics, Tata McGraw Hill, India.
4. J.L. Bansal and H.S. Dhami (2012) Differential Equations, Vols. I & II, Jaipur Publishing House, Jaipur.
5. M.Ray and Chaturvedi: A Text Book of Differential Equations, Student Friend & Co. Publisher, Agra.
6. Rao V. Dukkipati (2012) Engineering Mathematics, New Age International (P) Ltd., New Delhi.

## ME 113 MECHANICAL ENGINEERING

**Course Outcomes:** Upon completion of this course the students will be familiar with:

CO1	A fundamental understanding of the laws of thermodynamics and their application to a wide range of systems with work and heat interactions.
CO2	Concept of entropy and irreversibility of a process and application of thermodynamic relationships to solve practical problems.
CO3	Gas and vapour power cycles and the efficiencies.
CO4	Properties of steam and its application in power generation.
CO5	Construction and working of various boilers and IC engines.

**Cr. Hrs. 3 (3 + 0)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>0</b>

### **Unit-I**

*Thermodynamics:* Thermodynamic properties, closed and open systems, flow and non-flow processes, gas laws, laws of thermodynamics, internal energy. Application of First Law in heating and expansion of gases in non-flow processes only.

*Second law of thermodynamics:* Kelvin-Planck and Clausius statements. Reversible processes, Carnot cycle, Carnot theorem. Reverse Carnot cycle. Entropy, physical concept of entropy.

### **Unit-II**

*Properties of Steam:* Difference between gas and vapour, change of phase during constant pressure process. Generation of Steam, triple point and critical point. Internal energy and entropy of steam. Use of steam tables and Mollier chart, heating and expansion of vapour in non-flow processes.

### **Unit-III**

*Vapour Power Cycles:* Introduction to Carnot Cycle. Rankine cycle and modified Rankine cycle.

*Steam Generators :* Classification of steam boilers. Cochran, Lancashire, Locomotive and Babcock-Wilcox boilers. Boiler mountings and accessories.

*Steam Engines:* Introduction to simple and compound steam engines.

### **Unit-IV**

*Gas Power Cycles:* Introduction. Air Standard efficiency, other engine efficiencies and terms. Otto, diesel and dual cycles. Calculation of efficiency, mean effective pressure and their comparison.

*Internal Combustion Engines:* Introduction, Classification, terminology and description of IC Engines. Four stroke and two stroke petrol, gas and diesel engines. Comparison of petrol and diesel engines. Simple carburettor.

### **Text Books/References**

1. M. L. Mathur and F. S. Mehta. Thermal Engineering, (Vol. I, SI Edition), Jain Brothers, New Delhi.
2. R. K. Purohit : Foundation of Mechanical Engineering; Scientific Publishers (INDIA), Jodhpur.
3. P.K. Nag : Engineering Thermodynamics, TMH.

## ME114 WORKSHOP PRACTICE

**Course Outcomes:** Upon completion of this course the students will be familiar with:

CO1	Practical performance in carpentry shop.
CO2	Smithy Shop, Simple exercises involving basic operations like bending, drawing, punching, shaping, upsetting, and riveting.
CO3	Fitting Shop, Simple exercises involving basic operations like sawing, chipping, filling, drilling, reaming, threading with taps and dies.
CO4	Sheet Metal and Plumbing Shop: Demonstration of basic tools, pipe fittings and operations.

**Cr. Hrs. 1 (0 + 1)**

	L	T	P
<b>Credit</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>0</b>	<b>0</b>	<b>3</b>

*Carpentry Shop:* Acquaintance with types of wood, tools and their uses. Simple exercises involving basic operations like sawing, planning, chiselling, etc. Preparation of simple joints, cross half lap joint, dovetail joint, bridle joint, tennon and mortise joint.

*Smithy Shop:* Acquaintance with types of tools and their uses. Simple exercises involving basic operations like bending, drawing, punching, shaping, upsetting, and riveting.

*Fitting Shop:* Acquaintance with tools, measuring and marking tools, precision measuring tools and their uses. Simple exercises involving basic operations like sawing, chipping, filling, drilling, reaming, threading with taps and dies.

*Sheet Metal and Plumbing Shop:* Demonstration of basic tools, pipe fittings and operations.

### Texts/References

1. S. K. Hajra Choudhury and AK Hajra Choudhury. Elements of Workshop Technology (Vol. I), Media Promoters & Publishers Pvt. Ltd., Bombay.

## CE 115 ENGINEERING DRAWING

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

- CO1 Select, Construct and Interpret appropriate drawing scale as per the situation.
- CO2 Draw simple curves like ellipse, cycloid and spiral.
- CO3 Draw Orthographic projections of points, lines and planes.
- CO4 Draw orthographic projection of solids like cylinders, cones, prisms and pyramids including sections.
- CO5 Layout development of solids for practical situations.
- CO6 Draw isometric projections of simple objects.

**Cr. Hrs. 1 (0 + 1)**

	L	T	P
<b>Credit</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>0</b>	<b>0</b>	<b>3</b>

Introduction and letter writing. Construction and use of plain, diagonal and vernier scale. Methods of drawing ellipse, parabola and hyperbola. Methods of drawing cycloids, spirals. Orthographic projection and projection of points.

Projection of lines, projection of planes, projection of solids. Introduction of prism, pyramid, cylinder and cone.

Section of solids, introduction of intersection of surfaces. Development of plane and curved surface. Isometric projection.

**Text/Reference**

1. N.D. Bhatt. Elementary Engg. Drawing, Rupalee publication, Anand.
2. Lakshmi Narayan and Vaishwanar. A Text Book of Practical Geometry, Jain Brother, New Delhi.
3. R.B. Gupta. A Text Book of Engineering Drawing, Satry Prakashan, New Delhi. Fundamentals of Technical Drawing, Parkinson.

**BS 100P ENGINEERING PHYSICS**

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

CO1	Apply vector calculus approach to problems in electric field and magnetic field.
CO2	Apply laws of physics to simple LRC circuits.
CO3	Learn physics behind various types of lasers and their characteristics.
CO4	Understand the interference and diffraction from wave optics concepts and know its applications.
CO5	Understand polarization of light and its applications.

**Cr. Hrs. 3 (2 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>2</b>	<b>0</b>	<b>2</b>

**Unit-I**

*Electric Field:* Line integral of electric field, Potential difference, Field as gradient of potential, Divergence of a vector function, Differential form of Gauss's law, Laplacian, Laplace equations, Curl of a vector function. Gauss's divergence theorem.

*Magnetic Field:* Curl and Divergence of a magnetic field, Magnetic scalar and vector potential.

**Unit-II**

*Varying Field:* Faraday's law-integral and differential form, Self and mutual inductance, Neumann's equation, Charge and discharge of a capacitor through register, Growth and decay of current in LR circuit, Energy stored in electric and magnetic field, Displacement current, Maxwell's equations.

**Unit-III**

*Laser:* Coherence, Einstein's coefficient, Spontaneous and stimulated emission, Population inversion, Laser gain (pumping), Spectral narrowing in laser, Coherence length, Ruby and He-Ne laser.

*Interference:* Division of amplitude, colour of thin films, Newton's ring, Feby-Perot interferometer-principle, operation, determination of wave length and difference in wave length.

**Unit-IV**

*Diffraction:* Double slit Fraunhofer diffraction pattern, Fraunhofer diffraction by a plane transmission grating, Formation of spectra.

*Polarization:* Analysis of linearly, circularly and elliptically polarized light (Half wave and quarter wave plates), Optical activity, specific rotations, Laurent's half shade and its use for determination of specific rotation of sugar solution.

**Practicals**

1. To find refractive index and dispersive power of material of prism by spectrometer.
2. To find wave length of light by Newton's ring.

3. To find wave length of light by diffraction grating.
4. To find specific rotation of sugar solution by polarimeter.
5. To find wave length of light by Fresnel Biprism.
6. To find frequency of A.C. mains.
7. To determine dielectric constant of liquid using series resonance method.
8. To study charge and discharge of condenser through a resistor (C.R. Circuit).
9. To study LCR resonant circuit, resonance, quality factor and sharpness in (i) series circuit (ii) parallel circuit.

#### **Text Books/References**

1. K.K. Tiwari. (1995). Electricity and Magnetism, S. Chand and Company, New Delhi.
2. N. Subrahmanyam and Brijlal. (1993). A Text Book of Optics, S. Chand and Company, New Delhi.
3. Ahmed and Lal. (1966). Electricity, Magnetism and Electronics, Unitech House, Lucknow.
4. D.S. Mathur. (1993). Mechanics, S. Chand and Company, New Delhi.  
Gupta and Kumar. (1995). Practical Physics, Pragati Prakashan, Meerut.

### **CE 100 ENGINEERING MECHANICS**

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

CO1	Draw free body diagrams and determine the resultant of forces and/or moments.
CO2	Determine the centroid and second moment of area of sections.
CO3	Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.
CO4	Analyse statically determinate planar frames.
CO5	Analyse the motion and calculate trajectory characteristics.
CO6	Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.

**Cr. Hrs. 3 (2 + 1)**

	L	T	P
<b>Credit</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>2</b>	<b>0</b>	<b>2</b>

#### **(A) STATICS**

##### **Unit-I**

Introduction of condition of equilibrium: Force, system of force, coplanar forces.

*Moment and couples:* Moment and parallel forces, Couples, General conditions of equilibrium

*Practical Applications:* Levers, Cracked levers, Steel yards. Sagging chains and toggle joints.

*Centre of Gravity:* Centre of parallel forces, C.G. in some simple cases, C.G. of Solids.

*Moment of Inertia:* Moment of inertia, Radius of gyration and perpendicular axis. Determination of moment of inertia of simple sections. Mass of moment of inertia.



### **Unit-II**

*Friction:* Introduction, Critical angle of friction, Friction on horizontal planes, Friction on inclined planes, Wedge and block, Screw jacks, Rolling friction.

*Machines:* Introduction, Effects of friction, Loss of work, Reversible and irreversible machine, Law of machine, Wheel and axle, Differential wheel and axle, Pulley block, Screw jack, Single and double purchase crab, Worm and Worm wheel, System of pulleys.

*Frames:* Statically determinate plane frames, Method of joints, Method of sections, Graphical method.

### **(B) DYNAMICS**

#### **Unit-III**

*Rectilinear Motion,* Motion under gravity, Projectiles equation of the path, Maximum height attained, Time of flight, Horizontal range. Angle of projection, Projectile from a given height, Projectile on an inclined plane, Problems.

*Work, Power and Energy:* Work, Power, Work done by torque, Energy, Law of conservation.

#### **Unit-IV**

*Centripetal and centrifugal forces, Laws of motion:* Newton's Law of motion and their explanation, Collision of elastic bodies; Impulse and impulsive force, Principle of conservation of momentum, Loss of kinetic energy during impact.

### **Practicals**

1. Verification of law of polygon of forces.
2. Verification of principle of moment in case of compound level.
3. Verification of principle of moment in case of bell crank level.
4. Determination of reaction in case simply supported beam with or without overhang.
5. To determine coefficient of friction between different surfaces on horizontal plane.
6. To determine coefficient of friction between different surfaces in inclined plane.
7. Study of different wheel and Axle.
8. Study of single purchase crab.
9. Study of worm and worm wheel.
10. Study of Weston's pulley block.
11. Determination of mechanical advantage, velocity ratio and efficiency of single purchase crab.
12. Determination of mechanical advantage, velocity ratio and efficiency of double purchase crab.
13. Determination of mechanical advantage, velocity ratio and efficiency of first system of pulley.
14. Determination of mechanical advantage, velocity ratio and efficiency of second system of pulleys.
15. Determination of mechanical advantage, velocity ratio and efficiency of third system of pulleys Flywheel.

### **Text Books/References**

1. I.B. Prasad. Engineering Mechanics, Khanna Publisher, New Delhi.
2. R.S. Khurmi. Applied Mechanics, S. Chand & Company Ltd., New Delhi
3. S.B. Junnarkar. Applied Mechanics, Charotar Publishing House, New Delhi.
4. Saluja. Applied Mechanics, Satya Prakashan, New Delhi.

## EE 100 ELECTRICAL ENGINEERING – I

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

CO1	Solve DC networks.
CO2	Apply fundamentals to solve the single phase AC circuits.
CO3	Solve three phase AC circuit problems.
CO4	Apply principles to determine parameters for single phase transformer.
CO5	Identify and select appropriate type of instrument for measurement of electrical quantities.

**Cr. Hrs. 4 (3 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>2</b>

### **Unit-I**

*D.C. Networks:* Kirchoff's law, node voltage and mesh current methods, delta-star and star delta transformation, source conversion; solution of DC circuits by network theorems: Thevenin's, Norton's, superposition, Reciprocity and Maximum Power Transfer theorem.

### **Unit-II**

*Single Phase A.C.Circuits :* Single Phase EMF generation, average and effective values of sinusoidal and linear periodic wave forms, instantaneous and average power, power factor, reactive & apparent power, solution of R-L-C, series, parallel, series-parallel circuits, complex representation of impedances, phasor diagram, series and parallel resonance.

### **Unit-III**

*Three Phase A.C., Circuits :* Three phase EMF generation, delta and star-connection, line and phase quantities, solution of the 3- phase balanced circuits, Phasor diagram, measurement of power in three phase balanced circuits.

*Transformer:* Faraday's laws of Electromagnetic induction, construction and principle operation of single phase transformer, EMF equation, voltage and current relationship and Phasor diagram for ideal transformer.

### **Unit-IV**

*Electrical Measuring Instruments :* Introduction; type of measuring Instruments, Deflecting controlling & Damping Torque, D.C. PMMC instruments, shunts and multipliers, Moving iron ammeters and voltmeter, Dynamometers wattmeter, Induction type energy meter.

### **Practicals :**

Based on theory

### **Text Books/References**

1. B. L. Therja. Electrical Technology, S. Chand
2. M.E.Van Valkenberg. Network analysis, PHI
3. Soni and Gupta. Introduction to Electrical Network Theory, Dhanpat Rai Publisher
4. R.A. Gupta and Nikhal Gupta. (2002). Fundamentals of electrical & Electronics Engineering, JPH, 1st Edition,
5. H.P. Tiwari. (2002). Electrical & Electronics Engineering, College Book Centre, Jaipur.
6. J.B. Gupta. (2002). Fundamentals of Electrical & Electronics. S.K. Kataria and Sons. Dehli.

## ENVS 100 ENVIRONMENTAL STUDIES

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

CO1	Develop an understanding of different natural resources including renewable resources.
CO2	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO3	Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them.
CO4	Demonstrate an appreciation for need for sustainable development and role of science.
CO5	Aware of important acts and laws in respect of environment.

**Cr. Hrs. 3 (2 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>2</b>	<b>0</b>	<b>2</b>

### ***Unit-I***

*The Multidisciplinary nature of environmental studies:*

Definition, scope and need for public awareness. Environmental problems and their consequences

*Natural Resources:*

Renewable and non-renewable resources

Natural resources and associated problems

- Forest resources: Use over-exploitation, deforestation, and case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams, benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land and a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources, Equitable use resources for sustainable lifestyles.

### ***Unit-II***

*Ecosystems*

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem.

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

*Biodiversity and its conservation*

Introduction – Definition: genetic, species and ecosystem diversity, Biogeographically classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical,

and aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### ***Unit-III***

Environmental Pollution

Definition, Causes, effects and control measures of: -

Air pollution

Water pollution

Soil pollution

Marine pollution

Noise pollution

Thermal pollution

Nuclear hazards

*Solid waste Management:* Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

### ***Unit-IV***

*Social Issues and the Environment* - From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

*Human Population and the Environment*

Population growth, variation among nations, Population explosion- Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

### **Practicals**

Visit to river, forest, hill, mountain, local polluted plant, pond ecosystem

### **Text Books/References**

1. K. C. Agarwal. (2001). Environmental Biology, Nidi Publications, Bikaner.
2. B. L. Chaudhary and Jitendra Pandey. (2005). Environmental Studies, Apex Publishing House, Udaipur.
3. H Jhadav & V. M. Bhosale. Environmental Protection & Laws, Himalaya Pub. House, Delhi
4. M. N. Rao and A. K. Datta. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
5. B. K. Sharma. Environmental Chemistry. Goel Publishing House, Meerut
6. Pratap Singh, N. S. Rathore and A. N. Mathur. (2004). Environmental Studies, Himanshu Publications, Udaipur.
7. R. K. Trivedi and P. K. Goel. Introduction to Air Pollution, Techno Science Publications.

## BS 100C ENGINEERING CHEMISTRY

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

CO1	Demonstrate knowledge of science behind common impurities in water and methods to treat them.
CO2	Knowledge of methods to determine the calorific value of fuels, perform flue gas analysis and combustion analysis.
CO3	Apply the science for understanding corrosion and its prevention.
CO4	Demonstrate a knowledge of superconducting and organic electronic materials.
CO5	Knowledge of Kinetics of Reactions

**Cr. Hrs. 3 (2 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>2</b>	<b>0</b>	<b>2</b>

### ***Unit-I***

Sources of water, common impurities, requisites of drinking water in municipal water supply. Purification of water, sterilization, break point chlorination. Hardness, determination of hardness by Complexometric (EDTA) method, degree of hardness, Boiler troubles, carry over corrosion, Sludge and scale formation. Caustic embrittlement, cause of boiler troubles and their prevention.

### ***Unit-II***

Classification of fuels, solid fuels, Proximate and Ultimate analysis of coal, significance of constituents, theoretical method for calculation of Gross and net calorific values. Liquid fuels- Petroleum origin, Refining of Petroleum, knocking, octane number, anti knocking agents. Flue gas analysis by Orsat Apparatus, Calculations based on combustion.

### ***Unit-III***

*Corrosion* : Definition and its significance, Dry and Wet theories of corrosion, Cathodic & Anodic protection of corrosion, types of corrosion, factors affecting corrosion.

*New Engineering Materials*: Introduction, Properties and Applications of Super Conductors, Organic electronic materials, Fullerenes.

### ***Unit-IV***

*Chemical Kinetics*: Order and Molecularity of reaction, first and second order reaction, Derivation of equations for first and second order reaction, determination of order of reaction, Energy of activation and Arrhenius equations, Numerical of first and second order reactions.

### **Engineering Chemistry Practical**

1. Determination of viscosity of a liquid.
2. Estimation of free chlorine in a water sample.
3. Determination of temporary and permanent hardness by EDTA method.
4. Determination of Copper Sulphate iodometrically.
5. Estimation of Potassium dichromate iodometrically.
6. Determination of purity of Ferrous Ammonium Sulphate (Mohr's Salt) using Potassium Permanganate.
7. Estimation of available chlorine in Bleaching Powder sample.

8. Analysis of Brass.
9. Determination of Strength of Ferrous Ammonium Sulphate (FAS) using Potassium Ferricyanide as an external indicator.
10. Analysis of Common Salt.

#### **Text Books/References**

1. Jain and Jain. Engineering Chemistry, Dhanpat Rai Publishing Company(P) Ltd., New Delhi.
2. Jain and Gupta. A Text Book of Engineering Chemistry, Jaipur Publishing House, Jaipur.
3. B.K. Sharma. Engg. Chemistry (General), Krishna Prakashan Media (P) Ltd., Merrut.
4. S.S. Dara. A Text Book of Engineering Chemistry, S. Chand & Co., New Delhi.
5. M.M. Uppal. A Text Book of Engineering Chemistry, Khanna Publishers, New Delhi.
6. S.S. Dara. A Text Book on Experiments and Calculations in Engg. Chemistry, S. Chand & Co., New Delhi.
7. Ameta and Yasmin. Practical Engineering Chemistry, Himanshu Publications, New Delhi.

### **EC 100 ELECTRONICS AND INSTRUMENTATION**

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

CO1	Characterize passive electronic components.
CO2	Characterize diodes and transistors.
CO3	Demonstrate knowledge of concept and working of amplifier and oscillators circuits.
CO4	Demonstrate understanding of characteristics of power supplies.
CO5	Identify and select appropriate type of transducer for measurement of different quantities.

**Cr. Hrs. 4 (3 + 1)**

	L	T	P
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>2</b>

#### ***Unit-I***

**Passive Components:** Construction and characteristics of carbon composition, wire wound and film resistors. Potentiometer, color codes and rating of resistors. Characteristics and rating of capacitors for electronics circuits.

**Semi conductor:** Basic electrical characteristics of semi conductors. Theory of p-n junction. Characteristics and ratings of junction diodes. Basics of Zener diode, photo diode and LED.

#### ***Unit-II***

**Bipolar Junction Transistor:** npn and pnp transistors, Various configurations (CB, CC, CE) of BJT. Transistor biasing (Fixed, self, potential dividers) Basic classification of amplifier (Voltage and power amplifier). Basic concept of Class A, B, AB and C amplifiers.

#### ***Unit-III***

**Generation of waveforms:** Concept of positive and negative feedback. Introduction of oscillators like R-C, L-C and Crystal oscillators.

**Power supply:** Circuit configuration and analysis of Half wave, Full wave and Bridge rectifier. Basic concept of regulation, Zener diode voltage regulator, Transistor series regulator.

#### **Unit-IV**

*Transducers:* Definition, classification : Active and passive transducer, primary and secondary transducers, Analog and digital transducers. Measurement of displacement, temperature, velocity, force and pressure using potentiometer, resistance thermometer, thermocouples, bourden tube, LVDT, strain gauge and tachogenerator.

#### **Practicals**

Based on theory

#### **Text Books/References**

1. Millman and Halkias. Integrated electronics: Mc Graw Hill
2. W.D Cooper. Electronics Instrumentation and Measurement : PHI
3. M.L.Gupta. Electrical Engineering Materials
4. Malvino. Principles of Electronics
5. Jhon D. Ryder. Electronics Fundamentals

### **CS 100 INTRODUCTION TO COMPUTER PROGRAMMING AND DATA STRUCTURE**

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

CO1	Understand the basic building blocks of a computer.
CO2	Learn different systems and codes to represent numbers in computers and be able to convert the numbers from one system to another.
CO3	Learn the data types and syntax of C language.
CO4	Write, compile and execute programs in C language for solving engineering problems.
CO5	Demonstrate capability to choose appropriate type of data structures and perform operations on them.

**Cr. Hrs. 4 (3 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>2</b>

#### **Unit-I**

*Computer Fundamentals:* History of Computers; Organization of Computers: input unit, output unit, Storage Unit, Arithmetic Logic Unit, Central Processing Unit; CPU Operation; Memory Subsystem: RAM, ROM, Cache Memory & memory Hierarchy; Instruction Format and Instruction Execution Cycle; Number System & Codes: Binary, Decimal, Octal & Hexadecimal Number System, Conversion from one number system to another, sign magnitude, 1's Complement & 2's Complement representation of numbers; Numerical & Character codes: BCD, Excess-3, Gray, ASCII & EBCDIC Codes.

#### **Unit-II**

*Basics of Programming in C:* Constants, Variables and Data Types, Operators and Expressions, Input and Output operations, Decision making & Branching: if-else, switch statement; Decision making and looping; Arrays.

#### **Unit-III**

Character Arrays & strings, User defined function, Structures & Unions, Pointer Management, Dynamic Memory allocation & linked lists.

### **Unit-IV**

*Introduction to Data Structures* : Introduction to Linear Arrays & Representation of Linear Array in Memory, Traversing, Insertion & Deletion in Linear arrays, Bubble Sort, Linear & Binary search; Introduction to linked list – Representation of linked list in memory, Traversing, Searching, Insertion & Deletion in a linked list.

#### **Practicals**

Based on Theory

#### **Text Books/References**

1. E. Balagurusamy. "Programming in ANSI C", Tata McGraw Hill.
2. Kernighan and Ritchie. "The C Programming language", Printice Hall
3. P.M. Jat. "Programming with C", Apex Publishing House, Jaipur.
4. Dharm Singh. "Fundamentals of Compute Organization", Paragon International Publishers, New Delhi.
5. P.K. Sinha & P. Sinha. "Computer Fundamentals", BPB Publication.
6. Seymour Lipschutz. "Data Structure", Schaum's outline series, McGraw Hill.

### **BS 100E ENGLISH AND COMMUNICATION SKILLS**

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

CO1	Understand basic grammar principles and be able to synthesise and transform sentences.
CO2	Write CVs, letters for job application, complaints and emails.
CO3	Prepare technical reports and short essays.
CO4	Learn phonetic symbols and use correct sound, stress and intonation.
CO5	Learn basic do's and don'ts of an interview.
CO6	Show enhance communication ability in English.

**Cr. Hrs. 3 (2 + 1)**

**L T P**  
**Credit 2 0 1**  
**Hours 2 0 2**

### **Unit-I**

*Grammar and Usage* : Tense, Concord, Preposition, Common Grammatical Errors, Phrasal Verbs, Idioms, Words often misused, Synthesis of sentences, Transformation of Sentences (Simple, Compound, Complex, Voice, Speech). Analysis of sentences.

### **Unit-II**

*Comprehension*-Unseen passage.

*Composition* : Business Letters, E-mail, Memos, Circular, Notice, Curriculum Vitae and Covering Letter, Writing of Technical Report, Essay Writing.

### **Unit-III**

Phonetic Symbols and Transcription, Word Stress. Meaning and Characteristics of Seminar, Conference, Symposium and Work-Shop. Interview – Meaning, Types, Do's and Don'ts of Interviews.



### Unit-IV

*Communication Skills* : Meaning and Process of Communication, Basic Forms of Communication, Verbal and Non-Verbal Communication, Communication Barriers, Principles of Effective Communication.

#### *Language Lab Practical*

*Globerana Software* : Listening skills, Fundamental language skills, Communication skills, Vocabulary, Phonetics, Conversation.

Group discussion on current topics, Oral presentations, Writing skills, Exercises on pronunciation.

#### **Text Books/References**

1. Thomson and Martinet. (1997). A Practical English Grammar Exercise Book, Vol. I and II. O.U.P. Publication.
2. Michal Swan. (1995). Practical English Grammar, O.U.P. Publication.
3. David Green. (1990). Contemporary English Grammar Structure Composition, Macmillan Publication.
4. S. Allen. (1997). Living English Structure, Orient Longmans.
5. Daniel Jones. Drills and Tests in English Sound, ELBS.
6. Hornby, (1990). Advanced Learners Dictionary, O.U.P. Publication.
7. Kirshan Mohan. Speaking English Effectively, Macmillan Publication.
8. Audio-Video Tapes prepared by the British Council, New Delhi and Central Institute of English and Foreign Language, Hyderabad to be used in a Language Laboratory.
9. A. Adivi Reddy. Extension Education, Sree Lakshmi Press, Bapatla (A.P.).
10. G.L. Ray. (2005). Extension Communication and Management, Kalyani Publishers.

### **BS 121 MATHEMATICS – II**

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

CO1	Show knowledge of vector calculus and its applications in engineering.
CO2	Solve second order differential equations for application in their field of engineering.
CO3	Solve partial differential equations of first order and higher orders (with constant coefficients).
CO4	Solve simultaneous equations by matrix methods.
CO5	Determine eigenvalues and eigenvectors.
CO6	Diagonalise a matrix and invert a matrix.

**Cr. Hrs. 3 (3 + 0)**

	L	T	P
<b>Credit</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>Hours</b>	<b>3</b>	<b>0</b>	<b>0</b>

#### **Unit-I**

*Vectors Calculus* : Scalar and Vector field. Differentiation of vector functions, Gradient, Divergence, Curl and Differential Operator. Integration of vector functions, Line, Surface and

volume Integrals. Green's Theorem in a Plane, Gauss' and Stoke's Theorem (without proof) and their Applications.

### **Unit-II**

*Differential Equations* : Second Order Ordinary Differential Equations with Variables Coefficients. Exact Forms. Part of Complimentary Function is known. Change of Dependent Variable. Change of Independent Variable, Normal Forms. Method of Variation of Parameter.

### **Unit-III**

*Partial Differential Equations* : Formation of partial differential equations. Partial Differential Equations of First Order, Lagrange's Form, Standard Forms Higher order linear partial differential equations with constant coefficients.

### **Unit-IV**

*Matrices*: Rank of a matrix, Inverse of a matrix by elementary transformations. Consistency and Solution of simultaneous linear equations. Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof). Diagonalization of matrix.

### **Text Books/References**

1. Guar, Y.N. and Koul, C.I. (2013) Engineering Mathematics, Vols. I & II, Jaipur Publishing House, Jaipur.
2. Babu Ram: Engineering Mathematics-I, Pearson Education, India (2011).
3. B.V. Ramana (2012) Higher Engineering Mathematics, Tata McGraw Hill, India.
4. J.L. Bansal and H.S. Dhimi (2012) Differential Equations, Vols. I & II, Jaipur Publishing House, Jaipur.
5. M.Ray and Chaturvedi: A Text Book of Differential Equations, Student Friend & Co. Publisher, Agra.
6. Rao V. Dukkupati (2012) Engineering Mathematics, New Age International (P) Ltd., New Delhi.

## **CE 122 CIVIL ENGINEERING**

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

CO1	Demonstrate knowledge of various surveying methods.
CO2	Conduct a chain survey.
CO3	Conduct a compass survey.
CO4	Conduct levelling survey and be able to do RL calculations.
CO5	Demonstrate knowledge of properties of various building materials.

**Cr. Hrs. 2 (1 + 1)**

**L T P**

**Credit 1 0 1**

**Hours 1 0 2**

### **(A) SURVEYING AND LEVELING**

#### **Unit-I**

Principle and purpose of plane surveying.

*Chain Surveying* : Instrument for chaining, Direct & indirect ranging. Methods of chain along plane & sloping ground, Base line, check line, Tie line, Offset, Chain angle & recording in field book.

*Compass Surveying* : True & Magnetic meridian, whole circle bearing & quadrantal bearing system, construction & use of Prismatic & Surveyor Compass, Local attraction.

#### **Unit-II**

*Level and leveling* : Definition of various terms used in leveling. Types of Bench mark and their uses. Construction and use of Dumpy and Tilting levels, Leveling staves. Temporary adjustment of Dumpy level. Simple, differential leveling, fly leveling, longitudinal and cross sectioning, plotting of profile leveling. Determination of level by line of collimation and rise and fall method, Arithmetical checks. Level book and record keeping, leveling difficulties and errors in leveling.

### **(B) BUILDING MATERIAL**

#### **Unit-III**

*Stones*: Different types, properties of good building stones, common testing of stones, Dressing of stones and use of stones in construction.

*Bricks*: Types, raw materials, identification, composition. Properties and uses of ordinary bricks, fire resistant and chemical resistant bricks.

*Limes*: Definition, sources of lime, slaking of lime, ISI classification of lime.

#### **Unit-IV**

*Cement*: Chemical composition, types of cement, properties, uses and tests on cement.

*Mortars*: Proportioning, properties of ingredients and use of lime, cement and gauge mortars.

*Cement Concrete*: Ingredients, common proportions, properties of fresh hardened concrete, Water cement ratio, curing and consolidation of concrete.

#### **Practicals**

1. Study of accessories used in measurement of distances.
2. Ranging Direct and indirect and use of chain and tape.
3. Chining along sloping ground.
4. Chain surveying, field book recording and taking offsets for location details.
5. Study of prismatic and surveying compass and taking bearings.
6. Study of Dumpy level, temporary adjustment and R.L. calculations.
7. Study of Tilting level, temporary adjustment and R.L. calculations.
8. Simply and differential leveling operation, record in level book, practice for staff reading line of collimation and Rise and fall method calculations.
9. L-section and cross sectioning, fly leveling operation.
10. Plotting of working profile.

#### **Text Books/References**

1. S.C. Rangwala. Engineering Materials, Charotar Book Stall, Anand.
2. B.C. Punmiya. Surveying & Field Work (Vol. I), Laxmi publications, New Delhi.

## **ME123 MACHINE DRAWING-I**

**Course Outcomes:** Upon completion of this course the students will be familiar with:

CO1	Introduction to BIS codes.
CO2	Introduction to Orthographic Projection.
CO3	How to draw the missing views and Sectional Views.
CO4	Knowledge about Riveted and Welded Joints, Screw Fastenings.
CO5	Knowledge of Conventional representation of threads, Different types of lock nuts, studs, machine screws, cap screws and wood screws.

**Cr. Hrs. 1 (0 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>0</b>	<b>0</b>	<b>3</b>

Introduction, conventional representation of different materials used in machine drawing, Introduction to BIS codes.

*Orthographic Projection:* First and third angle methods of projection. Preparation of working drawing from models and isometric views. Drawing of missing views.

*Dimensioning:* Different methods of dimensioning.

*Sectional Views:* Concept of sectioning. Revolved and oblique section. Sectional drawing of simple machine parts

*Riveted and Welded Joints:* Types of rivet heads and riveted joints. Processes for producing leak proof joints. Symbols for different types of welded joints.

*Screw Fastenings:* Nomenclature, thread profiles, multistart threads, left and right hand threads. Square headed and hexagonal nuts and bolts. Conventional representation of threads. Different types of lock nuts, studs, machine screws, cap screws and wood screws. Foundation bolts.

*Different types of joints:* Knuckle joint, cotter joint and universal joint.

### Text Books/References

1. N. D. Bhatt. Machine Drawing, Charotar Book Stall, Anand.
2. V. Laxminarayan and ML Mathur. A Text Book of Machine Drawing, Jain Brothers, New Delhi.
3. P. S. Gill. Machine Drawing: S. K. Kataria & Sons, New Delhi.

## ME124 WORKSHOP TECHNOLOGY

**Course Outcomes:** Upon completion of this course the students will be familiar with:

CO1	Basic terms used in Mechanical Engineering and their definitions which will also help them in mechanical workshop along with theory exam.
CO2	Machining, machining mechanisms and safety techniques.
CO3	Fundamental Production techniques i.e. welding, foundry and machining.
CO4	Constructional details, working and chief operations that can be performed on some basic machine tools like Lathe, Shaper, Drilling etc.
CO5	Use of measuring and inspection tools and instruments on right place.

**Cr. Hrs. 3 (2 + 1)**

	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credit</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Hours</b>	<b>2</b>	<b>0</b>	<b>3</b>

### Unit-I

*Welding:* Introduction to types of welding; Principle of Electric arc welding, welding tools and safety devices, welding positions, welding joints, types of welds, Resistance welding, Oxyacetylene gas welding, types of flames, Soldering and Brazing.

### Unit-II

*Lathes:* Constructional details of centre lathe. Main operations and tools used on centre lathes.

*Shaper*: Types of shapers. Constructional details of standard shaper, shaper tools and main operations.

### ***Unit-III***

*Drilling Machines*: Types of drilling machines. Constructional details of pillar type and radial drilling machines. Main operations. Twist drills, drill angles and sizes.

*Forming* : Basic descriptions and applications of hot and cold working processes, forging, bending, shearing, drawing and forming operations.

### ***Unit-IV***

*Foundry & Casting Practice* : Introduction, types of patterns, mouldings, moulding Materials, cores, moulding tools and equipments. Moulding sands, properties of moulding sands. Casting defects.

*Casting methods* : Permanent mould casting, investment casting.

### **Practicals**

Practical exercises on welding, pattern making, foundry and machining operations.

### **Text Books/References**

1. Mathur, Mehta and Tiwari : Elements of Mechanical Engineering, Jain Brothers, New Delhi.
2. S.K. Hajra Choudhury and A.K. Hajra Choudhury. Elements of Workshop Technology (Vol. I and II), Media promoters & Publishers Pvt. Ltd., Bombay.