FIRST YEAR B.TECH (COMMON FOR ALL BRANCHES)
SEMESTER - I

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
				L	T	P	L	T	P	Th.	Pr.	MT
1	BSC	BS 111 (BSC)	Mathematics -I	2	1	0	2	1	0	80	0	20
2	ESC	ME 112 (ESC)	Mechanical Engineering	3	0	0	3	0	0	80	0	20
3.	ESC	ME 113 (ESC)	Workshop Practice	0	0	1.5	0	0	3	0	80	20
4	ESC	CE 114 (ESC)	Engineering Drawing	0	0	1.5	0	0	3	0	80	20
			NCC/NSS/NSO/ Yoga/Scout	-	-	-	0	0	2	-	-	-
			Total	**5**	**1**	**3**	**5**	**1**	**8**			

GROUP I

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
5.	BSC	BS100P (BSC)	Engineering Physics	2	0	1	2	0	2	50	30	20
6.	ESC	CE100 (ESC)	Engineering Mechanics	2	0	1	2	0	2	50	30	20
7.	ESC	EE100 (ESC)	Electrical Engineering	3	0	1	3	0	2	50	30	20
8.	HSMC	REE100 (HSM)	Environmental Studies and Disaster Management	2	0	0	2	0	0	80	0	20
			Total	**9**	**0**	**3**	**9**	**0**	**6**			

GROUP II

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
5	BSC	BS100C (BSC)	Engineering Chemistry	2	0	1	2	0	2	50	30	20
6.	ESC	EC100 (ESC)	Electronics and Instrumentation	2	0	1	2	0	2	50	30	20
7.	ESC	CS100 (ESC)	Computer Programming for Problem Solving	0	1	2	0	1	4	0	80	20
8.	HSMC	BS100E (HSM)	Communication Skills and Personality Development	2	0	1	2	0	2	50	30	20
			Total	**6**	**1**	**5**	**6**	**1**	**10**			
			Total Credits		**21**							

Note :
1. NCC/NSS/NSO/YOGA/SCOUT is compulsory non credit course and the student will be assessed as satisfactory/ unsatisfactory at the end of IV semester.
2. The courses BS 100P, CE 100, EE 100,REE 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 opt all the eight courses in first year.
3. Students have to undergo in house practical summer training (Branch Code 239 (PSI) of 15 days at the end of II semester and will assessed in III semester.

SEMESTER - II

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
				L	T	P	L	T	P	Th.	Pr.	MT
1	BSC	BS121 (BSC)	Mathematics -II	2	1	0	2	1	0	80	0	20
2	ESC	CE122 (ESC)	Civil Engineering	1	0	1	1	0	2	50	30	20
3.	ESC	ME123 (ESC)	Mechanical Drawing	0	0	1	0	0	2	0	80	20
4	ESC	ME 124 (ESC)	Workshop Technology	2	0	1	2	0	2	50	30	20
			NCC/NSS/NSO/ Yoga/ Scout	-	-	-	0	0	2	-	-	-
			Total	**5**	**1**	**3**	**5**	**1**	**8**			

GROUP I

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
5	BSC	BS 100C (BSC)	Engineering Chemistry	2	0	1	2	0	2	50	30	20
6.	ESC	EC100 (ESC)	Electronics and Instrumentation	2	0	1	2	0	2	50	30	20
7.	ESC	CS100 (ESC)	Computer Programming for Problem Solving	0	1	2	0	1	4	0	80	20
8.	HSMC	BS100E (HSM)	Communication skills and Personality Development	2	0	1	2	0	2	50	30	20
			Total	**6**	**1**	**5**	**6**	**1**	**10**			

GROUP II

S.N	Category	Course Code	Course title	Credits			Hrs/ week			Marks allotted		
5.	BSC	BS100P (BSC)	Engineering Physics	2	0	1	2	0	2	50	30	20
6.	ESC	CE100 (ESC)	Engineering Mechanics	2	0	1	2	0	2	50	30	20
7.	ESC	EE100 (ESC)	Electrical Engineering	3	0	1	3	0	2	50	30	20
8.	HSMC	REE 100 (HSM)	Environmental Studies and Disaster Management	2	0	0	2	0	0	80	0	20
			Total	**9**	**0**	**3**	**9**	**0**	**6**			
			Total Credits	**21**								

Note :

1. NCC/NSS/NSO/YOGA/SCOUT is compulsory non credit course and the student will be assessed as satisfactory/ unsatisfactory at the end of IV semester.

COURSE CONTENT
FIRST YEAR B.TECH. (I SEMESTER)

BS111 (BSC): MATHEMATICS – I

Cr. Hrs.   3 (2 + 1 + 0)

L   T   P

Credit   2   1   0

Hours   2   1   0

Course Outcome: 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   Apply the partial differentiation to compute the minima and maxima of functions of two variables.

CO4   Compute areas and volumes by integration.

CO5   Solve linear differential equations of higher order and homogenous differential equations with constant coefficients.

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.

Suggested Books & References:

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

6. Rao V. Dukkipati, *Engineering Mathematics*, New Age International (P) Ltd, New Delhi (2012).
7. Gupta C.B., Malik A.K., *Engineering Mathematics –I,* New Age international Publisher.

ME112 (ESC) MECHANICAL ENGINEERING

	L	T	P
Credit	3	0	0
Hours	3	0	0

Course Outcomes: **Upon completion of this course the students will be able to:**

CO1: Apply the principles of conservation of mass, first and second laws of thermodynamics to analyse closed steady state systems and processes involving heat and work interactions.
CO2: Show understanding of concepts of reversibility, entropy and Carnot cycle.
CO3 Demonstrate knowledge of properties of steam and ability to compute them from steam tables and Mollier chart.
CO4: Understand construction and working of steam boilers, steam engines and their specific applications.
CO5: Compute efficiency, power output, etc. of various vapour and gas cycles.
CO6: Demonstrate knowledge about construction and working of IC engines.

Unit 1

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 Claussius statements. Reversible processes, Carnot cycle, Carnot theorem. Reversed Carnot cycle. Entropy, physical concept of entropy.

Unit 2

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 3

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 4

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 Pub. (India), Jodhpur.
3. P.K. Nag: Engineering Thermodynamics, TMH.

ME113 (ESC)   WORKSHOP PRACTICE

	L	T	P
Credit	0	0	1.5
Hours	0	0	3

Course Outcomes: **Upon completion of this course the students will be able to:**

CO1:   Demonstrate knowledge of characteristics of various types of woods used in engineering applications.

CO2:   Demonstrate knowledge of tools and operations in carpentry work, black smithy, fitting, sheet metal and plumbing works in engineering practice.

CO3   Identify and use measuring instruments in workshop practice and pipe fittings.

CO4:   Learn use of tools in the carpentry, fitting, smithy, sheet metal and plumbing shop to make simple jobs.

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, tenon 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 books/References:

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

CE 114 (ESC) ENGINEERING DRAWING

Cr. Hrs.   1.5 (0 + 1.5)

	L	T	P
Credit	**0**	**0**	**1.5**
Hours	**0**	**0**	**3**

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.

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, SatryPrakashan, New Delhi.
4.   Fundamentals of Technical Drawing, Parkinson.

BS 100P (BSC) ENGINEERING PHYSICS

Cr. Hrs. 3 (2+0+1)
	L	T	P
Credit	2	0	1
Hours	2	0	2

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.

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, Febry-Perot interferometer-principle, operation, determination of wave length and difference in wave length.

Unit-IV
Diffraction: Double slit Fraunhoffer diffraction pattern, Fraunhoffer 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 polarimeter 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.
5. Gupta and Kumar. (1995). Practical Physics, Pragati Prakashan, Meerut.

CE 100 (ESC) ENGINEERING MECHANICS

Cr. Hrs. 3 (2 + 1)

L T P

Credit 2 0 1

Hours 2 0 2

Course Outcome: 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.

(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 Jack

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.

(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.

Practical
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 crack 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, SatyaPrakashan, New Delhi.

EE 100 (ESC) ELECTRICAL ENGINEERING

Cr. Hrs.   4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1   Proficiency in solving DC network.

CO2   Know-how of single phase AC circuits

CO3   Competency in solving three phase balanced AC circuits

CO4   Dexterity in using basic electrical instruments

CO5   Comprehension of transformer working principles.

Unit-I

Electro motive force, reluctance, laws of magnetic circuits, determination of ampere-turns for series and parallel magnetic circuits, hysteresis and eddy current losses.

Kirchoff's law, Delta-star and star-delta conversion, source conversion

Network theorems: Thevenin's, Norton's, superposition, and Maximum Power Transfer theorem.

Unit-II

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

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.

Fundamentals of DC machines: Working principle, operation and performance of DC machines (Motor and generator)

Unit-IV

Three phase A.C. circuits: Three phase EMF generation, delta and star connection, methods of three phase power measurement; power factor, reactive and apparent power, Series and parallel resonance.

Concept of Three phase induction motor: construction and operation. Basic introduction of single phase induction motor.

Practicals :

1. To Establish the Voltage-Current Relationship in an Electric Circuit and to Measure the Unknown Resistance by Ammeter-Voltmeter Method (Ohm's Law).
2. Experimentally Verify the Number of Resistance Connected in Series and parallel in an

Electric Circuit can be replaced by in Equivalent Resistance without Disturbing the Circuit Condition.

3. Verify Kirchhoff's Current Law and voltage law for a DC Circuit.
4. Verify Superposition Theorem For A DC Circuit.
5. Verify Thevenin's Theorem for a Dc Circuit.
6. To Measure Power and power factor in a Single Phase A.C. Series R-L Circuit.
7. Determination of Choke Coil Parameter Resistance (R) and Inductance (L).
8. To Study The Characteristics of an L-C-R Series Circuit.
9. Testing of Single Phase Energy Meter by Direct Loading Method.
10. Determination of Percentage Regulation of a Single Phase Transformer by Direct Loading Method.
11. Determination of Efficiency of a Single Phase Transformer By Direct Loading Method
12. To perform open circuit and short circuit test for single phase transformer
13. To obtain load characteristics of D.C. shunt/series /compound generator
14. To perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent circuit parameters
15. To perform no load & blocked –rotor test on 1 ph. induction motor & to determine the parameters of equivalent circuit.

Text Books/References
1. B.L. Therja. Electrical Technology, S. Chand.
2. M.E. Van Valkenberg. Network analysis, PH.I
3. Soni and Gupta. Introduction to Electrical Network Theory, Dhanpat Rai Publisher.
4. Dr. R.A. Gupta and Dr. Nikhal Gupta. (2002). Fundamentals of electrical & Electronics Engineering, JPH.
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.

REE 100(HSM)   ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Cr. Hrs. 2 (2 + 0)

L T P

Credit 2 0 0

Hours 2 0 0

Course Outcome: 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.

Unit-I

Environmental Studies: Definition, scope and importance. Natural Resources: Renewable and non-renewable resources and associated problems.

Forest resources: Use and over-exploitation. 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. Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: Growing energy needs, renewable and non-renewable energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.

Unit-II

Ecosystems: Concept, Structure and function. Energy flow in an ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the various ecosystems.

Biodiversity and its conservation: Introduction, definition, genetic species & ecosystem diversity and biogeographical classification of India.

Value of biodiversity. Biodiversity at global, national and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation.

Unit-III

Environmental Pollution: definition, cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

Solid Waste Management: causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Social Issues and the Environment: Urban problems related to energy; Water conservation, rain water harvesting, watershed management.

Environmental ethics: Issues and possible solutions; Wasteland reclamation, Consumerism and waste products. Environment Protection Act.

Issues involved in enforcement of environmental legislation. Public awareness, Human Population and the Environment: population growth, 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.

Unit-IV

Natural Disasters- Meaning and nature, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Climatic change: global warming, Sea level rise, ozone depletion.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, accidents.

Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Armed forces in disaster response; Disaster response; Police and other organizations.

Suggested Readings
1. Agarwal K.C., Environmental Biology, Nidi Publications, Bikaner, 2001.
2. Bharucha Erach. 2005. Text Book of Environmental Studies for Undergraduate Courses, University Grants Commission, University Press, Hyderabad.
3. Chary Manohar and Jaya Ram Reddy. 2004. Principles of Environmental Studies, BS Publishers, Hyderabad.
4. Chaudhary, B.L. and Jitendra Pandey: Environmental Studies, Apex Publishing House, Udaipur, 2005
5. Climate Change.1995: Adaptation and mitigation of climate change-Scientific Technical Analysis Cambridge University Press, Cambridge.
6. Gupta P.K. 2004, Methods in Environmental Analysis – Water. Soil and Air. Agro bios, Jodhpur.
7. Husain Majid. 2013, Environment and Ecology: Biodiversity, Climate Change and Disaster Management, online book.
8. Jhadav, H. & Bhosale, V.M.: Environmental Protection & Laws, Himalaya Pub. House, Delhi
9. Kaul S.N., Ashuthosh Gautam. 2002. Water and Waste Water Analysis, Days Publishing House, Delhi.
10. Rao, M.N. and A.K. Datta, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
11. Sharma J.P. 2003, Introduction to Environment Science, Lakshmi Publications.
12. Sharma, B.K., Environmental Chemistry, Goel Publishing House, Meerut
13. Sharma, R.K. & Sharma, G. 2005, Natural Disaster, APH Publishing Corporation, New Delhi.
14. Singh Pratap, N.S. Rathore and A.N. Mathur: Environmental Studies, Himanshu Publications, Udaipur, 2004.
15. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno Science Publications.

BS 100C (BSC) ENGINEERING CHEMISTRY

Cr.Hrs. 3(2+0+1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

Course Outcome: 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 Describe the purpose and operational steps of key water treatment processes used to improve water quality including: Coagulation, Sedimentation, Filtration, Disinfection, Corrosion Control, Taste and Odour Control

CO3 Know the methods to determine the calorific value of fuels, perform flue gas analysis and combustion analysis.

CO4 Apply the science for understanding corrosion and its prevention.

CO5 Apply the knowledge of Kinetics of Reactions

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 and its control: Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion.

Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

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.

Practicals

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.Chem.

S.Chand & Co., New Delhi.

7.   Ameta and Yasmin. Practical Engineering Chemistry, Himanshu Publications, New Delhi

EC100 (ESC): ELECTRONICS AND INSTRUMENTATION

	L	T	P
Credit	2	0	1
Hours	2	0	2

UNIT-I
Passive Components: Construction and characteristics of various types of resistors, capacitors & inductors for electronic circuits, color coding of resistors. Semiconductor Devices: Basic theory of semiconductors, constructions and characteristics of PN diode, Zener diode, photodiode, LED, BJT & JFET.

UNIT-II
Bipolar Junction Transistor: Introduction to BJT biasing circuits, Basic concept of class-A, class-B, class-AB, class-C amplifiers.
Power supply: Rectifier circuits and filters. Concept of voltage regulators, Zener diode voltage regulators, Transistor series regulator.

UNIT-III
Feedback & Oscilloscopes: Concept of positive and negative feedback. Introduction to Oscilloscope.Barkhausen criteria. Working principle of RC- phase shift, Wien bridge, Hartley, Colpitts and Crystal Oscilloscopes.

UNIT-IV
Transducers: Active and Passive transducers. Working principle of Thermocouple, LVDT, Strain Gauge and Tacho Generator. Instrumentation: Introduction to data acquisition system. Working principle of Electronic Multimeter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope and Spectrum Analyzer.

LIST OF PRACTICAL EXPERIMENTS
1. Identification and testing of different types of passive and active electronic components: Resistors, Capacitors, Inductors, Diodes, Transistors.
2. Plot the V-I characteristics in forward and reverse bias mode for (a) PN junction diode
(b) ZENER diode and find the cut- in and breakdown voltage respectively.
3. Plot the V-I characteristics of LED diode in forward bias mode and find the glow voltage.
4. Determine the R.M.S value of output voltage and check the waveform on CRO for:
(a) Half wave rectifier with and without filter.
(b) Full wave centre tapped rectifier with and without filter.
(c) Full wave bridge rectifier with and without filter.
5. Plot the input and output characteristics for two configurations of transistors:
(a) NPN/PNP transistor in CE configuration.
(b) NPN/PNP transistor in CB configuration.
6. Determine both theoretically and practically the frequency of oscillation for R-C Phase shift Oscilloscope.
7. Determine the output voltage of an amplifier: (a) with feedback (b) without feedback.
8. Study and perform basic measurement of Digital Multi Meter.
9. Study and perform basic measurement of Cathode Ray Oscilloscope/ Digital Storage Oscilloscope.
10. Study of Spectrum Analyzer and perform basic measurements.

Text Books/References
1. Millman and Halkias. Integrated electronics: Mc Grew Hill
2. W.D Cooper. Electronics Instrumentation and Measurement : PHI
3. M.L.Gupta. Electrical Engineering Materials
4. Melvino, Principles of Electronics
5. John D. Ryder. Electronics Fundamentals

CS100(ESC): COMPUTER PROGRAMMING FOR PROBLEM SOLVING

Cr. Hrs. 3 (0+1+2)

	L	T	P
Credit	0	1	2
Hours	0	1	4

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

CO1	Design, implement, test, debug, and document programs in C using conditional branching and iteration.
CO2	To use arrays, understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options
CO3	Implement recursion functions & use of pointers and structures to formulate programs.
CO4	To be able to create, read and write to/from files and to write simple searching and sorting algorithms

Unit I

Introduction to Programming, Algorithm, Flowchart, Arithmetic expressions and precedence: The Character set, constants, variables and keywords, data types, Type Conversion, Hierarchy of Operations, Conditional Branching: The if Statement, if-else Statement, Nested if-else, Ladder if-else, The Conditional Operators. Loops: While Loop, do-while loop, for Loop, Nesting of Loops, Multiple Initializations in for Loop, break Statement, continue Statement, Decisions using switch, Go to Keyword, finding roots of an equations.

Unit II

Arrays: Array Initialization, Bounds Checking, One and Two Dimensional Arrays, Memory Map of a 2-Dimensional Array, Strings: String Functions- strlen( ), strcpy( ), strcat( ), strcmp( ), Two-Dimensional Array of Characters. Function: Function Declaration and Prototypes, Parameter passing in functions: Call by Value and Call by Reference, Passing Array Elements to a Function, Passing an entire Array to a Function.

Unit III

Recursion: Recursion such as Finding Factorial, Fibonacci series, Ackerman function etc. Structures: Declaring a Structure, Array of Structures. Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures

Unit IV

File handling: create, open, insert, update, search and display operations. Basic Algorithms: Searching: linear & binary, Basic Sorting Algorithms (Bubble, Quick sort and Merge sort), Notion of linked list.

Text books / References:

1. "Let us C", Yashwant Kanetkar, Allied Publishers.
2. "The C programming language", Kernighan and Ritchie, Prentice Hall of India.
3. "Programming in ANSI C", E. Balaguruswamy, Tata McGraw Hill.

BS100E (HSM): COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

Cr. Hrs. 3 (2 + 0 +1)

L T P

Credit 2 0 1

Hours 2 0 2

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

CO1	Understand basic grammar principles, and apply them to synthesise and transform sentences and identify common errors in writing
CO2	Demonstrate enhanced communicative ability in English, and develop sensitivity to cultural differences in communication
CO3	Write structured paragraphs and essays, CVs, letters and professional emails
CO4	Understand their personality type, develop leadership qualities and time-management techniques
CO5	Understand the process and types of communication and the barriers to effective communication
CO6	Show improved vocabulary and pronunciation
CO7	Practice skills required for oral presentations, group discussions and interviews

Unit-I

Sentence and its types, Parts of Speech, Articles, Tenses, Concord, Modals, Narration and Voice

Unit-II

Nissim Ezekiel – Goodbye Party for Miss Pushpa T.S. – Poem
(Introduction to Indianisms and Difference between Indian English and Standard English)

George Orwell – Politics and the English Language – Essay
(Writing process and what constitutes good or bad writing; rules of writing for effective communication)

Unit-III

C.V and Resume Writing, Letter Writing, E-mail Writing, Paragraph Writing (Topic sentence, inductive and deductive logic), Essay Writing (Narrative, Descriptive, Expository and Persuasive)

Unit-IV

Personality Traits (Big Five Model), *Skills of a Good Leader,* Effective Time Management Techniques, Communication: Process and Types (Verbal/Non-Verbal/Para-Verbal, Intrapersonal/Interpersonal, Upward/Downward/Horizontal/Diagonal), Barriers to Effective Communication

PRACTICAL (Language Lab)

Phonetics, Group Discussions, Mock Interviews, Presentations, Vocabulary Building (Synonyms, Antonyms, One-Word Substitutes, Idioms and Phrases), Listening Comprehension, Everyday Conversations

SUGGESTED READINGS

1. *Practical English Usage.* Michael Swan. OUP. 1995.
2. *Remedial English Grammar.* F.T. Wood. Macmillan. 2007
3. *High School English Grammar and Composition.* Wren and Martin. S. Chand. 2018
4. *On Writing Well.* William Zinsser. Harper Resource Book. 2001
5. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
8. *The Ultimate Book of Common Errors.* Terry O'Brien. Rupa Publications. 2015.
9. *Technical Writing for Engineers and Scientists.* Barry J. Rosenberg. Addison-Wesley Professional. 2005.
10. *Spoken English*: *A Manual of Speech and Phonetics*. R.K. Bansal & J.B. Harrison. Orient Longman. 2013.
11. *English Phonetics & Phonology: A Practical Course*. P. Roach. Cambridge University Press, London. 2010.
12. *Handbook of the International Phonetic Association: A Guide to the Use of the International Phonetic Alphabet.* Cambridge University Press.
13. *Communicating Your Way to Success: The Success Stories.* Dale Carnegie. Manjul Publishing House. 2018.
14. *Talk like TED: The Public-Speaking Secrets of the World's Top Minds.* Carmine Gallo. St. Martin's Press. 2014.
15. *The Ace of Soft Skills: Attitude, Communication and Etiquette for Success.* Gopalaswamy Ramesh and Mahadevan Ramesh. Pearson Education. 2013.

FIRST YEAR B.TECH. (II SEMESTER)

BS121 (BSC): MATHEMATICS – II

Cr. Hrs.   3 (2 + 1 + 0)

L T P

Credit 2 1 0

Hours 2 1 0

Course Outcome: 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.

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's 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.

Suggested Books & References:

1. Guar, Y.N. and Koul, C.L.(2013), *Engineering Mathematics,* Vols I and ll, Jaipur Publishing house.
2. Bansal, J.L. and Dhami, H.S.(2012), *Differential Equation* Vols I and ll, Jaipur Publishing house.
3. Babu Ram (2011), *Engineering Mathematics –I* , Pearson Education India.
4. B. V. Ramana (2012), *Heigher Engineering Mathematics*, Tata McGrew Hill, India.
5. M. Ray and Chaturvedi, *A text book of Differential Equation*, Student Friend & Co. Publisher, Agra.

6. Rao V. Dukkipati (2012), *Engineering Mathematics*, New Age International (p) Ltd., New Delhi.
7. Gupta C.B., Malik A.K., *Engineering Mathematics –II,* New Age international Publisher.

CE 122 (ESC) CIVIL ENGINEERING

Cr. Hrs. 2 (1 + 1)

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

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

CO1 Demonstrate knowledge of various surveying methods.

CO2 Conduct a compass survey.

CO3 Conduct levelling survey and be able to do RL calculations.

CO4 Demonstrate knowledge of properties of various building materials.

CO5 Plot work profile.

(A) SURVEYING AND LEVELING

Unit-I

Principle and purpose of plane surveying.

Introduction of Chain Surveying: Instrument for chaining, Direct & indirect ranging. Introduction of laser based distance measurement

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

Introduction of plane table Surveying: Accessories and working operation.

Unit-II

Level and leveling: Definition of various terms used in leveling. Types of Bench mark and their uses. Construction and use of Dumpy level, 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 compaction of concrete.

*Timber :*Properties of good quality timber. Decay and preservation of timber.

Practicals

1.   Study of accessories used in measurement of distances.
2.   Ranging Direct and indirect and use of chain and tape.
3.   Study of prismatic compass and taking bearings..
4.   Study of Dumpy level, temporary adjustment and R.L. calculations.
5.   Simply and differential leveling operation, record in level book, practice for staff reading line of collimation and Rise and fall method calculations.
6.   Longitudinal sectioning.
7.   Cross sectioning.
8.   Fly leveling operation.
9.   Plotting of working profile.
10.   Introduction of laser based distance measurement.
11.   Properties of good quality bricks.
12.   Properties of good quality stone.
13.   Properties of good quality timber.
14.   Physical test of cement.

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.
3.   Kanetkar T. P., 'Surveying and leveling', Vol. I & II.
4.   Duggal S. K., 'Text book-Surveying', Vol. I & II.

ME123 (ESC) MECHANICAL DRAWING

	L	T	P
Credit	0	0	1
Hours	0	0	2

Course Outcomes: Upon completion of this course the students will be able to:

CO1:   Demonstrate knowledge of conventional representation employed in machine drawing.
CO2:   Make detailed drawings of simple machine parts in first/third angle projection by proper choice of sectioned views as per need.
CO3   Read, interpret and visualize machine parts from a given drawing.
CO4:   Demonstrate knowledge of riveted, welded, threaded and screwed joints and fastenings.

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 (ESC) WORKSHOP TECHNOLOGY

	L	T	P
Credit	2	0	1
Hours	2	0	2

Course Outcomes: **Upon completion of this course the students will be able to:**

CO1: Understand welding principles, equipment and tools of arc-, gas and resistance welding, brazing and soldering.

CO2: Describe construction, operations and tools of lathe, shaper and drilling machines.

CO3 Understand basic hot and cold forming operations.

CO4: Demonstrate knowledge of types of patterns, cores, moulding sands and tools.

CO5: Understand sand, permanent mould and investments castings and casting defects.

Unit 1

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 2

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 3

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.

Measurement and Inspection: Classification of measuring instruments, linear and angular measurement, comparators.

Unit 4

Foundry & Casting Practices: 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:

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