Course Code: BAC-C102/C202
Course Name: Engineering Chemistry

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 4**

Prerequisites:	**Engineering Chemistry**
Objectives:	To acquire knowledge about the periodic properties, oxidation number, hydrogen bonding and hybridization. To understand the general concepts of thermodynamics, chemical kinetics and acid-base equilibrium. To gain the knowledge of polymers, conducting polymers, synthesis, properties and uses of some common polymers, nylons and rubbers. To learn the significance of Nano chemistry and different approaches to synthesis of Nanoparticles. To understand organic reactions like addition reactions, elimination reactions, substitution reactions and oxidation-reduction reactions. To understand the synthesis of some common drugs like Aspirin, Phenacetin & Paracetamol.
Course Coordinator	**Dr. Ajay Kumar**

NOTE:	The question paper shall consist of two sections (Sec.-A and Sec.-B). Section-A shell contains ten short type questions of six marks each and the student shall be required to attempt any five questions. Section-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

UNIT	Module	Course Content	No. of Hours	POs mapped
UNIT-1	*Module-1*	Shielding and effective nuclear charge, Penetration of orbitals, Division of elements into s, p, d and f blocks, Variation of s, p, d and f orbital energies of atoms in the periodic table, Atomic and Ionic sizes, Ionization potential, Electron affinity, Electronegativity, Dipole moment, Polarizability.	**05**	PO1/ PO2/ PO3/ PO4/ PO5… –
	Module-2	Oxidation states, Coordination numbers and geometries, Hydrogen bonding, Concept of hybridization.	**03**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-2	*Module-3*	Introduction, Rate of reaction, Factors influencing rate of reaction, Rate law and reaction order, Differentiate between molecularity and reaction order, Arrhenius equation, Activation energy and its determination, Transition state theory of reaction rates.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
	Module-4	Thermodynamic functions: Energy, Enthalpy, Entropy and Free energy, Physical significance of entropy, Estimations of entropy and free energies,	**04**	PO1/ PO2/ PO3/ PO4/ PO5…

		Free energy and emf, Cell potentials, Nernst equation and applications (without derivation) Acid-base, solubility and solubility product.		
UNIT-3	*Module-5*	Basic concepts of polymers, Classification of polymerization, Industrial applications of polymers, Differentiate between (i) Addition and condensation polymers, (ii) Thermoplastic and thermosetting polymers, Elementary idea of biodegradable and conducting polymers.	**06**	PO1/ PO2/ PO3/ PO4/ PO5…
	Module-6	**Plastics:** Synthesis, properties and uses of Polyvinyl chloride (PVC), Polytetrafluoroethylene (PTFE)/Teflon, Polymethyl methacrylate (PMMA), Bakelite. **Nylons:** Introduction to Nylons, Preparation, properties and uses of Nylon 6, and Nylon 6,6. **Rubbers:** Natural rubber and synthetic rubber, Vulcanization of rubber, Advantages of vulcanized rubber.	**02**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-4	*Module-7*	Introduction, Characteristic properties of nanomaterials, Synthesis of nanomaterials (Top-down and bottom-up approach), Introduction, properties and applications of Fullerenes (C60), Carbon nanotubes (CNT's), Nanorods and Nanowires, Applications of nanomaterials in Medicine, Energy science, Bio-sensors, Electronics, Catalysis and Fabrics.	**08**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-5	*Module-8*	Introduction to reactions involving Addition, Elimination, Substitution and Oxidation and Reduction. Isomerism: Basic concept of geometrical and optical isomerism.	**06**	PO1/ PO2/ PO3/ PO4/ PO5…
	Module-9	Definitions of different classes of common drugs, Synthesis and uses of Aspirin, Paracetamol and Phenacetin.	**02**	PO1/ PO2/ PO3/ PO4/ PO5…
Total No. of Hours			**40**	

Learning Outcomes:	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will enable the student to: **Define** the shielding effect, effective nuclear charge, dipole moment, oxidation-reduction, oxidation number, coordination number, hydrogen bonding, hybridization, reaction rate, molecularity, reaction order, internal energy, entropy, enthalpy, free energy, cell potentials, acids-bases, polymers, nylons, nanotechnology, nanoscale, and nanoparticles (**L1**). **Illustrate** the periodic properties, Arrhenius equation, activation energy, solubility product, Nernst equation, biodegradable polymer, conducting polymer, vulcanization of rubber, nanomaterials, Fullerenes, Carbon nanotubes, Nano rods, nanowires, addition reaction, elimination reaction, substitution reaction, geometrical isomerism and optical isomerism (**L3**). **Describe** the trends of periodic properties in the periodic table (**L2**). **Calculate** the oxidation number and coordination number (**L4**). **Determine** the hybridization, reaction rate, molecularity, reaction order, solubility product, activation energy, entropy and free energy (**L3**).

	Discuss the factors affecting the periodic properties, consequences due to hydrogen bonding, factors affecting the reaction rate, theories of reaction rates, significance of entropy, applications of Nernst equation, characteristic properties of nanomaterials, electrophilic and nucleophilic addition, E1 and E2 elimination, S_N1 and S_N2 substitution (**L2**). **Differentiate** between molecularity and reaction order, addition and condensation polymers, thermoplastics and thermosetting polymers, E1 and E2 elimination, S_N1 and S_N2 substitution, geometrical and optical isomerism (**L4**). **Explain** the process of vulcanization, advantages of vulcanized rubber, applications of polymers, and nanomaterials (**L2**). **Illustrate** the synthesis of PVC, PMMA, Teflon, Bakelite, Nylon 6, Nylon 6,6, Aspirin Paracetamol and Phenacetin (**L3**).

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1	B.H. Mahan, R.J. Myers, University Chemistry, 4th Edition, (Addison-Wesley) Thomson Press (India) LTD. (ISBN: 0-201-45576-5).	1998
2	P.W. Atkins, Physical Chemistry, Oxford University Press, New York (ISBN: 0-19-566902-9).	2005
3	B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, 44th Edition, Vishal Publishing Co., Jalandher, India (ISBN: 81-88646-74-1).	2009
4	P.C. Jain & M. Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Company (P) LTD., New Delhi (ISBN: 978-93-5216-000-6).	2015
5	S.S. Dara, A Textbook of Engineering Chemistry, S. Chand & Company LTD., Ram Nagar, New Delhi (ISBN: 81-219-0539-9).	2002
6	Dr. Rajshree Khare, A textbook of Engineering Chemistry, S.K. Kataria & Sons, New Delhi, India.	2019
7	A Text Book of Engineering Chemistry, 16th Edition, by Jain & Jain - Dhanpat Rai & Sons, New Delhi, India.	2015
8	A Text Book of Engineering Chemistry by Dr. Rajshree Khare – S.K. Kataria & Sons, India.	2019

Course Code: BEM-C102
Course Name: ENGINEERING MATHEMATICS-I

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 4**

Prerequisites:	*Fundamental of Calculus*
Objectives:	1. Introduction to differential calculus, Leibnitz theorem asymptotes, tracing of curves. 2. Introduction to partial differential calculus, Jacobians, Maxima, Minima and their application in engineering problems. 3. Introduction to double and triple integrals and its application to find area and volume, centre of gravity of plane and solids. 4. Introduction to vector calculus, curl, divergence and their application in engineering problems. 5. Introduction to matrices and their properties.
Course Coordinator	*Dr Vivek Goel*
Course Faculty	*Dr Vivek Goel*
Lectures	*40* Hours

NOTE:

The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

Module	**Course Content**	**No. of Hours**	**POS Mapped**
Module-1	**Differential Calculus I:** Successive differentiation, Leibnitz theorem, Taylor's & Maclaurin's, Expansion, Indeterminate forms, Radius of curvature, Asymptotes, Double points and their classification, Tracing of curves.	*10*	*PO1/PO2/PO3/PO4/PO5/PO6/PO10/PO12*
Module-2	**Differential Calculus II :**Partial Differentiation of functions, Normal to surfaces and tangent	*8*	*PO1/PO2/ PO6/PO7/ PO12*

	plane, Change of variables, Jacobian, Taylor's series of two variables, Truncation errors, Extrema of function of two and more variables, Method of Lagrange's multipliers		
Module-3	**Multiple Integrals :**Fundamental Theorem of integral calculus, Differentiation under the integral sign, Double and triple integrals, Change of order of integration, change of variables. Application to arc length, area , volume, centroid and moment of inertia. Gamma and Beta functions, Dirichlet's integral.	*6*	*PO1/PO2/ PO3/PO6/ PO8/PO10 /PO12*
Module-4	**Vector Calculus :**Differentiation of a vector, Scalar and vector fields, Gradient, Divergence, Curl and their physical meanings, Differential operator and identities, Line, Surface and Volume integrals, Green's theorem in plane. Gauss and Stoke's theorems (without proof). Simple applications.	*6*	*PO1/PO2/ PO4/PO5/ PO6/PO7/ PO9/PO10 /PO12*
Module-5	**Matrices :**Elementary row/ column operations, Rank of a matrix and its applications, Eigen-values and Eign vectors, Cayley-Hamilton theorem, Diagonalisation of Matrices, Linear dependence and independence, Normal matrices, Complex matrices and unitary matrices	*10*	*PO1/PO2/ PO3/PO4/ PO5/PO6/ PO8/PO9/ PO10/PO1 2*
Total No. of Hours		*40*	

Learning Outcomes	.1.Understand the concept of nth differentiation, Leibnitz theorems, 2.Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. 3. To understand the concept of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. 4. The concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals

	and its application. 5. Understand the concept of matrices and their applications to solve linear simultaneous equations. The concept of eigen value and eigen vector and complex matrices.

Suggested books: (*According to the reference style decided by departmental Board of Studies)*

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Prasad C., A first course in mathematics for Engineers, Prasad Mudranalaya	
2.	Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York,	1999
3.	Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi,	2000
4.	Srivastava R.S.L., Engineering Mathematics Vol.I	

Course Code: BCE-C102/ BCE-C202
Course Name: PROGRAMMING FOR PROBLEM SOLVING

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit : 4**

Prerequisites:	None
Objectives:	
Course Coordinator	Dr. Aman Tyagi

NOTE:	The question paper shall consist of two sections A, B. Section A contains 10 short type questions of 6 marks each, and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**ntroduction to Computers:** Block diagram of computers, functions of its important components, Memory and I/O devices. Concept of assembler, interpreter, compiler & generation of languages. **Number System:** Decimal, Binary, Octal, and Hexadecimal numbers and their arithmetic (addition, subtraction, multiplication, and division): 1's and 2's complements	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Programming in C:** History, Introduction to C Programming Languages, Structure of C Programs, Compilation and Execution of C Programs, debugging techniques, Data Type and sizes, Declarations of variables, Modifiers, Identifiers and keywords, Symbolic Constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Pre-processor. **Operators:** Unary operators, Arithmetic & Logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation. **Control Statements:** If-else, switch, break, continue, the coma operator, go to statement. **Loops:** while, do-while, for loop.	**08**	)1/)2/)3	PSO1/ PSO2

Module-3	**Arrays:** One-dimensional arrays: declaration, initialization and application. Two-dimensional array: declaration, initialization and application, Multidimensional arrays. **Handling of Character Strings:** Declaring and initializing string variables, reading strings, Writing strings, Arithmetic operation on strings, comparison of two strings and string handling functions. **Pointers:** Accessing the address of the variable, Declaring and initializing pointers, accessing a variable through its pointer expression, pointer increment and scale factor, pointers and array, pointers and character strings.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-4	**Functions:** Need for user defined function, return value and its type, function calls, no argument and No return values function, Argument and No return values functions, argument and return value functions. Handling of non-integer function, Scope and life time of variable in functions. **Recursion**: Recursive Definition and processes, recursion in C, example of recursion, Tower oh Hanoi Problem, simulating recursion, Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	**Structures:** Structures definition, giving value to members, structure initialization, array of structures, array within structures, structures within structures, structures and functions, Structure Pointers. **File Handling:** Creating and Deleting a File, Updating File, Copying File, Searching & Sorting in a File.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Course outcome

CO1: Knowledge and Understanding Demonstrate a foundational understanding of computer systems, including their block diagrams, major components, memory, and I/O devices, as well as different number systems and their arithmetic operations. CO2: Application of Concepts Apply the concepts of assembler, interpreter, and compiler to understand the generation of programming languages and their impact on software development. CO3: Analysis and Problem Solving Analyze and solve problems by writing and debugging C programs, including understanding data types, declarations, modifiers, and symbolic constants, and utilizing control statements such as if-else, loops, and arrays effectively. CO4: Critical Thinking and Algorithm Development Develop algorithms and implement them in C by demonstrating a deep understanding of operators, pointers, functions, and recursion, and by applying these concepts to problemsolving, including complex tasks such as simulating recursion and backtracking. CO5: Practical Application of Data Structures Apply data structure concepts, such as structures and file handling, to create, update, and manipulate data files, including searching and sorting, and understand their practical use in software development.

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	Rajaraman V.(3/e), Fundamental of Computers, PHI, New Delhi, 1999
2.	Sanders,D.H., Computers Today, Mcgraw Hill, 1998
3.	Kris Jamsa, DOS the complete reference, Tata McGraw Hill
4.	J.Peek Tim O'reilly & M.Locekides, UNIX POWER TOOLS, BPB Publication
5.	Yashwant Kanetkar, Let Us C, BPB
6.	Yashwant Kanetkar, C In Depth, BPB

Course Code: BME-C103
Course Name: BASIC MECHANICAL ENGINEERING

MM: 100 **Time: 3 Hr.** **L T P** **3 0 0**	**Sessional: 30** **ESE: 70** **Credit : 3**

Prerequisites :	None
Objectives:	
Course Coordinator	Mr. Praveen Pandey and Mr. Yogesh Kumar

NOTE:	The question paper shall consist of two sections A, B. Section A contains 10 short type questions of 6 marks each, and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Unit	Course Content	No. of Hours	POs mapped	PSOs mapped
Unit-1	**Thermodynamics I**: Introduction to SI units, Definition of thermodynamic system, Surrounding and Universe, Quasi static process, Energy interaction Zeroth law, Concept of temperature First law of thermodynamics, Application to closed and open system, Concept of Enthalpy, steady flow energy equation, Throttling process.	**08**	PO1/ PO2/PO 3	PSO1/ PSO2
Unit-2	**Thermodynamics II:** Second law, reversible and irreversible process, Thermal reservoir, heat engines and thermal efficiency, COP of heat pump and refrigerator, Carnot cycle, Claudius inequality, Concept of entropy, Entropy change for ideal gases.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Unit-3	**Thermodynamics III:** Generation of steam at constant pressure, Properties of steam, Use of property diagram, Process of vapor in closed and open system, Rankine cycle. Stroke clearance ratio, Compression ratio, Definition and calculation of mean effective pressure (no proof) for air standard cycles (Otto and diesel cycles	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Unit-4	**Mechanics: Trusses:** Plane structure, (Method of Joints and Sections only) Beams: Bending moment and shear force diagram for statically determinate beams.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Unit-5	**Strength of Materials:** Simple stresses and strain, strain energy, stress- strain diagram, elastic constants. Compound stress and strain: state of stress at a point, Simple tension, pure shear, general two-dimensional stress system,	**08**	PO1/ PO2/ PO3	PSO1/PS O2

	principal planes, principal stresses and strains, Mohr's stress circle, Poisson's ratio, maximum shear stress.			
Total No. of Hours		**40**		

Learning outcomes

After completing a course in Basic Mechanical Engineering, students should be able to understand fundamental principles, analyze mechanical systems, and apply knowledge to solve engineering problems, including understanding manufacturing processes and mechanical design.

Suggested books:

S. No.	**Name of Authors /Books /Publisher/Year**
1.	Kumar DS (2/e), Thermal Science and Engineering, S.K.Kataria, New Delhi,2001
2.	P.K.Nag (2/e), Engineering Thermodynamics, TMH, New Delhi,2001
3.	R.Yadav(7/e), Thermal Engineering, Central Publishing House, Allahabad, 2000
4.	Shames Irving H.(4/e), Engineering Mechanics, PHI, New Delhi, 1994
5.	Hibler (1/e), Statics and Dynamics, Pearson Education, Singapore, 2000

Course Code: BEN-A103
Course Name: ENVIRONMENTAL STUDIES

MM: 100 **Time: 3 Hr.** **L T P** **2 0 0**	**Sessional: 30** **ESE: 70** **Credit: 0**

Prerequisites :	None
Objectives:	
Course Coordinator	

NOTE:	The question paper shall consist of two sections A and B. Section A contains 10 short type questions of 6 marks each and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**The Multidisciplinary Nature of Environmental Studies & Ecosystems:** (a) Definition, scope and importance of ecology and environment (b) The ecological components: (i) Abiotic components: soil, water, light, humidity and temperature (ii) Biotic components & their relationships- symbiosis, commensalisms, parasitism, predation and antibiosis (c) Concept of an ecosystem (d) Structure and function of an ecosystem (e) Producers, consumers and decomposers (f) Energy flow in the ecosystem (g) Ecological succession (h) Food chains, food webs and ecological pyramids (i) Introduction, types, characteristic features, structure and function of the following ecosystems: (i) Forest ecosystem (ii) Grassland ecosystem (iii) Desert ecosystem (iv) Aquatic ecosystems (pond, river, ocean estuaries, streams, lakes) (j) Need for public awareness	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Natural Resources:** (a) Renewable and Non-Renewable resources (b) Natural resources and associated problems: (i) Forest resources: use and over-exploitation, deforestation case, timber extraction, mining, dams and their effects on forest and tribal people (ii) Water resources: use and over-utilization of surface and ground	**08**	)1/)2/)3	PSO1/ PSO2

	floods, drought, conflicts over water, dams benefits and problem (iii) Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, case studies (iv) Food resources : world food problems, changes caused by agriculture overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies (v) Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies (vi) Land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification (vii) Biodiversity & its conservation: definition- genetic, species and ecosystem diversity, values of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values (viii) 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*&*ex-situ* conservation of biodiversity (ix) Bio-geographical classification of India (x) Role of an individual in conservation of natural resources (xi) Equitable use of resources for sustainable lifestyles.			
Module-3	**Environmental Pollution:** (a) Definition, causes, effects and control measures of: air pollution, water pollution, soil pollution, noise pollution, thermal pollution and nuclear hazards (b) Solid waste management- causes, effects and control measures of urban and industrial wastes (c) Role of an individual in prevention of pollution (d) Pollution case studies (e) Disaster management: floods, earthquake, cyclone & landslides.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-4	**Social Issues and the Environment:** (a) From unsustainable to sustainable development (b) Urban problems related to energy (c) Water conservation, rain water conservation, rain water harvesting, management (d) Resettlement & rehabilitation of people- its problems and concerns, case studies (e) Environmental ethics-issues and possible solutions (f) Wasteland reclamation (g) Consumerism and waste products (h) Population growth, variation among nations, family welfare program (i) Environment and human health, human rights, value education (j) HIV/AIDS (k) Role of information technology (IT) in environment and human health (l) Case studies.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	**Environmental policies and laws:** Salient features of following acts (a) Environment Protection Act 1986 (b)	**08**	PO1/ PO2/ PO3	PSO1/PSO2

	Air (Prevention and Control of Pollution) Act 1981 (c) Water (Prevention and Control of Pollution) Act 1974 (d) Wildlife Protection Act 1972 (e) Forest Conservation Act 1980 (f) Issues involved in enforcement of environmental legislation (g) Public awareness.			
Total No. of Hours		**40**		

Learning Outcomes:	

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	Asthana, D. K. (2006). Text Book of Environmental Studies. S. Chand Publishing.
2.	Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
3.	Basu, R. N., (Ed.) (2000). Environment. University of Calcutta, Kolkata

Course Code: BAC-C151/C251
Course Name: Engineering Chemistry Laboratory

MM: 50 **Time: 2 Hr.** **L T P** **0 0 2**	**Sessional: 15** **ESE: 35** **Pass : 40%**

Prerequisites:	**Engineering Chemistry Lab.**
Objectives:	The objective of the chemistry laboratory sessions is to: Enable the students to get hands-on practice and to understand the applications of "qualitative and quantitative analysis" in engineering. Develop the experimental skills by manual and by instrumentation. Make students aware about the fundamental and experimental knowledge of chromatographic techniques like ascending paper chromatography and thin layer chromatography. Learn the students to analyze the turbidity, pH, conductivity and refractive index instrumentally.
Course Coordinator	**Dr. Ajay Kumar**

NOTE:	In practical examination, the student shall be required to perform one experiment which carries 20 marks and 15 marks shall be reserved for practical record and viva-voce examination. The number of students in a batch allotted to an examiner for practical examination shall not exceed 30 students.Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

LIST OF EXPERIMENTS

Choice of 10-12 experiments from the followings:

Chemical analysis of a salt (mixture of one acidic radical and one basic radical).
Determination of relative surface tension of given liquid by drop count method using stalagmometer.
Determination of relative viscosity of given liquid using Ostwald's viscometer.
Separation of given binary mixture by thin layer chromatography (TLC).
Separation of given binary mixture by ascending paper chromatography.
Determination of moisture content present in hydrated copper sulphate ($CuSO_4.5H_2O$).
Titration between a strong acid and strong base.
Titration between potassium permanganate and oxalic acid/Mohr's salt solution.
Determination of chloride content of given water sample by Mohr's method.
. Determination of total hardness of a water sample by using standard EDTA solution.
. Determination of turbidity of given sample using Nephelo turbidity meter.
. Determination of conductance of different KCl solutions and calculation of the specific and equivalent conductance of each solution.
. Determination of the pH of unknown solutions using a digital pH meter.
. Determination of total dissolved solids (TDS) of given water samples.
. Determination of refractive index of a liquid sample using the Abbe's refractometer.

. Determination of molar mass of an unknown solid using the colligative property of freezing point depression. . Study of adsorption of acetic acid on charcoal and to verify Freundlich isotherm. . Preparation of a polymer (Polyvinyl chloride/Bakelite).

Learning Outcomes:	**Laboratory Outcomes** The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to: **Analyze** a salt sample (**L4**). **Measure** molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, pH, turbidity, refractive index, etc. (**L5**) **Determine** the concentration of unknown sample via acid-base/redox titrations (**L3**). **Separate** the components present in a mixture by TLC/Paper chromatography (**L4**). **Estimate** the moisture content of a salt, chloride content, TDS and total hardness of water sample (**L4**). **Prepare** a polymer (Polyvinyl chloride/Bakelite) (**L3**).

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1	Advanced Practical Physical Chemistry, by J.B. Yadav – Krishna Prakashan Media.	2016
2	Analytical Chemistry Vol. I, II, III, by Dr. Subhash Kumar Agarwala & Dr. Keemti Lal – Pragati Prakashan.	---
3	Applied Chemistry: Theory & Practice, Second Edition, by O.P. Virmani & A.K. Narula – New Age International Private Limited.	2017

BCE-C151/BCE-C251
PROGRAMMINGFORPROBLEMSOLVINGLAB

MM:50 **Sessional:15**
Time:2 hrs. **ESE:35**
LTP **Credit:1**
0 02

LISTOFEXPERIMENTS

1. Practiceof all internalandexternalDOScommands.
2. Writesimplebatchprogram.
3. Givingexposureto windows environment.
4. Fileandprogrammanagementinwindows.
5. PracticeofallUNIXcommands.
6. Introductiontotexteditingandwordprocessing.
7. Netsurfing.
8. CreationandusageofE-mailaccount.
9. WriteaprograminCtoperformdifferentarithmeticoperations.
10. Writeaprogram inC togreateroftwonumbers.
11. Writeaprogram inCto checkwhetherno.isoddoreven.
12. Writeaprogram inC to checkwhetherno. isprime ornot.
13. WriteaprograminCtoprintFibonacciseries.
14. Writeaprogram inC toprintfactorial of ano.
15. Writeaprogram inC toadd twomatrices.
16. WriteaprograminC tosearchano.in array.

NOTE

1. Inpractical examinationthe studentshall berequired toperform oneexperiment.
2. Ateachershallbe assigned 20studentsfordailypracticalworkinlaboratory.
3. Nobatchfor practicalclass shallconsistof morethan 20students.
4. Thenumberofstudentsinabatchallottedtoanexaminerforpracticalexaminationshallnotexceed20 students.
5. Addition/deletioninabovelistmaybemadeinaccordancewiththefacilitiesavailablewiththeapproval ofH.O.D./Dean.

Course Code: BME-C153/253
Course Name: Engineering Graphics and Design

MM: 100 **Time: 3 Hr.** **L T P** **1 0 2**	**Sessional: 15** **ESE: 35** **Credit : 2**

Prerequisites:	NIL
Objectives:	Nil

Course Coordinator	Dr. Sanjeev Lambha and Dr. Jasbir Singh
NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

Unit	Course Content	No. of Hours
Unit1	**Introduction to Engineering Drawing** Principles of Engineering Graphics and their significance, usage of Drawing instruments, letteringand dimensioning, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epicycloid,andHypocycloidScales–Plain, DiagonalandVernier Scales;	**8**
Unit-2	OrthographicProjectionsandProjectionsof Regularsolids PrinciplesofOrthographicProjections-Conventions– Principalplanes,AuxiliaryPlanes,Introduction to first angle and third angle projection,Projections of Points, projection of lines-parallel to both the planes, parallel to one and inclined to other, inclined to both the planes, truelengthandtracesofaline, and linesinclined toboth planes,Projections ofplanes, tracesofplanes,anglesofinclinationsofplanes,parallelplanes	**8**

Unit-3	**Sections and Sectional Views of Right Angular Solids and Isometric Projections**Prism,Cylinder,Pyramid,Cone– AuxiliaryViews;DevelopmentofsurfacesofRightRegularSolids-Prism,Pyramid,CylinderandCone;Drawthesectionalorthographicviewsofgeometricalsolids, objects fromindustryand dwellings(foundation to slab only) Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; IsometricViewsoflines,Planes,SimpleandcompoundSolids;ConversionofIsometricViewstoOrthographicViews andVice-versa, Conventions;	**8**
Unit-4	Overview of ComputerGraphicsCustomization andCADDrawing Computer technologies that impact on graphical communication, Demonstrating knowledge of thetheory of CAD software (AUTOCAD) [such as: The Menu System, Toolbars (Standard, ObjectProperties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, CoordinateSystem), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (whereapplicable), The Status Bar, Different methods of zoom as used in AUTOCAD, Select and eraseobjects.;IsometricViewsof lines,Planes, Simple and compoundSolids.	**8**
Total		**40**

Learning Outcomes:

CourseOutcomes

All phases of manufacturing or construction require the conversion of new ideas and designconceptsintothebasiclinelanguageofgraphics.Therefore,therearemanyareas(civil,mechanical, electrical, architectural and industrial) in which the skills of the CAD techniciansplay majorroles in the designanddevelopment of new products or construction. Studentsprepare for actual work situations through practical training in a new state-of-the-art computerdesignedCAD laboratoryusingengineeringsoftware.

Thiscourseisdesignedtoaddress:

To prepare you to design a system, component, or process to meet desired needs withinrealistic constraints such as economic, environmental, social, political, ethical, health andsafety,manufacturability, and sustainability

To prepare you to use the techniques, skills, and modern engineering tools necessary forengineeringpractice

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Thestudent willlearn:

Introductiontoengineeringdesignanditsplaceinsociety

Exposuretothevisualaspectsof engineeringdesign

Exposuretoengineeringgraphicsstandards

Exposuretosolidmodellingandcomputer-aided geometricdesign

Exposuretocreatingworkingdrawingsandengineeringcommunication

Suggested Books

S. No.	NameofAuthors/Books/Publisher	Year of Publication
1.	BhattN.D.,PanchalV.M.&IngleP.R.,(2014),EngineeringDrawing,CharotarPublishingHouse	2014
2.	Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation	2002
3.	AgrawalB. &AgrawalC.M.(2012),EngineeringGraphics,TMHPublication	2012
4.	Narayana,K.L. &Pannaiah(2008),TextbookonEngineeringDrawing,ScitechPublishers	2008

BEG-A251
TECHNICALCOMMUNICATIONLAB
MM:50 **Sessional:15**
Time:2 hrs. **ESE:35**
LTP **Credit:1**
0 02

Experimentsrelatedtothefollowing:
Objectives:
1. ToexposethelearnerstoEnglishsoundsystemandacquirephoneticskillandspeechrhythm.
2. Tohelpthelearnersusegrammarcorrectly.
3. Totrainthelearnerstospeak English,clearly,intelligibilityandeffectively.
4. Toequipthelearnerstocompeteforacareer,andenablethemtofunctioneffectivelyincareerswhich demandgood communication skills.

Contents:

i) Non-verbal communication
- Useofhands
- Postureof shoulders
- Eyecontact
- Weight of the body
- Movement of thebody

ii) Applied Phonetics
- SoundofEnglish-consonantsandVowels
- PhonemicTranscription
- Stress,RhythmandIntonation

RemedialGrammar
- Someusefulexpression(introduction,greetingsetc.)thatareusedfrequently.
- Commonmistakesintheuseofnouns,pronouns,adjectives,adverb,prepositionsandconjunctions.
- Useofwhoandwhome,muchandmany,stillandyet,soasandsothat,makeanddo.
- Tenseand theiruse.
- Confusionofparticiples.
- TagQuestions

Readingand Speakingskills,Listeningand Writingskills
- Presentationandaddresses
- Groupdiscussion
- Interviews
- Roleplaying

ReadingandWritingskills,ListeningandWritingskills

- Letterwriting-formalandinformal
- Reallifesocialsituations
- Curriculumvitae
- Agenda,notice andminutes

References

1). T. Balsubramaniam. “Phonetics for Indian students”, Macmillan India Ltd.
2). Jones, Daniel. “English Pronouncing Dictionary”, Cambridge Univ. Press.
3).Oxford AdvancedLearnersDictionary.
4). Taylor,Grant.“ConversationPractice”,TMH,NewDelhi.
5). F.T.A.Wood.“RemedialEnglishGrammar”,MacmillanIndiaLtd.
6). Berry,ThomasElliot.“Themost commonerrorsinEnglishusage”,TMH,NewDelhi.
7).N.Krishnaswamy.“ModernEnglish”, Macmillan IndiaLtd.
8).Desmond.“PeopleWatching”.

CourseOutcomes

Thestudent willacquire basic proficiencyin English includingreading andlisteningcomprehension,writingand speakingskills.

Course Code: BAP-C202
Course Name: ENGINEERING PHYSICS

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit: 4**

Prerequisites:	None
Objectives:	
Course Coordinator	Dr. Devendra Singh

NOTE:	The question paper shall consist of two sections A and B. Section A contains 10 short type questions of 6 marks each and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**Wave & Oscillations:** Simple harmonic motion, damped and forced simple harmonic oscillator, Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator – heavy, critical, and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator.	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Quantum Mechanics:** Introduction to quantum physics, black body radiation, explanation using the photon concept, photoelectric effect, Compton effect, de Broglie hypothesis, wave-particle duality, Born's interpretation of the wave function, verification of matter waves, uncertainty principle, Schrodinger wave equation & its solution for particle in box.	**08**	)1/)2/)3	PSO1/ PSO2
Module-3	**Electrostatics:** Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Farady's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images with simple examples, energy of a charge distribution and its expression in terms of electric field.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-4	**Magnetostatics & LASERS:** Bio-Savart law, Divergence, and curl of static magnetic field; vector potential and calculating it for a given magnetic field	**08**	PO1/ PO2/ PO3	PSO1/ PSO2

	using Stokes' theorem; the equation for the vector potential and its solution for given current densities. Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby laser, He-Ne and CO2 laser, properties, and applications of lasers.			
Module-5	**Electronic materials:** Free electron theory of metals, quantum theory of free electrons, Fermi level, Density of states, Energy bands in solids, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Semiconductors: Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), concentration of charge carriers, Carrier generation and recombination, Carrier transport: diffusion and drift in p-n junction.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Learning Outcomes:	The concepts developed in this course will aid in quantification of several concepts in Physics that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will enable the student to: • Define Free electrons theory of metals, quantum theory of free electrons, Fermi level, Density of states, Energy bands in solids, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors and insulators, Occupation Probability, Fermi level. • (L1). • Illustrate Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier concentration and temperature (equilibrium carrier statistics), Concentration of charge carriers, Carrier generation and recombination, Carrier Transport: diffusion and drift in p-n junction (L3). • Describe the fundamentals of semiconductors (L2). • Calculate the mobility of charge carriers (L4). • Determine the radius of Bohr's first orbit of hydrogen atom by Heisenberg's uncertainty (L3). • Discuss the factors affecting the periodic properties, consequences due to hydrogen bonding, factors affecting the reaction rate, theories of reaction rates, significance of entropy, applications of Nernst equation, characteristic properties of nanomaterials, electrophilic and nucleophilic addition, E1 and E2 elimination, SN1 and SN2 substitution (L2). • Differentiate among conductors, insulators and semiconductors (L4). • Explain the process of population inversion in various types of lasers (L2). • Illustrate the pumping of various types used in lasing action (L3).

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	I.G. Main, Vibrations and Waves in Physics, Cambridge University Press (1993).
2.	H. J. Pain, The Physics of Vibrations and waves, Wiley India Pvt., Ltd. 6th Edition (2010).

3.	David Griffiths, Introduction to Electrodynamics, Pearson Education India Learning Private Ltd. 4th Edition (2015).
4.	Halliday, Resnick, Walker, Fundamental of Physics, Wiley India Pvt. Ltd; 10th Edition (2015).
5.	W. Saslow, Electricity, magnetism and light, Academic Press, 1th Edition (2002).
6.	E. Hecht, Optics, Pearson Education, India, 4 th Edition (2008).
7.	A. Ghatak, Optics, Tata McGraw-Hill Education India, 5 th Edition (2012).
8.	O. Svelto, Principles of Lasers, Springer Science & Business Media (2010).
9.	D.J. Griffiths, Quantum Mechanics, Pearson Education (2014).
10.	R. Robinett, Quantum Mechanics, OUP Oxford (2006).
11.	L.I. Schiff, Quantum Mechanics, Tata McGraw-Hill Education Pvt. Ltd, 4th Edition (2014)
12.	D.A. Neamen, Semiconductor Physics and Devices, Times Mirror High Education Group, Chicago (1997).
13.	E.S. Yang, Microelectronic Devices, McGraw Hill, Singapore (1998).
14.	B. G. Streetman, Solid State Electronic Devices, Prentice Hall of India (1995).
15.	K. Charles, Introduction to Solid State Physics, John Wiley, Singapore, 7th Edition (1996).

Course Code: BEM-C202
Course Name: Engineering Mathematics II

MM: 100	**Sessional: 30**
Time: 3 Hr.	**ESE: 70**
L T P	**Credit: 4**
3 1 0	

Prerequisites:	This course provides an introduction to the basic concepts and techniques of
Objectives:	Ordinary differential equations and their types. Linear differential equations 1. and their applications. 2. Partial differential equations and their solutions. 3. Introduction to series solution and special functions. 4. Introduction to Fourier series, Fourier series of special functions, half range series. 5. Introduction of Statistical tools, Binomial, Poisson and Normal distribution.
Course Coordinator	*Dr Vivek Goel*
Course Faculty	*Dr Vivek Goel*
Lectures	*40* Hours

NOTE:

		The question paper shall consist of two sections (Section-A and Section-B). Section-A shall contain of ten (10) short answer type questions of six (06) mark each and student shall be required to attempt any five (05) questions. Section-B shall contain eight (08) long answer type questions of ten (10) marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

Course Handout cum Lecture Plan

Syllabus before Sessional 1(*12* **Lectures &***3* **Tutorials/ Practical's)***			
Module	**Course Content**	**No. of Hours**	**POS Mapped**
Module-1	**Differential Equation:** Ordinary differential equations of first order, orthogonal trajectories, linear differential equations with constant coefficients, Euler- Cauchy equations,	**8**	PO1/PO2/PO3/PO4/PO5/PO6/PO10/PO12

	Equations of the form $y''= f(y)$. Solution of second order differential equations by change of dependent and independent variables, Method of variation of parameters for second order differential equations. Simple applications.		
Module-2	**Partial Differential Equations and its Applications :** Introduction of partial differential equations, Linear partial differential equations of II order with constant coefficients and their classifications parabolic, elliptic and hyperbolic with illustrative examples, Method	**9**	PO1/PO2/ PO6/PO7/ PO12
	of separation of variables. Wave and Heat equation up to two-dimensions.		
Module-3	**Solution in Series:** solution in series of second order linear differential equations, Bessel's and Legendre's equations and their solutions, Properties of Bessel function and Legendre's polynomials, Recurrence relations, Generating functions, Jacobi series, Integral representation of Bessel's functions.	**8**	*PO1/PO2/ PO3/PO6/ PO8/PO10 /PO12*
Module-4	**Fourier Series:** Fourier series, Dirichlet's condition and convergence. Half range series, Harmonic analysis.	**7**	*PO1/PO2/ PO4/PO5/ PO6/PO7/ PO9/PO10 /PO12*
Module5	**Statistics:** Moments, Moment generating functions. Binomial, Poisson and Normal distributions. Correlation and Regression. Method of least squares and curve fitting - straight line and parabola.	**8**	*PO1/PO2/ PO3/PO4/ PO5/PO6/ PO8/PO9/ PO10/PO1 2*
Total No. of Hours		**40**	

Course Outcomes	1. Understand the concept of differentiation and apply for solving differential equations. 2. Students understand the concepts of partial differential equations and how to solve linear Partial Differential with different methods and enable them to apply in solving problems like heat equation, wave equation etc.. 3. Get an idea of power series method to solve differential equations Familiar with Legendre equation and Legendre polynomial 4. To represent periodic functions using Fourier series.

	5. Explore small and large data-sets to create testable hypotheses and identify appropriate statistical tests. Perform correlation, regression analysis and appropriate statistical tests for real life situations.

Suggested books: (*According to the reference style decided by departmental Board of Studies)*

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Prasad C., A first course in mathematics for Engineers, Prasad Mudranalaya	
2.	Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York,	1999
3.	Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi,	2000
4.	Srivastava R.S.L., Engineering Mathematics Vol.I	
5.	Kapur J. N. & Saxena H.C., Mathematical Statistics	1960

Course Code: BEE-C202
Course Name: BASIC ELECTRICAL ENGINEERING

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit: 4**

Prerequisites:	None
Objectives:	
Course Coordinator	Mr. Gaurav Kumar

NOTE:	The question paper shall consist of two sections A and B. Section A contains 10 short type questions of 6 marks each and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**D.C. Network Theory:** Concept of elements**,** Circuit theory concepts- Mesh and node analysis, Star-Delta transformation. Network Theorems- Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, DC Transients- RL, RC circuits.	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Steady State Analysis of A.C. Circuits:** Sinusoidal and Phasor representation of voltage and current, average and rms value, form and peak factor of sinusoidal and different waveforms, single -phase A.C. circuit- behavior of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor. **Three Phase A.C. Circuits:** Star-Delta connections, line and phase voltage/current relations, three - phase power and its measurement.	**08**	)1/)2/)3	PSO1/ PSO2
Module-3	**Magnetic Circuits:** Ampere turns, magnetomotive force, permeability, reluctance, composite magnetic circuits, comparison between magnetic and electric circuits. **Transformer:** Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single-phase transformer, O.C. and S.C. tests.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2

Module-4	**D. C. Machines:** Principle of electromechanical energy conversion, types of D.C. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, speed control of D.C. motors and applications. **Measuring Instruments:** Principle of working and constructional features of Permanent Magnet Moving Coil and Moving Iron ammeters and voltmeters, Electrodynamic Wattmeter, Induction type single-phase Energy meter.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	**Three-phase Induction Motor:** Principle of operation, types and methods of starting, slip-torque characteristics and applications. **Single-phase Induction Motor:** Principle of operation, methods of starting. **Three-phase Synchronous Machines**: Principle of operation and application of synchronous motor.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Learning Outcomes:	1. Define electrical networks mathematically 2. Develop elementary knowledge of electromagnetism 3. Compare DC and AC circuits and analyze them 4. Analyze elementary knowledge of Electric machines 5. Classify and compare different types of Electrical machines

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	V. Del Toro, Principles of Electrical Engineering, Prentice Hall International.
2.	H. Cotton, Advanced Electrical Technology, Wheeler Publishing.
3.	E. Huges, Electrical Technology.
4.	B. L., Theraja, Electrical Technology, Vol-1, S. Chand Publisher, New Delhi.
5.	W.H. Hayt & J.E. Kennedy, Engineering circuit Analysis, Mc Graw Hill.
6.	I.J. Nagrath, Basic Electrical Engineering, Tata Mc Graw Hill.
7.	A.E. Fitgerald, D.E., Higginbotham and A Grabel, Basic Electrical Engineering, Mc Graw Hill.
8.	Ashfaq Hussain, Fundamentals of Electrical Engineering, Dhanpat Rai Publish.

Course Code: BET-C202
Course Name: ELECTRONIC DEVICES

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit: 4**

Prerequisites:	None
Objectives:	
Course Coordinator	Mr.Prateek Agrawal and Mr.Amrish

NOTE:	The question paper shall consist of two sections A and B. Section A contains 10 short type questions of 6 marks each and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	Semiconductors, energy band description of semiconductors, effect of temperature on semiconductors, intrinsic and extrinsic semiconductors, donor and acceptor impurities, electron and hole concentration, conductivity of a semiconductor, mobility and resistivity, Generation and Recombination, Hall effect, Fermi level, mass action law, charge densities in a semiconductor, diffusion and Poisson and continuity equation.	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	P-N junction and its properties, V-I characteristics of P-N junction, semiconductor-diode, depletion layer, equivalent circuits of junction diode, diode equation, diode resistance and capacitance, application of junction diode as clippers, clampers and rectifiers (Half-wave, Full-wave and bridge), efficiency of rectifiers, ripple factor, filter circuits, Zener and avalanche breakdown mechanism, Zener diode and its characteristics, equivalent circuit of Zener diode, Zener diode as a voltage regulator, LED, photo diode and solar cell.	**08**	)1/)2/)3	PSO1/ PSO2
Module-3	Bipolar junction transistor (BJT) and its action, Transistor configurations (CB, CE and CC) and their characteristics, cut-off, active and saturation regions. Transistor as a switch, operating point, dc load line, Transistor biasing and its necessity, thermal runaway, types of biasing and their analysis, stability factors, Transistor as a regulator. Concept of Transistor	**08**	PO1/ PO2/ PO3	PSO1/ PSO2

	amplifier, graphical analysis of CE amplifier, dc and ac equivalent circuits, Emitter follower and its ac model.			
Module-4	Ebers-Moll model of BJT, T model of BJT, Hybrid model of BJT at low frequency, computation of voltage gain, current gain and power gain, Zi and Zo and approximate formulas, high frequency transistor hybrid π model.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	Field Effect Transistor: JFET and its characteristics, biasing of JFET, small signal low frequency and high frequency model of JFET amplifier, configurations of JFET, MOSFET, MESFET (Enhancement & depletion types) their construction and characteristics, configuration of MOSFET, MOS capacitor.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Learning Outcomes:	At the end of the course the students can able to • Analyze the characteristics of different electronic devices such as diodes, transistors etc • Measure voltage, frequency and phase of any waveform using CRO. • Create sine, square and triangular waveforms with required frequency and amplitude using function generator.

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	Integrated Electronics: Jacob Millman & C.C. Halkias
2.	Malvino and leach “Digital principle and applications.
3.	Streetman Ben.G, “Solid state electronic devices” (3/e), PHI
4.	Millman and grabel, “Microelectronics” PHI
5.	Robert Bolyestad “Electronic devices and circuit”, PHI

Course Code: BHU-S202
Course Name: VEDIC SCIENCE & ENGINEERING

MM: 100 **Time: 3 Hr.** **L T P** **3 1 0**	**Sessional: 30** **ESE: 70** **Credit: 0**

Prerequisites:	None
Objectives:	
Course Coordinator	Dr. Murali Manohar Tiwari

NOTE:	The question paper shall consist of two sections A and B. Section A contains 10 short type questions of 6 marks each and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**Science in Vedic literature and Indian Philosophy-I**: Kanad's atomic theory, concept of parmanu, Formation of molecules, Parimandal, Comparison with Dalton's atomic theory and models of Thompson, Rutherford and Bhor. Concept of SAMATA and VISHAMTA vs Maxwell-Boltzmann's distribution of velocities and energies.	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Science in Vedic literature and Indian Philosophy-II**: First and Second Law of thermodynamics in daily life. Law of helplessness of mankind in thermodynamics and Indian philosophy. Entopy in life and concept of pralaya. Dhananjay Vs concept of Radioactivity-life after death. Atomic spectrum Vs concept of Kundalini.	**08**	O1/ O2/ O3	PSO1/ PSO2
Module-3	**Vedic Mathematics**: Measurements in Vedic Times, ancient scale of length, mass, time and temperature, Number system, Geometry according to sulba Sutra. Overview of Vedic Mathematical Rules (ekadhiken pooren, Nikhil navtascharaman dashatah, oordhavatriyagyabhyam)	**08**	PO1/ PO2/ PO3	PSO1/ PSO2

Module-4	**Electrical, Electronics & Aeronautical Engineering in Vedas**: Concept of electrical Engineering, type of electricity – Tadit, Saudamini, Vidyut, Shatakoti, Haradini, Ashani. Electronics Engineering in Vedic literature. Aeronautical Engineering in Vedic literature, Types of Vimanas and their construction and working, Shakun viman, Rukma viman, Tripura viman, concept of calculator and ancient ways of computation.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	**Mechanical, Chemical, Civil & Architectural engineering in Vedic Literature**: Mechanical & Chemical Engineering in ancient India, Art of Alchemy, Types of Iron and steel. Civil and Architectural engineering in Vedic literature. Concept of cryptography & Art of secret writing.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Learning Outcomes:	B.Tech. students of all programmes of faculty of engineering & technology will be able to learn about the development of various concepts of sciences and engineering in ancient India.

Suggested books:

S. No.	Name of Authors /Books /Publisher/Year
1.	Science in Vedas by Acharya Vaidyanath Sashtri.
2.	Science in the Vedas by Hansraj, Shakti Publications, Ludhiana.
3.	Vedic Mathematics by Swamisri Bharati Krishana Teerathaji, Motilal Banarasi Das, Delhi.
4.	Brahad Viman shastra by Maharishi Bhardwaj.
5.	Vymanika shastra, English translation by G. R. Josyer.
6.	Alchemy and Metallic Medicines in Ayurveda by : Vaidya Bhagwan Das.
7.	History of Hindu Chemistry by : P. C. Raya
8.	Indian Alchemy by : Dr. S. Mahdihassan.
9.	Ancient Scientist of Indian by Satya Prakash.
10.	Vaishaishik Darshan by Maharishi Kanad.
11.	Vedas : The sources of ultimate science by S. R. Verma, Nag Publisher, New Delhi.

CourseCode:BAP-C151/BAP-C251
CourseName:EngineeringPhysicsLaboratory

MM:50 **Time: 2 Hr.L T P** **0 0 2**	**Sessional: 15** **ESE:35** **Credit: 1**

Prerequisites:	**EngineeringPhysicsLab.**
Objectives:	Theobjectiveof thePhysicslaboratorysessions isto: Enablethestudentstogethands-onpracticeandtounderstandtheapplicationsof Physics in engineering. Develop theexperimental skills bymanual and byinstrumentation. Makestudentsawareaboutthefundamentalandexperimentalknowledgeof Physics.
CourseCoordinators	**Dr.SunilPanwar&Dr.DevendraSingh**

NOTE:	In practical examination, the student shall be required to perform one experiment which carries20 marks and 15 marks shall be reserved for practical record and viva-voce examination. Thenumberofstudentsinabatchallottedtoanexaminerforpracticalexaminationshallnotexceed 30students.Addition/deletioninabovelistmaybemadeinaccordancewiththefacilitiesavailablewiththe approval ofH.O.D./Dean.

LISTOFEXPERIMENTS

Thereareonlytenexperimentswhich are given below:

Toverifytheinversesquarelawofradiationusingphotoelectriceffect.
To determine the value of Planck's constant and photoelectric work functionofthematerialofthe cathodeusing photoelectriccell.
To determine the frequency of an unknown signal by drawing the Lissajouspatternsforvariousfrequencyratiosandevaluatethephasedifferencebetween two sinusoidal signals applied to X and Y inputs of cathode rayoscilloscope.
Todeterminethevalue ofe/mofan electronbyHelicalMethod/Magnetron Method.
Todeterminetheresistivityandenergybandgapbyfourprobemethod.
Tofindtherefractiveindexofthematerialofgivenprism by usingspectrometer.
TodeterminethewavelengthofHe-Nelaserbydiffractionmethod.
TodeterminetheStefan'sconstant.

8.	Todeterminetheradius
9.	ofcircularcoilbyvariationofmagneticfieldTodetermine

LearningOutcomes:	**LaboratoryOutcomes** ThePhysicslaboratorycoursewillconsistofexperimentsillustratingtheprinciplesofPhysicsrelevanttothestudyofscienceandengineering.Thestudentswill learn to: **Analyze**Semiconductor samplebyFourProbeMethod. **Measure**theSpecificchargeof electron. **Analyse**thedrawingof LissajousPatterns. **Determination** of the refractive index of Prism's material bySpectrometer. **Estimate**the resistivityofthesemiconductor.

Suggestedbooks:

S.No.	NameofAuthors/Books/Publisher	YearofPublication
1	Manualforelectricalmeasurementlab,Dr.DevendraSingh&Dr.RajeevSaxena, NationalPressAssociates,NewDelhi	2017
2	PracticalPhysics,Dr.GKGupta,Dr.VKGoel,M.S.Tomar,KedharnathRamnath, MeerutDelhi	--
3	PracticalPhysics,CLArora,SChandPublication	2014

BAP-C151/BAP-C251
EngineeringPhysicsLab.
CO-PO/PSOMAPPING

CO-PO/PSOMAPPING

Course Outcomes (CO)	Action Verb (CO)	Bloom'sLevel	ProgramOutcomes(POs)												Program Specific Outcomes(PSOs)		
			EngineeringKnowledge	ProblemAnalysis	Design/DevelopmentofSolutions	ConductInvestigationsofComplexProblems	ModernToolUsage	TheEngineerandSociety	Environmentand Sustainability	Ethics	Individual and TeamWork	Communication	ProjectManagementandFinance	LifeLongLearning			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

s)																	
CO1	Analyze	AnalyzeL4	3	3	3	3	2	3	3	2		3	3	3			

CO2	**Measure**	**Evaluate L5**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**		**3**	**2**	**3**			
CO3	**Determine**	**Apply L3**	**3**	**3**	**3**	**2**	**2**	**3**			**3**	**3**	**3**	**2**			
CO4	**Separate**	**Analyze L4**	**3**	**3**	**3**	**3**	**2**	**3**			**3**	**3**	**2**	**2**			
CO5	**Estimate**	**Analyze L4**	**3**	3	3	3	3	3	3	3	3	3	3	**3**			
CO6	**Prepare**	**Apply L3**	**3**	3	2	3		3	3		3	3	3	**3**			
	Average		**3**	**3**	**2.8**	**2.6**	**2.4**	**3**	**3**	**2.6**	**3**	**3**	**2.6**	**2,6**			

CourseCode:BEE-C151/BEE-C251
CourseName:BASICELECTRICALENGINEERINGLAB

MM:100 **Time:3Hr.** **LTP** **0 02**	**Sessional:15** **ESE:35** **Credit:1**

Prerequisites:	PhysicsandMathematicsat10+2level
Objectives:	his course deals with basic introduction of system components ofelectricalsystems,andprovideshandsonpracticeinassembling,interconnecting,testing,andrepairingsuchsystembymakinguseof varioustoolsusedinelectricalworkshop.
CourseCoordinator	Mr.GauravKumar, Asst.professor

Experiments	**LabContent**	**No. of Hours**	**POsmapped**	**PSOs mapped**
Exp. No. 1	VerificationofKirchoff'slaws.	02	PO1/PO2 PO3/PO4	PSO1/PSO 2/PSO3
Exp. No. 2	VerificationofThevenin'stheorems.	02	PO1/ PO2PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 3	VerificationofNorton'stheorem	02	PO1/ PO2PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 4	VerificationofSuperpositiontheorem.	02	PO1/ PO2PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 5	Verification of maximum power transfertheorem.	02	PO1/ PO2PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 6	Measurementofpowerinthree-phasecircuit bytwo wattmeter method.	02	PO3/PO1	PSO 1/ PSO2/PSO3
Exp. No. 7	Determinationofefficiencyofasingle-phasetransformerbyloadtest.	02	PO1/PO3	PSO 1/ PSO2/PSO3
Exp.No. 8	To perform open circuit test on single-phasetransformer&findequivalentcircuit parameters.	02	PO1/PO3	PSO 1/ PSO2/PSO3
Exp. No. 9	Toperformshortcircuittestonsingle-phase transformer&findequivalentcircuitparameters	02	PO3/ PO4/PO1/PO2	PSO 1/ PSO2/PSO3
Exp. No. 10	D.C. generator characteristics (a) Shuntgenerator(b)Seriesgenerator(c)Compound generator	02	PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 11	SpeedcontrolofD.C.shunt generator.	02	PO3/ PO4/PO1/P	PSO 1/ PSO2/PSO3

			O2	
Exp. No. 12	Tostudyrunningandreversingofathree-phase InductionMotor	02	PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 13	Tostudy&calibrationofasingle-phaseEnergy Meter.	02	PO3/PO1/	PSO 1/ PSO2/PSO3
Exp. No. 14	Calibrationofvoltmeterandammeter..	02	PO2/ PO1/PO3/PO4	PSO 1/ PSO2/PSO3
Exp. No. 15	TostudyofresonanceinRLCcircuit.	02	PO3/PO1	PSO 1/ PSO2/PSO3

CourseOutcomes:	IllustratetheapplicationofKVL/KCLandnetworktheoremstoDCelectricalcircuits. Selecttheappropriatetoolsandcomponentsrequiredforspecificoperation. Demonstratethebehaviorofasingle-phaseACseriesresonantcircuit. Calculateefficiencyofasingle-phasetransformer andDCmachine. Calculateefficiencyofasingle-phasetransformer andDCmachine.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	1		2		3	1	3	1	2	3	3
CO2	3	3	3	3		1		1		3		3	2	3	3
CO3	3	3	3	3	1		2		2	2	1		2	3	3
CO4	3	3	3	3	1	2				2	1		2	3	3
CO4	3	3	3	2	2	1	3		1	2	1	2	2	3	2

CourseName:ELECTRONICDEVICESLAB
CourseCode: BET-C151/BET-C251

MM:50 **Time:2Hr.** **LTP** **0 0 2**	**Sessional:15** **ESE:35** **Credit:1**

Prerequisites:	None
Objectives:	Tostudybasicelectroniccomponents Toobservecharacteristicsofelectronicdevices
CourseCoordinator	Mr.PrateekAgarwal

NOTE:	Inpracticalexaminationthestudentshallberequiredtoperformoneexperiment. Ateachershall beassigned30studentsfordailypractical workinlaboratory. Nobatchforpracticalclassshall consistofmorethan30students. 4.Thenumberofstudentsinabatchallottedtoanexaminerforpracticalexaminationshallnotexceed 30 students. 5. Addition/deletioninabovelistmaybemadeinaccordancewiththefacilitiesavailablewiththeapprovalof H.O.D.

LISTOF EXPERIMENTS	Todraw theV-Icharacteristicsof PNjunction diode. TodrawtheV-IcharacteristicsofZenerdiode andstudyitas voltageregulator. Tostudyjunctiondiodeashalfwaveandfull waverectifier. Tostudyjunction diodeas clipperandclamper. Todrawtheinputandoutput characteristicsofatransistorin CEandCBconfiguration. Tofindthesmall signalh-parametersofatransistor. TodrawtheinputandoutputcharacteristicsofFETandtomeasurethepinchoffvoltage. Todrawthedrainandtransfercharacteristiccurveof MOSFET. TodrawthefrequencyresponseofFET amplifier. TodrawthefrequencyresponsecurveofEmitter Follower.

LearningOutcomes:	At theendof thecoursethestudentscanable to Analyzethecharacteristics ofdifferent electronicdevicessuchas diodes,transistorsetc Measure voltage,frequencyandphase ofanywaveformusingCRO. Createsine,squareandtriangularwaveformswithrequiredfrequencyandamplitudeusingfunction generator.

Effectivefromthesession2024-25

CourseCode:BAP-C151/BAP-C251
CourseName:EngineeringPhysicsLaboratory

MM:50 **Time: 2 Hr.L T P** **0 0 2**	**Sessional: 15** **ESE:35** **Credit: 1**

Prerequisites:	**EngineeringPhysicsLab.**
Objectives:	Theobjectiveof thePhysicslaboratorysessions isto: Enablethestudentstogethands-onpracticeandtounderstandtheapplicationsof Physics in engineering. Develop theexperimental skills bymanual and byinstrumentation. Makestudentsawareaboutthefundamentalandexperimentalknowledgeof Physics.
CourseCoordinators	**Dr.SunilPanwar&Dr.DevendraSingh**

NOTE:	In practical examination, the student shall be required to perform one experiment which carries20 marks and 15 marks shall be reserved for practical record and viva-voce examination. Thenumberofstudentsinabatchallottedtoanexaminerforpracticalexaminationshallnotexceed 30students.Addition/deletioninabovelistmaybemadeinaccordancewiththefacilitiesavailablewiththe approval ofH.O.D./Dean.

LISTOFEXPERIMENTS

Thereareonlytenexperimentswhich are given below:

1.Toverifytheinversesquarelawofradiationusingphotoelectriceffect.
2.To determine the value of Planck's constant and photoelectric work functionofthematerialofthe cathodeusing photoelectriccell.
3.To determine the frequency of an unknown signal by drawing the Lissajouspatternsforvariousfrequencyratiosandevaluatethephasedifferencebetween two sinusoidal signals applied to X and Y inputs of cathode rayoscilloscope.
4.Todeterminethevalue ofe/mofan electronbyHelicalMethod/Magnetron Method.
5.Todeterminetheresistivityandenergybandgapbyfourprobemethod.
6.Tofindtherefractiveindexofthematerialofgivenprism by usingspectrometer.
7.TodeterminethewavelengthofHe-Nelaserbydiffractionmethod.
8.TodeterminetheStefan'sconstant.
9.To determine the radius of circular coil by variation of magnetic field.
10. To determine the spring constant by Hooks law.

LearningOutcomes:	**LaboratoryOutcomes** ThePhysicslaboratorycoursewillconsistofexperimentsillustratingtheprinciplesofPhysicsrelevanttothestudyofscienceandengineering.Thestudentswill learn to: **Analyze**Semiconductor samplebyFourProbeMethod. **Measure**theSpecificchargeof electron. **Analyse**thedrawingof LissajousPatterns. **Determination** of the refractive index of Prism's material bySpectrometer. **Estimate**the resistivityofthesemiconductor.

Suggestedbooks:

S.No.	NameofAuthors/Books/Publisher	YearofPublication
1	Manualforelectricalmeasurementlab,Dr.DevendraSingh&Dr.RajeevSaxena, NationalPressAssociates,NewDelhi	2017
2	PracticalPhysics,Dr.GKGupta,Dr.VKGoel,M.S.Tomar,KedharnathRamnath, MeerutDelhi	--
3	PracticalPhysics,CLArora,SChandPublication	2014

BAP-C151/BAP-C251
EngineeringPhysicsLab.
CO-PO/PSOMAPPING

CO-PO/PSOMAPPING

Course Outcome	Action Verb (CO)	Bloom'sLevel	ProgramOutcomes(POs)												Program Specific Outcomes(PSOs)		
			Engineering Knowledge	Problem Analysis	Design/Development ofSolutions	Conduct Investigations ofComplex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			

s (COs)			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Analyze	AnalyzeL4	3	3	3	3	2	3	3	2		3	3	3			

CO2	**Measure**	**Evaluate L5**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**		**3**	**2**	**3**			
CO3	**Determine**	**Apply L3**	**3**	**3**	**3**	**2**	**2**	**3**			**3**	**3**	**3**	**2**			
CO4	**Separate**	**Analyze L4**	**3**	**3**	**3**	**3**	**2**	**3**			**3**	**3**	**2**	**2**			
CO5	**Estimate**	**Analyze L4**	**3**	3	3	3	3	3	3	3	3	3	3	**3**			
CO6	**Prepare**	**Apply L3**	**3**	3	2	3		3	3		3	3	3	**3**			
	Average		**3**	**3**	**2.8**	**2.6**	**2.4**	**3**	**3**	**2.6**	**3**	**3**	**2.6**	**2,6**			

C**ourseCode:BME-C252**

CourseName:Workshop Practice Lab

MM:50 **Time:2 Hr.** **LTP** **0 02**	**Sessional:15** **ESE:35** **Credit: 1**

Prerequisites:	NIL
Objectives:	
CourseCoordinator	Mr. Rishi Kumar and Mr. Kapil Dev Sharma

Module	CourseContent	No.ofHours
Module-1	Carpentry Shop 1. Study of Carpentry Tools, Equipment and different joints. 2. To prepare a half T joint of given dimensions.	**04**
Module-2	Moulding Shop 3. Introduction to Patterns, pattern allowances, Gate, Riser, and Runner. 4. To prepare a mould of half bearing.	**04**
Module-3	Metal Joining. 5. To prepare a butt joint of MS strips using Arc welding. 6. To prepare a T joint of MS strips using Oxy Acetylene gas welding.	**04**
Module-4	Fitting Shop 7. To prepare a rectangular piece with slant edge of given size from M.S. flat.	**02**
Module-5	8. To prepare a job on Lathe machine of given shape and size. 9. To prepare a job on Shaper machine of given shape and size. 10. To prepare a job on Milling machine of given shape and size. 11. To prepare a job on CNC train master of given shape and size. 12. To prepare a job on drilling machine of given shape and size.	**10**
TotalNo. ofHours		**24**

Learning Outcome	
	Build thorough knowledge of various tools, machines, devices used in engineering Acquire thorough knowledge of carrying out various operations in mechanical engineering workshop Utilize measuring skills gained in workshop practice. Acquire “Hands on” training and practice to students for use of various tools, devices and machines. Utilize practical skills in guiding works the trades.

NOTE 1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean

Course Code: BSP-S251
Course Name: PHYSICAL TRAINING & YOGA

MM: 50 **Time: 3 Hr.** **L T P** **0 0 2**	**Sessional: 50** **ESE: 0** **Credit : 0**

Prerequisites :	None
Objectives:	To make the students understand the importance of sound health and fitness principles as they relate to better health. To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness. To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of injury. To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.
Course Coordinator	**Dr. Dharmendra Balyan**

NOTE:	The question paper shall consist of two sections A, B. Section A contains 10 short type questions of 6 marks each, and student shall be required to attempt any five questions. Section B contains 8 long type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus.

Module	Course Content	No. of Hours	POs mapped	PSOs mapped
Module-1	**Introduction to Physical Education** o Meaning & definition of Physical Education o Aims & Objectives of Physical Education o Changing trends in Physical Education	**08**	PO1/ PO2/PO3	PSO1/ PSO2
Module-2	**Olympic Movement** o Ancient & Modern Olympics (Summer & Winter) o Olympic Symbols, Ideals, Objectives & Values o Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)	**08**	O1/ O2/ O3	PSO1/ PSO2
Module-3	**Physical Fitness, Wellness & Lifestyle** o Meaning & Importance of Physical Fitness & Wellness o Components of Physical fitness o Components of Health related fitness o Components of wellness o Preventing Health Threats through Lifestyle Change o Concept of Positive Lifestyle	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-4	**Fundamentals of Anatomy & Physiology in Physical Education, Sports and Y oga** o Define Anatomy, Physiology & Its Importance oEffect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)	**08**	PO1/ PO2/ PO3	PSO1/ PSO2
Module-5	**Kinesiology, Biomechanics & Sports**	**08**	PO1/ PO2/	PSO1/PSO2

	oMeaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports o Newton's Law of Motion & its application in sports. oFriction and its effects in Sports.		PO3	
Module-6	**Postures** oMeaning and Concept of Postures. oCauses of Bad Posture. oAdvantages & disadvantages of weight training. oConcept & advantages of Correct Posture. o Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis. o Corrective Measures for Postural Deformities	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-7	**Yoga** o Meaning & Importance of Yoga o Elements of Yoga o Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas o Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) o Relaxation Techniques for improving concentration - Yog-nidra	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-8	**Yoga & Lifestyle** oAsanas as preventive measures. o Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana. o Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana. oBack Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. o Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana. o Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-9	**Training and Planning in Sports** oMeaning of Training o Warming up and limbering down o Skill, Technique & Style o Meaning and Objectives of Planning. oTournament – Knock-Out, League/Round Robin & Combination.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-10	**Psychology & Sports** oDefinition & Importance of Psychology in Physical Edu. & Sports o Define & Differentiate Between Growth & Development o Adolescent Problems & Their Management o Emotion: Concept, Type & Controlling of emotions oMeaning, Concept & Types of Aggressions in Sports. oPsychological benefits of exercise.	**08**	PO1/ PO2/ PO3	PSO1/PSO2

	oAnxiety & Fear and its effects on Sports Performance. oMotivation, its type & techniques. oUnderstanding Stress & Coping Strategies.			
Module-11	**Doping** o Meaning and Concept of Doping o Prohibited Substances & Methods o Side Effects of Prohibited Substances	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-12	**Sports Medicine** oFirst Aid – Definition, Aims & Objectives. oSports injuries: Classification, Causes & Prevention. o Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Module-13	**Sports / Games** Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. oHistory of the Game/Sport. oLatest General Rules of the Game/Sport. oSpecifications of Play Fields and Related Sports Equipment. oImportant Tournaments and Venues. oSports Personalities. oProper Sports Gear and its Importance.	**08**	PO1/ PO2/ PO3	PSO1/PSO2
Total No. of Hours		**40**		

Learning Outcomes:	To practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation. To learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance. To learn breathing exercises and healthy fitness activities To understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination. To perform yoga movements in various combination and forms. To assess current personal fitness levels. To identify opportModuleies for participation in yoga and sports activities. To develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc. To improve personal fitness through participation in sports and yogic activities. To develop understanding of psychological problems associated with the age and lifestyle. To demonstrate an understanding of sound nutritional practices as related to health and physical performance.

S. No.	Name of Authors /Books /Publisher/Year
1.	Modern Trends and Physical Education by Prof. Ajmer Singh.
2.	Light On Yoga by B.K.S. Iyengar.
3.	Health and Physical Education – NCERT (11th and 12th Classes)