Vidya Pratishthan's Kamalnayan Bajaj Institute of Institute of Engineering and Technology, Baramati

Faculty of Science & Technology

Board of Studies

Electrical Engineering

First Year Bachelor of Technology

(Pattern: 2024)

(w.e.f. AY: 2024-25)

Syllabus: First Year (FY B. Tech.) Electrical Engineering (2024 Pattern)
w.e.f. AY:2024-2025

SEMESTER-I

Course Code	NEP Category	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BS24101	BSC	Engineering Mathematics - I	3	-	1	20	20	70	20			130	3	-	1	4
BS24104	BSC	Engineering Chemistry	2	2	-	20	20	50	20	30		140	2	1	-	3
ET24101	ESC	Basic Electronics Engineering	3	2	-	20	20	70	20	30		160	3	1	-	4
ME24102	ESC	Engineering Graphics	1	2				50	20			70	1	1	-	2
EL24102	PCC	Electrical Engineering Materials	2	-	-	20	20	50				90	2	-	-	2
EL24103	VSEC	Electrical Workshop	0	4	-	20			20	30		70	0	2	-	2
HS24102	IKS	Indian Knowledge System	2	-	-	20					30	50	2	-	-	2
HS24103	CC	Co-curricular Courses -I	-	4	-				50			50	-	2	-	2
Total			**13**	**14**	**1**	**120**	**80**	**290**	**150**	**90**	**30**	**760**	**13**	**7**	**1**	**21**

SEMESTER-II

Course Code	NEP Category	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BS24102	BSC	Engineering Mathematics - II	3	-	1	20	20	70	20	0	0	130	3	-	1	4
BS24103	BSC	Engineering Physics	2	2	-	20	20	50	20	30	0	140	2	1	-	3
EL24101	ESC	Basic Electrical Engineering	3	2	-	20	20	70	20	30	0	160	3	1	-	4
CO24101	ESC	Programming & Problem Solving	3	2		20	20	70	20	30	0	160	3	1	-	4
IT24101	VSEC	Computer Proficiency	0	4	-	20	0	0	20	30	0	70	0	2	-	2
HS24101	AEC	Communication and Professional Skills	2	-	-	20	0	0	0	0	30	50	2	-	-	2
HS24104	CC	Co-curricular Courses -II	-	4	-	0	0	0	50	0	0	50	-	2	-	2
Total			**13**	**14**	**1**	**120**	**80**	**260**	**150**	**120**	**30**	**760**	**13**	**7**	**1**	**21**

Mrs. J. S. Kulkarni
Dept. Autonomy Coordinator
Department of Electrical Engineering

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Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati (Autonomous Institute)		
First Year Engineering (2024 Course)		
BS24101-Engineering Mathematics-I (Linear Algebra and Calculus)		
Teaching Scheme: **Theory: 3 Hours/Week** **Tutorial: 1 Hour/Week**	**Credits (04)** **03+01**	**Examination Scheme:** **In-Semester: 20 Marks** **End-Semester: 70 Marks** **Course Activity: 20 Marks** **Term Work: 20 Marks**

Prerequisites:
Differentiation, Integration, Basics of Matrices and Determinants.

Course Objectives:
To make the students familiarize with concepts and techniques in Calculus, and Matrices. The aim is to equip them with the techniques to understand advanced-level mathematics and its applications to enhance analytical thinking power, useful in their disciplines.

Course Outcomes (COs): The students will be able to
CO1: Expand function in power series using Taylors and Maclaurin's series and evaluate indeterminate form using L' Hospital Rule.
CO2: Understand basic concepts of periodic functions, Fourier series, and harmonic analysis.
CO3: Develop basic concepts of partial derivatives and apply to solve various problems on partial derivatives.
CO4: Apply partial differentiation to evaluate Jacobian, extreme values of the functions and estimate Error & Approximation.
CO5: Apply the concept of rank to solve systems of linear equations, examine linear dependent and independent vectors, and analyze systems of linear equations and transformation.
CO6: Understand the concept of Eigenvalues and eigenvectors and apply it to solving Engineering problems.

Course Contents

Unit 1: Differential Calculus **[07 Hours]**
Expansion of Functions: Taylor's series, Maclaurin's series, Indeterminate Forms, L' Hospital rule, Evaluation of limits.

Unit 2: Fourier Series **[07 Hours]**
Definition, Dirichlet's conditions, Full Range Fourier Series, Half Range Fourier Series, Harmonic Analysis and Applications to Problems in Engineering.

Unit 3: Partial Differentiation **[07 Hours]**

Introduction to functions of several variables, Partial Derivatives, Euler's Theorem on Homogeneous functions, Partial derivative of Composite Function, Total Derivative.

Unit 4: Applications of Partial Differentiation **[07 Hours]**

Jacobian and its applications, Errors and Approximations, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit 5: Linear Algebra-Matrices, System of Linear Equations **[07 Hours]**

Rank of a Matrix, Echelon form and Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Application to Problems in Engineering.

Unit 6: Linear Algebra-EigenValues and EigenVectors, Diagonalization **[07 Hours]**

Eigenvalues and Eigenvectors, Cayley Hamilton theorem, Diagonalization of a matrix and Applications.

Textbooks:

1. Higher Engineering Mathematics by B. V. Ramana 1st ed (Tata Mcgraw Hill, 2011)
2. Applied Mathematics (Vol. I & Vol. II) by P.N.Wartikar and J.N.Wartikar (Pune Vidyarthi Griha Prakashan, 2009.)

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Reference Books:

1. Engineering Mathematics: A tutorial approach by Ravish R Singh and Mukul Bhatt ((1st ed, Tata McGraw Hill Education Private Limited, 2013).
2. Higher Engineering Mathematics by B. S. Grewal (44th ed: Khanna Publication, 2019).
3. Advanced Engineering Mathematics by Erwin Kreyszig (10th ed: Wiley India, 2023)
4. Advanced Engineering Mathematics by Peter O'Neil (8th ed: Cengage Learning, 2024).

Guidelines for Tutorial and Term Work:

i) Tutorial for the subject shall be engaged in a minimum of three batches per division (batch size of 23 students maximum)

ii) Term work shall consist of Six assignments on each Unit-1 to Unit-6 and is based on performance and continuous internal assessment.

Course Coordinator **Dept. Autonomy Coordinator** **BOS Chairman** **Principal**

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Vidyanagari, Baramati-413133

BS24104: Engineering Chemistry		
Teaching Scheme:	**Credits:03**	**Examination Scheme:**
TH: 02 Hrs/Week		**Course Activity: 20 Marks**
		In-Semester Exam: 20 Marks
		End-Semester Exam: 50 Marks
PR: 02 Hrs/Week		**Practical Exam: 30 Marks**
		Term-Work: 20 Marks

Prerequisite Courses:

Knowledge of water and pollution, periodic table, Titrations- volumetric analysis, structure property relationship, types of crystals, classification and properties of polymers, knowledge of fuels, electromagnetic radiations, electrochemical series and corrosion

Companion Course, if any: Laboratory Practical

Course Objectives:

1. To understand technology involved in the analysis of water for improving its quality as a commodity by purification.
2. To understand corrosion mechanisms and study preventive methods for corrosion control.
3. To understand chemistry of various engineering materials with composition-structure, properties and applications of speciality polymers and nanomaterial.
4. To study conventional and green fuels with respect to their composition, properties and applications and to build consciousness about the advancement in batteries.

Course Outcomes

On completion of the course, learner will be able to

CO-1: Apply different methodologies for the analysis of water and techniques involved in the softening of water as a commodity.

CO-2: Explain causes of corrosion and methods used for minimizing corrosion along with finishing of metals with technological importance.

CO-3: Illustrate the knowledge of advanced engineering materials for various engineering applications on the basis of structure and properties.

CO-4: Analyze fuels and suggest the use of alternative green fuels along with energy storage.

Course Contents

Unit I: Water Treatment **(6 Hrs)**

Impurities in water (Suspended, Biological & Dissolved chemical), Hardness of water- Types, Units (no conversions). Analysis of water: hardness (EDTA method) with numerical, alkalinity with numerical, and Water Softening methods: Demineralization, Electrodialysis and Reverse Osmosis method.

Unit II: Corrosion and Corrosion Control **(6 Hrs)**

Introduction, Types of corrosion – Dry and Wet corrosion. Nature of oxide films and Pilling-Bedworth's rule. Electrochemical theory of wet corrosion – galvanic cell corrosion, differential aeration corrosion. Factors influencing rate of corrosion: nature of metal, nature of environment. **Methods of corrosion control and prevention:** Metallic coatings and its types, surface preparation, methods to apply metallic coatings - hot dipping (galvanizing & tinning), metal cladding and electroplating.

Unit III: Engineering Materials: **(6 Hrs)**

Polymers: Introduction, Classification of polymers, Thermoplastics and Thermosets, Polymer terminologies, properties of polymers- Crystallinity and Glass transition temperature. Speciality Polymers: Introduction, Structure, properties and applications of the following polymers-**Biodegradable Polymers:** Poly lactic acid (PLA) and Polyhydroxy Butyrate Valerate, PHBV **Polymer composites:** Fiber reinforced plastic (FRP)- Carbon reinforced polymer composite. **(Introductory part of Polymer may be given for Self-preparation)**

Nanomaterials: Definition, Importance of nanomaterials Classification with examples. **Quantum dots**: Definition, difference between Nanomaterials and quantum dots, Synthesis of Metal, Metal oxide and Metal Sulfide nanomaterials by Co-Precipitation method.

Unit IV: Renewable Energy Sources **(6 Hrs)**

Introduction (definition, classification of fuels and characteristics of an ideal fuel)

Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), **Green Fuels:** Introduction to Power alcohol and Biodiesel. Preparation reactions, properties, advantages and disadvantages of **Power alcohol**. **Hydrogen gas** as a future fuel: synthesis by Steam reforming method, H_2-O_2 Fuel Cell. **Batteries:** Solar cell and Li-ion Battery- Principal, Construction and Working with applications.

Books & Other Resources:

Text Books:

1. Engineering Chemistry, Wiley India Pvt. Ltd.
2. Engineering Chemistry by O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd.
3. Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand & Company Ltd.

Reference Books:

1. Basic Concept of Analytical Chemistry, 2ed, S. M. Khopkar, New Age-International Publisher.
2. Recent trends in Fuel Cell Science and Technology-Suddhasatwa Basu, Anamaya Publishers, New Delhi.
3. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar, Wiley Eastern Ltd.
4. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
5. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41st Edition, 2004.
6. Instrumental Methods of Chemical analysis, H. H. Willard, L. L. Merritt Jr., John A. Dean, Wadsworth Publishing Co Inc; 7th edition.
7. Environmental Chemistry, A. K. De, New Age International Publications, 8th edition.

Guidelines for Laboratory - Term work Assessment:

1. The distribution of weightage of term work marks should be informed to students before start of the semester.
2. Term work assessment should be on continuous basis. At frequent intervals students are expected to inform about their progress/lagging.

Guidelines for Laboratory Conduction:

1. DO's and DONT'S, along with precautions, are need to be displayed at prominent location in the laboratory.
2. Students should be informed about DO'S and DON'T and precautions before performing.

LIST OF PRACTICALS [Any 10 (9+1) to be performed by the student]

1. To determine hardness of water by EDTA method.
2. To determine alkalinity of water.

3. To determine strength of strong acid using pH meter.
4. Titration of a strong acid with strong base using conductivity meter.
5. To determine molecular weight/radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement.
6. Determination of fixed carbon content of coal.
7. Study of corrosion of metals in a medium of different pH.
8. Estimation of percentage of iron in the given rust solution using standard Potassium Dichromate solution (External indicator method).
9. Electroplating of copper on zinc/iron plate.
10. Saponification/acid value of oil.
11. To Determine Chloride content of water by Mohr's method.
12. To determine maximum wavelength of absorption of $CuSO_4/FeSO_4/ KMnO_4$, verify Beer's law and find unknown concentration of given sample.

Demonstration Experiments:

13. Synthesis of Conducting Polyaniline from Aniline by Chemical Oxidative Polymerization and Conductivity measurements.
14. Study of pH sensitive Keto-enol tautomerism in curcumin (Turmeric).

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(w. e. f. Academic Year 2024-25)

First Year B. Tech. (2024 Course)		
ET24101: Basic Electronics		
Teaching Scheme: **TH : 03 Hrs./week** **PR : 02 Hrs./Week**	**Credits: 04**	**Examination Scheme:** **In Semester : 20 Marks** **End Semester : 70 Marks** **Activity : 20 Marks** **PR Exam : 30 Marks** **TW : 20 Marks**

Course Objectives:

1. The principle of electronics and working principle of PN junction diode and special purpose diodes.
2. Construction, working principle and applications of transistors like BJT, MOSFETs.
3. Construction, working principle and applications of OPAMP.
4. Basics of various logic gates, digital circuits and their applications.
5. The operating principles and applications of various active and passive sensors.
6. Basic principles of communication systems.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Analyze the functionality of basics of P-N junction diode and its circuits.

CO2: Understand & illustrate the working of BJT and MOSFET with applications

CO3: Build and test analog circuits using OPAMP and applications.

CO4: Build and test digital circuits using universal/basic gates and flip flops.

CO5: Select sensors for specific applications.

CO6: Understand Basics of Communication systems.

Course content

Unit I: Introduction to Electronics and Diode Circuits (07Hrs)

Evolution of Electronics, Impact of Electronics in industry and in society.

Introduction to active and passive components.

P-N Junction Diode and applications: P-N Junction diode: construction and its working in forward and reverse bias condition, V-I characteristics of P-N Junction Diode. Diode Applications: Diode as a switch, Half Wave Rectifier, Full wave centre tap and Bridge Rectifier, Diode Limiters and Clampers.

Special purpose diodes: Zener diode, Light Emitting Diode (LED) and photo diode along with V-I characteristics and their applications.

Unit II: Transistors and applications (06Hrs)

Bipolar Junction Transistor: Construction, type, Operation, Different configurations of BJT, operating regions of BJT, input and output characteristics in CE configurations, DC load line and operating point, Applications of BJT: BJT as switch, Common Emitter Amplifier.

Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation, V-I characteristics, Regions of operation, MOSFET as switch & amplifier.

Unit III: Operational amplifier (05Hrs)

Differential amplifiers, **Functional** block diagram of operational amplifier, ideal operational amplifiers and parameters, OPAMP applications: Op-amp as Inverting and Non inverting amplifier, Summing amplifier, Comparator, Integrator and differentiator.

Unit IV Number System and Logic Gates (07Hrs)

Number System: - Binary, BCD, Octal, Decimal, Hexadecimal their conversion. Signed & unsigned numbers, Binary arithmetic, Binary subtraction using 2"s complement Boolean Algebra, De-Morgan's theorem.

Basic Gates: AND, OR, NOT, Universal Gate: NAND, NOR, XOR, XNOR, Half adder, Full adder

Sequential Circuits: Flip Flop's (Circuit diagram and truth Table) - SR, JK, T and D Introduction to Microprocessor and Microcontroller (Only block diagram and explanation)

Unit V Sensors (06Hrs)

Classification of a sensors, Active /Passive Sensors, Analog/Digital Sensors, Motion Sensors (LVDT, Accelerometer), Temperature Sensors (Thermocouple, Thermistor, RTD), Optical Sensors (LDR), Mechanical Sensors (Strain Gauge, Load Cell, Pressure sensors), Biosensors. (Working Principle and one application).

Unit VI Communication Systems (06Hrs)

Basic block Diagram of communication system, Modes of Communications, Communication Media: Types of Wired and Wireless media, Electromagnetic Spectrum, Allotment of frequency band for different applications, necessity of modulation, Introduction to AM and FM Modulation, Modulation index, spectrum, waveforms and equations of AM and FM wave, comparison between FM and AM.

Books:

Text Books:

1. "Electronics Devices" by Thomas. L. Floyd, 9th Edition, Pearson (Unit I, II)
2. "Modern Digital Electronics" by R.P. Jain, 4th Edition, Tata McGraw Hill (Unit III)
3. "Electronic Instrumentation" by H.S. Kalsi, 3rd Edition, Tata McGraw Hill (Unit IV)
4. "Sensors and Transducers" by D. Patrnabis, 2nd Edition, PHI (Unit V)
5. "Electronic Communication Systems" by Kennedy & Davis, 4th Edition, Tata McGraw Hill (Unit VI)
6. "Mobile Wireless communication" by M. Schwartz, Cambridge University Press (Unit VI)

Reference Books:

1. "Digital Fundamentals" by Thomas. L. Floyd, 11th Edition, Pearson
2. "Mobile Communication" by J. Schiller, 2nd Edition, Pearson
3. "Sensors Handbook", by S. Soloman, 2nd Edition.

List of Laboratory Experiments/Assignments

1. **Electronic Components:**
   Study of Active and Passive components.
2. **Measurements using various measuring equipment's:**
   a) Set up CRO and function generator for measurement of voltage, frequency
   b) Measure voltage, current and resistance using digital multimeter.
3. **Diode Characteristics**
   a)V-I characteristics of PN Junction diode
4. **Rectifier circuits:**
   Implement half wave, full wave and bridge rectifier using diodes
5. **Frequency response of BJT:**
   To plot frequency response of BJT amplifier.**(Simulation)**
6. **Linear applications of Op-amp:**
   Build Inverting and non-Inverting amplifier using op-amp **(Study the datasheet of typical Op-Amp 741)**
7. **Test and verify the truth tables of:**
   a) Basic and Universal Gates **(Study the data sheet of respective IC's)**
   b) Half and Full Adder
8. **Case Study of any one electronics appliances (Micro wave oven, AC, TV, Mobile, Washing Machine) with block diagram, specification etc.**

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ME24102- Engineering Graphics B. Tech (Sem-I and Sem-II)		
Teaching Scheme: **TH : 01 Hr/Week** **PR : 02 Hr/Week**	**Credit** **02**	**Examination Scheme:** **End Sem: 50 Marks** **TW: 20 Marks**

Engineering Graphics is a fundamental subject in engineering that involves creating and interpreting graphical representations of objects, designs, and systems. It serves as a communication tool among engineers, designers, and other stakeholders in the engineering field. It is considered as a language of an engineer.

Prerequisite: Basic trigonometry and knowledge of basic drawing instruments

Course Objectives:

1. To communicate design concepts effectively through graphical representation.
2. To Gain knowledge of conic sections, their significance in engineering applications, and methods of constructing conic shapes.
3. To acquire knowledge of development of lateral surfaces for optimizing material usage.
4. To develop visualization skills through orthographic and isometric projections.
5. To make use of Computer Aided Design (CAD) software for developing technical drawings.

Course Outcomes:

On completion of the course, learner will be able to:

CO1: ***Develop*** various engineering curves using the drawing instruments.

CO2: ***Construct*** developments of lateral surfaces for cut sections of geometrical solids.

CO3: ***Generate*** 2D Drawing from 3D views using concept of Orthographic Projection.

CO4: ***Generate*** 3D views from 2D drawings using concept of Isometric Projection.

CO5: ***Construct*** fully-dimensioned 2D, 3D drawing using computer aided drafting tools.

Unit-1: Engineering Graphics Fundamentals and Engineering Curves	**[3 Hrs.]**
Need of Engineering Drawing and design, Sheet layout, Line types and dimensioning and simple geometrical constructions, Introduction to conic sections and its significance, various methods to construct the conic sections. Helix for cone and cylinder, rolling curves (Involutes, Cycloid) and Spiral	
Unit-2: Development of Lateral Surfaces	**[3 Hrs.]**
Introduction to development of lateral surfaces and its industrial applications. Draw the development of lateral surfaces for cut sections of cone, pyramid, prism etc.	
Unit-3: Orthographic Projection	**[3 Hrs.]**
Principles of Orthographic Projections, types of orthographic projections–First angle and third angle projections, obtaining orthographic projections of given pictorial views by using first angle projection method along with sectional views.	
Unit-4: Isometric Projection	**[3 Hrs.]**
Principles of Isometric projection – Isometric and natural Scale, Isometric views of simple and compound solids, drawing isometric views from given orthographic views.	

Text Books:

1) Bhatt N.D and Panchal V.M, Elementary Engineering Drawing, (Plane and Solid Geometry), Charotar Publishing House, 53rd Edition.
2) Jolhe Dhananjay, Engineering Drawing with An Introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited,5th Edition 2017.
3) K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi
4) Dhawan, R. K., (2000), "A Textbook Of Engineering Drawing", S. Chand, New Delhi

Reference Books:

1) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2) Madsen, D. P. and Madsen, D. A., (2016), "Engineering Drawing and design", Delmar Publishers Inc., USA
3) Rathnam, K., (2018), " A First Course in Engineering Drawing", Springer Nature Singapore Pte. Ltd., Singapore

Practical Session (Term work assessment guidelines):

Draw minimum two problems on each assignment on the A3 size drawing sheet.

Suggested List of Laboratory Experiments/Assignments:

Assignment 1: Construct any Engineering Curve by any method

Assignment 2: Draw the development of lateral surface of a solid/ truncated solid

Assignment 3: Orthographic view of any machine element along with sectional view.

Assignment 4: Draw Isometric view for given orthographic views.

Assignment 5: Construct all above assignments using CAD software.(Print on A4 size sheets)

12/09/24

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Head
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VPKBIET BARAMATI PUNE (MS.)

First Year B. Tech. (2024 Course)		
EL24102: Electrical Engineering Materials		
Teaching Scheme: **TH: 02 Hrs/Week**	**Credits: 02**	**Examination Scheme:** **Course Activity: 20 Marks** **In-Semester Exam: 20 Marks** **End-Semester Exam: 50 Marks**

Prerequisite Courses:

Basic Physics

Course Objectives:

1. To understand dielectric properties and dielectric breakdown in solid, liquid and gaseous insulating materials.
2. To describe solid, liquid and gaseous insulating materials along with their properties and applications.
3. To comprehend and explain classification, properties and applications of magnetic materials.
4. To understand and summarize properties and applications of electrical conducting materials.

Course Outcomes:

On completion of the course, learner will be able to:

CO-1: Illustrate about dielectric properties and dielectric breakdown in solid, liquid and gaseous insulating materials.

CO-2: Describe solid, liquid and gaseous insulating materials along with their properties and applications.

CO-3: Explain classification, properties and applications of magnetic materials

CO-4: Summarize properties and applications of electrical conducting materials.

Course Contents

Unit I:

a) Dielectric Properties of Insulating Materials **(5 Hrs)**

Static Field, Parameters of Dielectric material [Dielectric constant, Electric Susceptibility, Dipole moment, Polarization, Polarizability], Introduction to Polar and Non-Polar dielectric materials. Mechanisms of Polarizations-Electronic, Ionic and Orientation Polarization (descriptive treatment only), Clausius Mossotti Equation, Piezo-Electric, Pyro-Electric & Ferro-Electric Materials, Dielectric loss and loss tangent, Concept of negative tan delta.

b) Dielectric Breakdown **(2 Hrs)**

Concept of Primary and Secondary Ionization of Gases (descriptive treatment only), Breakdown Voltage, Dielectric Strength, Factors affecting Breakdown Strengths of Solid, Liquid and Gaseous dielectric materials.

Unit II: Insulating Materials, Properties & Applications (7 Hrs)

Introduction, Characteristics of Good Insulating Material, Classification, Solid Insulating Materials-Paper, Press Board, Fibrous Materials, Ceramics, Mica, Asbestos, Resins, Liquid Insulating Materials such as Transformer Oil, Varnish, Askarel. Insulating Gases like Air, SF6, Nitrogen, Hydrogen and Vacuum. Insulating Materials for Power and Distribution Transformers, Rotating Machines, Capacitors, Cables, Line Insulators and Switchgears.

Unit III: Magnetic Materials, Properties & Applications (7 Hrs)

Introduction, Parameters of Magnetic material [Permeability, Magnetic Susceptibility, Magnetization], Classification of Magnetic materials, Diamagnetism, Paramagnetism, Ferromagnetism, Anti-ferromagnetism, Ferri-magnetism, Ferro-magnetic behaviour below Critical Temperature, Spontaneous Magnetization, Ferrites, B-H Curve for Ferromagnetic Materials, Applications of Ferro magnetic Materials, Magnetic materials for Electric Devices such as Transformer Core, Core of Rotating Machines (Silicon Steel, Chromium Steel, Cobalt Steel, Permalloy, Alnico alloy) Soft Magnetic Materials, Hard Magnetic Materials.

Unit IV: Conducting Materials, Properties & Applications (7 Hrs)

General Properties of Conductor, Electrical Conducting Materials - Copper, Aluminium and its applications, Materials of High and Low Resistivity-Constantan, Nickel-Chromium Alloy,

Tungsten, Kanthal, Silver and Silver alloys, Characteristics of Copper Alloys (Brass & Bronze), Electrical Carbon Materials. Materials used for Lamp Filaments, Solders, Metals and Alloys for different types of Thermal Bimetal and Thermocouples.

Books & Other Resources:

Text Books:

1. A Course in Electrical Engineering Materials, S. P. Seth, Dhanpat Rai Publication.
2. Electrical Engineering Materials, R. K. Rajput, Laxmi Publication Ltd.
3. Electrical Engineering Materials, K. B. Raina and S. K. Bhattacharya, S. K. Kataria Sons Publication.
4. Material Science for Electrical Engineering, P. K. Palanisamy, Scitech Pub. Pvt. Ltd.
5. Electrical Engineering Materials, T. T. T. I., Madras

Reference Books:

1. Electrical Engineering Materials, C. S. Indulkar and S. Thiruvengadam, S. Chand Publication.
2. Electrical Engineering Materials, S. P. Chalotra and B. K. Bhattacharya, Khanna Publication.
3. High Voltage Engineering, Kamraju and Naidu, Tata McGraw Hill Publication.
4. Introduction to Material Science for Engineering, James F. Shackelford and M. K. Muralidhara, Pearson Education

Course Activity (Any ONE of the following):

For the assessment of Course Activity, a student must complete at least ONE activity out of the followings:

1. Power Point Presentation
2. Poster Presentation

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Course Coordinator	Dept. Autonomy Coordinator	BOS Chairman	Principal

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First Year B. Tech. (2024 Course)		
EL24103: Electrical Workshop		
Teaching Scheme: **PR : 04 Hrs./Week**	**Credits: 02**	**Examination Scheme:** **Activity : 20 Marks** **PR Exam : 30 Marks** **TW : 20 Marks**

Prerequisite Courses: Basic knowledge of electricity, Electrical wiring, Students should have knowledge of various classes of materials like solid, liquid, gaseous insulating materials.

Course Objectives: The course aims to:

1. To introduce different types of electrical wiring and connection of various components.
2. To impart fundamental knowledge of earthing and its importance.
3. To understand importance and usage of different electrical safety devices and materials.
4. State various applications and measuring methods for solid, liquid and gaseous insulating materials.

Course Outcomes: Use successful completion of this course, the students will able to:

1. Apply the knowledge of different types of electrical wiring and perform connections of various components.
2. Identify the importance of earthing.
3. Create awareness of different electrical safety devices and materials.
4. Understand the different types of electrical insulating materials and their applications.

Books:

Text Books:

1. R.P. Singh, "Electrical Workshop", I.K. International Publishing House Pvt. ISBN-9789381141205.
2. John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, "Electrical Safety Handbook", 3rd edition, McGraw-Hill, 2006.
3. Sushant M. Nagare, "Electrical Materials & Wiring Practice", Gigatech Publishing House, ISBN-8193808118.
4. "A Course in Electrical Engineering Materials", by S.P. Seth, Dhanpat Rai and Sons publication.

Reference Books

1. W. Fordham Cooper, "Electrical Safety Engineering", second edition, Butterworth & Co., 1986.

2. "Electrical Engineering Materials", by S. P. Chalotra and B. K. Bhattacharya, Khanna Publishers, Nath Market.
3. Handbook of International Electrical Safety Practices, Princeton Energy Resources International, 2010, Scrivener Publishing, USA.

Guidelines for Laboratory - Term Work Assessment:

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.
2. Term work assessment should be on a continuous basis.
3. At frequent intervals students are expected to inform about their progress/lagging.

Guidelines for Laboratory Conduction:

1. DO's and DON'TS, along with precautions, are needed to be displayed at prominent locations in the laboratory.
2. Students should be informed about DO'S and DON'T and precautions before performing.

Guidelines for Students Lab Journal:

The Student's Lab Journal should contain following related to every experiment –

1. Theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.

There should be continuous assessment for the TW.

List of experiments (Any 12 to be performed by the student)

1. To study and use electrical safety devices such as hand gloves, gum boot, insulating mats, line tester and life safety materials with their specifications.
2. To study compliance with safety & IE rules when performing the wiring.
3. To identify and specify different types of sockets and plugs used for different current and voltage ratings.
4. To study different types of electrical lamps.
5. To study and perform connections of Staircase wiring.

6. To study and perform connections of Godown wiring.
7. To study and perform wiring of fluorescent tube light with distribution box.
8. To study and perform wiring of ceiling fan with distribution box.
9. To study and perform the connection of one switch and one socket board.
10. To study and perform connection of one socket, one switch and lamp load.
11. To study and perform soldering of electrical and electronic components on PCB for any application.
12. To study Earth Tester and measurement of earth resistance.
13. To measure dielectric strength of solid insulating material-IS 2584.
14. To measure dielectric strength of liquid insulating material-IS 6789.
15. To measure dielectric strength of gaseous insulating material as per IS using Sphere Gap-Unit.
16. To obtain B-H Curve for different ferromagnetic materials.

Note: The list of experiments is not limited to the above, but a course coordinator may design a few new experiments based on recent technologies/trends in the relevant Engineering Domain. However, the course coordinator needs to get approval by the Program Assessment Committee and Chairman BOS/HOD well in time.

Course Activity (Any ONE of the following):

For the assessment of Course Activity, a student must complete at least ONE activity out of the followings:

1. Poster Preparation and presentation.
2. Power Point presentation.

Mr.S.D. Shelar	Mrs. J. S. Kulkarni	Mrs. P.N. Jaiswal	Dr. R.S. Bichkar
Course Coordinator	Dept. Autonomy Coordinator	BOS Chairman	Principal

Head
Department of Electrical Engineering

Principal
Pratishthan's
Kamalnayan Bajaj Institute of
Engineering & Technology, Baramati
Vidyanagari, Baramati-413133

VPKBIET BARAMATI
Affiliated to S.P.P.U. Pune Id No./PU/PN/Engg./152/2000
PUNE (MS.)

Course Name: Indian Knowledge System

Course Code: HS24102

Teaching Scheme	Credits: 2 (Theory)	Examination Scheme:
Theory: 2 Hours/Week		Activity: 20 Marks Oral: 30 Marks Total: 50 Marks

Course Objectives:

1. To create awareness about the history and rich culture of the Country.
2. To introduce Vedic mathematics principles for faster calculations.
3. To know the science and Astronomy contributions of the traditional knowledge of Bhārata.
4. To learn engineering and technology contributions of the traditional knowledge of Bhārata.

Course Outcomes:

Students will be able to

CO1: Explain the historicity of the Indian Knowledge System and the broad classification of Indian philosophical systems.

CO2: Apply Vedic Mathematics for faster calculations.

CO3: Understand the importance of science and astronomy concepts developed by Bhārata.

CO4: To understand the contributions in the engineering, technology, and architectural heritage of ancient Bharata.

UNIT -I: Bhāratīya Civilization and Development of Knowledge System **(4 hours)**

Genesis of the land, Antiquity of civilization, the Saraswatī-Sindhu Civilization, Traditional Knowledge System, The Vedas, Main Schools of Philosophy, Ancient Education System, the Takṣaśilā University, the Nālandā University, Ethnic Studies, Life Science studies, Agriculture, Ecology and Environment, Āyurveda, Integrated Approach to Healthcare, Medicine, Microbiology, Surgery, and Yoga. Life and works of Agastya, Patanjali, Lopamudra, Ghosha, Gargi Maitreyi, Adishankaracharya, Panini, Aryabhatta, Kanada, Kautilya, Vishwakarma, Sushruta, Charaka, Bhaskaracharya, Madhavacharya.

UNIT-II: Vedic Mathematics **(8 hours)**

Indian Mathematicians: Varahmihir, Brahmagupta, Srinivasa Ramanujan, Neelkanth Somayya, Bharti Krishna Tirtha, Introduction to sutras, and sub sutras, Methods for Addition, Multiplication, division, squaring and square roots, cube and cube roots, Factorization. Differentiation and Integration methods. Easy Solution of linear equations, Quadratic equations, High-Speed Matrix Algebra.

Vedic Geometry: Different forms of straight lines, The Triangle, The Cyclic Quadrilateral, Squares, and the Circle, Geometrical constructions (such as Altars), Transformation of simple shapes, Kalpa Sutras-Srautha Sutras and Sulbha Sutras

UNIT-III: Science, Astronomy **(4 hours)**

Concepts of Matter, Life and Universe, Gravity, Sage Agastya's Model of Battery, Velocity of Light, Vimāna: Aeronautics, Vedic Cosmology and Modern Concepts, Bhāratīya Kāla-gaṇanā, History and Culture of Astronomy, Sun, Earth, Moon, and Eclipses, Earth is Spherical and Rotation of Earth, Archeoastronomy.

UNIT-IV: Engineering, Technology, and Architecture **(4 hours)**

Pre-Harappan and Sindhu Valley Civilization, Laboratory and Apparatus, Juices, Dyes, Paints and Cements, Glass and pottery, Metallurgy, Engineering Science and Technology in the Vedic Age and Post-Vedic Records, Iron Pillar of Delhi, Rakhigarhi, Mehrgarh, Sindhu Valley Civilization, Marine Technology, and Bet–Dwārkā.

Textbooks:

1. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan,
2. Engineering and Technology in Ancient India by Ravi Prakash Arya
3. History of Science in India Volume-I, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramakrishna Mission Institute of Culture, Kolkata (2014).
4. Science and Technology in Ancient Indian Texts by Bal Ram Singh, Nath Girish, Umesh Kumar Singh
5. Vedic Mathematics, Swami Bharati Krishna Trithaji, MotilalBanarsidass, New Delhi.

Reference Books:

1. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).

2. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012).

3. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).

4. Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, Wiley Eastern Limited, New Delhi

5. Advanced Vedic Mathematics, Rajkumar Thakur, Rupa Publications India Pvt. Ltd 2019

6. Vedic Geometry Course, S. K. Kapoor, Lotus Press

7. NPTEL Course: Indian Knowledge System (IKS): Concepts and Applications in Engineering https://onlinecourses.swayam2.ac.in/imb23_mg53/preview

8. Rigvedadi Bhashya Bhumika: Swami Dayananda Saraswati publisher Arya samaj, Vedic Mission West Midlands.

9. Patanjali Yogsutra a commentary by Shri Shri Ravishankar, Arktos media.

10. NPTEL Course: Sohoni Pushkar, Introduction to the History of Architecture in India, IISER Pune, 2020. https://onlinecourses.nptel.ac.in/noc22_ar03/preview

Examination Scheme :

Activity **20 Marks**

1. 10 Marks for Activity

Activity includes survey/ research, models, charts, and implementations on topics mentioned or relevant to the syllabus. Students need to present their work at the end of the term.

2. 5 Marks for Attendance.

3. 5 Marks for Quiz MCQs (Test on All Units)

Oral **30 Marks**

Oral examination will be conducted by external and internal examiners.

Course Coordinator **Dept. Autonomy Coordinator** **BOS Chairman** **Principal**

FY B. Tech Semester I Subject Name: Cocurricular course – I Subject Code: -HS24103		
Teaching Scheme: **TH: -** **PR: 04 Hrs./Week**	**Credits: 02**	**Examination Scheme:** **Course Activity: -** **In-Semester Exam: -** **End-Semester Exam: -**
		TW 50 Marks
		TW Marks Distribution- **25 CC+ 15 PE+ 10 Yoga**

Introduction:

Cocurricular activities like music, art, drama, and clubs help students discover and develop their passions, creativity, and talents. Sports promote physical fitness, encouraging a healthy lifestyle and reducing the risk of health issues. Physical activity has been shown to enhance concentration and memory, which can lead to better academic performance. Engaging in activities outside the classroom can reduce stress and mental fatigue, helping students maintain better focus in their studies.

Companion Course, if any: Practical

Course Objectives:

1. The course aims to foster creativity, collaboration, and a holistic understanding of performing arts and their integration.
2. To impart the students with basic concepts of Physical Education, Sports, and Yoga for health and wellness.
3. To familiarize the students with health-related Exercise, Sports, and Yoga for overall growth & development.

Course Outcomes:

On completion of the course, the learner will be able to –

CO1: Express themselves creatively.

CO2: Demonstrate teamwork and collaboration with peers.

CO3: Develop communication and social skills

CO4: Enhance experiential learning through various arts forma and physical fitness.

CO5: To understand the basic principles and practices of Physical Education, Sports, and Yoga.

CO6: Develop lifelong active habits

Course Contents

Co-curricular:

Unit I: Introduction to Co-curricular Activities **(6 Hrs)**

Types, Theory (of Music, Dance, Theater, Literary, Fine Art, Applied and Other Forms), Programmes and Competitions, Benefits, Professional Aspects

Unit II: Performing Activities/Practicing – Demos etc. **(10Hrs)**

Students **must join anyone** / one from each group of the following clubs and perform activities on a given theme in a group or individually.

Group I:
(a) Music and Singing: Singing and Instrumental (Percussion Group: Keyboard, Tabla, Flute, etc.) and String Group: (Tambora, Veena, Guitar, Violin, Banjo, etc.), Folk Type: Dafali, Ektari, Dholki. Types: Classical, Semi-classical, and Westerns
(b) Dance: Types: Classical, Semi-classical, Contemporary
(c) Theater: Drama, One-act-play, Mono-act, Skit, Mime, Mimicry

Group II:
(d) Literary: Poetry, Elocution, Quiz, Debate
(e) Art & Craft and Fine Art: Drawing, Painting, Rangoli, Cartooning, Knitting, Weaving, Embroidery, Quilling, Paper Folding, Clay Modeling Tattoo Making Photography, Videography, Digital Art (Related to Computers, Media)
(f) Other Activities: NSS, Gardening, Cooking.

Unit III: Post Activity **(6 Hrs)**

Report preparation/ performance video/ Participation/ Group Activities/ Professional Certification.
Sample Topics in each Performing Activity: Performing, Choreography/Composing/Direction, Backstage Management (Lighting, ...) Literary: Script Writing.

LIST OF ACTIVITIES (to be performed by the student)

1. Students should prepare a short video of his/her own art form. (3-4 min)
2. Students should participate in any of the competitions conducted in the institute or outside the institute as an outcome of the course and show evidence of the same.
3. Students should prepare a portfolio report of his/her work for submission.

Guidelines for Laboratory-Term Work Assessment:

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.
2. Students' progress should be observed continuously. At frequent intervals, students will inform about their progress/lagging. At the end, competitions will be organized as a part of term work assessment.

Physical Education, Sports, and Yoga:

1. Introduction to Sports and Health. **(4 Hrs)**

Need and Importance, History, Types, Typical equipment and other requirements, Precautions, Benefits, Rules and regulations, and Modern trends of Physical Education, Sports, and Yoga (Through classroom videos interaction/Self-learning videos)

2. Physical Fitness Practice: **(12 Hrs)**

1. Importance of Yoga & Fitness.
2. Fundamental Principles of Yoga & Fitness Training.
3. Components of Fitness and Fitness Equipment
4. Types of Yoga Practices - Yogic Asanas, Pranayama and Meditation
5. Introduction to Nutrition and Balanced Diet for Fitness

3. Sports and Games **(12 Hrs)**

Students should select one unique game out of the following in each Semester:

Outdoor Games: Volleyball, Basketball, Softball, Baseball, Netball,

Athletics: Track Events, Long Jump, High Jump, Triple Jump, shot put, Discus Throw, Hammer, Javelin Throw

Indoor Games: Badminton, Table Tennis,
Gymnastics: Mallakhamb, Rope Mallakhamb.

Guidelines for Term Work Conduction:

1. **Physical Education:**
   General & Specific warm-up exercises Recreation Games and Fitness
   Anyone Major Game

2. **Yoga**
   Suryanamaskara
   Basic Set of Yoga Asana
   Basic Set of Pranayama & Meditation

Principal
Vidya Pratishthan's
Kamalnayan Bajaj Institute of
Engineering & Technology, Baramati
Vidyanagari, Baramati-413133

Ms. Pallavi A. Bokey
co-curricular co-ordinator (cultural)

Dr. Rajveer Shastri
BoS chairman

Dr. Bipin Patil
co-curricular co-ordinator (sports & Yoga)

Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati (Autonomous Institute)		
First Year Engineering (2024 Course)		
BS24102 - Engineering Mathematics-II (Ordinary Differential Equations, Integral Calculus and Statistics)		
Teaching Scheme: **Theory: 3 Hours/Week** **Tutorial: 1 Hour/Week**	**Credits: (04)** **03+01**	**Examination Scheme:** **In-Semester: 20 Marks** **End-Semester: 70 Marks** **Course Activity: 20 Marks** **Term Work: 20 Marks**

Prerequisites:
Differentiation, Integration, Differential Equations.

Course Objectives:
To make the students with Mathematical Modeling of physical systems using differential equations, advanced techniques of integration, tracing of curves, multiple integrals, and their applications. The aim is to equip them with the techniques to understand advanced-level mathematics and its applications that would enhance thinking power, useful in their disciplines.

Course Outcomes (COs): The students will be able to
CO1: Solve first-order first-degree differential equations using suitable methods.
CO2: Apply the concept of differential equations for various physical systems such as Newton's law of cooling, electrical circuits, rectilinear motion, mass-spring systems, and heat transfer.
CO3: Represent, visualize, and analyze Statistics data and learn basic concepts of probability.
CO4: Evaluate definite improper integrals using techniques like Gamma, Beta function, DUIS, and Error function.
CO5: Sketching the curve of a given equation and measuring the arc length of various curves.
CO6: Evaluate multiple integrals and apply them to calculate area, volume, Center of gravity, and moment of inertia.

Course Contents

Unit 1: First Order Ordinary Differential Equations **[07 Hours]**
Exact differential equations, Equations reducible to exact form. Linear differential equations, Equations reducible to linear form, Bernoulli's Equation.

Unit 2: Applications of Differential Equations **[07 Hours]**
Applications of Differential Equations to Orthogonal Trajectories, Newton's Law of Cooling,

Kirchhoff's Law of Electric Circuits, Rectilinear Motion, One Dimensional Conduction of Heat.

Unit 3: Statistics and Probability **[07 Hours]**

Importance of Statistics in Engineering. Data Types, Measures of Central Tendency and their Applications. Probability Theory. Classical definition, Equiprobable Sample Space. Conditional Probability, Bayes Theorem, Applications.

Unit 4: Integral Calculus **[07 Hours]**

Reduction Formulae, Beta and Gamma functions, Differentiation Under Integral Sign and Error functions.

Unit 5: Curve Tracing **[07 Hours]**

Tracing of Curves Cartesian, Polar and Parametric curves, Rectification of curves.

Unit 6: Multiple Integrals and their Applications **[07 Hours]**

Double and Triple integrations, change of order of integration, Applications to find Area, Volume, Mass, Centre of Gravity and Moment of Inertia.

Textbooks:

1. Higher Engineering Mathematics by B. V. Ramana 1st ed (Tata Mcgraw Hill, 2011)
2. Applied Mathematics (Vol. I & Vol. II) by P.N.Wartikar and J.N.Wartikar (Pune Vidyarthi Griha Prakashan, 2009.)
3. Engineering Mathematics: A tutorial approach by Ravish R Singh and Mukul Bhatt (1st ed, McGraw Hill Education India Pvt Ltd, 2013)

Reference Books:

1. Higher Engineering Mathematics by B. S. Grewal (44th ed: Khanna Publication, 2019).
2. Advanced Engineering Mathematics by Erwin Kreyszig (10th ed: Wiley India, 2023).
3. Advanced Engineering Mathematics by Peter O'Neil (8th ed: Cengage Learning, 2024)
4. Schaum's Outlines: Differential Equations by Richard Bronson and Gabriel B. Costa.
5. Schaum's Outlines: Calculus by Frank Ayres and Elliott Mendelson.
6. Fundamentals of Mathematical Statistics by S. C. Gupta and V. K. Kapoor (Sultan Chand & Sons)

Guidelines for Tutorial and Term Work:

- Tutorial for the subject shall be engaged in minimum three batches (batch size of 23 students maximum) per division.
- Term work shall consist of Six assignments and on each Unit-1 to Unit-6 and is based on performance and continuous internal assessment.

Course Coordinator	Dept. Autonomy Coordinator	BOS Chairman	Principal
		Head First Year VPKBIET, Baramati-413133	Principal Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering & Technology, Baramati Vidyanagari, Baramati-413133.

BS24103: Engineering Physics		
Teaching Scheme: **TH : 02 Hrs./week** **PR : 02 Hrs./Week**	**Credits** **03**	**Examination Scheme:** **Activity: 20 Marks** **In Semester: 20 Marks** **End Semester: 50 Marks** **PR Exam: 30 Marks** **TW: 20 Marks**

Course objectives

1. To escalate conceptual understanding of Optics, Semiconductors & Quantum mechanics.
2. To inculcate the importance of Physics concepts in diverse engineering applications.
3. To explore developments in Physics via. Lasers, Optical Fibre, and Superconductivity.

Course Outcomes: After learning this course, pupils (stakeholders) will be able to:

1. Understand the optical phenomena including interference and polarization, and relate them to various engineering applications.
2. Learn laser mechanism and their prominent applications in various fields.
3. Evaluate the advent of quantum mechanics and distinguish the wave nature of a matter particle at an atomic dimension.
4. Apply concepts of semiconductors for the explanation of charge carrier kinetics in electronic devices and analyse properties of superconductors and their applications in cutting-edge technologies

Course content

Unit I: Wave Optics **(06 Hrs.)**

Interference: Introduction to interference, Constructive and destructive interference, Path difference and phase difference, Interference in a thin film of uniform thickness (with derivation), Interference in a thin film wedge shape (qualitative), Applications of interference: testing optical flatness, anti-reflection coating. applications of Newton's Ring: Determine the unknown wavelength, numerical.

Polarization: Polarization of light, Malus law, Double refraction, geometry of calcite crystal, Huygen's theory of double refraction, Specific rotation (qualitative only), Optically active materials, numerical.

Unit II: Laser and Optic Fiber **(06 Hrs.)**

Laser: Introduction, interaction of light with matter-absorption, spontaneous emission, stimulated emission, population inversion, metastable state, active system, resonant cavity, characteristics of the laser, Ruby laser, He-Ne laser. Applications of lasers: Holography, IT,

industrial, medical.

Optic Fiber: Introduction, structure of optical fiber, Acceptance Angle, Acceptance Cone, Numerical Aperture and its derivation, Advantages of optical fiber communication over conventional methods, numerical.

Unit III: Quantum Mechanics **(06 Hrs.)**

Introduction, need of quantum mechanics, wave-particle duality of radiation & matter, De-Broglie hypothesis, De-Broglie wavelength in terms of kinetic energy and potential, concept of the phase, and group velocity (qualitative only), Heisenberg Uncertainty Principle, Properties of matter-wave, Wave-function, and its physical significance, Schrodinger's equations: time-independent and time-dependent, Application of Schrodinger's time independent wave equation - Particle enclosed in infinitely deep potential well (Particle in Rigid Box), Tunneling effect: tunnel diode and numerical.

Unit IV: Semi- and Superconductor Physics **(06 Hrs.)**

Semiconductor Physics: Introduction, classification of solids based on band theory. Conductivity of conductors and semiconductors, Hall effect: Derivation for Hall voltage, Hall coefficient, applications of Hall effect, Formation of PN junction with band diagram (forward and reverse bias), Solar cell (basic principle with band diagram) I-V Characteristics.

Superconductivity: Introduction, superconductivity, Properties: Zero electrical resistance, Meissner effect, Critical magnetic field, Persistent current, Type I and Type II superconductors, Applications of superconductors: SQUID, Maglev, etc.

Books:

Text Books:

1. Engineering Physics - Avadhanulu, Kshirsagar, S. Chand Publications
2. A textbook of optics - N Subrahmanyam and Brij Lal, S. Chand Publications
3. Engineering Physics - Gaur, Gupta, Dhanpat Rai, and Sons Publications

Reference Books

1. Fundamentals of Physics, Resnick, and Halliday (John Wiley and Sons)
2. Optics, Jenkins and White (Tata McGraw Hill)
3. Principles of Physics, Serway, and Jewett (Saunders College Publishing)
4. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
5. Principles of Solid-State Physics, H. V. Keer, New Age International
6. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)

List of experiments (Any 8)

1. To determine the radius of curvature of a plano-convex lens by Newton's ring method.
2. To determine wavelength by using a plane diffraction grating.

3. Determination of specific rotation of a solution with Laurent's Half Shade Polarimeter.
4. Experiment based on Laser (Thickness of wire, determination of grating element).
5. To determine the energy band gap of a given semiconductor.
6. To study I-V characteristics and determine the fill factor of a solar cell.
7. To determine the Hall coefficient and charge carrier density.
8. To determine ultrasonic velocity in liquid using an ultrasonic interferometer and its compressibility.
9. To verify cosine law of Malus.
10. Determination of electrical resistivity of given semiconductor using four probe method.
11. To find out the Magnetic susceptibility of a given material.
12. Determination of Acceptance angle and Numerical Aperture using fiber optic cable.
13. Study of quantum tunneling effect using tunnel diode.
14. Determination of angle of divergence of a laser beam using DIODE laser mains operated.
15. Determination of wavelength of laser light using semiconductor laser diffraction
16. To determine the absorption coefficient of the sound of a given material.

Course Coordinator **Dept. Autonomy** **BOS Chairman** **Principal**

Head
First Year
VPKBIET, Baramati-413133

First Year B. Tech. (2024 Course)		
EL24101: Basic Electrical Engineering		
Teaching Scheme: **TH: 03 Hrs/Week** **PR: 02 Hrs/Week**	**Credits:04**	**Examination Scheme:** **In-Semester Exam: 20 Marks** **End-Semester Exam: 70 Marks** **Course Activity: 20 Marks** **Practical Exam: 30 Marks** **Term-Work: 20 Marks**

Prerequisite Courses:

Fundamentals of Physics, Electron theory and Electromagnetism.

Companion Course, if any: Laboratory Practical

Course Objectives:

1. To introduce fundamental concepts of DC circuits, Star-Delta transformation, KCL, KVL and theorems to find the solution of circuits.
2. To impart knowledge of electromagnetic circuits and differentiate electromagnetic circuits with electric circuits.
3. To impart basic knowledge of fundamentals of Electrostatics and all electrical quantities such as current, voltage, power, energy, frequency along with different parameters of AC waveform, phase angles and various arithmetic operations of phasor quantities.
4. To provide knowledge about fundamental parameters of single phase AC circuits consists of resistance, inductance and capacitance with different waveforms and phasor diagrams.
5. To provide knowledge about fundamental parameters such as line and phase quantities in three phase AC circuits and basics of work, power and energy .
6. To understand the operation of a single phase transformer.

Course Outcomes

On completion of the course, learner will be able to

CO-1: Apply star-delta transformation techniques to simplify the resistive circuits and find out the solution of DC circuits by using KVL, KCL and different network theorems

CO-2: Apply the knowledge of electromagnetic circuits to calculate various parameters and to differentiate magnetic circuits with electrical circuits.

CO-3: Apply the knowledge of Electrostatics and AC fundamentals to find various parameters of alternating sinusoidal quantities, differentiate various types of phase angles and perform various arithmetic operations of phasor quantities.

CO-4: Understand fundamentals of single phase AC circuits consisting of resistance, inductance and capacitance with different waveforms and phasor diagrams to calculate various parameters of it.

CO-5: Understand fundamentals of three phase AC circuits with different waveforms and phasor diagrams and apply the knowledge of work, power and energy to solve energy conversion problems.

CO-6: Understand the operation of single phase transformers to calculate efficiency and regulation at different loading conditions.

Course Contents

Unit I: D.C Circuits **(07 Hrs)**

Classification of electrical networks, classification of voltage as well as current sources: ideal and practical, numerical based on source transformation techniques, numerical based on simplification of networks to find equivalent resistance by using Series and parallel combinations, Star to Delta and delta to star conversion (including derivations). Kirchhoff's Voltage and Current Laws to find solutions of networks using loop analysis, Superposition theorem, Thevenin's theorem and Norton's theorem.

Unit II: Electromagnetism **(07 Hrs)**

Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, nature of magnetic field of long straight conductor, solenoid and toroid. Definition and units: magnetomotive force, flux, flux density, reluctance, permeability and field strength, and their relationships. Series magnetic circuit, only theory of parallel magnetic circuit and comparison

of electric circuit with magnetic circuit. Force on current carrying conductor placed in magnetic field, Fleming's left hand rule, Faraday's laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced e.m.f, self and mutual inductance, coefficient of couplings. Energy stored in a magnetic field.

Unit III: Electrostatics and AC Fundamentals (07 Hrs)

A) Electrostatics: Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant. **(03 Hrs)**

B) AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak (maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor. **(04 Hrs)**

Unit IV: Single Phase AC Circuits (07 Hrs)

Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series and parallel RLC circuits, concept of impedance and admittance, concept of active, reactive, apparent, complex power and power factor, only theory of Parallel AC circuits.

Unit V: Three Phase AC Circuits and Work, Power, Energy (07 Hrs)

A) Three Phase A.C. Circuits: Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. **(03 Hrs)**

B) Work,Power,Energy: Effect of temperature on resistance, resistance temperature coefficient, insulation resistance, conversion of energy from one form to another in electrical, mechanical and thermal systems, Simple numerical based on calculation of residential electricity bill. **(04 Hrs)**

Unit VI: Single phase AC Transformer **(07 Hrs)**

Principle of working, construction and types of transformers, emf equation, voltage and current ratios. Losses, definition of regulation and efficiency, to determine regulation and efficiency by direct loading method, concept of autotransformers.

Books & Other Resources:

Text Books:

1. Principles of Electrical Engineering, V. D. Toro,Prentice Hall India, 1989
2. Theory and Problems of Basic Electrical Engineering, D. P. Kothari, I.J. Nagrath, PHI Publication
3. Basic Electrical Engineering,V.K. Mehta, Rohit Mehta, S Chand Publications
4. A text book on electrical technology Vol-I, B. L. Theraja

Reference Books:

1. Electrical technology, H Cotton, CBS Publications
2. Fundamentals of Electrical Engineering‖, L. S. Bobrow, Oxford University , 2011.
3. Electrical and Electronics Technology‖, E. Hughes, Pearson, 2010.
4. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw Hill, 2009

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2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.
8. There should be continuous assessment for the TW.
9. Assessment must be based on understanding of theory, attentiveness during practical, understanding Session, how efficiently the student is able to make connections and get the results, and timely submission of journals.

LIST OF PRACTICALS (Any 08 to be performed by the student)

1. To study safety precautions while working on electrical systems, handling various equipment such as multimeter, ammeters, voltmeters, wattmeter, real life resistors, inductors and capacitors.
2. To demonstrate different types of electrical protection equipment such as fuses, MCB, MCCB, and ELCB.
3. To verify KVL and KCL.
4. To verify the Superposition theorem.
5. To verify Thevenin's and Norton's theorem in a DC network.
6. To observe charging and discharging response of capacitor on storage oscilloscope using DC step input.
7. To observe voltage and current waveforms of series RL and RC circuit on storage oscilloscope and measure the phase angle between them.
8. To verify the relation between phase and line quantities in three phase balanced Star connected to load.
9. To verify the relation between phase and line quantities in three phase balanced Delta connected load.
10. To determine efficiency and regulation of single phase transformer by direct loading test.
11. To measure insulation resistance of three core cables by using Megger.

12. To draw and make connections of Staircase wiring and Godown wiring.

Note :

The list of experiments is not limited to the above, but a course coordinator may design a few new experiments based on recent technologies/trends in the relevant Engineering Domain. However the course coordinator needs to get approval by the Program Assessment Committee and Chairman BOS/HOD well in time.

Course Activity (Any one of the following) :

1. Concept test
2. Powerpoint presentation

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First Year B. Tech. (2024 Course)		
CO24101: Programming and Problem Solving(Python)		
Teaching Scheme: **TH : 03 Hrs./Week** **PR : 02 Hrs./Week**	**Credits: 04**	**Examination Scheme:** **In Semester : 20 Marks** **End Semester : 70 Marks** **Activity : 20 Marks** **PR Exam : 30 Marks** **TW : 20 Marks**

Prerequisite Courses, if any: Students are expected to have a good understanding of basic Computer principles.

Course objectives

The Primary objective is to give students a basic introduction to programming and problem solving with the computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation.

1. To understand problem solving, problem solving aspects, programming and to know about various program design tools.
2. To learn problem solving with computers.
3. To learn basics, features and the future of Python programming
4. To acquaint with data types, input output statements decision making, looping and functions in Python.
5. To learn features of Object Oriented Programming using Python.
6. To acquaint with the use and benefits of files handling in Python

Course Outcomes: After learning this course, pupils (stakeholders) will be able to:

CO1. Apply various skills in problem solving.

CO2. Choose the most appropriate programming constructs to solve the problems.

CO3. Exhibit the programming skills for writing of well- documented programs including use of the logical constructs

CO4. Use modular programming approach to solve problems

CO5. Apply several built-in functions in python to manipulate strings & to handle files

CO6: Apply object oriented constructs for organizing code to maximize its reusability

Course content

Unit I: Problem Solving, Programming and Python Programming (07 Hrs.)

General Problem Solving Concepts- Problem solving in everyday life, types of problems, problem solving with computers, difficulties with problem solving, Problem Solving Strategies, Top down design.

Program Design Tools: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms.

Basics of Python Programming: Features of Python, Literal constants, variables and identifiers, Basic Data Types, Input operation, Comments, Keywords, Indentation, Operators and expressions, Expressions in Python, Writing and executing Python programs.

Unit II: Python List, Tuples and Dictionary (07 Hrs.)

List: Creating list, traversing list, List operations, List methods, List slicing, map and reduce

Tuple: Creating tuple, traversing tuple, tuple operation, tuple methods, conversion: list to tuple & tuple to list

Dictionaries: Creating dictionary, key and value, dictionary operations, dictionary methods.

Unit III: Decision Control Statements (07 Hrs.)

Decision Control Statements: Decision control statements, **Selection/conditional** branching Statements: if, if-else, nested if statements.

Basic loop Structures/Iterative statements: while loop, for loop. Nested loops, Looping with indices, The break, continue, pass, else statement used with loops.

Unit IV: Functions and Modules (07 Hrs.)

Need for functions, Function: definition, call, variable scope and lifetime, Function arguments, return statement. Defining functions, Type conversions, Recursive function, Advanced Functions: lambda, map, filter, reduce, documentation string, Modular programming: Introduction to modules, Introduction to packages in Python, Overview of standard library, Introduction to Some commonly used libraries (math) and MathPlotLib.

Unit V: Strings and File Handling (07Hrs.)

Strings and Operations- concatenation, appending, multiplication and slicing, strings formatting operator, built in string methods and functions, Slice operation, in and not in operators, comparing strings, Iterating strings, the string module, Debugging.

Files: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files. Directory Introduction and basic operations.

2.	To accept an object mass in kilograms and velocity in meters per second and display it's Momentum. Momentum is calculated as $e=mc^2$ where m is the mass of the object and c is its velocity
3.	To accept N numbers from users. Compute and display maximum in list, minimum in list, sum and average of numbers.
4.	To accept a student's five course marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course, If student scores aggregate greater than 75%, then the grade is distinguished. If aggregate is 60>= and <75 then the grade of first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division
5.	To check whether the input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number. Itself. Ex. 371.
6.	To simulate a simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing x^y and x!.
7.	To accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number e) prime factors.
8.	To accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.
9.	To accept a number from the user and print digits of the number in a reverse order.
10.	To input a binary number from the user and convert it into a decimal number.

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First Year B. Tech. (2024 Course)		
IT24101: Computer Proficiency		
Teaching Scheme: **PR : 04 Hrs./Week**	**Credits: 02**	**Examination Scheme:** **Activity : 20 Marks** **PR Exam : 30 Marks** **TW : 20 Marks**

Prerequisite Courses: Basic Computer knowledge

Course Objectives:

1. Understand the basics of computer operating systems.
2. Apply Basic operations on data using word sheets, spreadsheets, and presentations.
3. Understand the WWW and information on the Internet (the web).
4. Understand the networks and its working.
5. Understand Digital Financial Services, e-commerce technologies.
6. Use of various Social Media networking platforms, e-Governance and their usage etc.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Understand the working and function of the computer system and Operating System.

CO2: Apply word processing skills for preparing documents.

CO3: Design spreads sheet for preparing database records.

CO4: Create power point presentation for business purpose.

CO5: Understand basic concepts of HTML CSS and Networking.

CO6: Use social media platforms and Google technologies.

Guidelines for Lab /TW Assessment

- Examiners will assess the term work based on performance of students considering the parameters such as timely conduction of practical assignment, methodology adopted for implementation of practical assignment, timely submission of assignment in the form of handwritten write-up along with results of implemented assignment, attendance etc.
- Examiners will judge the understanding of the practical performed in the examination by asking some questions related to theory & implementation of experiments he/she has carried out. Appropriate knowledge of usage of software and hardware related to respective laboratories should be as a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers of the program in a journal may be avoided. There must be hand-written write-ups for every assignment in the journal.

- The HDD/SSD/USB drive containing student programs should be attached to the journal by every student and the same to be maintained by the department/lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.
- Term work shall consist of six assignments and Practical's on each Unit-1 to Unit-6 and is based on performance and continuous internal assessment.

Guidelines for Laboratory Conduction

1. All the assignments should be implemented.
2. All assignments are compulsory.
3. The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic.
4. All the assignments should be conducted on the latest version of Windows OS and MS office.
5. The following practical should be conducted batch wise using Computer System, with Webcam and headphone facility.

Practical for the subject shall be engaged in minimum four batches (batch size of 20 students).

List of Assignments

1. Demonstration of OS installation: Windows and Linux. Study and execute basic linux commands.
2. Prepare Resume using MS office/LibreOffice/MS Office 365 following feature: Heading-Font Size: 12 Bold, Font type: Times New Roman, Tables, Images, Bullets. List.
3. Prepare Resume using Google docs. Write a formal letter to Principal/HoD for getting permission for internship enrolment.
4. Create a database for student result analysis records using MS excel sheet (Use properties like: Sum, Average, Order, Alphabet order, Percentage, Topper list, analysis)
5. Create a data entry sheet where students input details (e.g., employee records or sales data). Implement data validation rules to restrict inputs (e.g., restrict a column to numerical values or dates).
6. Design a PowerPoint Presentation for a suitable topic using following design features like drawing, design, transition, animations, themes, timing etc.
7. Create a web page using HTML. (Website domain: Educational, Social)
8. Create a web page using HTML and CSS. (Website domain: Entertainment, Sports, Trading, Medical, etc.).
9. (A) Create your personal social media account on LinkedIn. Group discussion on technical topics using Zoom/Google meet/Microsoft team online platform.
   (B) Study and Understand how to use the Google technologies (Gmail, Classroom, YouTube, etc.), Record, upload and publish videos on YouTube.

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HS24101: Communication and Professional Skills F.Y. B. Tech (Sem-I and Sem-II)		
Teaching Scheme: **Th.: 2 Hr. / Week**	**Credits: 02**	**Examination Scheme:** **Activity : 20 Marks** **Oral Test : 30 Marks**

Course Objectives:

1. To communicate well using meaningful sentences for conversation or speech
2. To comprehend communication process and write effectively and enhance formal communication
3. To acquire better presentation skills and participate in healthy discussion: both formal and informal among peers
4. To be confident in facing interviews, acquiring professional skills and be industry ready

Course Outcomes: On completion of the Course, learner will be able to:

CO1: Communicate with their peers and professionals confidently.

CO2: Understand how to analyse their personality using SWOC analysis technique.

CO3: Develop presentation and participate in group discussion.

CO4: Understand and implement etiquette in workplace and in society at large.

Course Contents

Unit I: English Grammar and Linguistic Competence Building **[07 Hrs.]**

Tenses in English, Modal Auxiliary Verbs, Enhancement of Word Power, Essentials of Pronunciation in English

Unit II: Language Skills and Presentation Skills Enhancement **[07 Hrs.]**

Listening, Speaking, Reading and Writing, Making an Effective Presentation, Group Discussion: Dos and Don'ts of Group Discussion

Unit III: Business Writing **[07 Hrs.]**

Letter Writing, Resume Writing, Report Writing, Email Writing

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Unit IV: Job Readiness **[07 Hrs.]**

Professional Etiquette, SWOC Analysis, Types of Interviews, Interview Skills, Mock Interview, Facing an Interview

Term Work/Assignments:

Term work will consist of the record of the following assignments.

1. Letter/Application writing
2. Resume writing
3. Group Discussion
4. Report Writing

Textbooks:

- *Communication Skills for Technical Students* by T. M. Farhatullah, Orient Longman, 2002.
- *Communication for Business: A Practical Approach* by Shirley Tailor and V Chandra, Pearson, 2010.

Reference Books:

- Corporate Communication by Jaishri Jethwaney, Sage, 2018.
- Written Communication in English by Saran Freeman, Orient Longman, 2010.
- Business Correspondence and Report Writing, R. C. Sharma and Krishna Mohan, Tata McGraw Hill, 2017.
- A Foundation Course in Human Values and Professional Ethics, R R Gaur and R Sangal and G P Bagaria, Excel Books, 2010.
- Functional Grammar and Spoken and Written Communication in English, Bikram K Das, Orient Blackswan, 2006.
- 77 Ways to Perfect Your Communications Skills: Enhancing Your Personal and Professional Relationships, Frank H Leone, 2020.
- Handbook of Pronunciation of English Words, J Sethi, Eastern Economy Edition, 2010.

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FY B. Tech Semester I Subject Name: Cocurricular course – I Subject Code: -HS24103		
Teaching Scheme: **TH: -** **PR: 04 Hrs./Week**	**Credits: 02**	**Examination Scheme:** **Course Activity: -** **In-Semester Exam: -** **End-Semester Exam: -**
		TW 50 Marks
		TW Marks Distribution- **25 CC+ 15 PE+ 10 Yoga**

Introduction:

Cocurricular activities like music, art, drama, and clubs help students discover and develop their passions, creativity, and talents. Sports promote physical fitness, encouraging a healthy lifestyle and reducing the risk of health issues. Physical activity has been shown to enhance concentration and memory, which can lead to better academic performance. Engaging in activities outside the classroom can reduce stress and mental fatigue, helping students maintain better focus in their studies.

Companion Course, if any: Practical

Course Objectives:

1. The course aims to foster creativity, collaboration, and a holistic understanding of performing arts and their integration.
2. To impart the students with basic concepts of Physical Education, Sports, and Yoga for health and wellness.
3. To familiarize the students with health-related Exercise, Sports, and Yoga for overall growth & development.

Course Outcomes:

On completion of the course, the learner will be able to –

CO1: Express themselves creatively.

CO2: Demonstrate teamwork and collaboration with peers.

CO3: Develop communication and social skills

CO4: Enhance experiential learning through various arts forma and physical fitness.

CO5: To understand the basic principles and practices of Physical Education, Sports, and Yoga.

CO6: Develop lifelong active habits

Course Contents

Co-curricular:

Unit I: Introduction to Co-curricular Activities **(6 Hrs)**

Types, Theory (of Music, Dance, Theater, Literary, Fine Art, Applied and Other Forms), Programmes and Competitions, Benefits, Professional Aspects

Unit II: Performing Activities/Practicing – Demos etc. **(10Hrs)**

Students **must join anyone** / one from each group of the following clubs and perform activities on a given theme in a group or individually.

Group I:
(a) Music and Singing: Singing and Instrumental (Percussion Group: Keyboard, Tabla, Flute, etc.) and String Group: (Tambora, Veena, Guitar, Violin, Banjo, etc.), Folk Type: Dafali, Ektari, Dholki. Types: Classical, Semi-classical, and Westerns
(b) Dance: Types: Classical, Semi-classical, Contemporary
(c) Theater: Drama, One-act-play, Mono-act, Skit, Mime, Mimicry

Group II:
(d) Literary: Poetry, Elocution, Quiz, Debate
(e) Art & Craft and Fine Art: Drawing, Painting, Rangoli, Cartooning, Knitting, Weaving, Embroidery, Quilling, Paper Folding, Clay Modeling Tattoo Making Photography, Videography, Digital Art (Related to Computers, Media)
(f) Other Activities: NSS, Gardening, Cooking.

Unit III: Post Activity **(6 Hrs)**

Report preparation/ performance video/ Participation/ Group Activities/ Professional Certification.
Sample Topics in each Performing Activity: Performing, Choreography/Composing/Direction, Backstage Management (Lighting, ...) Literary: Script Writing.

LIST OF ACTIVITIES (to be performed by the student)

1. Students should prepare a short video of his/her own art form. (3-4 min)
2. Students should participate in any of the competitions conducted in the institute or outside the institute as an outcome of the course and show evidence of the same.
3. Students should prepare a portfolio report of his/her work for submission.

Guidelines for Laboratory-Term Work Assessment:

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.
2. Students' progress should be observed continuously. At frequent intervals, students will inform about their progress/lagging. At the end, competitions will be organized as a part of term work assessment.

Physical Education, Sports, and Yoga:

1. Introduction to Sports and Health. **(4 Hrs)**

Need and Importance, History, Types, Typical equipment and other requirements, Precautions, Benefits, Rules and regulations, and Modern trends of Physical Education, Sports, and Yoga (Through classroom videos interaction/Self-learning videos)

2. Physical Fitness Practice: **(12 Hrs)**

1. Importance of Yoga & Fitness.
2. Fundamental Principles of Yoga & Fitness Training.
3. Components of Fitness and Fitness Equipment
4. Types of Yoga Practices - Yogic Asanas, Pranayama and Meditation
5. Introduction to Nutrition and Balanced Diet for Fitness

3. Sports and Games **(12 Hrs)**

Students should select one unique game out of the following in each Semester:

Outdoor Games: Volleyball, Basketball, Softball, Baseball, Netball,

Athletics: Track Events, Long Jump, High Jump, Triple Jump, shot put, Discus Throw, Hammer, Javelin Throw

Indoor Games: Badminton, Table Tennis,
Gymnastics: Mallakhamb, Rope Mallakhamb.

Guidelines for Term Work Conduction:

1. **Physical Education:**
   General & Specific warm-up exercises Recreation Games and Fitness
   Anyone Major Game

2. **Yoga**
   Suryanamaskara
   Basic Set of Yoga Asana
   Basic Set of Pranayama & Meditation

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Ms. Pallavi A. Bokey
co-curricular co-ordinator (cultural)

Dr. Rajveer Shastri
BoS chairman

Dr. Bipin Patil
co-curricular co-ordinator (sports & Yoga)