CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – I YEAR
ELECTRICAL ENGINEERINGAPPROVED BY
BOARD OF SYLLABUS
OCTOBER 2023
(w.e.f. Batch 2023 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI (DEEMED TO BE UNIVERSITY)
HARIDWAR-249404
Website: https://www.gkv.ac.in/departments/ee/

VISION

To impart knowledge, develop skills and prepare graduates in achieving global excellence in Electrical Engineering education, industry, high human values and research.

MISSION

- **[M1]: (Modern Brilliance)**
  To prepare engineering graduates with deep understanding of fundamentals of Electrical Engineering through theory and practical experiences.
- **[M2]: (Skills, Ethics &Values)**
  To prepare professionals with good technical skills, positive attitude and ethical values.
- **[M3]: (Collaboration)**
  Develop strong collaborative links with industry, research organizations and academia to encourage creativity and innovation.
- **[M4]: (Base for Holistic Learning)**
  To provide a platform for developing new products and systems based on recent technologies that can help industry and society as a whole.

PROGRAM EDUCATIONAL OBJECTIVES

- **PEO1:** To train the students of Electrical Engineering so that they can work with government or private sector companies responsible for development of power sector & prove themselves in electrical maintenance for the industry.
- **PEO2:** To train students of Electrical Engineering who can contribute to teaching profession, research & development by pursuing higher studies.
- **PEO3:** To train students of Electrical engineering in a manner that they should function effectively in the multicultural and multidisciplinary groups in their practice of Electrical engineering profession.
- **PEO4:** To encourage students to develop lifelong learning skills, to have self-motivation and high moral and ethical values for a successful professional career.
- **PEO5:** To train the students of Electrical Engineering to contribute their knowledge for social work, human values, national development.

PROGRAM SPECIFIC OUTCOMES

- **PSO1:** Graduates will demonstrate their knowledge in effective implementation during their practice of profession of Electrical Engineering with due regard to environment and social concerns**.**
- **PSO2:** Graduates will demonstrate their knowledge in analysis, design, erection and laboratory experimentation regarding Electrical Engineering**.**
- **PSO3:** Graduates will be motivated for continuous self-learning in engineering practice and pursue research in advanced areas of Electrical Engineering in order to offer engineering services to the society, ethically.

Batch 2023-2024 and onwards

(Effective from the academic session 2023-24)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR
Faculty of Engineering & Technology
Electrical Engineering

B. Tech. First Year
Syllabus in accordance with AICTE Model Curriculum

SEMESTER-I

DSC/SEC/DSE/ AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM		
		L	T	P	CT	TA	Total	ESE		
THEORY										
BAP-C102	Engineering Physics	3	1	0	20	10	30	70	100	4
BEM-C102	Engineering. Mathematics– I	3	1	0	20	10	30	70	100	4
BET-C102	Electronic Devices	3	1	0	20	10	30	70	100	4
BEE-C102	Basic Electrical Engineering	3	1	0	20	10	30	70	100	4
BHU-S102	Vedic Science and Engineering	2	0	0	20	10	30	70	100	1
		TOTAL CREDITS								17
	Induction Program	for first three weeks								0
PRACTICAL										
BAP-C151	Engineering Physics Lab	0	0	2	10	5	15	35	50	1
BET-C151	Electronic Devices Lab	0	0	2	10	5	15	35	50	1
BEE-C151	Basic Electrical Engineering Lab	0	0	2	10	5	15	35	50	1
BME-C152	Workshop Practice	0	0	2	10	5	15	35	50	1
BSP-S151	Physical Training and Yoga	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								5
TOTAL		14	4	10	150	75	225	525	750	22

Effective from the session 2023-24

Mandatory Induction Program

Induction program forstudents to be offered rightat the start of the first year. **(3 weeks duration)**and **credit:0**	
Activities carried out during three weeks induction program	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

Effective from the session 2023-24

Course Code: BET-C102/BET-C202
Course Name: ELECTRONIC DEVICES

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

Prerequisites:	Applied Physics
Objectives:	The course is aimed at: [1] Imparting knowledge about basics of semiconductor physics, electronic devices such as PN-Junction Diode and its circuits, Zener diode, BJT, FET, their uses as an amplifier. [2] Teaching about the different biasing circuits of BJT and FET with their ac equivalent circuits and solving various transistor parameters. [3] Design, construct and take measurement of various analog circuits and compare experimental results in the laboratory with theoretical analysis. [4] Determine parameter values for large and small signal models for diodes, BJTs and MOSFETs based on knowledge of the device structure, dimensions, and bias conditions.
Course Coordinator	Mr. Amrish&Mr. Prateek Agarwal

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	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	*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.	**10**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-2	*Module-2*	P-N junction and its properties, V-I characteristics of P-N junction, application of junction diode as clippers, clampers and rectifiers (Half-wave, Full-wave and bridge)	**05**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
	Module-3	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.	**03**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-3	*Module-4*	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	**08**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2

		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 amplifier, graphical analysis of CE amplifier, dc and ac equivalent circuits, Emitter follower and its ac model.			
UNIT-4	*Module-5*	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.	**07**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
UNIT-5	*Module-6*	Field Effect Transistor: JFET and its characteristics, configurations of JFET, MOSFET, FET biasing, Fixed-bias configuration, Self-bias configuration, Voltage-Divider biasing, MESFET (Enhancement & depletion types) their construction and characteristics, configuration of MOSFET, MOS capacitor.	**07**	PO1/ PO2/ PO3/ PO4	PSO1/ PSO2
Total No. of Hours			**40**		

Learning Outcomes:	At the end of the course, a student will be able to: • **Define** construction, characteristics, operations, various biasing circuits and configurations of bipolar junction transistors. • **Explain** the theory of p-n junction and zener diode with their characteristics and applications. • **Analyze** the hybrid model of transistor at low frequencies and high frequency, **explain** basics of FETs and MOSFETs. • **Compare** the energy band structure of materials with emphasis on their properties and classification and **analyze** the fermi–dirac function and fermi levels in semiconductors. • **Design** the basic diode and BJT circuits.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Jacob Millman & C.C. Halkias, "Integrated Electronics**",** 2nd edition, Mcgraw Hill Higher Education, ISBN- 978-0074622452	2002
2.	Malvino and leach, "Digital principle and applications**",** 8th edition, McGraw Hill Education, ISBN- 978-9339203405	2014
3.	Millman and grabel, "Microelectronics**",** ***2nd***Ed, PHI, ISBN- 978-0074637364	2006
4.	Hamdy A. Taha, "***Operation Research"*,** Pearson Publisher, ISBN-13:9780134480176	2017
5.	Robert Bolyestad, "Electronic devices and circuit**",** 11th edition, PHI, ISBN- 978-9332542600	2015

Batch 2023-2024 and onwards

Effective from the session 2023-24

Course Code: BAP-C102/BAP-C202
Course Name: Engineering Physics

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

Prerequisites:	**Engineering Physics**
Objectives:	1. To acquire knowledge about the fundamentals of Semiconductors. 2. To understand the general concepts of de-Broglie waves. 3. To gain the fundamental knowledge of quantum mechanics. 4. To learn the significance of Heisenberg's Uncertainty principle. 5. To understand the knowledge of electrostatics and electrodynamics with their various applications in various areas of Physics. 6. To understand the principles, constructions and functions of various lasers.
Course Coordinator	**Dr. Devendra Singh**

NOTE:	The question paper shall consist of two sections (Sec.-A and Sec.-B). Section-A shall contain 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*	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.	08	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-2	*Module-2*	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/ PO4/ PO5…
UNIT-3	*Module-3*	Introduction to quantum Physics, Black body radiation, Explanation using the photon concept, Photo electric effect, Compton's effect, de Broglie hypothesis, Verification of matter waves, Davisson- Germer's Experiment, Uncertainty principle, Schroedinger wave equation & its solution for particle in a box, Physical significance of wave function.	08	PO1/ PO2/ PO3/ PO4/ PO5…

UNIT-4	*Module-4*	Electric Field, Electric flux, Gauss's Law and its applications, 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 Theorem, Method of Electrical Images with simple examples, Energy of a charged distribution and its expression in terms of electric field.	08	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-5	*Module-5*	Biot-Savert's Law and its applications, Divergence and Curl of Static Magnetic field; Magnetic Vector potential for a given magnetic field using Stoke's Theorem, Motion of a charged particle in a magnetic field and CRO.	06	PO1/ PO2/ PO3/ PO4/ PO5…
	Module-6	Einstein's Theory of matter radiation interaction & A and B Coefficients; Amplification of light by Population Inversion, Different types of Lasers: Ruby Laser, He-Ne Laser and CO_2 Laser, Properties and applications of Laser.	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 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. Thecourse 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 of Publication
1	David Griffiths, Introduction to Electrodynamics, Pearson Education India Learning Private Ltd. 4th Edition.	2015
2	Halliday, Resnick and Walker, Fundamental of Physics, Wiley India Pvt. Ltd; 10th Edition.	2015
3.	D J Griffiths, Quantum Mechanics, Pearson Education	2014
4.	LI Sciff, Quantum Mechanics, Tata McGraw-Hill Education Pvt. Ltd., 4th Edition	2014
5.	DA Neamen, Semiconductor Physics and Devices, Times Mirror High Education Group, Chicago	1997
6.	ES Yang, Microelectronic Devices, McGraw-Hill, Singapore	1998
7.	ES Yang, Microelectronic Devices, McGraw-Hill, Singapore	1998
8.	BG Streetman, Solid State Electronic Devices, Prentice Hall of India	1995
9.	K Charles, Introduction to Solid State Physics, John wiley, Singapore, 7th Edition	1996

BAP-C102/BAP-C202
Engineering Physics
CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Define	Remember L1	3	3	2	2	3	3	2	2		3		3			
CO2	Illustrate	Apply L3	3	2	3	3	3	3	3	3		3	2	3			
CO3	Describe	Understand L2	3	3	3	3					3	3					
CO4	Calculate	Analyze L4	3	3	3	2					3	3					
CO5	Determine	Apply L3	3	3	3	3	3	3			3	3					
CO6	Discuss	Understand L2	3	3	3	3	2	3			3	3		3			
CO7	Differentiate	Analyze L4	3	3	3	3		3	3		3	3		3			
CO8	Explain	Understand L2	3	2	3	2	3	3	3		3	3	3	3			
CO9	Illustrate	Apply L3	3	2	2	2		3	3		3	3	3	3			
	Average		3	2.6	2.7	2.5	2.8	3	2.8	2.5	3	3	2.6	3			

Effective from the session 2023-24

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	*DrVivekGeol*
Course Faculty	*DrVivekGeol*
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)				
UNIT	**Module**	**Course Content**	**No. of Hours**	**POS Mapped**
UNIT-1	*Module-1*	**Differential Calculus I:** Successive differentiation, Leibnitz theorem, Taylor's & Maclaurin's, Expansion, Indeterminate forms, Radius of curvature, Asymptotes, Double points and theirclassification, Tracing of curves.	*10*	*Po1/po2/ po3/po4/ po5/po6/ po10/po1 2*
UNIT-2	*Module-2*	**Differential Calculus II :**Partial Differentiation of functions, Normal to surfaces and tangent plane, Change of variables, Jacobian, Taylor's series of two variables, Truncation errors, Extrema offunction of two and more variables, Method of Lagrange's multipliers	*8*	*Po1/po2/ po6/po7/ po12*
Syllabus after Sessional 1 & before Sessional 2(21 _Lectures &4 _Tutorials/ Practical's)				
UNIT-3	*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.	*6*	*Po1/po2/ po3/po6/ po8/po10 /po12*

		Application to arc length, area , volume, centroid and moment of inertia. Gamma and Beta functions, Dirichlet's integral.		
UNIT-4	*Module-4*	**Vector Calculus :**Differentiation of a vector, Scalar and vector fields, Gradient, Divergence, Curl andtheir 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*
Syllabus after Sessional 2 (7_Lectures &2 _Tutorials/ Practical's)				
UNIT-5	*Module5*	**Matrices :**Elementary row/ column operations, Rank of a matrix and its applications, Eigen-values andEign vectors, Cayley-Hamilton theorem, Diagonalisation of Matrices, Linear dependence andindependence, Normal matrices, Complex matrices and unitary matrices	*10*	*Po1/po2/ po3/po4/ po5/po6/ po8/po9/ po10/po1 2*
Total No. of Hours			*40*	

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

Effective from the session 2023-24

Course Code: BEE-C102/BEE-C202
Course Name: BASIC ELECTRICALENGINEERING

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

Prerequisites:	
Objectives:	• To provide students of all branches of engineering with an overview of all the fields of electrical engineering • To prepare students for learning advanced topics in electrical engineering
Course Coordinator	Mr. Gaurav Kumar

NOTE:	The question paper shall consist of two sections (Section-A and Section-B). Section-A shallcontainoften(10)shortanswertypequestionsofsix(06)markeachandstudentshall 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 requiredto attempt any four questions. Questions shall be uniformly distributed from the entire syllabus

UNIT	Module	Course Content	No. of Hours	POs mapped	PSOs mapped
UNIT-1	*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.	**06**	PO1/ PO2/ PO3	PSO1/ PSO2
UNIT-2	*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.	**7**	PO1/ PO2/ PO3	PSO1
	Module-3	Three Phase A.C. Circuits: Star-Delta connections, line and phase voltage/current relations, three -phase power and its measurement.	**4**	PO1/ PO2/ PO3	
UNIT-3	*Module-4*	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

UNIT-4	*Module-5*	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.	**08**	PO1/ PO2/ PO3/ PO6	PSO1 / PSO2
	Module-6	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.		PO1/ PO2/ PO3/ PO6	
UNIT-5	*Module-7*	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/ PO6	PSO1 / PSO2 /PSO 3
Total No. of Hours			**40**		

CourseOutcomes :	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

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	D.P. Kothari & I.J. Nagrath – Basic Electrical Engineering – Tata McGraw Hill	*2003*
2.	D.C. Kulshreshta – Basic Electrical Engineering - Tata McGraw Hill	*2019*
3.	J.B.Gupta – Fundamentals of Electrical Engineering & Electronics – S.K.Kataria	*2016*
4.	V.K. Mehta, Rohit Mehta – Basic Electrical Engineering – S.Chand.	*2006*

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO 6**	**PO7**	**PO 8**	**PO9**	**PO10**	**PO11**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**
CO1	**Develop**	**Understand L2**	3	1	2	1		2	2	1	2	1	2	2	1	1	1
CO2	**Examine**	**Reconize L2**	3	2	2	1	2	3	1	2	2	1	3	2	2	2	2
CO3	**Choose**	**Apply L2**	3	1	3	1	2	2	2	2	1	2		1	1		
CO4	**Assess**	**Understand L2**	3	2	2	3	3	1	2	1	1	1	2	1		1	2
CO5	**Design**	**Evalute L2**	3	1	1	2	1	2	1	2	2	3	1	2	1	2	1

Effective from the session 2023-24

Course Code: BHU-S102/BHU-S202
Course Name: VEDIC SCIENCE & ENGINEERING

MM: 100 **Time: 3 Hr.** **L T P** **2 0 0**	**Sessional: 30** **ESE: 70** **Credit : 1**

Prerequisites:	Elementary knowledge of Mathematics & Science
Objectives:	Subject Vedic Science & Engineering was introduced in all B.Tech. programmes to make engineering students aware of 1. MahirshiKanad's atomic theory , law of gravitation , distribution of energy , samata and vishamata. 2. Laws of thermodynamics applicable in life ,entropy and concept of pralay, atomic spectrum and concept of kundalini, 3. Concepts of Vedic Mathematics. 4. Concept of various engineering subjects like Electrical, Electronics & Aeronautical Engineering Mechanical, Chemical, Civil & Architectural engineering in Vedic Literature.
Course Coordinator	DrM.M.Tiwari

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	Module	Course Content	No. of Hours	POs mapped
UNIT-1	*Module-1*	**Science in Vedic literature and Indian Philosophy-I**: Kanad's atomic theory, concept of parmanu, Formation of molecules, Parimandal, Comparison with Modern atomic theory. Concept of SAMATA and VISHAMTA vs Maxwell- Boltzmann's distribution of velocities and energies.MaharshiKanad's Law of Motion and Law of Gravitation.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT -2	*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.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…

UNIT-3	*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 (ekadhikenpooren, Nikhil navtascharamandashatah, oordhavatriyagyabhyam)	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-4	*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, Shakunvimana, Rukmavimana, Tripura vimana.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
UNIT-5	*Module-5*	**Mechanical, Chemical, Civil & Architectural engineering in Vedic Literature**: Mechanical & Chemical Engineering in ancient India,Civil and Architectural engineering in Vedic literature.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
Total No. of Hours			**20**	

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 of Publication
1.	KantiSwarup,P.K.Gupta,Manmohan "***Operation Research",*** Sultan Chand &Sons,ISBN 81-8054-226-2	1977
2.	Frederick S.Hillier,GeraldJ.Lieberman, "Introduction to ***Operation Research",*** Tata Mc Graw Hill, ISBN-13:978-0-07-060092-8	1967
3.	S .D.Sharma, "***Operation Research",*** KedarNath Ram Nath&Co., ISBN-XXXX	1972
4.	Hamdy A. Taha, "***Operation Research",*** Pearson Publisher, ISBN-13:9780134480176	1971

Effective from the session 2023-24

Course Name: ELECTRONIC DEVICES LAB
Course Code:BET-C151/BET-C251

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

Prerequisites:	None
Objectives:	• To study basic electronic components • To observe characteristics of electronic devices
Course Coordinator	Mr. Prateek Agarwal

NOTE:	1. In practical examination the student shall be required to perform one experiment. 2. A teacher shall be assigned 30 students for daily practical work in laboratory. 3. No batch for practical class shall consist of more than 30 students. 4.The number of students in a batch allotted to an examiner for practical examination shall not exceed 30 students. 5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D.

LIST OF EXPERIMENTS	1. To draw the V-I characteristics of PN junction diode. 2. To draw the V-I characteristics of Zener diode and study it as voltage regulator. 3. To study junction diode as half wave and full wave rectifier. 4. To study junction diode as clipper and clamper. 5. To draw the input and output characteristics of a transistor in CE and CB configuration. 6. To find the small signal h-parameters of a transistor. 7. To draw the input and output characteristics of FET and to measure the pinch off voltage. 8. To draw the drain and transfer characteristic curve of MOSFET. 9. To draw the frequency response of FET amplifier. 10. To draw the frequency response curve of Emitter Follower.

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.

Effective from the session 2023-24

Course Code: BAP-C151/BAP-C251
Course Name: Engineering Physics Laboratory

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

Prerequisites:	**Engineering Physics Lab.**
Objectives:	The objective of the Physics laboratory sessions is to: 1. Enable the students to get hands-on practice and to understand the applications of Physics in engineering. 2. Develop the experimental skills by manual and by instrumentation. 3. Make students aware about the fundamental and experimental knowledge of Physics.
Course Coordinators	**Dr. Sunil Panwar& Dr. Devendra Singh**

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

There are only ten experiments which are given below:

1. To verify the inverse square law of radiation using photoelectric effect.
   To determine the value of Planck's constant and photoelectric work function of the material of the cathode using photoelectric cell.
2. To determine the frequency of an unknown signal by drawing the Lissajous patterns for various frequency ratios and evaluate the phase difference between two sinusoidal signals applied to X and Y inputs of cathode ray oscilloscope.
3. To determine the value of e/m of an electron by Helical Method/ Magnetron Method.
4. To determine the resistivity and energy band gap by four probe method.
5. To find the refractive index of the material of given prism by using spectrometer.
6. To determine the wavelength of He-Ne laser by diffraction method.
7. To determine the Stefan's constant.

8. To determine the radius of circular coil by variation of magnetic field
9. To determine the spring constant by Hook's law.

Learning Outcomes:	**Laboratory Outcomes** The Physics laboratory course will consist of experiments illustrating the principles of Physics relevant to the study of science and engineering. The students will learn to: o **Analyze** Semiconductor sample by Four Probe Method. o **Measure** the Specific charge of electron. o **Analyse** the drawing of Lissajous Patterns. o **Determination** of the refractive index of Prism's material by Spectrometer. o **Estimate** the resistivity of the semiconductor.

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1	Manual for electrical measurement lab, Dr. Devendra Singh & Dr. Rajeev Saxena, National Press Associates, New Delhi	2017
2	Practical Physics, Dr. GK Gupta, Dr. VK Goel, M.S.Tomar, KedharnathRamnath, Meerut Delhi	--
3	Practical Physics, CL Arora, S Chand Publication	2014

BAP-C151/BAP-C251
Engineering Physics Lab.
CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Indidual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Analyze	Analyze L4	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**			

Effective from the session 2023-24

Course Code: BEE-C 151/BEE-C251
Course Name: BASIC ELECTRICAL ENGINEERING LAB

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

Prerequisites:	Physics and Mathematics at 10+2 level
Objectives:	1. This course deals with basic introduction of system components of electrical systems, and provides hands on practice in assembling, interconnecting, testing, and repairing such system by making use of various tools used in electrical workshop.
Course Coordinator	Mr. Gaurav Kumar, Asst. professor

Experiments	**Lab Content**	**No. of Hours**	**POs mapped**	**PSOs mapped**
Exp. No. 1	Verification of Kirchoff's laws.	02	PO1/ PO2 PO3/PO4	PSO 1/PSO 2/ PSO 3
Exp. No. 2	Verification of Thevenin's theorems.	02	PO1/ PO2 PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 3	Verification of Norton's theorem	02	PO1/ PO2 PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 4	Verification of Superposition theorem.	02	PO1/ PO2 PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 5	Verification of maximum power transfer theorem.	02	PO1/ PO2 PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 6	Measurement of power in three-phase circuit by two wattmeter method.	02	PO3/ PO1	PSO 1/ PSO 2/ PSO 3
Exp. No. 7	Determination of efficiency of a single-phase transformer by load test.	02	PO1/ PO3	PSO 1/ PSO 2/ PSO 3
Exp. No. 8	To perform open circuit test on single-phase transformer & find equivalent circuit parameters.	02	PO1/ PO3	PSO 1/ PSO 2/ PSO 3
Exp. No. 9	To perform short circuit test on single-phase transformer & find equivalent circuit parameters	02	PO3/ PO4/ PO1/ PO2	PSO 1/ PSO 2/ PSO 3
Exp. No. 10	D.C. generator characteristics (a) Shunt generator (b) Series generator (c) Compound generator	02	PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 11	Speed control of D.C. shunt generator.	02	PO3/ PO4/ PO1/ PO2	PSO 1/ PSO 2/ PSO 3
Exp. No. 12	To study running and reversing of a three-phase Induction Motor	02	PO3/ PO4	PSO 1/ PSO 2/ PSO 3

Exp. No. 13	To study & calibration of a single-phase Energy Meter.	02	PO3/ PO1/	PSO 1/ PSO 2/ PSO 3
Exp. No. 14	Calibration of voltmeter and ammeter..	02	PO2/ PO1/ PO3/ PO4	PSO 1/ PSO 2/ PSO 3
Exp. No. 15	To study of resonance in RLC circuit.	02	PO3/ PO1	PSO 1/ PSO 2/ PSO 3

Course Outcomes:	1. Illustrate the application of KVL/KCL and network theorems to DC electrical circuits. 2. Select the appropriate tools and components required for specific operation. 3. Demonstrate the behavior of a single-phase AC series resonant circuit. 4. Calculate efficiency of a single-phase transformer and DC machine. 5. Calculate efficiency of a single-phase transformer and DC machine.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
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

Effective from the session 2023-24

BME-C152/BME-C252
WORKSHOP PRACTICE

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

LIST OF EXPERIMENTS

Carpentry Shop
1. Study of Carpentry Tools, Equipment and different joints.
2. To prepare a half T joint of given dimensions.

Moulding Shop
3. Introduction to Patterns, pattern allowances, Gate, Riser, and Runner.
4. To prepare a mould of half bearing.

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.

Fitting Shop
7. To prepare a rectangular piece with slant edge of given size from M.S. flat.

Machine Shop
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.

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.

Effective from the session 2023-24

BSP-S151
Physical training and Yoga

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

UNIT 1

1. Warming up (meaning, types and methods)
2. Components of physical fitness (strength, endurance, speed, flexibility and agility)
3. Methods of improving strength
4. Methods of improving endurance
5. Methods of improving speed
6. Methods of improving flexibility
7. Limbering down/ cooling down

UNIT 2

1. Yama
2. Niyama
3. Asana and Pranayama
4. Shatkarma and Mudra
5. Dharana and Dhyana
6. Meditation and Samadhi

(Effective from the academic session 2023-24)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

B. Tech. First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-II

DSC/SEC/DSE /AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BAC-C202	Engineering Chemistry	3	1	0	20	10	30	70	100	4
BEM-C202	Engineering Mathematics – II	3	1	0	20	10	30	70	100	4
BCE-C202	Programming for Problem Solving	3	1	0	20	10	30	70	100	4
BME-C203	Basic Mechanical Engineering	3	0	0	20	10	30	70	100	3
BEN-A203	Environmental Studies	2	0	0	20	10	30	70	100	1
		TOTAL CREDITS								16
PRACTICAL										
BAC-C251	Engineering Chemistry Lab	0	0	2	10	5	15	35	50	1
BCE-C251	Programming for Problem Solving Lab	0	0	2	10	5	15	35	50	1
BME-C253	Engineering Graphics and Design Lab	1	0	2	10	5	15	35	50	2
BEG-A251	Technical Communication Lab	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								6
TOTAL		15	3	10	150	75	225	525	700	21

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after II semester examination. The report and certificate of completion of training program has to be submitted in the department, which will be evaluated in III semester. The students have to present PPT of the industrial training/mini project/internship for presentation in the department.

Effective from the session 2023-24

Course Code: BAC-C102/BAC-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:	7. To acquire knowledge about the periodic properties, oxidation number, hydrogen bonding and hybridization. 8. To understand the general concepts of thermodynamics, chemical kinetics and acid-base equilibrium. 9. To gain the knowledge of polymers, conducting polymers, synthesis, properties and uses of some common polymers, nylons and rubbers. 10. To learn the significance of Nanochemistry and different approaches to synthesis of Nanoparticles. 11. To understand the organic reactions like addition reactions, elimination reactions, substitution reactions and oxidation-reduction reactions. 12. 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 contain 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	**04**	PO1/ PO2/ PO3/ PO4/ PO5…

		equation, Activation energy and its determination, Transition state theory of reaction rates.		
	Module-4	Thermodynamic functions: Energy, Enthalpy, Entropy and Free energy, Physical significance of entropy, Estimations of entropy and free energies, Free energy and emf, Cell potentials, Nernst equation and applications (without derivation) Acid-base, solubility and solubility product.	**04**	PO1/ PO2/ PO3/ PO4/ PO5…
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, nanorods, 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. RajshreeKhare, 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. RajshreeKhare – S.K. Kataria& Sons, India.	2019

BAC-C102/202
Engineering Chemistry
CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Conduct Investigations of Complex Problems	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Indual and Team Work	Communication	Project Management and Finance	Life Long Learning			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Define	Remember L1	3	3	2	2	3	3	2	2		3		3			
CO2	Illustrate	Apply L3	3	2	3	3	3	3	3	3		3	2	3			
CO3	Describe	Understand L2	3	3	3	3					3	3					
CO4	Calculate	Analyze L4	3	3	3	2					3	3					
CO5	Determine	Apply L3	3	3	3	3	3	3			3	3					
CO6	Discuss	Understand L2	3	3	3	3	2	3			3	3		3			
CO7	Differentiate	Analyze L4	3	3	3	3		3	3		3	3		3			
CO8	Explain	Understand L2	3	2	3	2	3	3	3		3	3	3	3			
CO9	Illustrate	Apply L3	3	2	2	2		3	3		3	3	3	3			
	Average		3	2.6	2.7	2.5	2.8	3	2.8	2.5	3	3	2.6	3			

Effective from the session 2023-24

Course Code: BEM-C202

Course Name: ENGINEERING MATHEMATICS-II

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

Prerequisites:	Engineering mathematics-I, Elementary mathematics
Objectives:	1. Ordinary differential equations and their types. Linear differential equations 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	*DrVivekGeol*
Course Faculty	*DrVivekGeol*
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)				
UNIT	**Module**	**Course Content**	**No. of Hours**	**POS Mapped**
UNIT-1	*Module-1*	**Differential Equation :**Ordinary differential equations of first order, orthogonal trajectories, linear differential equations with constant coefficients, Euler- Cauchy equations, 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.	*8*	*Po1/po2/po3/po4/po5/po6/po10/po12*
UNIT-2	*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	*9*	*Po1/po2/po6/po7/po12*

		with illustrative examples, Method of separation of variables. Wave and Heat equation up to two-dimensions.		
Syllabus after Sessional 1 & before Sessional 2(21 _Lectures &4 _Tutorials/ Practical's)				
UNIT-3	*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*
UNIT-4	*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*
Syllabus after Sessional 2 (7_Lectures &2 _Tutorials/ Practicals)				
UNIT-5	*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/po12*
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

Effective from the session 2023-24

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:	**To Understand concept of computers and its components.** **To understand the Number System** **To introduce to basics of C programming** **To introduce to Array, Pointers, Functions and File handling.**
Course Coordinator	

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 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, Identifiersand 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**	PO1/ PO2/ PO3	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.	**08**	PO1/ PO2/ PO3	PSO1/ PSO2

	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.			
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**		

Learning Outcomes:	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 numbersystems 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, includingunderstanding 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 problem-solving, 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.	YashwantKanetkar, Let Us C, BPB
6.	YashwantKanetkar, C In Depth, BPB

CO-PO/PSO MAPPING														
Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
(COs)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**2**	**1**			**2**		**1**		**1**	**1**		**1**	
CO2	**3**	**3**	**1**	**2**			**2**				**2**		**1**	
CO3	**2**	**2**	**3**	**2**			**1**	**1**		**1**	**1**	**1**	**1**	
CO4	**2**	**3**	**3**	**3**		**1**	**2**		**1**		**1**	**2**	**1**	
CO5	**2**	**1**	**1**	**2**						**2**		**3**	**1**	**1**

Effective from the session 2023-24

BME-C203
BASIC MECHANICAL ENGINEERING

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

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question 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 I

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.

UNIT II

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**.**

UNIT III

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

UNIT IV

Mechanics: Trusses: Plane structure, (Method of Joints and Sections only) Beams: Bending moment and shear force diagram for statically determinate beams.

UNIT V

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, principal planes, principal stresses and strains, Mohr'sstress circle, Poisson's ratio, maximum shear stress

References

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

Effective from the session 2023-24

BEN-A203
ENVIRONMENTAL STUDIES

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 1**
2 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question 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 I

Multidisciplinary Nature of Environmental Studies & Ecosystems: (a) definition, scope and importance of ecology and environment (b) ecological components: (i) abiotic components: soil, water, light 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)(j)Need for public awareness

UNIT II

Natural Resources: (a) forest resources: use and over-exploitation, deforestation, timber extraction, mining; dams and their effects on forest and tribal people (b) water resources: use and over-utilization of surface and ground water, benefits and problems of dams (c) mineral resources: use and exploitation, environmental effects of extracting and using mineral resources (d) energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources (e) land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification (f) biodiversity & its conservation: definition- genetic, species and ecosystem diversity, values of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values (g) 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* methods (h)bio-geographical classification of India (i) role of an individual in conservation of natural resources (j) equitable use of resources for sustainable lifestyles

UNIT III

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) disaster management: floods, earthquake, drought & landslides

UNIT IV

Social Issues and the Environment: (a) from unsustainable to sustainable development (b) urban problems related to energy (c) rain water harvesting (d) resettlement & rehabilitation of people-problems and concerns (e) environmental ethics- issues and possible solutions (f) wasteland reclamation (g) population growth and family welfare programme (h) environment and human health, human rights, value education (i) HIV/AIDS (j) role of information technology (IT) in environment and human health (k) global environmental issues: global warming, acid rain, ozone layer depletion

UNIT V

Environmental policies and laws: (a) salient features of following acts i. Environment Protection Act 1986 ii. Air (Prevention and Control of Pollution) Act 1981 iii. Water (Prevention and Control of Pollution) Act 1974 iv. Wildlife Protection Act 1972 v. Forest Conservation Act 1980 (b) issues involved in enforcement of environmental legislation (c) public awareness

References

1. Agarwal, K.C. *Environmental Biology*, Nidhi Publ. Ltd., Bikaner.
2. Bharucha E. *The Biodiversity of India*, Mapin Publishing Pvt. Ltd., Ahmedabad.
3. Clark R.S. *Marine Pollution*, Clanderson Press Oxford.
4. Cunningham, W.P., Cooper, T.H., Gorhani, E. & Hepworth, M.T. *Environmental Encyclopedia*, Jaico Publ. House, Mumabai.
5. De A.K. *Environmental Chemistry*, Wiley Eastern Ltd.
6. Gleick, H.P. *Water in Crisis*, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press.
7. Hawkins R.E. *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay.
8. Heywood, V.H &Waston, R.T. *Global Biodiversity Assessment*, CambridgeUniv. Press.
9. Odum, E.P. *Fundamentals of Ecology*, W.B. Saunders Co. USA.
10. Rao M N. &Datta, A.K. *Waste water treatment*, Oxford & IBH Publ. Co. Pvt. Ltd.
11. Sharma B.K. *Environmental Chemistry*, Geol Publ. House, Meerut.
12. Trivedi R.K. *Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards*, Vol. I and II, Enviro Media.
13. Trivedi R. K. and Goel, P. K. *Introduction to air pollution*, Techno-Science Publication.
14. Wanger K.D. *Environmental Management*, W.B. Saunders Co. Philadelphia, USA.

Effective from the session 2023-24

Course Code: BAC-C151/BAC-C251
Course Name: ENGINEERING CHEMISTRY LABORATORY

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

Prerequisites:	**Engineering Chemistry Lab.**
Objectives:	The objective of the chemistry laboratory sessions is to: 4. Enable the students to get hands-on practice and to understand the applications of "qualitative and quantitative analysis" in engineering. 5. Develop the experimental skills by manual and by instrumentation. 6. Make students aware about the fundamental and experimental knowledge of chromatographic techniques like ascending paper chromatography and thin layer chromatography. 7. 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:

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

15. Determination of refractive index of a liquid sample using the Abbe's refractometer.
16. Determination of molar mass of an unknown solid using the colligative property of freezing point depression.
17. Study of adsorption of acetic acid on charcoal and to verify Freundlich isotherm.
18. 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 – PragatiPrakashan.	---
3	Applied Chemistry: Theory & Practice, Second Edition, by O.P. Virmani& A.K. Narula – New Age International Private Limited.	2017

BAC-C151/251

Engineering Chemistry Lab.

CO-PO/PSO MAPPING

CO-PO/PSO MAPPING

Course Outcomes (COs)	Action Verb (CO)	Bloom's Level	Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
			Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Conduct Investigations of Complex Proble	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management and Finance	Life Long Learning			

						ms											
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	**Analyze**	**Analyze L4**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**		**3**	**3**	**3**			
CO 2	**Measure**	**Evaluate L5**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**		**3**	**2**	**3**			
CO 3	**Determine**	**Apply L3**	**3**	**3**	**3**	**2**	**2**	**3**			**3**	**3**	**3**	**2**			
CO 4	**Separate**	**Analyze L4**	**3**	**3**	**3**	**3**	**2**	**3**			**3**	**3**	**2**	**2**			
CO 5	**Estimate**	**Analyze L4**	**3**	3	3	3	3	3	3	3	3	3	3	**3**			
CO 6	**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**			

Effective from the session 2023-24

BCE-C151/BCE-C251
PROGRAMMING FOR PROBLEM SOLVING LAB

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

LIST OF EXPERIMENTS

1. Practice of all internal and external DOS commands.
2. Write simple batch program.
3. Giving exposure to windows environment.
4. File and program management in windows.
5. Practice of all UNIX commands.
6. Introduction to text editing and word processing.
7. Net surfing.
8. Creation and usage of E-mail account.
9. Write a program in C to perform different arithmetic operations.
10. Write a program in C to greater of two numbers.
11. Write a program in C to check whether no. is odd or even.
12. Write a program in C to check whether no. is prime or not.
13. Write a program in C to print Fibonacci series.
14. Write a program in C to print factorial of a no.
15. Write a program in C to add two matrices.
16. Write a program in C to search a no. in array.

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.

Effective from the session 2023-24

BME-C253
ENGINEERING GRAPHIC AND DESIGN LAB

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

Unit 1: Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering and dimensioning, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, and Hypocycloid Scales – Plain, Diagonal and Vernier Scales;

Unit 2: Orthographic Projections and Projections of Regular solids
Principles of Orthographic Projections-Conventions – Principal planes, Auxiliary Planes, 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, true length and traces of a line, and lines inclined to both planes, Projections of planes, traces of planes, angles of inclinations of planes, parallel planes.

Unit 3: Sections and Sectional Views of Right Angular Solids and Isometric Projections
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Unit 4: Overview of Computer Graphics Customization and CAD Drawing
Computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software (AUTOCAD) [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in AUTOCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.

Unit 5: AUTOCAD as a tool for design and drawing objects

Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); orthographic projection techniques; Drawing sectional views of composite right regular geometric solids CAD software(AUTOCAD) modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models.

Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling. Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Appling Colour coding according to building drawing practices; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

References

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. &Pannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

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 Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

This course is designed to address:

- To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice
-

The student will learn :

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling and computer-aided geometric design
- Exposure to creating working drawings and engineering communication

Effective from the session 2023-24

BEG-A251
TECHNICAL COMMUNICATION LAB

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

Experiments related to the following:

Objectives:

1. To expose the learners to English sound system and acquire phonetic skill and speech rhythm.
2. To help the learners use grammar correctly.
3. To train the learners to speak English, clearly, intelligibility and effectively.
4. To equip the learners to compete for a career, and enable them to function effectively in careers which demand good communication skills.

Contents:

i) Non - verbal communication
- Use of hands
- Posture of shoulders
- Eye contact
- Weight of the body
- Movement of the body

ii) Applied Phonetics
- Sound of English-consonants and Vowels
- Phonemic Transcription
- Stress, Rhythm and Intonation

Remedial Grammar
- Some useful expression (introduction, greetings etc.) that are used frequently.
- Common mistakes in the use of nouns, pronouns, adjectives, adverb, prepositions and conjunctions.
- Use of who and whome, much and many, still and yet, so as and so that, make and do.
- Tense and their use.
- Confusion of participles.
- Tag Questions

Reading and Speaking skills, Listening and Writing skills
- Presentation and addresses
- Group discussion
- Interviews
- Role playing

Reading and Writing skills, Listening and Writing skills

- Letter writing-formal and informal
- Real life social situations
- Curriculum vitae
- Agenda, notice and minutes

References

1). T. Balsubramaniam. “Phonetics for Indian students”, Macmillan India Ltd.
2). Jones, Daniel. “English Pronouncing Dictionary”, Cambridge Univ. Press.
3). Oxford Advanced Learners Dictionary.
4). Taylor, Grant. “Conversation Practice”, TMH, New Delhi.
5). F.T.A. Wood. “Remedial English Grammar”, Macmillan India Ltd.
6). Berry, Thomas Elliot. “The most common errors in English usage”, TMH, New Delhi.
7). N. Krishnaswamy. “Modern English”, Macmillan India Ltd.
8). Desmond. “People Watching”.

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Effective from the session 2023-24

Course Name: ROBOTICS PROJECTS
Course Code: BET-254

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

Prerequisites:	None
Objectives:	• Students are familiar with the installation of the embedded controller (Arduino) • Students can install integrated development environment (IDE), as well as program the board's firmware. • Students can access the pins of the Arduino, as well as they can distinguish between digital and analog pin.
Course Coordinator	Mr. Anuj Kumar Sharma

NOTE:	The class will be divided into groups of two/three students.

LISTOF MODULES

Part 1

a. Hello World
b. Controlling a Relay
c. LED Bar Graph Display
d. Playing Music
e. Simple Counter
f. Controlling a Servo
g. Measuring Temperature by Thermistor
h. IR Remote Controller
i. 3-axis Accelerometer
j. 4x4 Matrix Keypad
k. Controlling DC motor
l. Controlling Stepper Motor

Part 2

a. 3-DOF Manipulator Kinematic Diagram and Coordinate Transformation
b. DC motors Torque/Speed Control
c. Control the Velocity of the Joints
d. Open-Loop and Feedback Control to Set the Position of the End Effector
e. Speed, Stability, and Accuracy in a Control Algorithm of Robot

Learning Outcomes:	At the end of the course the students can able to • Students understand the kinematics and coordinate transformation of robot by implementing and analyzing 3-degree-of-freedom manipulator. • Students can design appropriate simple robotic systems to accomplish a specific task. • Students can differentiate between open-loop and feedback control for motion (position and velocity) for the robot. • Students know how to follow the guidelines for accessing to the microcontroller of the robot and program it for a desired task.