I / II Semester B. E. (Common for all branches)

Course Code: **101**
Title of the Course: **Applied Mathematics - I**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
5	1	0	6	6	3	10	10	80	100

Unit	Contents	Hours
I	**Differential calculus** Successive differentiation, Leibnitz's theorem, Taylor's and Maclaurin's theorem, Indeterminate forms.	15
II	**Partial Differentiation -I** Partial Derivatives, Euler's theorem on homogeneous functions, Transformation of independent variables (Chain rule)	15
III	**Partial Differentiation - II** Jacobians, Taylor's and Maclaurin's series for functions of two variables, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers	15
IV	**Integral calculus** Beta and Gamma functions, R.M.S value, Differentiation of definite integrals, (Leibnitz's Rule) Tracing of Curves (Cartesian, Standard Parametric and Polar Curves)	15
V	**Statistics** Fitting of straight line, second degree parabola and exponential curve by the method of Least Squares, Coefficient of linear correlation, Regression lines, Rank correlation.	15
	Total	75

Text Book:

1. A text book of Engineering Mathematics, Volume I and II by D.T. Deshmukh

Reference Books:

1. A text book of Applied Mathematics Volume I and II by J.N. Wartikar and P.N. Wartikar

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

3. Advanced Engineering Mathematics by H. K. Dass

4. Advanced Engineering Mathematics by Erwins Kreyszig

I / II Semester B. E. (Common for all branches)

Course Code: **102**
Title of the Course: **Applied Mathematics – II**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
5	1	0	6	6	3	10	10	80	100

Unit	Contents	Hours
I	**Ordinary Differential Equations I** Solution of first order and first degree differential equations, Exact, Linear and reducible to Linear (Bernoulli's equation), Higher order linear differential equations with constant coefficients, General methods for particular integral and method of variation of parameters.	15
II	**Ordinary Differential Equations II** Short methods of particular integral of Higher order linear differential equations with constant coefficients. Cauchy's and Legendre's differential equations, Simultaneous differential equations, Differential equation of the form $d^2y/dx^2 = f(y)$, Application of differential equation to electrical circuits, Kinematics and Vibrations (upto second order)	15
III	**Multiple Integrals and their Applications** Elementary double integral. Change of order of integration (Cartesian), Elementary Tripple Integral, Applications to Area, Volume, Surface area, Moment of inertia and Centre of gravity.	15
IV	**Vector calculus I** Vector differentiation, Velocity and Acceleration, Tangential and Normal acceleration, Vector operator Del, Gradient, Directional Derivative of scalar point function.	15
V	**Vector calculus II** Vector point function, Divergence and Curl, Solenoidal and Irrotational vector fields. Scalar potential, Work done and Conservative vector field, Line, Surface and Volume Integrals. Statements without proof of Gauss Divergence theorem, Greens theorem, Stoke's theorem.	15
	Total	75

Text Book:

1. A text book of Engineering Mathematics, Volume I and II by D.T. Deshmukh

Reference Books:

1. A text book of Applied Mathematics Volume I and II by J.N. Wartikar and P.N. Wartikar

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

3. Advanced Engineering Mathematics by H. K. Dass

4. Advanced Engineering Mathematics by Erwins Kreyszig

I / II Semester B. E. (Common for all branches)

Course Code: 103
Title of the Course: Applied Physics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	**Quantum Physics** Dual nature of matter, De-Broglies concept of matter waves , Davisson and Germer's experiment, Compton scattering (qualitative approach), Heisenberg's uncertainty principle and its experimental illustrations, wave packet concept, wave function interpretation, Schrodinger's wave equations, applications : Particle in infinite potential well, qualitative approach for finite potential well, tunneling.	09
II	**Semiconductor Physics** Formation of energy bands in solids, Classification of solids based on band theory, Energy band diagram of germanium & silicon, Probability distribution function Fermi energy-its dependence on temp and doping concentration, conductivity of solids. p-n junction diode, junction voltage equation, Hall effect-its derivation and application, transistors.	10
III	**Solid state physics** Introduction, Lattice, basis, space lattice, Unit cell, Bravais lattices, crystal system- SC, BCC & FCC, octahedral and tetrahedral voids. Crystal structure, Miller indices, Braggs law.	08
IV	**Wave optics & Electron ballistics** Interference due to thin films of uniform and non uniform thickness, Newton's ring, Antireflection coating applications, Motion of electron in uniform electric and magnetic fields, Concept of crossed fields. Electron refraction electric and magnetic focusing devices-CRT, CRO and its applications, Bainbridge Mass spectrograph.	09
V	**Lasers and fibre optics** Introduction, Principle of laser, laser characteristics, Spatial and temporal coherence of light waves,types of laser, and its application. Introduction to optical fibre structure, principle, modes of propogation, acceptance angle, Numerical aperture, fractional refractive index, types and classifications of optical fibre, V – number, attenuation & its different mechanisms, distortion, applications as sensors and detectors advantages of optical fibre in communication.	09
	Total	45

Text Books:

1. Engineering Physics by Avadhanulu & Kshirsagar S. Chand Prakashan.

Reference Books:

1. Concept of modern Physics by A. Beiser TMH Edition
2. Concept of modern Physics by S. L. Gupta &S. Gupta
3. Refresher Course in Physics by C.L. Arora S. Chand Publication
4. Fundamentals of Physics by David Halliday, Robert Resnik And Jerle Walker John Wiley & Sons 2002
5. Optics by Ajay Ghatak
6. Lasers and Non Linear Optics by B.B. Laud, New Age Publications
7. Lasers Theory & Application by Avadhanulu, S. Chand and Company
8. Electronic Engineering Material & Devices by John Allison (TMH)
9. Applied Physics by P.K. Mittal, I.K. International
10. Applied Physics by K. C. Nandi, Tech. Max. Pune

I / II Semester B. E. (Common for all branches)

Course Code: 104
Title of the Course: **Engineering Mechanics**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
	Note: Only First Angle Method of Projections Should be Used	
I	**Basic Concepts:** System of forces, Moment of forces and its Application, Couples and Resultant of Force System **Equivalent Force System:** Resultant of a 2 dimensional distributed loads and three-dimensional general force system **Equations of Equilibrium:** Free body diagrams, Types of Supports, Equations of equilibrium, coplanar concurrent and non-concurrent systems, general spatial force system, Support reactions for determinate beams with different types of load – concentrated, uniformly distributed and uniformly varying load.	09
II	**Analysis of perfect Frames:** Analysis of pin jointed simple and cantilever frames by method of joints and method of section. **Friction Forces:** Law of Coulomb friction, problem involving Dry Friction, simple application like wedges, belt friction and band brakes. **Simple Machine –** Differential wheel and axle, single and double purchase Crab, Velocity Ratio, Mechanical advantage, efficiency etc.	09
III	**Centroids and Moments of Inertia:** Centroid location by first principle, centroid of composite areas, Second Moment and products of inertia of plane areas, Transfer theorems for moment of inertia and Product of inertia. **Introduction of Virtual work theorem:** Principle of Virtual work applied to equilibrium of Mechanisms, simple beam, Pin jointed frames.	09
IV	**Kinematics & Kinetics of Particles:** Rectilinear motion of a particle with variable acceleration, Motion curves, Projectile motion, normal and tangential components of acceleration, kinetics of particle and several interconnected particles.	09
V	**Collision of elastic bodies:** Principle of conservation of momentum, Impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies. **D'Alemberts Principles**, problems on connected system of particles.	09
	Total	45

Text & Reference Books:

1. Engineering Mechanics: F. L. Singer
2. Engineering Mechanics: Timoshenko & Young
3. Engineering Mechanics: Bear & Johnston
4. Engineering Mechanics: I. H. Shames
5. Engineering Mechanics: A. Nelson

I / II Semester B. E. (Common for all branches)

Course Code: **105**
Title of the Course: **Communication Skills**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
1	0	2	3	2	3	10	10	80	100

Unit	Contents	Hours
I	Principles and Practice of letter writing: Business, Job and Bank Correspondence.	05
II	Technical report writing.	05
III	**Grammer:** 1. Correction of common Errors 2. Exercise on rewrite as directed 3. Correct use of words, idioms, phrases, prepositions, etc.	08
IV	1. Principles of Public Speaking 2. Reading Comprehension	05
V	1. Professional Communication Skills - Meaning, Significance, Types, Dimensions & Barriers 2. Group Discussion and Personal Interview - Importance of GD, Modules of GD, How to prepare for GD; Meaning, types & techniques of PI, How to prepare for PI	07
	Total	30

Activities to be undertaken in the Laboratory:

Sr No	Name of the practical	Activity to be taken	Medium of practical
1	Barriers To Communication	1.Introduction to various kinds of barriers 2. Activity class on semantic barriers	PPT Based, Activity Based
2	Reading Skills	1.Skimming,Scanning & Gist reading 2.Compreehending passages	PPT Based, Activity Based
3	Development Of Word Power	1.IPA,pronunciation techniques 2.Often wrongly pronounced words 3. Word Power, homophones, synonyms/antonyms	Software based PPT Based, Activity Based
4	Non Verbal Communication	1. Kinesics in com/ interviews 2. Activities/ role play	Software based PPT Based, Activity Based
5	Speaking Skills	1 Introduction of effective way of speaking 2. Oral presentations Extempore/Debate/JAM	PPT Based, Activity Based
6	Group Discussion	1 GD rules 2 GD of groups in 6	Software based PPT Based, Activity Based
7	Interview Techniques	1.Various types of interviews 2. Resume making 3 Mock Interviews (one 2 one)	Software based PPT Based, Activity Based
8	Use Of Figurative Language	1.Intro phrases/idioms/proverbs 2. Idioms related to Colour/Number/animals/parts of the body/Miscellaneous	PPT Based, Activity Based
9	Listening Skills	Listening Barriers	PPT Based, Activity Based
10	Presentation Skills	1.Preparing visual aids/PPTs 2.Writing references	PPT Based, Activity Based

Text & Reference Books:

1. Public Speaking and Influencing Men in Business – Dale Carnegie
2. Professional Communication Skills – Bhatia and Sheikh
3. Business Communication – K.K.Sinha
4. Communication Skills – Dr. P. Prasad
5. Technical Communication – Raman and Sharma
6. High School Grammer and Composition – Wren and Martin
7. Modern English Grammer Usage and Composition – N. Krishnaswami

I / II Semester B. E. (Common for all branches)

Course Code: **106**
Title of the Course: **Applied Physics Laboratory**

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

Course Objectives

1) To understand and analyse the theoretical concepts in physics through experimentation
2) To learn and use the proper methods while gathering experimental data.
3) To get familiar with the proper use of basic instruments in physics laboratories.

Minimum ten (10) experiments are to be performed from the list given below. (at least 08 experiments are to be performed in addition to 02 demonstration experiments).

List of Experiments:

1. Determination of resistivity of a semiconductor by four probe method

2. A study of transistor characteristics in common base configuration.

3. A study of Hall Effect in semiconductors.

4. Determination of the radius of curvature of a plano-convex lens using Newton's rings.

5. Determination of thickness of a thin foil using air wedge.

6. A study of the characteristics of a solar cell.

7. A study of the static characteristics of germanium and silicon diodes/LED/Zener Diode and their comparison

8. Cathode ray oscilloscope applications (Frequency & Phase)

9. A study of transistor characteristics in common emitter configuration.

10. Determination of activation energy of a thermister.

11. Determination of wavelength of Laser light using plane transmission grating. (Demonstration)

12. To measure the divergence of laser beam. (Demonstration)

13. Determination of numerical aperture and acceptance angle, attenuation in optical fibre. (Demonstration)

14. A study of cubic space lattices and atomic packing in solids.

15. e/m by Thomson's method.

Outcome by the end of the session:

- Students will be able to do experiments based on syllabus using proper methodology and derive scientific conclusion/s based on experiments conducted.

I / II Semester B. E. (Common for all branches)

Course Code: **107**
Title of the Course: **Engineering Mechanics Laboratory**

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

List of Experiments:

Note: A student has to perform **any 8** experiments out of the following list.

1. To determine the reactions at the supports of a simply supported beam.

2. To determine MA, VR and efficiency of a double purchase crab and to verify law of machine..

3. To determine the M.A., V.R. and efficiency of the differential wheel - axle and to verify law of machine.

4. To determine the forces in the members jib and tie of the jib crane apparatus.

5. To determine the coefficient of coil friction.

6. To determine the coefficient of friction between two surfaces by inclined plane.

7. To determine the moment of inertia of flywheel.

8. Verification of Newton's second law of motion by Fletcher's Trolley.

9. To determine the reactions at the supports of a given beam by graphical method.

10. To determine the reactions at the supports and the forces in members of a given truss by graphical method.

I / II Semester B. E. (Common for all branches)

Course Code: 108
Title of the Course: Workshop Practice – I (Mechanical and Electrical)

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	3	25	25	50

Unit	Contents	Hours
I	**Mechanical Workshop:** Teachers / Instructors are expected to introduce with the tools & equipments used in following workshop sections with their operations & safety precautions. - Fitting Shop - Carpentry - Welding - Smithy / Plumbing - Use of powers tools such as hand drill and grinder - Demonstration of lathe, drilling, milling machines **Performance Procedure** The Teachers / Instructors are expected to introduce with the tools & equipments normally used in above listed sections of Mechanical Workshop, particularly with respect to operation & safety precautions. The students shall prepare minimum FOUR Jobs during practical periods. Students are expected to prepare minimum four Jobs during practical periods of workshop.	24
II	**Electrical Workshop:** The following sections / practical in Electrical Workshop shall be included : - Study of tools, accessories & different types of Switches required in electrical maintenance - Study of general protective devices like Fuses (including Cartridge & HRC) , MCB and ELCB - House wiring & Industrial wiring and their electrical wiring diagram, beginning from the point of service line (to be demonstrated on panel board with all necessary accessories, preferably at reduced AC voltage) - Study of EARTHING & its requirements (as per IE Rules, 1956), as general electrical safety measure - Study of some of the domestic electrical appliances - Study of some of the domestic purpose & industry purpose Lamps **Performance Procedure** The Teachers / Instructors are expected to introduce/ demonstrate on Penal Board the electrical wiring with proper use of the tools & accessories normally used in above listed practical of Electrical Workshop, particularly with respect to selection, ratings, operation & safety precautions. The operation & working of fuses, switches, tools, accessories, domestic electrical appliances & lamps should be demonstrated. The students shall be required to prepare Journal (and/or Drawing sheet), wherever required.	21
	Total	45

Text / Reference Books:

1. Elements of Workshop Technology (Volume – 1) by Hajra Choudhary
2. Indian Electricity Act, 1956
3. Books on Electrical installation & Power System Engineering

Abbreviations

TW: Term Work   **POE**:   Performance & Oral Examination

TERM WORK (TW)

The Term Work (TW) shall comprise of minimum of nine (09) numbers of jobs/experiments to be performed by the students, with minimum FOUR jobs in Mechanical workshop section & minimum FIVE in Electrical workshop section. **The separate Journals shall be prepared for these two sections & their evaluation shall be as mentioned below:**

Mechanical Workshop Section	13-marks*
Electrical Workshop Section	12-marks*
Total Marks	**25**

*Distribution of above (13) and (12) marks shall be as mentioned below:

Experiments performance & Journal submission	06(05)-marks
Written Test / Viva Voce on practical topics	05-marks
Attendance (practical both)	02-marks
Total Marks	**13(12)**

PERFORMANCE & ORAL EXAMINATION (POE)

The POE shall comprise of oral examination only, with all odd roll number students going for MECHANICAL WORKSHOP SECTION & all even roll number students going for ELECTRICAL WORKSHOP SECTION or vice-versa. (**That means maximum of 25 marks shall be awarded in POE on the basis of student's performance in either of the section only**.)

I / II Semester B. E. (Common for all branches)

Course Code: **109**
Title of the Course: **Computer Programming**

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	1	2	3	25	25	50

*Note: The objective of this laboratory is to provide hands-on experience with programming in C. It is expected that the students will demonstrate adequate to high skills with programs in C.

Unit	Contents	Hours
I	**Fundamentals of Computers:** Introduction, Basic structure of a computer, input process Output system, Input / Output Devices, Memories, Hardware, Software, System Software, Application software, Applications of Computers, Types of Computers. Programming Languages, Errors in Languages, Algorithms & Flowcharts. Types of Programming Languages – Machine-level, Assembly-level and High-level Languages, Scripting Languages, Natural Languages; Their relative Advantages and Limitations; High-level Programming Language Tools – Compiler, Linker, Interpreter, Intermediate Language Compiler and Interpreter, Editor.	07
II	**Programming Language 'C':** Variables, Data types, Declarations, Operators, Expressions, Input Output Operations, Formatted I/O, Hierarchy of Operations, Decision Making the While, The For, The Do While Loops, Nesting of loops, Switch, Continue, Break statements, Jumps in loops, Go To Statements.	06
III	Defining & Using Functions, Parameter passing, Recursion, Pointers, Pointers to functions, Global, Static, local variables, Command line Arguments.	05
IV	Array variables, syntax rules for arrays, Multiple subscripts in arrays, reading & writing multidimensional arrays Pointers & Arrays, Array of Pointers, Manipulation in array, String Handling.	05
V	Using structures, structures in arrays, arrays in structures, Pointers for structure, pointer to pointer, Enumerated Data type, Union, Preprocessor, Macros, and Compilers controlled Directives. File management, Sequential files, unformatted files, Text files, and Binary files, Bitwise Operators. Graphics Programming: Lines, Drawing & Filling images, Patterns, Drawing & Filling Shapes, Palettes & Colors, text in Graphics. Passing by Reference; Main Function.	07
	Total	30

Term Work (TW):

Term work shall consist of at least fifteen exercises/assignments on programming in C in the form of a journal and **necessary documentation. T**he sample list of programs is given below. This list is based on contents of syllabi given above and shall be used as a guideline for solving problem statements specified within the scope of this laboratory course.

1. Write a C program to accept ten numbers from console and then to display them back on console in ascending order.

2. Write a C program to calculate the sum of all numbers from 0 to 200 (both inclusive) that are divisible by 4.

3. Write a program to find the largest and the smallest from the given three integers

4. Write a program to print the square and cube of n natural numbers using while loop.

5. Write a program to find sum, difference, product and quotient of any two integers as per the choice of the user.

6. Write a C program to accept the length of three sides of a triangle from console and to test and print the type of triangle – equilateral, isosceles, right angled, none of these.

7.Write a program to print a chart showing the temperature in centigrade from $0°$ to $100°$ to with their corresponding values in Farenhiet, using while loop and using the relation $C / 5 = F-32 / 9$.

8. Write a program in C to solve a quadratic equation

9. Write a program in C to calculate the interest and total amount to be paid by entering the amount of loan and the number of years, either by simple interest method or by compound interest method as per the choice of the user.

10. Write a C program to accept a string from console and to display the following on console:

(a) Total number of characters in the string   (b) Total number of vowels in the string

(c) Total number of occurrence of character 'a' in the string.   (d) Total number of occurrence of string 'the' in the string.

11. Write a program in C to reverse the digits of a given integer.

12. Write a program in C to read an integer and display each of the digit of the integer in English.

13. Write a program in C to generate first 25 Fibonacci numbers

14. Write a program in C to generate prime numbers between 1 and *n*.

15. Write a program in C to compute the GCD of the given two integers

16. Write a program in C to compute the factorial of the given positive integer using recursive function.

17. Write a program in C to compute the roots of a quadratic equation.

18. Write a program in C to sort *n* integers using interchange sort.

19. Write a program in C to compute addition/subtraction/multiplication of two matrices. Use functions to read, display and add/subtract/multiply the matrices.

20. Write a program in C to carry out following operations on strings using library functions

(a) To concatenate a string S2 to string S1.   (b) To find the length of a given string

(c) To compare two strings S1 and S2.   (d) To copy a string S2 to another string S1.

21. Write a program in C to accept ten names and print the given names in opposite order using array of pointers.

22. A data file contains a set of examination scores followed by a trailer record with a value of -1. Write a C program to calculate and print the average of the scores.

23. A company maintains the record of their employees as : Name, designation , Details of the pay like Gross pay, Provident Fund deductions, Professional tax and the Net pay. Keep the details of the pay within a separate structure

24. To write a program in C to demonstrate various file handling operations.

25. Write a program in C to draw lines, circles, rectangles and to set attributes of the figures.

Text Books:
1. Programming in ANSI by E. Balaguruswami
2. The ANSI C Programming by Kerningham and Ritchie
3. Let Us C by Y.P. Kanetkar
4. Turbo C. Reference Manual
5. C in Depth by Srivastava, BPB Publications
6. C by Aitken BPB Publications.

I / II Semester B. E. (Common for all branches)

Course Code: **110**
Title of the Course: **Applied Chemistry**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	**Water Conditioning** *Industrial:* Types units of hardness; Softening; (principle, reactions, advantage, limitation Comparison of) Lime-Soda (no methods), Zeolite, de-mineralization process; Numericals on lime-soda and Zeolite process; Boiler Troubles(causes, Effect on boiler operation & methods of prevention) Carry over-priming foaming; Scale sludge, caustic embrittlement, Boiler corrosion; Internal conditioning-(phosphate, carbonate, calgon). **Domestic:** coagulation & sterilization using UV, ozone, chlorine, Break point chlorination.	10
II	**Corrosion and Battery Science** **Introduction**, Cause and Consequences of corrosion, Factors influencing corrosion Chemical & electrochemical corrosion. Mechanisms of electrochemical corrosion; Pilling-Bedworth rule; Differential aeration theory of corrosion. **Types of corrosion and Preventive Methods:** Pitting; Inter granular, Stress, Waterline Corrosion; Corrosion prevention a) Design & material selection, b) Cathodic & anodic protection, c) protective surface coating- (only principle Methods not required)-tinning, galvanizing & powder coating, metal cladding and electroplating. **Battery:** Secondary - Nickel-cadmium. Fuel cell applications, advantages and limitations eg Alkaline Fuel Cell.	08
III	**Materials and Green Chemistry** *Cement:* Portland cement: Raw material, manufacture, process parameters, role of microscopic constituents, Properties:-Setting & hardening; heat of hydration, soundness; Types (characteristics, application) High alumina, White, Rapid hardening, Ready Mix Concrete, flyash (properties, advantage, limitation, application) as cementing material. **Green Chemistry**: Introduction, principles, concept of carbon credits.	09
IV	**Fuels and Energy** *Fuels:* **Introduction:** Calorific value, HCV & LCV; Determination of CV by Bomb & Boy's calorimeter; numericals; **Solid fuels:-** significance of proximate and Ultimate analysis; numericals (Dulongs formula). **Liquid and Gaseous fuels**:- bubble tower fractional distillation of crude oil (boiling point wise separation only); Knocking in IC & Compression engine; Octane & Cetane number, Doping agents (Antiknocking, Anti oxidants, antiicing) Fisher-tropsch process of manufacture of synthetic gasoline; catalytic cracking (Only Principal, Definition, reactions and catalysts used, Advantage, Method of fixed bed & fluid bed not required) Bio-diesel, CNG (Composition, properties, advantages, limitations, applications, method of preparation not needed).	10
V	**Lubrication and Combustion Calculations** *Lubricants:* Introduction, mechanism; Hydrodynamic, boundary & extreme pressure lubrication; Classification-solid, semisolid & liquid lubricants; Biodegradable lubricants (properties, application, advantage limitation); Properties of greases:- Drop test & consistency test; Properties of liquid lubricants (definition, significance) flash & fire point, viscosity & viscosity index, Cloud & Pour Point: Criteria for selection of lubricant- IC engine, refrigeration, gear, transformer, steam turbine, delicate mechanical system. Numericals on Combustion estimations.	08
	Total	45

Text Books:

1. Text Book of Engineering Chemistry, S. S. Dara, S. Chand and Company Ltd., New Delhi.
2. Textbook of Engineering Chemistry, P. C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
3. Text Book of Environmental Chemistry and Pollution Control, S. S. Dara; S. Chand and Company Ltd., New Delhi.
4. Textbook of Engineering Chemistry, S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry, A. V. Bharati and Walekar, Tech Max Publications, Pune.
6. Engineering Chemistry, Arty Dixit, Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.

Reference Books:

1. A solid slate Chemistry and its Application by Anthony R. West, John Wiley & Sons(1989)
2. A Text book of Engineering Chemistry by Shashi Chawla; Dhanpat Rai & sons, New Delhi
3. A textbook of polymer science Fred. Billmeyer Jr. Wiley India Third edition
4. Applied chemistry by N. krishnamurthy . P.vallinavagam. and k. .Jeysubramanian TMH
5. Applied chemistry for engineers by T.S.Gyngell
6. Chemistry in Engineering by Lloyd A.Munro, Prentice-hall, Inc Nj
7. Chemistry of advanced materials – CNR Rao, Rsc Pbl.
8. Chemistry of Cement, J. D. Lee, Mcgraw Hill Publishing Company, New Delhi.
9. Chemistry of Engineering Materials, by Rober B Leigeou Mc Graw-Hill Book Company, Inc New York
10. Chemistry, Raymond Chang. (Tata McGraw Hill).
11. Corrosion Engineering by Mars G. Fontana and Norbert D. Green Mc Graw Hill Book Co. Tokyo
12. Electrochemistry, Philip H. Rieger (Chapman and Hail)
13. Engineering Chemistry (Vol. I and II) by Rajaram and Kuriakose.
14. Engineering Chemistry B.K.Sharma Krishna Prakashan media private LTD.
15. Engineering Chemistry by Gyngell, McGraw Hill Publishing Company, New Delhi.
16. Engineering chemistry by R.gopalan, and others, Vikas publications
17. Engineering Chemistry by R.V.Gadag, A.Nityananda Shetty ; I K International Publishing House, New Delhi
18. Engineering Chemistry, B. S. Sivasankar, Tata Mcgraw Hill Publishing Company, New Delhi.
19. Engineering Chemistry, O. G. Palan, Tata Mcgraw Hill Publishing Company, New Delhi.
20. Engineering Chemistry, R. Shivakumar, Tata Mcgraw Hill Publishing Company, New Delhi.
21. Engineering Chemistry, Saraswat and Thakur, Vikas Publication, New Delhi.
22. Engineering materials. Venneth G Budinski (Prentice-- Hall of India).
23. Environmental chemistry, A. K. De (New Age International Publishers)
24. Fuels and Combustion by Amir Circar, Orient Longmans
25. Fundamentals of corrosion by Michael Henthorne, Chemical Engineering
26. Fundamentals of Engineering Chemistry (theory and Practice), S. K. Singh (New Age International Publishers)
27. Materials science and engineering an introduction, William D. Callister, (Jr.,Wiley.publisher)
28. Polymer science and technology, Joel R Fried (Prentice -. Hall of India).
29. Polymer Science, V.R. Gowarikar (Wiley Eastern Ltd.).
30. Text book of engineering chemistry, R.N. Goyal and Harrmendra Goel, (Ane books India).
31. Tyre Technology, Tom French, Adam Hilger, New York
32. Water treatment by F.I. Bilane, Mir publisher
33. Water treatment for industrial and other use by Eskel Nordell, Rein hold Publishing Corporation,New York
34. Chemistry, Raymond Chang. (Tata McGraw Hill).
35. Principles of the solid state, H.V. Keer (New age international publishers).

I / II Semester B. E. (Common for all branches)

Course Code: 111
Title of the Course: Basic Electrical Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	**DC and AC Circuits** Concept of Electrical Circuit, Active & Passive elements, Voltage & Current Sources, Concept of Linearity & Linear network, Unilateral & Bilateral Elements, R,L and C as Linear Elements, Source Transformation, Kirchoff's Law, Superposition Theorem, Star- Delta Transformation.	05
	AC Fundamentals, Sinusoidal & square waveforms , their average & effective values, Concept of Phasor, Phasor Diagram of RLC combinational Circuits with sinusoidal supply, Apparent, Active & Reactive Powers, Electrical Energy, Power Factor, Causes & disadvantages of Low power factor, Power factor improvement using capacitor.	05
II	**Magnetic Circuit & Single Phase Transformer** Concept of Magnetic Circuit, Analogy between Electric & magnetic Circuit, magnetic circuits with DC and Ac excitations, magnetic Leakage & Fringing, B-H Curve, Hysteresis & Eddy current losses, Series & Parallel Magnetic circuits, Mutual coupling, Laws of Electromagnetism.	04
	Principle of operation & construction of Transformer, EMF Equation, Phasor Diagram under no load & loaded conditions, Equivalent Circuit, O.C. & S.C. Tests, Power Losses, Efficiency & Regulation, Introduction to Auto Transformer.	05
III	**Electrical Machines** Principles of Electromechanical energy conversion, Fleming's Right & Left Hand rule DC Generator': Construction, working , types and applications DC Motor': Construction, working , types and applications EMF Equation, Methods of Excitation, Back EMF, Condition for maximum efficiency, Torque equation of motor, Characteristics, Speed control of DC shunt Motor, Applications of DC motor	06
	Types of Three Phase Induction Motors, Principle of Operation, Slip-Torque Characteristic, Applications	03
	Construction, Principle of operation & working of Single phase Induction Motor, Methods of Starting , Applications	02
IV	**Measuring Instruments, Electrical safety & Introduction to Power System** Types of Instruments, Construction & working Principle of PMMC & moving iron type Voltmeters & Ammeters, Single phase dynamometer wattmeter, Induction type Energy meter, Use of Shunts & multipliers.	03
	Overloads, short circuits & earth leakage, HRC Fuse, MCB, ELCB, Earth & Neutral wire, Factors influencing earth resistance, Pipe & plate earthing.	02
	Three phase system : its necessity & advantages, Generation of three phase voltages, Phase sequence, Star & Delta Connections, Balance supply & balance load, Line & phase voltage/ current relations, Three phase power, General Lay out & single line diagram of Electrical Power System & functions of elements therein.	03
V	**Basic Electronics** Semiconductor Devices, PN Junction Diode, Half Wave & full wave Rectifiers, Filters, Zener Diode, Introduction to BJT & its CE characteristic, BJT as an amplifier & switch.	04
	Introduction to number systems & Logic Gates, Boolean Algebra & its applications (POS and SOP form), K-maps.	03
	Total	45

Text Books:

1. V. Del Toro " Principles of Electrical Engineering", Prentice Hall
2. I.J. Nagrath " Basic Electrical Engineering", Tata McGraw Hill
3. D.F. Fitzgerald, A. Grabel Higginbotham " Basic Electrical Engineering", McGraw Hill
4. Mittal & Mittal " Basic Electrical Engineering", Tata McGraw Hill
5. B.L. Theraja and A.K. Theraja"A Text Book of Electrical Technology", Volume - I & II
6. J. Millman & Halkias " Electronic Devices & Circuits", Tata McGraw Hill
7. Herbert Taub " Digital Circuits & Microprocessors", McGraw Hill

Reference Books:

1. Edward Hughes " Electrical Technology", Pearson Education
2. T.K. Naagaskar & M.S. Sukhija " Basic Electrical Engineering", Oxford University Press
3. Joseph A. Edminister " Electrical Circuits : Schaums Outline Series", Tata McGraw Hill
4. S.K. Bhattacharya & S. Chatterjee " Industrial Electronics & Control", Tata McGraw Hill
5. P.S. Bhimra " Electrical Machines", Khanna Publishers
6. H. Cotton " Advanced Electrical Technology", Wheeler Publications
7. W.H. Hayt & J.E. Kennely " Engineering Circuit Analysis", McGraw Hill
8. Alan Motorshed " Electronic Devices & Circuits ", Tata McGraw Hill
9. R.P. Jain " Modern Digital Electronics", Tata McGraw Hill

I / II Semester B. E. (Common for all branches)

Course Code: **112**
Title of the Course: **Engineering Graphics**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	4	10	10	80	100

Unit	Contents	Hours
	Note: Only First Angle Method of Projections Should be Used	
I	**Introduction to Engineering Drawing** Use of various drawing instruments, Conventions in Drawing, Lettering, BIS conventions. Layout of drawing sheet, sizes of drawing sheets. Different types of lines used in drawing practice, Dimensioning. Introduction to computer aided drafting package, Introduction to scales and representative factor (RF). **Curves used in Engineering Practice** Conic sections- Ellipse(excluding focus directrix method), Parabola, Hyperbola & involute, Cycloid curves- only Cycloid. **Basics of Orthographic Projections** Principle of projection, orthographic projection, reference planes, concepts of four quadrants, methods of orthographic projections, difference between first and third angle projection, first angle projections, conventions used to represent methods of orthographic projection. **Projections of Points and Lines** Projections of points in all possible positions w. r. to reference planes, projections of line parallel to both reference planes, perpendicular to one of the reference planes, inclined to one & parallel to other reference plane, inclined to both reference planes. (Lines in First Quadrant Only), simple problems on straight lines (excluding applications of straight lines)	09
II	**Projections of Planes** Projection of planes when it is parallel to one & perpendicular to other reference plane, lying in reference plane, inclined to one & perpendicular to other reference plane, inclined to both reference planes. **Auxiliary planes** – Auxiliary Inclined Plane (AIP) and Auxiliary Vertical Plane (AVP), Use of Auxiliary Plane method for solving the problems. **Projections of Solids** Solids: cube, tetrahedron, prism, pyramid, cylinder and cone, projections of above solids when axis perpendicular to one of the reference planes, axis inclined to one & parallel to other reference plane, axis inclined to both the reference planes.	09
III	**Sections of Solids** Section planes, sectional views, to project sectional views of above solids cut by different section planes (when solid is in simple position, when axis is parallel to one & inclined to other reference plane). **Development of Surfaces of Solids** Applications of development of surfaces, methods of development, development of surfaces of above solids, development of surfaces of cut solids. (No reverse development)	09
IV	**Orthographic Projections** Conversion of pictorial view into orthographic views.	09
V	**Isometric Projection** Isometric view and projection, Isometric scale, conventions, isometric views of lines, plane figures, simple and compound figures, construction of Isometric view/projection from given orthographic views of blocks	09
	Total	45

Text Books:

1. N.D. Bhatt, Elementary Engineering Drawing, Charotar Publishing house, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
3. M.B. Shah, B.C. Rana, Engineering Drawing, Pearson.
4. Pakhatkar, Engg. Drawing, Nirali Prakashan.
5. P J. Shah, Text Book of Engineering Drawing,S Chand & Publications

Reference Book:

1. P.S. Gill, Engineering Graphics.
2. Luzadder Warren J, Duff John, Fundamentals of Engineering Drawing, PHI Publications

I / II Semester B. E. (Common for all branches)

Course Code: **113**
Title of the Course: **Ethical Science**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
1	1	0	2	2	2	05	05	40	50

Unit	Contents	Hours
I	1. Concept of culture and civilization 2. Applied humanities and social engineering 3. Socio-legal awareness: right to information (RTI), Public Interest Litigation (PIL), Intellectual Property Rights (IPR) and Patents, Lokpal and Lokayukta	06
II	1. Meaning and scope of Industrial Psychology and Industrial Sociology 2. Fatigue, Selection and Training of Workers, Motives for Work in Industry 3. Transactional Analysis	06
III	1. Sustainable development 2. Professional ethics 3. Organisational behavioural dynamics: Leadership in Industry	06
IV	1. Indian Constitution and Federal System 2. Fundamental rights and directive principles 3. Role of Bureaucracy in Modern Society	06
V	1. Industrial democracy 2. Works organisation: power, authority and status system; formal and informal organisation 3. Industrialisation and Urbanisation: Study of Slums	06
	Total	30

Text & Reference Books:

1. A New Look into Social Science by Shabbir, Sheikh and Dwadashiwar
2. An Introduction to Sociology by Vidya Bhushan and Sachdeva
3. Social Science: The Indian Scene by Yogesh Atal
4. Applied Humanities by Rajni Tondon
5. A History of World Civilisations by J E Swain
6. Industrial Psychology by Haire Mason
7. Introduction to Constitution of India by Durga Das Basu
8. Industrial Sociology in India by N R Seth
9. Human Resource Development and Management by Dr A M Sheikh
10. The Economics of Sustainable Development by Surender Kumar

I / II Semester B. E. (Common for all branches)

Course Code: 114
Title of the Course: Applied Chemistry Laboratory

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

A total of Any TEN experiments out of the following should be performed in a academic session, any SIX experiments from group I and any FOUR from group-II should be demonstrated.

Group-I

1. Determination of temporary & permanent hardness of water by complexometry method.
2. To estimate the amount of Ni^{+2} ions in a given solution by complexometric method.
3. Estimation of free chlorine in the water by iodometry.
4. Determination of calcium in cement by volumetric method
5. Type and extent of alkalinity by Warder's method.
6. Estimation of dissolved oxygen in a water sample
7. Determination of capacity of anion exchange resin.
8. Determination of capacity of cation exchange resin.
9. Determination of Copper by Iodometry.
10. To estimate the amount of ferrous and ferric ions present in the given solution or from ore.
11. Determination of hardness of water due to calcium and magnesium ions separately.
12. Determination of heat of neutralisation.
13. Determination of acid Value of lubricating oil.
14. Determination of viscosity of lubricating oil at different temp by Redwood Viscometer No.1 or No. 2.
15. Adsorption of acetic acid on charcoal.

Group-II

1. Determination of moisture content/ volatile matter/ ash content of coal.
2. Saponification number of animal/vegetable oil.
3. Determination of molecular weight of a polymer by viscosity measurements.
4. Determination of carbon residue of lubricating oil by Conradson's Apparatus.
5. Determination on rate of corrosion by weight loss by corrossometer.
6. Preparation of Biodiesel and its characterization.
7. Study of charging of lead acetate battery by measuring density of sulphuric acid electrolyte.
8. Determination of pH of waste water.
9. Determination of conductivity and potential difference.
10. Verification of Beers Law.
11. Determination of COD in waste water.
12. Consistency and Penetration test of grease
13. Saponification of acetic acid.
14. Determination of calorific value of a solid fuel using Bomb Calorimeter.
15. Determination of flash point of lubricating oil by Cleveland's apparatus open cup.
16. Determination of flash point of lubricating oil by Abel's apparatus closed cup.
17. Determination of flash point of lubricating oil by Pensky Martin's apparatus close cup.
18. Project on water / fuel analysis

Laboratory manual(s)

1. Applied Chemistry theory and practical O.P. Virmani and A.K. Narular (New Age International).
2. Laboratory Manual on Engineering Chemistry by Dr. Sudharani (Dhanpat Rai Publishing).
3. A Textbook on experiment and calculation in engineering chemistry by S.S. Dara. S.Chand
4. Inorganic quantitative analysis, Vogel. (Prentice Hall).

I / II Semester B. E. (Common for all branches)

Course Code: **115**
Title of the Course: **Basic Electrical Engineering Laboratory**

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

Recommended List Of Experiments:

1. To plot the B-H curve of magnetic material

2. To study RLC series circuit.

3. To study RLC parallel circuit.

4. To verify Kirchoff's Laws (KVL & KCL)

5. To verify superposition theorem.

6. To perform O.C. and S.C. Tests on single phase transformer.

7. To determine percentage efficiency & percentage regulation of single phase transformer by direct loading.

8. To verify transformation ratio of single phase transformer.

9. To determine phase difference & power factor using CRO for different types of load. (Resistive & Inductive only)

10. To study speed control of DC shunts motor.

11. To study Half Wave & Full Wave Rectifiers (With & without filter)

12. To study input & output characteristic of BJT in common emitter configuration.

I / II Semester B. E. (Common for all branches)

Course Code: **116**
Title of the Course: **Engineering Graphics Laboratory**

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

Eight A2 (594X420mm) (Half imperial) size drawing sheets:

Sheet No.1:   Engineering Curves (To draw any four curves mentioned in the syllabus)

Sheet No.2:   Projection of Lines (Minimum two problems)

Sheet No.3:   Projection of Planes & solids (Minimum two problems each)

Sheet No.4:   Sections of Solids and Development of surfaces of Solids (Minimum two problems)

Sheet No.5:   Orthographic views from given pictorial view.

Two problems on orthographic views from given pictorial view

Sheet No.6:   Isometric View/Projection

Two problems each on Isometric views & Isometric projections.

Text Books:

   2. N.D. Bhatt, Elementary Engineering Drawing, Charotar Publishing house, Anand, India.
   2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
   3. M.B. Shah, B.C. Rana, Engineering Drawing, Pearson.
   4. Pakhatkar, Engg. Drawing, Nirali Prakashan.
   5. P J. Shah, Text Book of Engineering Drawing,S Chand & Publications

Reference Book:

   3. P.S. Gill, Engineering Graphics.
   4. Luzadder Warren J, Duff John, Fundamentals of Engineering Drawing, PHI Publications

I / II Semester B. E. (Common for all branches)

Course Code: 117
Title of the Course: Workshop Practice – II (Electronics and IT)

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Unit	Contents	Hours
I	**ELECTRONICS:** Introduction to Active & Passive Electronic components. Demonstration and use of electrical and electronics hand and power tools. Measurement of resistor and capacitor, measurement of voltage and frequency using oscilloscope. Demonstration and performance measurement of any two electronic components / devices – Diodes, Transistor & Logic gates. Working of Remote Controller. **PRINTED CIRCUIT BOARDS:** Layout drawing, +ve and –ve film making, PCB etching and drilling, tinning and soldering techniques. Assembly of Electronic components on the printed circuit board (PCB).	16
II	**IT & COMPUTERS:** Introduction and identification of hardware components of a typical computer system. Handling and operating peripheral devices like printer, scanner, pen drives, CD-ROM, Multimedia Devices, UPS etc. Identification and study of communication elements like Single pair wires (phone lines), multipair wires (UTP), fibre-optic cables, printer data cables, connectors- RJ-45, RJ-9, RJ-11, USB, 9-Pin and 25-Pin serial and parallel connectors; converters- serial to USB, 9-Pin to 25- Pin, Vice-Versa and others. POST (power on self test), Power related problems. Use of CD Read / Write operations etc. Installation of Operating system windows and Linux, simple diagnostic exercises. Study of Computer Networks. Basic Network topologies. Basics of Local Area Network.	14
	Total	30

Text / Reference Books:

1. The Art of Electronics by Paul Horowitz and Winfield Hill, Cambridge LPE.

2. Basic Electronics by Grob, Tata McGraw Hill, New Delhi

3. The Complete PC Upgrade and Maintenance Guide by Mark Minasi, BPB Publications, New Delhi

4. IBM PC and Clones – Hardware Troubleshooting and Maintenance by B Govindarajalu, Tata McGraw Hill, New Delhi.

5. Computer Networks and Internets by D E Comer and M S Narayanan, Pearson Publishing House, New Delhi.

Abbreviations:

TW: Term Work   **POE**:   Performance & Oral Examination

TERM WORK (TW)

The Term Work (TW) shall comprise of numbers of jobs/experiments to be performed by the students based on contents of syllabi in Electronics workshop section and I.T. workshop section. **The separate Journals shall be prepared for these two sections & their evaluation shall be as mentioned below:**

Electronics Workshop Section	13-marks*
I.T. Workshop Section	12-marks*
Total Marks	**25**

*Distribution of above (13) and (12) marks shall be as mentioned below:

Experiments/jobs & Journal submission	06(05)-marks
Written Test / Viva Voce on practical topics	05-marks
Attendance (practical both)	02-marks
Total Marks	**13(12)**

PERFORMANCE & ORAL EXAMINATION (POE)

The POE shall comprise of oral examination only, with all odd roll number students going for ELECTRONICS WORKSHOP SECTION & all even roll number students going for I.T. WORKSHOP SECTION or vice-versa. (**That means maximum of 25 marks shall be awarded in POE on the basis of student's performance in either of the section only**.)

I / II Semester B. E. (Common for all branches)

Course Code: ES (Compulsory/Audit Course)
Title of the Course: Environmental Studies

Course Scheme					Evaluation Scheme		
Lectures	Tutorial(s)	Practical	Periods/week	Credits	MSE	IE	Total
0	0	2	2	0	50	25	75

Unit	Contents	Hours
I	**The Multidisciplinary nature of environmental studies** . Definition, scope and importance. . Need for public awareness.	01
II	**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.	04
III	**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.	03
IV	**Natural resources :** **. Renewable and non-renewable resources :** . Natural resources and associated problems. - Forest resources: Use and over exploitation, deforestation, 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 as a resource, land degradation, man induced landslides, soil erosion and desertification. . Role of an individual in conservation of natural resources. . Equitable use of resources for sustainable lifestyles	04

V	**Ecosystems**	03
	. 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)	
VI	**Biodiversity and its conservation**	04
	. Introduction - Definition: genetic, species and ecosystem diversity.	
	. Bio-geographical classification of India.	
	. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.	
	. Biodiversity at global, National and local levels.	
	. India as a mega-diversity nation.	
	. 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.	
VII	**Environmental Pollution**	04
	. 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	
	. Role of an individual in prevention of pollution.	
	. Pollution case studies.	
	. Disaster management: floods, earthquake, cyclone and landslides.	
VIII	**Field work**	02
	. Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain	
	. Visit to a local polluted site - Urban / Rural / Industrial / Agricultural	
	. Study of common plants, insects, birds.	
	. Study of simple ecosystems - pond, river, hill slopes, etc.	
	Total	25

*Note: Contents of the syllabi mentioned under unit I to VIII shall be for teaching for the examination to be conducted at the end of the semester i.e. MSE for 50 marks. The examination paper shall be having MCQs, Short answer type questions and an Essay. The IE consisting of 25 marks will be in the form of Report to be submitted based on field work done.

Text & Reference Books:

1) Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India.
3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4) Clark R.S., Marine Pollution, Clanderson Press Oxford
5) Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7) Down to Earth, Certre for Science and Environment

8) Gleick, H.P. 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 473p.

9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural Histroy Society, Mumbai

10) Heywood, V.H. & Watson, R.T. 1995, Global Biodiversity Assessment, Ca mbridge Univ. Press 1140p

11) Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi. 284 p.

12) Mckinney, M.L. & Schoch, R.M. 1996, Environmental Science Systems & Solutions, Web Enhanced Edition.

13) Mhaskar A.K., Matter Hazardous, Techno-Science Publications

14) Miller T.G.. Jr., Environmental Science, Wadsworth Publishing Co.

15) Odum, E.P., 1971, Fundamentals of Ecology, W.B.Saunders Co., U.S.A., 574p.

16) Rao M.N. & Datta A.K.,1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.

17) Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.

18) Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science

19) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications

20) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.

21) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.:Environmental Studies, Pimpalapure & Co., Publishers, Nagpur.

22) R.Rajagopalan : Environmental Studies, Oxford University Press, New Delhi,2005

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