Syllabus: First Year (FY B. Tech.) Mechanical Engineering

(Pattern 2024) w.e.f. AY:2024-2025

SEMESTER-I

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	ACT	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BS24101	Engineering Mathematics - I	3	-	1	20	20	70	20	-	-	130	3	-	1	4
BS24104	Engineering Chemistry	2	2	-	20	20	50	20	30	-	140	2	1	-	3
ME24101	Basic Thermodynamics	3	2	-	20	20	70	20	-	30	160	3	1	-	4
ME24102	Engineering Graphics	1	2	-	-	-	50	20	-	-	70	1	1	-	2
ME24103	Basics of Electromechanical System	2	-	-	20	20	50	-	-	-	90	2	-	-	2
ME24104	Workshop	-	4	-	20	-	-	20	30		70	-	2	-	2
HS24102	Indian Knowledge System	2	-	-	20	-	-	-	-	30	50	2	-	-	2
HS24103	Co-curricular Course 1	-	4	-	-	-	-	50	-	-	50	-	2	-	2
Total		**13**	**14**	**1**	**120**	**80**	**290**	**150**	**60**	**60**	**760**	**13**	**7**	**1**	**21**

SEMESTER-II

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	ACT	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BS24102	Engineering Mathematics - II	3	-	1	20	20	70	20	-	-	130	3	-	1	4
BS24103	Engineering Physics	2	2	-	20	20	50	20	30	-	140	2	1	-	3
CE24102	Engineering Mechanics	3	2	-	20	20	70	20	30	-	160	3	1	-	4
CO24101	Programming & Problem Solving	3	2	-	20	20	70	20	30	-	160	3	1	-	4
IT24101	Computer Proficiency	-	4	-	20	-	-	20	30	-	70	-	2	-	2
HS24101	Communication and Professional Skills	2	-	-	20	-	-	-	-	30	50	2	-	-	2
HS24104	Co-curricular Course 2	-	4	-	-	-	-	50	-	-	50	-	2	-	2
Total		**13**	**14**	**1**	**120**	**80**	**260**	**150**	**120**	**30**	**760**	**13**	**7**	**1**	**21**

Dept. Academic Coordinator
Mr. S. C. Mahadik

Head of Department
Dr. M. S. Lande

Dean Academic
Dr. S. M. Bhosle

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

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**

Head
First Year
VPKBIET, Baramati-413133

Principal
Vidya Pratishthan's
Kamalnayan Bajaj Institute of
Engineering & Technology, Baramati
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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Id No. PU/PN/Engg/152/2009

First Year B. Tech. (2024 Course)		
ME24101: Basic Thermodynamics		
Teaching Scheme: **TH : 03 Hrs./week** **PR : 02 Hrs./Week**	**Credits: 04** **(Theory: 03,** **Practical: 01)**	**Examination Scheme:** **In Semester : 20 Marks** **End Semester : 70 Marks** **Activity : 20 Marks** **OR Exam : 30 Marks** **TW : 20 Marks**

Prerequisites: Higher Secondary Science courses: Fundamental concepts of Mathematics (e.g. derivative, integration, nature of curves, slope of curve), Physics (e.g. Volume, Pressure, Velocity, Work, Energy).

Course objectives

1. To understand the fundamental concepts and laws of thermodynamics
2. To understand the equations and processes governing the ideal gas behavior
3. To be able to use steam tables/ Mollier charts for reading properties of steam.
4. To understand the basic working of a steam generator.

Course Outcomes: After learning this course, learners will be able to:

1. DESCRIBE the basics of thermodynamics with heat and work interactions.Learn laser mechanism and their prominent applications in various fields.
2. APPLY the first law of thermodynamics to various processes and systems and draw inferences
3. APPLY the concepts of the second law of thermodynamics
4. DETERMINE heat transfer, work transfer & other important thermodynamic properties for the processes undergone by ideal gas
5. DETERMINE the properties of steam
6. DESCRIBE the working of steam generator

Course content

Unit-1: Basic Concepts and Definitions	**[7 Hrs]**
Fundamentals – Role of thermodynamics in mechanical Engineering, Thermodynamic System, Boundary, Types of system, State of system, Properties of system, Control volume, Process, Temperature, Definition of thermal equilibrium and Zeroth law, Temperature scales, Various Thermometers, Definition of heat, Concept of heat and work, Sign convention and its conversion. Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. (Simple numerical)	
Unit-2: The first Law of thermodynamics	**[7 Hrs.]**

Defining Change of energy and Heat Transfer through analysis of the Joule's Experiment, Closed system formulation of First law, Special case: closed system undergoing cycle, Open system formulation of First law of thermodynamics,

Application of first law: Application of first law to flow and non-flow Processes and Cycles. Steady flow energy equation (SFEE), Applications of SFEE to various devices such as Nozzle, Turbine, Compressors, Boilers etc. concept of PMM-I.

Unit-3: Second Law of Thermodynamics and Entropy	**[7 Hrs.]**

Limitations of first law of thermodynamics, Thermal reservoir, Heat Engine, Refrigerator and Heat pump: Schematic representation, Efficiency and Coefficient of Performance (COP), Kelvin-Planck & Clausius Statement of the Second law of Thermodynamics; PMM-II kind, Equivalence of the two statements; Clausius Inequality, Concept of Reversibility and Irreversibility, Carnot Theorem/Principles, Carnot Cycle.
Entropy as a property, Principle of increase of Entropy, Entropy - a measure of Disorder.

Unit 4 Ideal Gas **[7 Hrs.]**

Properties and Processes of Ideal Gas: Ideal Gas definition, Gas Laws: Boyle's law, Charle's law, Avagadro's Law, Equation of State, Ideal Gas constant and Universal Gas constant, Ideal gas Processes- on P-v and T-s diagrams, Constant Pressure, Constant Volume, Isothermal, Adiabatic, Polytropic, Throttling Processes (Open and Closed systems), Calculations of Heat transfer, Work done, Internal Energy, Change of Entropy for an ideal gas.

Unit-5: Properties of Pure substances	**[7Hrs.]**

Properties of Pure substances: Formation of steam at constant pressure , Phase changes, Properties of steam, Use of Steam Tables, Study of P-v, T-s and h-s plots (Mollier Chart) for steam, Dryness fraction and its determination, Study of steam calorimeters: Separating, Throttling and Combined Separating-throttling Calorimeter, various steam processes

Unit-6: Low Pressure Steam Generators	**[7 Hrs.]**

Steam Generators: Classification, Constructional details of low-pressure boilers, Primary Features of high pressure (Power) boilers, Location, Construction and working principle of boiler, Boiler mountings and accessories, Instrumentations required for safe and efficient operation, Introduction to IBR Act.

Text Books:

1. P. K. Nag, "Engineering Thermodynamics", Tata McGraw Hill Publications
2. R. K. Rajput, "Engineering Thermodynamics", EVSS Thermo, Laxmi Publications
3. P. L Ballaney, "Thermal Engineering", Khanna Publishers
4. M M Rathore, "Thermal Engineering", Tata McGraw-Hill
5. S. Domkundwar, C.P. Kothandaraman, A. Domkundwar, " A Course in Thermal Engineering", Dhanpat Rai & Co.

Reference Books:

1. Rayner Joel, "Basic Engineering Thermodynamics", AWL-Addison Wesley
2. Cengel and Boles, "Thermodynamics an Engineering Approach", McGraw Hill
3. G.VanWylen, R.Sonntag and C.Borgnakke, "Fundamentals of Classical Thermodynamics", John Wiley & Sons
4. Holman J.P, "Thermodynamics", McGraw Hill
5. M Achuthan, "Engineering Thermodynamics", PHI
6. Incropera, F. P.and Dewitt, D.P., "Fundamentals of Heat and Mass Transfer, John Wiley and Sons, USA.
7. Steam Tables and Mollier chart

Guidelines for Lab /TW Assessment (Any 8)

1. Demonstration temperature and pressure measuring devices used in various thermal systems.
2. Measurement of Specific Heat of Solid/Liquids.
3. Determination of fuel properties like flash point, pour point and fire point.
4. Demonstrate and Calculation of dryness fraction of steam using combined separating and throttling calorimeter.
5. Validation of the first law of thermodynamics.
6. Demonstration of heat pump and refrigerator and calculation of COP.
7. Demonstration of any two steady flow devices/systems (Boilers, Heat exchangers, compressor, pump, turbine, etc.)
8. Analysis of different processes of ideal gas by using computer programming/software.
9. Analysis of different properties of steam gas by using computer programming/software.
10. Demonstration of water tube boiler, boiler mountings and accessories.
11. Demonstration of a Household Refrigerator.
12. Demonstration of the Air Conditioning system.
13. Assignment on identification and calculation of work interaction between two systems.
14. Assignment on application of the first law of thermodynamics to closed/open system
15. Determination of thermal conductivity of insulating powder.

Activity (Any One):

1. Visit to any Process Industry/Plant having a Boiler equipped with Accessories. The visit report consists of Details about the Industry/Process Plant. Operational description of the Equipment with specification, its use, capacity, application etc.

2. Poster presentation by a group of 2 to 4 students on any syllabus topics.
3. Seminar: Peer teaching learning.

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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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VPKBIET BARAMATI PUNE (MS.)

First Year B. Tech. (2024 Course)		
ME24103: Basic Electromechanical Systems		
Teaching Scheme: **TH : 02 Hrs./week**	**Credits: 02** **(Theory: 02)**	**Examination Scheme:** **In Semester : 20 Marks** **End Semester : 50 Marks** **Activity : 20 Marks**

Prerequisites: Basic knowledge of physics and problem solving skills

Course objectives

1. To impart basic knowledge of electrical quantities and provide working knowledge for the analysis of DC and AC circuit
2. To understand the construction and working principle of DC and AC machine
3. To recognize the e-Vehicle Configurations and Understand its drive and storage systems
4. To gain foundational knowledge in electronics engineering

Course Outcomes: After learning this course, learners will be able to:

1. Understand and apply the fundamental electrical laws
2. Interpret the construction and working of different types of electrical machines
3. Understand the electrical vehicle configuration with respect to its drives and storage system
4. Design and develop basic electronic circuits

Course content

Unit-1: Introduction to Electrical Engineering: Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Energy and Power – Series parallel combination of R, L, C components, Voltage Divider and Current Divider Rules – Super position Theorem, Network Analysis – Mesh and Node methods- Faraday's Laws of Electro-magnetic Induction, Magnetic Circuits, Self and Mutual Inductance, Introduction to 1-Phase and 3-phase systems, Introduction to electric grids.	**[7 Hrs]**
Unit-2: Electrical Machines: DC Motor: Construction, principle of operation, Different types of DC motors, Voltage equation of a motor, significance of back emf, Speed, Torque, Torque-Speed characteristics, Output Power, Efficiency, and applications. Single Phase Transformer: Construction, principle of operation, EMF Equation. Regulation and Efficiency of a Transformer.	**[7 Hrs.]**

Induction Machine: Three Phase Induction Motor: Construction and Principle of Operation, Slip and Torque, Speed Characteristics. Stepper motor: Construction, principle, and mode of operation.	
Unit-3: Electric Vehicle Technology: Brief history of Electric Vehicle (EV), Components of EV, Types and Benefits of EV. **Storage Devices**: Cell construction and working of batteries like Lithium- Iron Phosphate (LFP), Lithium Nickel-Manganese-Cobalt (NMC) and Lithium-Manganese Oxide (LMO), Voltage, Impedance, Ah and Wh Capacity, Cycle Life, Energy density, Power, C-rate and safety aspects, Vehicle Battery Management System - block diagram **Electric Drives**: Factors used for selection of the electric motor in EVs BLDC hub motor drive for EVs, characteristics and speed control of BLDC motor, three phase induction motor drive for EVs	**[7 Hrs.]**
Unit-4: Introduction to Electronics Engineering: Introduction to IC, Logic gates, resistor, capacitor, diodes, LED, relays etc. Arduino Uno Architecture, Major component of IOT (Hardware & Software), IDE setup, Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino. **Overview of Sensors**: working, Analog and Digital Sensors, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino, Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module, Real time Examples of IoT	**[7 Hrs.]**
Text Books: 1. Edward Hughe "Electrical and Electronic Technology", 10th Edition, Pearson Education Asia, 2019. 2. P. Kothari, I J Nagrath, "Electric Machines", 5th Edition, Tata McGraw Hill, 2017. 3. P. Malvino, "Electronic Principles", 7th Edition, Tata McGraw Hill, 2007.	

Reference Books:

1. S. K. Bhattcharya, "Basic Electrical and Electronics Engineering", Pearson, 2012.

2. Vincent Del Toro, "Electrical Engineering Fundamentals", Prentice Hall of India Private Limited, 2nd Edition, 2003.

3. David Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2008.

4. Michael Tooley A., "Electronic circuits: Fundamentals and Applications", 3rd Edition, Elsevier Limited, 2006.

Activity (Any One):

1. Case study of Electric Vehicle which must include its electrical and electronics configuration.

2. Electronics circuit design for a problem statement using any software/hardware, making use of sensors.

3. Electrical/Electronic circuit design for an identified problem statement.

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First Year B. Tech. (2024 Course)		
ME24104: Workshop		
Teaching Scheme: **PR : 04 Hrs./Week**	**Credits: 02**	**Examination Scheme:** **Activity : 20 Marks** **TW : 20 Marks** **PR Exam : 30 Marks**

Pre-requisites: Knowledge of general safety protocols, Basic understanding of material selection and process for different mechanical jobs.

Course objectives:

1. To ensure that students are aware of and can follow safety protocols.
2. To familiarize students with common hand tools and their applications.
3. To understand metalworking and woodworking techniques.
4. To apply measuring and assembly skills in practical tasks.

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

1. Familiar with safety norms to prevent any mishap in the workshop.
2. Able to understand the construction, working and functions of machine tools and their parts.
3. Able to handle appropriate hand tools, cutting tools and machine tools to manufacture a job.
4. Able to use measuring instruments and fitting tools for assembly and disassembly.

List of experiments (Eight practicals are mandatory)

1. Mandatory briefing on shop-floor safety, industry safety and factories acts.
2. Demonstration of Measuring Instruments, Cutting Tools and Clamping Devices used in workshop.
3. Demonstration and working of Centre lathe Demonstration on various functions of lathe parts: Headstock, Tailstock, Carriage, Lead screw, all geared Mechanism, Apron mechanism etc.
4. Demonstration of Drilling Machine Demonstration on construction of Drilling machines, Tool holding devices, Concept of speed, feed and depth of cut.
5. Introduction and demonstration of CNC/VMC machines.
6. Introduction and demonstration of 3D printing.
7. Assembly and Disassembly of mechanical systems in the workshop (e.g.

gearbox, fan/blower, bench vice, tailstock, etc.)

8. One utility job on sheet metal operations on Power Press (punching, blanking, bending, etc.)
9. One utility job preferably using sheet metal (e.g. Tray, Funnel, etc.) with or without riveting/welding/brazing/soldering (as per requirements).
10. One utility job on simple Lathe operations: Step turning and facing, drilling operation on a Mild Steel cylindrical job on Centre Lathe. Understanding the concept of speed, feed and depth of cut.
11. One utility job involving fitting to size, male-female fitting with drilling and tapping operation on Mild Steel Plate.
12. One utility job of Carpentry Introduction to woodworking, kinds of woods, hand tools & machines, Types of joints, wood turning, etc.

Guidelines for Laboratory Conduction: Each practical will be of 4 hrs.

*i. 1st and 2nd experiments are **mandatory**.*

*ii. 3rd to 6th Sessions are about demonstration experiments **(Any 2)***

*iii. 7th to 12th on making utility job **(Any 4** in a group of 4 to 5 students)*

Guidelines for Student's Lab Journal

i. Students have to maintain a workshop diary consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job and time schedule.

ii. Students have to maintain one file for write ups based on demonstration of machine tools and safety norms.

Course Activity (20 Marks)

Any of the following activities should be completed by a group of students (minimum 2/Max 5 members) for 20 Marks.

A) Manufacturing a useful product by metal working or wood working techniques (combination of fitting/welding/sheet metal/smithy/plumbing operations are allowed if required)

B) Field Visit to engineering workshop/industry/startup

C) Design and manufacturing of simple object using 3D printing.
D) Experimental report on machining/manufacturing concept

Books:

Text Books:

1. Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.
3. John, K. C., (2010),"Mechanical Workshop Practice, Prentice Hall Publication, New Delhi.

Reference Books

1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2. Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
3. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

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

VPKBIET BARAMATI PUNE (MS)

Head
Department of Mechanical Engineering
VPKBIET Baramati - 413133

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

Course Name with Code: Engineering Mechanics (CE24102)		
Teaching Scheme: **TH: 03 Hours/week** **PR: 02 Hours/Week**	**Credits** **04**	**Examination Scheme:** **Activity: 20 Marks** **In Semester:20Marks** **End Semester: 70 Marks** **TW: 20 Marks** **PR: 30 Marks**

Prerequisites:

1.Basic principles of trigonometry
2.Geometry
3.Algebra
4.Linear differentiation and integration
5.Principles of Physics (equations of motions)

Companion Course, if any: Laboratory Practical

Course Objectives:

1. To impart knowledge about force systems and methods to determine resultant of force system.
2. To impart knowledge about Principle of equilibrium to determine- reaction of beams, support reactions, friction forces.
3. To study the structural members and calculate member forces in trusses, cables and frames.
4. To impart knowledge about centroid and center of gravity to determine resultant centroid and moment of inertia
5. To train students to solve application problems related to particle mechanics using principles of kinematics, kinetics and work power energy.

Course Outcomes:

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

CO1: Determine resultant of various force systems.
CO2: Determine reactions of beams, sphere, strings and friction forces using principles of equilibrium.
CO3: Solve trusses, cables for finding member forces and apply principles of equilibrium.
CO4: Determine centroid of area and moment of inertia for plane lamina and composite figures.
CO5: Calculate position, velocity and acceleration of particle using principles of kinematics.
CO6: Calculate position, velocity and acceleration of particle using principles of kinetics and Work & Energy.

Course Contents

Unit I: Resolution and Composition of Forces **(07 Hours)**

Introduction and Principle of statics, force systems, Principle of superposition & Transmissibility, resolution and composition of forces, resultant of concurrent forces, moment of a force, Couple, Varignon's theorem, resultant of parallel force system, Equivalent Force Couple system.

Unit II: Equilibrium and Friction **(07 Hours)**

Equilibrium

Free body Diagram, equilibrium of concurrent, parallel forces in a plane, equilibrium of general forces in plane equilibrium of three forces. Types of beams: simple and compound beams, type of loads, types of supports.

Friction

Introduction to friction, Law of friction, application of friction on Blocks and ladder, application to flat belt.

Unit III: Analysis of Structures **(07 Hours)**

Analysis of plane trusses by method of joint, analysis of plane trusses by method of section, cables with supports at same and different level subjected to point loads, Analysis of simple plane frame.

Unit IV: Centroid of Plane Lamina, Moment of Inertia **(07 Hours)**

Centroid of plane lamina, moment of inertia (MI), perpendicular axis theorem, parallel axis theorem, MI of standard shapes.

Unit V: Kinematics of Particle **(07 Hours)**

Kinematics of linear motion, constant acceleration, motion under gravity, equations of motions in cartesian and path coordinates for curvilinear motion, projectile motion.

Unit VI: Kinetics of Particle **(07 Hours)**

Newton's second Law and its applications to rectilinear motion, curvilinear motion, and introduction to work energy principle and impulse momentum equation, direct and central impact, coefficient of restitution.

Books & Other Resources:

Text Books:

1. Vector Mechanics for Engineers STATICS - Beer & Johnston, Tata McGrawHill Publications, 12th Edition, (2018)
2. Vector Mechanics for Engineers DYNAMICS - Beer & Johnston, Tata McGrawHill Publications, 12th Edition,(2018)
3. Engineering Mechanics: Statics and Dynamics - A. K. Tayal, Unmesh Publications, 11th Edition, (2000)
4. Engineering Mechanics- Bhavikatti , Newage Publications, 8th Edition, (2017)

Reference Books:

1. Engineering Mechanics -Singer Harper & Row, Hill Publishers, 3rd Edition, (1975)
2. Engineering Mechanics - Meriam and Crage , Wiley Publications, 9th Edition, (2020)
3. Engineering Mechanics -Timoshenko and Younge, McGraw Hill Publications, 5th Edition, (2013)
4. Introduction of Engineering Mechanics- S. Rajshekaran and G Sankarasubramanian, Vikas Publications, 1st Edition, (2011)
5. Engineering Mechanics- R.S. Khurmi, S. Chand Publications, 3rd Edition, (2019)

Laboratory Course

Guidelines for Instructor's Manual

An instruction manual with aim, objective, apparatus, procedure and calculations to be performed for each experiment to be provided for students called as Lab Manual. Every year problems for assignment should be changed. It is advisable to give different data to different batches.

Guidelines for Student's Lab Journal

Journal should be hand written Guidelines for Lab /TW Assessment Each and every experiment should be assessed and given mark out of 10. Finally the marks can be converted as per given in the structure.

Guidelines for Laboratory Conduction

Divide the students of a batch in groups of not more than 4 students and ask each group to take readings separately followed by calculations for each experiment. After every experiment faculty should sign the lab manual of readings of every student in the batch.

Suggested List of Laboratory Experiments/Assignments

Group-A (Any five of the following)

1. To verify the law of polygon of forces by using universal force table.
2. To determine support reaction of cantilever or simply supported beams using beam apparatus.
3. Determine the coefficient of friction using belt.
4. To study the curvilinear motion of the particle.
5. Determine the coefficient of restitution using different materials.
6. Determine the reactions at support for the loaded simply supported truss.
7. Calculation of centroid for the various definite/indefinite shapes.

Group B

Assignment of minimum five problems on every unit to be solved during practical sessions.

Activity:

Preparation of mini projects/model making in a group of 3 to 4 students based on engineering mechanics concepts.

Course Coordinator (Dr. Y.H. Tambe)

Dept. Autonomy Coordinator (Dr. G.N. Nanwl)

BOS Chairman

Principal

Head
Department of Civil Engineering
VPKBIET, Baramati-413133

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

DEPARTMENT OF CIVIL ENGINEERING
VPKBIET
Baramati
413133

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.

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

Principal
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Engineering & Technology, Baramati
Vidyanagari, Baramati-413133

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

ABP.
Dr. Anil Patil

Prof. R.K. Shastri

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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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Prof. R. K. Shastri

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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)