

TEACHING SCHEME FOR B.TECH SEMESTER I (Electrical), Effective from Academic year 2014-15																
Sem	Subject Code	Name of Subject	Teaching Scheme				Credit				Examination Scheme					
			Hrs.				L	T	P	Total	Theory				Practical /TW Ass.	Grand Total
			L	T	P	Total					Int. Asses	Sem End	Hrs	Total		
I	2HS101	Calculus	3	1	0	4	3	1	0	4	40	60	3	100	0	100
	2HS103	Communication Skills	2	0	2	4	2	0	1	3	40	60	3	100	50	150
	2EE101	Elements of Electrical Engineering	3	0	2	5	3	0	1	4	40	60	3	100	50	150
	2ME101	Elements of Mechanical Engineering	3	0	2	5	3	0	1	4	40	60	3	100	50	150
	2CI102	Engineering Mechanics	3	0	2	5	3	0	1	4	40	60	3	100	50	150
	2CI103	Environmental Studies & Disaster Management	3	0	0	3	3	0	0	3	40	60	3	100	0	100
	2HS104	Creative & Critical Thinking	2	0	0	2	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>			<b>19</b>	<b>1</b>	<b>8</b>	<b>28</b>	<b>17</b>	<b>1</b>	<b>4</b>	<b>22</b>	<b>240</b>	<b>360</b>	<b>-</b>	<b>600</b>	<b>200</b>	<b>800</b>

Note: Institute is at liberty to offer any six subjects and Calculus for Semester – I

Selection of subjects for Semester I will be done by the institute to balance the teaching load of departments

**Learning Outcomes:**

Upon completion of this course, students will be able to :

- Understand all basic fundamentals of Differentiation and Integration.
- Prepare him/herself for finding Area and Volume.
- Apply mathematical formulas in various subjects of his/her branch.

**Syllabus:**

Unit No	Topics
1	<p><b>Differential Calculus :</b> Review of the prerequisites such as limits of sequences and functions, continuity, uniform continuity and differentiability. Successive differentiation, Leibniz's theorem(without proof), Taylor's &amp; Maclaurin's expansions of single variable, Indeterminate forms.</p>
2	<p><b>Partial differentiation and its applications :</b> Partial and total differential coefficient, Euler's theorem, Transformations, Geometrical interpretation of partial derivatives, Tangent plane and Normal line, Jacobians, Taylor's expansion for two variables, Errors and approximations, Maxima and Minima of functions of two variables ,Lagrange method of undetermined multipliers to determine stationary values.</p>
3	<p><b>Integral Calculus :</b> Reduction Formulae: Reduction formulae of the type <math>\int \sin^n x dx</math> , <math>\int \cos^n x dx</math> , <math>\int \sin^m x \cos^n x dx</math> , <math>\int \tan^n x dx</math> and <math>\int \cot^n x dx</math> . Beta &amp; Gamma function, Error function, Elliptic integrals. Application of integration- Length of a curve, Area of a bounded region, volume &amp; surface area of a solid of revolution for Cartesian, parametric &amp; polar form.</p>
4	<p><b>Multiple integrals :</b> Double integral, change of order of integration, transformation of variables by Jacobian only for double integration, change into polar coordinates in double integrals only ,Triple integral, Application of multiple integration to find areas, volumes, C.G., M.I. and mean values.</p>

**Text Books:**

1. Higher Engineering Mathematics by Dr. B. S. Grewal

**Reference Books:**

1. Higher Engineering Mathematics Vol. I & II by Dr. K. R. Kachot.
2. Calculus and analytical geometry by G. B. Thomas and R. L. Finney

**Learning Outcomes:**

On successful completion of the course, the students will be able to:

- Understand the basic concepts of communication skills for engineers.
- Acquire satisfactory competency in use of four basic skills of English language (lsrw).
- Handle various professional communication situations more effectively and fruitfully.
- Use English in real life and in authentic context.

**Syllabus:**

<b>Unit No.</b>	<b>Topics</b>
<b>1</b>	<p><b>Basics of Communication:</b></p> <p>Definition, Principles, Process, Functions, and Forms of communication (Formal – Informal, Verbal – Non-verbal, Electronic and Visual)</p> <p>Barriers to communication with remedies</p>
<b>2</b>	<p><b>Introduction to Functional Grammar in English</b></p> <p>Verb Forms, collocations, homophones and homonyms, conjunctions, abbreviations &amp; acronyms and Introduction to English Sounds</p>
<b>3</b>	<p><b>Receptive Language Skills:</b></p> <p><b>Listening Skill:</b></p> <p>Definition and process of listening skill, Pre-requisites of effective listening, Modes of listening, Causes of poor listening, Tips for effective listening, Traits of a good listening</p> <p><b>Reading Skill:</b></p> <p>Definition and types of reading, Techniques for effective reading comprehension, Purposes of Reading</p>
<b>4</b>	<p><b>Productive Language Skill – I (Oral Communication):</b></p> <p><b>Presentation Skills:</b></p> <p>Definition of presentation, Components of presentation, Planning to prepare effective presentation, Steps for preparing effective presentation, Boredom Factors in presentation, Attention grabbers in presentation</p> <p><b>Group Discussion:</b></p> <p>Definition and nature of group discussion, Pre-requisites for group discussion, Objectives of group discussion, Characteristics of group discussion, How to prepare for group discussion, Dos and don'ts in group discussion</p>

**Job Interviews:**

Definition, purpose and types of interview, Types of job interview, Process of job interview, Tips and techniques of job interview, success and failure factors in job interview

**5 Productive Language Skills – II (Written Communication)**

Significance of written communication for professionals, Fundamentals of good writing, Guidelines for effective writing – Selection of words, Framing sentences and Composing paragraphs.

Precis Writing, Paragraph Composition, Advertisement drafts with special reference to Engineering & Technology

**Letter writing:**

Structure and layout of a business letter, Types of business letters – inquiry, reply, complaint and adjustment letter, sales promotion, Job application with resume

**Report writing:**

Purpose of a report, types of reports, Structure and style of reports, Committee report, Individual report

**Reference Books:**

1. Technical Communication – Principles and Practice by Meenaksi Raman & Sangeeta Sharma (Oxford University Press)
2. Effective Technical Communication by M Ashraf Rizvi (TMH Publication)
3. Business Communication by V. K. Jain and Omprakash Biyani (S. Chand & Company)
4. A Communicative Grammar of English by Geoffery Leech and Fan Svartvik (Pearson Longman)
5. New International Business English by Jones & Alexander (Oxford University Press)
6. Professional English in Use: Engineering with Answers: Technical English for Professionals by Mark Ibbotson, Cambridge Uni. Press
7. Oxford English for Electrical and Mechanical Engineering by Eric H. Glendinning and Norman Glendinning
8. Oxford English for Careers: Technology 1: Student's Book by Eric Glendinning
9. Oxford English for Information Technology: Audio CD by Eric Glendinning and John McEwan
10. English for Specific Purposes (Resource Books for Teachers) by Keith Harding

**Learning Outcomes:**

Upon completion of this course, students will acquire knowledge about:

- Learn to predict the behavior of any electrical and magnetic circuits.
- Distinguish between DC, AC, single phase and three-phase AC supply systems, highlighting the advantages and disadvantages of the different systems.
- Apply basic electric laws in solving circuit problems and able to perform power calculation.
- Identify the types of capacitors and know the practical applications of various types of capacitors.
- Understand the basic concepts of Electromagnetic Induction and Electrical Generation principle.
- Understand the Economic Aspects of Electrical Engineering and apply this knowledge to work with better power factor leading to Energy Conservation.
- Develop the concept of Work, Power & Energy with Electrical Engineering perspective.
- Know the concept of Illumination from engineering point of view.

**Syllabus:**

<b>Unit No.</b>	<b>Topics</b>
<b>1</b>	<b>D.C. Circuits :</b> Source Transformation, Star-Delta Transformation, Application of Kirchhoff's Law, Superposition Theorem, Thevenin's Theorem, Norton's & Maximum Power Transfer Theorem.
<b>2</b>	<b>Capacitor :</b> Types of Capacitor, Capacitance of Multiple Parallel Plate Capacitor, Energy stored in a Capacitor, Charging & Discharging of Capacitor & Time constant.
<b>3</b>	<b>Magnetic circuit :</b> Law of Magnetic Circuit, Series & parallel Magnetic Circuits and Calculation, Comparison of magnetic & Electric Circuit, Magnetization Curves.
<b>4</b>	<b>Electromagnetic Induction :</b> Review of Faraday's Law, Lenz's Law, Self & Mutual Inductance, Inductance of coupled circuits, Rise and Decay of Current in Inductive circuit & Time Constant, Magnetic Hysteresis, Hysteresis Loss, Eddy Current Loss.
<b>5</b>	<b>A.C.Circuits :</b> Generation of A.C. Voltage , Equation of A.C. Voltage, Average value, R.M.S. Value, Form Factor, Peak Factor, Phase & Phase Difference, Vector Representation of A.C. Voltage and Current. Addition and Subtraction of Vectors, Mathematical Representation of Vectors, Complex Algebra, Polar & Exponential form, Pure Resistive, Pure Inductive, Pure Capacitive and combination of R-L-C Circuits, Active -Reactive and Apparent power & Power Factor, Resonance in R-L-C Series Circuit, Q-factor, Solution of Parallel circuit by Admittance, Phasor & Complex Algebra methods, Resonance in Parallel circuit.

**6 3-Phase Circuits :**

Generation of 3-phase voltage, Phase Sequence , Interconnection of three phase, Star – Delta, Voltage ,Current & Power relationship in balanced 3-Phase Circuits, Measurement of power in 3-phase circuit and Effect of power factor on Wattmeter readings.

**7 Economic Aspects :**

Tariff & its types, Causes and effects of low power factor, Methods of improving power factor.

**8 Work, Power, Energy :**

Heating Effect of Electric Current and Joule's law , Thermal Efficiency, Electrical Units of Power and Energy , Calculation of Power & Energy .

**9 Illumination :**

Definition and important terms, Laws of illumination, Requirement of good lighting, Types of lighting scheme, Street lighting, Factory and Flood lightning.

**Text Books**

1. U.A.Patel , "Elements of Electrical & Electronics Engineering " ,Atul Prakashan.
2. B.L.Thereja,"Electrical Technology " , S.ChandVolume-I.

**Reference Books**

1. V.N.Mittal,"Basic Electrical Engineering", Tata Mc Grawhill, New Delhi.
2. V.K.Mehta,"Principles of Power Systems " , Pub. By S.Chand.

**Learning Outcomes:**

After learning this course one will be able to:

- Understand about the working, functions and applications of equipments used in daily life.
- Identify the broad context of Mechanical engineering problems, including describing the problem conditions and identifying possible contributing factors
- Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
- Employ mathematics, science, and computing techniques in a systematic, comprehensive, and Rigorous manner to support the study and solution of Mechanical engineering problems.
- Synthesize analysis results to provide constructive and creative engineering solutions that reflect social and environmental sensitivities.
- Exhibit good teamwork skills and serve as effective members of multidisciplinary project teams.

**Syllabus:**

<b>Unit No.</b>	<b>Topics</b>
<b>1</b>	<p><b>Introduction:</b> I Prime movers, Sources of energy, Types of prime movers, Force and mass, Pressure, Work, Power, Energy, Heat, Temperature, Units of heat, Specific heat capacity, Interchange of heat, Change of state, Mechanical equivalent of heat, Internal energy, Enthalpy, Entropy, Efficiency, Statements of Laws of Thermodynamics, Calorific values</p> <p><b>Properties of gases:</b> Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Internal energy, Relation between Cp and Cv, Enthalpy, Non flow process, Constant volume process, Constant pressure process, Isothermal process, Poly-tropic process, Adiabatic process.</p>
<b>2</b>	<p><b>Properties of Steam:</b> Introduction, Steam formation, Types of Steam, Enthalpy, Specific volume of steam and dryness fraction of steam, Internal energy, Steam tables, Non-flow process. Measurement of dryness fraction, Throttling calorimeter, Separating calorimeter, Combined calorimeter.</p>
<b>3</b>	<p><b>Steam Boilers:</b> Introduction, Classification, Simple vertical boiler, Cochran boiler, Lancashire boiler, Locomotive boiler, Babcock and Wilcox boiler, Hi-Pressure boiler, functioning of different mountings and accessories.</p> <p><b>Internal Combustion Engines:</b> Introduction, Classification, Engine details, otto four-stroke cycle, Diesel-four-stroke cycle, Difference between otto cycle and Diesel cycle, Two-stroke cycle, Difference between two-stroke and four-stroke cycle, indicated power (ip), Brake Power (bp), Efficiencies. Governors, I.C. Engine governing, Fly wheel.</p>
<b>4</b>	<p><b>Air Compressors:</b></p>

Introduction, Uses of Compressed air, Reciprocating compressors, Operation of a compressor, multistage reciprocating compressors, Rotary compressors

**Pumps:**

Introduction, Reciprocating pump, types and operation, Bucket pump, Air Chamber, Centrifugal pumps, Types and Priming, Rotary pumps.

**5 Refrigeration & Air Conditioning:**

Introduction, Refrigerant, Types of refrigerators, Vapour compression refrigerating system, Vapour absorption refrigerating system, Window and split air conditioners.

**Couplings, Clutches and Brakes:**

Introduction, Couplings, Clutches, Brakes, Types of brakes. Difference between a brake and a clutch

**6 Important Engineering Materials:**

Properties of materials, Ferrous & Nonferrous materials and other important engineering materials such as Timber, Abrasive material, silica

**Text Books**

1. Elements of Mechanical Engineering, S.M. Bhatt, H.G. Katariya, Books India publication
2. Thermal Science and Engineering by Dr. D.S. Kumar, S.K. Kataria & sons, Publication New Delhi
3. Elements of Mechanical Engineering, Desai & Soni, AtulPrakashan

**Reference Books**

1. Basic Mechanical Engineering by Pravin Kumar, Pearson
2. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
3. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
4. Introduction to Engineering Materials by B.K. Agrawal Tata Mcgrahill Publication, New Delhi

**Learning Outcomes:**

Upon completion of this course, students will acquire knowledge about Fundamentals of engineering principles, concept of centre of gravity and moment of inertia, importance of frictional force in real world problems, advantages of using machines, and effect of forces for different phenomenon when the bodies are in motion.

**Syllabus:**

Unit No.	Topics
<b>1</b>	<b>INTRODUCTION:</b> Definition of Statics, Kinetics and Kinematics, Scalar, Vector quantities, Fundamental principle of engineering mechanics, System of units.
<b>2</b>	<b>FUNDAMENTAL OF STATICS:</b> Force and Effect of forces, Types of force and force systems, Moment, Couple and its characteristics, Law of parallelogram of forces , Law of polygon of forces , Varignon;s principle Types of Supports and Loads, Support reactions and problems related to theories.
<b>3</b>	<b>CENTRE OF GRAVITY:</b> Definition of Centroid centre of gravity, Moment area method for finding out centre of gravity for 1D, 2D and 3D problems, Composite sections, PappusGuldinus theorems I &II.
<b>4</b>	<b>MOMENTOFINERTIA:</b> Concept of MI, Methods for finding out MI, Theorem of Parallel Axis and Perpendicular axis and related problems.
<b>5</b>	<b>EQUILLIBRIUM:</b> Concept of Free body diagram, Lami’s theorem and its applications.
<b>6</b>	<b>FRICTION:</b> Terminology, Friction on inclined smooth and rough surfaces, Ladder friction.
<b>7</b>	<b>SIMPLE LIFTING MACHINES:</b> Terminology, Conditions of reversibility of machines, Law of machine, method for finding out velocity ratio of simple wheel and axle, Differential wheel and axle, Single purchase crab winch, Double purchase crab winch, Simple screw jack and differential screw jack, related problems.
<b>8</b>	<b>KINEMATICS:</b> Terminology, Combined motion of rotation and translations, Case of Crank and Shaft, Instantaneous centre and its location, Single degree free vibrations
<b>9</b>	<b>KINETICS:</b> Newton’s law of motions, De-Alembert’s Principle, Motion of connected bodies on plane and inclined surfaces, Related problems.

**Laboratory Work:** This shall consist of field and laboratory work based on above content.

**Term Work:** Term work shall consist of 8 to 10 experiments and assignments consisting theoriesand numerical based on above syllabus

**Learning Outcomes:**

Upon completion of this course, students will acquire knowledge about

- Understand the natural environment and its relationships with human activities.
- Characterize and analyze human impacts on the environment.
- Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
- Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at a local and global levels.
- Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

**Syllabus:**

Unit No.	Topics
<b>1</b>	<p><b>Introduction to Environment:</b> Definition, Components of Environment, Relationship between different components, Man-Environment relationship, Impact of Technology on the environment, Environmental Degradation, Sustainable Development, Environmental Education.</p>
<b>2</b>	<p><b>Ecology &amp; Ecosystems:</b> Introduction: Ecology- Objectives and Classification, Concepts of an ecosystem- structure &amp; function of ecosystem, Components of ecosystem- Producers, Consumers, 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: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Bio-Geo- Chemical Cycles- Hydrological Cycle, Carbon cycle, Oxygen Cycle, Nitrogen Cycle, Sulfur Cycle.</p>
<b>3</b>	<p><b>Environmental Pollution:</b> <b>Air Pollution:</b> Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like SPM, SO<sub>2</sub>, NO<sub>x</sub> – Natural &amp; Anthropogenic Sources, Effects of common air pollutants, Air Pollution Episodes <b>Noise Pollution:</b> Introduction, Sound and Noise measurements, Sources of Noise Pollution, Ambient noise levels, Effects of noise pollution, Noise pollution control measures. <b>Water Pollution:</b> Introduction – Water Quality Standards, Sources of Water Pollution, Classification of water pollutants, Effects of water pollutants, Eutrophication, Water Pollution Episodes <b>Current Environmental Global Issues:</b> Global Warming and Green Houses Effect, Acid Rain, Depletion of Ozone Layer.</p>
<b>4</b>	<p><b>Energy Resources:</b> <b>Renewable &amp; Nonrenewable Resources:</b> Renewable Resources, Nonrenewable Resources,</p>

Destruction versus Conservation.

**Energy Resources:** Energy Resources - Indian Scenario , Conventional Energy Sources & its problems, non-conventional energy sources- Advantages and its Limitations

**5 Types of Disaster**

Introduction, Types of Natural Disasters, Accidental Disasters, Impact of Disasters on Trade and International Trade

**6 Natural Disasters:**

Introduction, Earthquakes, Hurricanes, Tornadoes, Floods, Drought, Tsunami, Volcanoes, Cyclones and Storms, Forest Fires, Severe Heat Waves, Landslides and Avalanches, Epidemics and Insect Infestations

**7 Technological and Social Disasters:**

Introduction, Types of Technological Hazards, Hazardous Materials, Social Disasters, Political and Crowd Disasters, War and Terrorism

**8 Disaster Management:**

Components of Disaster Management, Government's Role in Disaster Management through Control of Information, Actors in Disaster Management, Organizing Relief measures at National and Local Level, Psychological Issues, Carrying Out Rehabilitation Work, Government Response in Disaster

**Text Books**

- 1 Basics of Environmental Studies by Dr. N. S. Varandani, Books India Publications
- 2 Disaster Management by MukeshDhunna, Vayu Education of India, Delhi Publication

**Reference Books**

- 1 Environmental Studies by R. Rajagopalan, Oxford University Press Publication
- 2 Environmental Science by Richard T Wright & Bernard J Nebel, Prentice Hall India Publication
- 3 Environmental Science by Daniel B Botkin& Edward A Keller, Wiley Publications

## 2HS104: Critical and Creative Thinking

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### Learning Outcomes:

On successful completion of the course, the students will be:

- able to enhance their creative and innovative thinking skills
- familiar with processes and methods of creative problem solving: observation, definition, representation, ideation, evaluation and decision making
- able to take better decisions
- able to evaluate facts in an argument
- learn the Art of Questioning
- able to be better thinkers

### Syllabus:

**Unit  
No.**

**Topics**

**1 Creativity, Innovation & Critical thinking**

Introduction to Creativity and Innovation, Differentiation between creative and critical thinking, Thinking styles and common mistakes in thinking, Thinking about information and emotions, truth and knowledge, Evaluating arguments by asking the right questions about issues, conclusions, reasons, assumptions, evidence, etc.

**2 Techniques for improving Creativity**

Brainstorming, Lateral Thinking, List of Mental Associations, Random Combinations, Matrix of Ideas, Use of Manipulative verbs, Tree of Possibilities, Abstraction, Transformation, Use of mind stimulation: games, brain-twisters and puzzles

**3 Creativity in problem solving:**

Problem Definition, Understanding, Representing, Pattern Breaking, Thinking differently, Changing your point of view, Watching for paradigm shift, Challenging conventional wisdom, Lateral thinking, etc.

### Reference Books:

1. Asking the right Questions by M.Neil Browne & Stuart M. Keeley, Pearson, Prentice Hall
2. Teach Yourself to Think by Edward de Bono, Penguin
3. Lateral Thinking by Edward de Bono, Penguin
4. Six Thinking Hats by Edward de Bono, Penguin
5. Selected videos showcasing cases and arguments