SHRI SANT GADGE BABA COLLEGE OF ENGINEERING AND TECHNOLOGY, BHUSAWAL

(AN AUTONOMOUS INSTITUTE)

FIRST YEAR ENGINEERING

COMMON TO ALL BRANCHES UNDER NEP 2020 GUIDELINES

[With effect from the academic year 2025-26]

		SEMESTER-I (Group A)										
Sr	**Course Category**	**Course Code**	**Course Title**	**Teaching Schedule**			**Evaluation Scheme**			**Total [A+B+C]**	**Credit**
				L	**T**	**P**	**Continuous Assessment**		**ESE (C)**		
							CA (A)	**MSE (B)**			
		Induction programme									
1	BSC	BT25BSOM1101	Engineering Mathematics-I	3	--	--	20	20	60	100	3
2	BSC	BT25BSOCH102	Engineering Chemistry	3	--	--	20	20	60	100	3
3	ESC	BT25ESOPP103	Programming for Problem Solving	3	--	--	20	20	60	100	3
4	ESC	BT25ESOEM104	Engineering Mechanics	3	--	--	20	20	60	100	3
5	PCC	BT25PCOCM105	Basics of Civil and Mechanical Engineering	2	--	--	20	20	60	100	2
6	VSEC	BT25VSODT106	Design Thinking	2	--	--	50	--	–	50	2
7	CC	BT25CCOYG107	Yoga/NSS/NCC	--	--	4	50	--	–	50	2
8	BSC	BT25BSOCL108	Engineering Chemistry Lab	--	--	2	50	--	50	100	1
9	AEC	BT25AEOPL109	Programming for Problem Solving Lab	--	--	2	50	--	50	100	1
10	ESC	BT25ESOML110	Engineering Mechanics Lab	--	--	2	50	--	50	100	1
11	MDM	BT25MDOEE111	Energy and Environmental Engineering	1	--	--	50	--	–	50	1
				17		10	400	100	450	950	
										Total	**22**

		SEMESTER-II (Group A)									
Sr No	**Course Category**	**Course Code**	**Course Title**	**Teaching Schedule**			**Evaluation Scheme**			**Total [A+B+C]**	**Credit**
				L	**T**	**P**	**Continuous Assessment**		**ESE (C)**		
							CA (A)	**MSE (B)**			
1	BSC	BT25BSEM2112	Engineering Mathematics-II	3	--	--	20	20	60	100	3
2	BSC	BT25BSEPH113	Engineering Physics	3	--	--	20	20	60	100	3
3	ESC	BT25ESEEE114	Basics of Electrical and Electronics Engineering	2	--	--	20	20	60	100	2
4	ESC	BT25ESEEG115	Engineering Graphics	2	--	--	20	20	60	100	2
5	HSSM	BT25HMECS116	Effective Communication Skills	2	--	--	20	20	60	100	2
6	VSEC	BT25VSEWP117	Workshop Practices	--	--	4	50	--	–	50	2
7	IKS	BT25IKEIK118	IKS Bucket	2	--	--	50	--	–	50	2
8	CC	BT25CCEHW119	Health and Wellness Management	--	--	4	50	--	–	50	2
9	BSC	BT25BSEPL120	Engineering Physics Lab	--	--	2	50	--	50	100	1
10	ESC	BT25BSEEL121	Basics of Electrical and Electronics Engineering Lab	--	--	2	50	--	50	100	1
11	ESC	BT25BSEGL122	Engineering Graphics Lab	--	--	2	50	--	50	100	1
12	AEC	BT25AEECL123	Effective Communication Skills Lab	--	--	2	50	--	–	50	1
				14		16	450	100	45	1000	
										Total	**22**

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FIRST YEAR ENGINEERING

COMMON TO ALL BRANCHES UNDER NEP 2020 GUIDELINES

[With effect from the academic year 2025-26]

SEMESTER-I (Group B)											
Sr No	Course Category	Course Code	Course Title	Teaching Schedule			Evaluation Scheme			Total [A+B+C]	Credit
				L	T	P	Continuous Assessment		ESE (C)		
							CA (A)	MSE (B)			
Induction programme											
1	BSC	BT25BSOM1101	Engineering Mathematics-I	3	--	--	20	20	60	100	3
2	BSC	BT25BSOPH113	Engineering Physics	3	--	--	20	20	60	100	3
3	ESC	BT25ESOEE114	Basics of Electrical and Electronics Engineering	2	--	--	20	20	60	100	2
4	ESC	BT25ESOEG115	Engineering Graphics	2	--	--	20	20	60	100	2
5	HSSM	BT25HMOCS116	Effective Communication Skills	2	--	--	20	20	60	100	2
6	VSEC	BT25VSOWP117	Workshop Practices	--	--	4	50	--	–	50	2
7	IKS	BT25IKOIK118	IKS Bucket	2	--	--	50	--	–	50	2
8	CC	BT25CCOHW119	Health and Wellness Management	--	--	4	50	--	–	50	2
9	BSC	BT25BSOPL120	Engineering Physics Lab	--	--	2	50	--	50	100	1
10	ESC	BT25BSOEL121	Basics of Electrical and Electronics Engineering Lab	--	--	2	50	--	50	100	1
11	ESC	BT25BSOGL122	Engineering Graphics Lab	--	--	2	50	--	50	100	1
12	AEC	BT25AEOCL123	Effective Communication Skills Lab	--	--	2	50	--	–	50	1
				14		16	450	100	450	1000	45
										Total	**22**

SEMESTER-II (Group)											
Sr	Course Categ-ory	Course Code	Course Title	Teaching Schedule			Evaluation Scheme			Total [A+B+C]	Credit
				L	T	P	Continuous Assessment		ESE (C)		
							CA (A)	MSE (B)			
1	BSC	BT25BSEM2112	Engineering Mathematics-II	3	--	--	20	20	60	100	3
2	BSC	BT25BSECH102	Engineering Chemistry	3	--	--	20	20	60	100	3
3	ESC	BT25ESEPP103	Programming for Problem Solving	3	--	--	20	20	60	100	3
4	ESC	BT25ESEEM104	Engineering Mechanics	3	--	--	20	20	60	100	3
5	PCC	BT25PCECM105	Basics of Civil and Mechanical Engineering	2	--	--	20	20	60	100	2
6	VSEC	BT25VSEDT106	Design Thinking	2	--	--	50	--	–	50	2
7	CC	BT25CCEYG107	Yoga/NSS/NCC	--	--	4	50	--	–	50	2
8	BSC	BT25BSECL108	Engineering Chemistry Lab	--	--	2	50	--	50	100	1
9	AEC	BT25AEEPL109	Programming for Problem Solving Lab	--	--	2	50	--	50	100	1
10	ESC	BT25ESEML110	Engineering Mechanics Lab	--	--	2	50	--	50	100	1
11	MDM	BT25MDEEE111	Energy and Environmental Engineering	1	--	--	50	--	–	50	1
				17		10	400	100	450	950	100
										Total	**22**

SEMESTER-I

Subject: **Engineering Mathematics-I** Subject Code: **BT25BSOM1101**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12th science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

- **Course Objectives:**

1. To know the application of the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problems.
2. To determine Eigen values and Eigen vectors of matrix and applications to Scaling, Rotation and Translation.
3. To know and apply the concept partial derivatives and Euler's theorem.
4. To understand the applications of partial differentiations to Jacobian of functions of several variables, Maxima/ Minima, Lagrange's method.
5. To demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.

- **Course Outcomes:**

CO1: Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problems.

CO2: Apply the matrix technique to find Eigen values and Eigen vectors and applications to rotation , scaling and translation.

CO3: Demonstrate the concept partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions.

CO4: Compute Jacobian of functions of several variables and their applications to engineering problems.

CO5: Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	2	-	-	-	-	-	-	-	2
CO2	3	-	2	-	-	-	-	-	-	-	2
CO3	3	-	2	-	2	-	-	-	-	-	2
CO4	3	-	2	-	1	-	-	-	-	-	2
CO5	3	-	2	-	-	-	-	-	-	-	2

SYLLABUS

Unit I: Rank of Matrix and Applications [07 Hours]

Rank of a matrix; Echelon Form, Normal form, PAQ normal form of a matrix; Consistency of non- homogeneous and homogeneous system of linear equations; Orthogonal Transformations. Applications to Electrical Networks.

Unit II: Eigen Values and Eigen Vectors [07 Hours]

Eigen values and Eigen vectors; Properties of Eigen values and Eigen vectors (without proofs); Cayley-Hamilton‘s theorem (without proof) and its applications. Applications of matrix to rotation, translation and scaling.

Unit III: Partial Differentiation [07 Hours]

Partial derivatives of first and higher orders; Homogeneous functions – Euler‘s Theorem for functions containing two and three variables (without proofs); Total derivatives; Change of variables

Unit IV: Applications of Partial differentiation [07 Hours]

Jacobians; Functional dependence and independence; Taylor‘s and Maclaurin‘s theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange‘s method of undetermined multipliers.

Unit V: Vector Differentiation [07 Hours]

Introduction to vector algebra; Displacement, velocity and acceleration; Scalar and vector fields: Gradient, divergence and curl; Solenoidal and irrotational vector fields; Vector identities (statement without proofs).

Text Books:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3. A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware,
1. Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar,
2. Pune Vidyarthi Griha Prakashan,Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO.
3. Pvt. Ltd., New Delhi.

Reference Books:

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw- Hill Publishing
4. Company Ltd., New Delhi.

Subject**: Engineering Chemistry**

Subject Code:**BT25BSOCH102/ BT25BSECH102**

Teaching scheme		Examination scheme			Credit
Th(Hrs/week)	Tu (Hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

This course is aimed at introducing the fundamentals of basic sciences (Chemistry) to under graduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic Principles of Chemistry and their applications in different branches of engineering.

- **Course Objectives:**

1. To know the demonstration of knowledge of Chemistry in technical fields.
2. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. To understand and develop the importance of water in industrial and domestic usage.
4. To identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields
5. To examine a fuel and suggest alternative fuels.

- **Course Outcomes:**

CO1: Demonstrate knowledge of chemistry in technical fields.

CO2: Bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer

CO3: Develop the importance of water in industrial and domestic usage

CO4: Identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields

CO5: Examine a fuel and suggest alternative fuels.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	-	-	-	-	-	-	-
CO3	-	3	3	1	1	-	-	-	-	-	-
C04	-	-	-	-	-	-	1	-	-	-	-
C05	-	-	-	3	-	1	3	-	-	-	-

SYLLABUS

Unit I: Water Technology [08 Hours]

Impurities in water, hardness of water, its types, Units and numerical on hardness determination. Determination of hardness by EDTA, alkalinity, effects of hard water in boiler - priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge.

Water treatment: i) Zeolite method ii) Demineralization method.

Unit II: Fuels [09 Hours]

Introduction (definition, classification of fuel. characteristics of an ideal fuels. Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Determination of Calorific value by Bomb calorimeter and Boy's gas calorimeter, Solid fuel: Coal: Analysis of Coal-Proximate and Ultimate analysis.

Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range

Gaseous fuel: Composition, properties and applications of producer gas & water gas.

Unit III: Polymers [06 Hours]

Introduction, Classification of polymers, Mechanism of addition polymerization. Preparation, properties & applications of – Polyethylene, Polystyrene, PVC, Nylon 66, Teflon.

Synthetic Rubber – preparation, properties & applications of Styrene butadiene rubber (SBR), Nitrile rubber, Butyl rubber.

Unit IV: Electrochemistry [06 Hours]

Introduction, Conductance measurement by Wheatstone bridge method, Cell constant,

Conductometric titrations, Glass electrode and its application for pH measurement, Ostwald's theory of acid- base indicator, Fuel cell , working of H2-O2 fuel cell and its applications, Rechargeable Batteries: Lithium ion batteries and Lithium batteries.

Unit V: Corrosion and its Control Measures [06 Hours]

Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion and waterline corrosion, Factors affecting the rate of corrosion, protection techniques – Cathodic protection & anodic protection, galvanization and tinning.

Text Books:

6. Jain P.C & Jain Monica, Engineering Chemistry, DhanpatRai& Sons, Delhi, 1992.
7. Bhal&Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
8. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge
9. Publishers - 2015.
10. V. R.Gowarikar, Polymer Science, New Age International Publication

Reference Books:

1. Barrow G.M. Physical Chemistry, McGraw-Hill Publication, New Delhi.
2. O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3. WILEY, Engineering Chemistry,WileyIndia,NewDelhi2014.
4. S.S.Dara, Engineering Chemistry,McGraw Hill Publication, New Delhi.

Subject: **Programming for Problem Solving**

Subject Code: **BT25ESOPP103/ BT25ESEPP103**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

This course introduces students to computational thinking and problem-solving techniques using the Python programming language. It is aimed at beginners and focuses on developing skills to design algorithms and write efficient, readable, and modular code to solve real-world problems. Python is used due to its simplicity, readability, and wide applicability in fields like data science, automation, and web development. The course covers basic programming constructs, control structures, functions, data structures (lists, tuples, dictionaries, and sets), file handling, and an introduction to object-oriented programming. Students will apply these concepts through hands-on labs and assignments designed to build confidence and proficiency in programming.

- **Course Objectives:**

1. To introduce fundamental concepts of programming and problem-solving.
2. To develop algorithmic thinking and structured coding habits using Python.
3. To use built-in data structures and libraries for efficient problem solving.
4. To prepare students for more advanced computing courses or applications.
5. To learn features of object oriented programming concepts using python.

- **Course Outcomes:**

CO1: Inculcate and apply various skills in problem solving.

CO2: Choose appropriate programming constructs and features to solve the problems in diversified domains.

CO3: Exhibit the programming skills for the problem-solving using functions and string manipulations.

CO4: Demonstrate File handling and dictionaries in Python.

CO5: Apply Object Oriented concepts in Python.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	-	-	-	1	-	1	2	-	2
CO2	3	2	2	-	2	1	-	2	2	-	3
CO3	3	2	-	-	3	-	-	1	2	-	2
CO4	2	2	-	3	3	-	-	1	-	-	-
CO5	3	2	3	-	3	-	-	1	2	-	3

SYLLABUS

Unit I: Problem Solving, Programming and Python Programming [07 Hours]

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

Basics of Python Programming: Features of Python, History and Future of Python, Programming Paradigm, and Features of Object Oriented Programming, Applications of Python Languages.

Unit II: Advance Data Types and Decision Control Statements [07 Hours]

Advance data types- Tuples, Lists, Sets and Dictionary. Decision Control Statements: Decision control statements, Selection/conditional branching

Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative Statements, while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops.

Unit III: Functions and Strings [07 Hours]

Functions: Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.

Strings and Operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation,

ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module

Unit IV: File Handling and Dictionaries [07 Hours]

Files: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files. File Positions, Renaming and deleting files. Directory Methods,

Dictionaries creating, assessing, adding and updating values. Case Study: Study design, features, and use of any recent, popular and efficient system developed using Python. (This topic is to be excluded for theory examination)

Unit V: Object Oriented Programming [07 Hours]

Structured and object oriented: Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation.

Classes and Objects: classes and objects, class method and self-argument, __init__() method, class variables and object variables, __del__() method, public and private members, Built in function to check, Get, Set and Delete class attribute, Garbage collection, class methods, Static Method

Text Books:

5. Downey, A. B. (2015). Think Python: How to think like a computer scientist (2nd ed.). O'Reilly Media.
6. Thareja, R. (2017). Python programming. Oxford University Press.
7. Severance, C. R. (2016). Python for everybody: Exploring data in Python 3. CreateSpace Independent Publishing Platform.

Reference Books:

1. Sweigart, A. (2015). Automate the boring stuff with Python: Practical programming for total beginners. No Starch Press.
2. Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming (1st ed.). O'Reilly Media.
3. Lutz, M. (2013). Learning Python (5th ed.). O'Reilly Media.
4. Zelle, J. M. (2010). Python programming: An introduction to computer science (3rd ed.). Franklin, Beedle & Associates.

Web Resources

- https://docs.python.org/3/
- https://www.geeksforgeeks.org/python-programming-language/
- https://www.w3schools.com/python/

- http://pythontutor.com/
- https://www.programiz.com/python-programming
- https://stackoverflow.com/questions/tagged/python

Online Courses

- **Coursera - Python for Everybody by University of Michigan**
  - https://www.coursera.org/specializations/python
- **edX - Introduction to Python Programming by Georgia Tech**
  - https://www.edx.org/course/introduction-to-python-programming

Subject: **Engineering Mechanics**

Subject Code: **BT25ESOEM104/ BT25ESEEM104**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

  Mechanics mainly deals with problems connected with beam reaction , motion or equilibrium of material and bodies and resulting interaction between them. Its purview come varieties of general and specialized engineering discipline connected with mining structures, machine mechanism or their parts. Basic understanding of the concept and principles involved in mechanics is essential. Application of the principles to engineering situation relevant to mining should be emphasized.

- **Course Objectives:**

1. To understand the resolving forces and moments for a given force system.
2. To know and apply Conditions of static equilibrium to analyze given force system.
3. To compute Centre of gravity.
4. To compute the motion characteristics of a body/particle for a Rectilinear Motion.
5. To know and discuss relation between force and motion characteristics.

- **Course Outcomes:**

CO1: Apply fundamental Laws of Engineering Mechanics

CO2: Apply Conditions of static equilibrium to analyze given force system

CO3: Compute Centre of gravity and Moment of Inertia of plane surfaces

CO4: Compute the motion characteristics of a body/particle for a Rectilinear Motion

CO5: Know and discuss relation between force and motion characteristics

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	-	-	-	-	-	-	-	-	1
CO2	3	1	-	-	-	-	-	-	-	-	1
CO3	3	1	-	-	-	-	-	-	-	-	1
C04	3	1	-	-	-	-	-	-	-	-	1
C05	3	1	-	-	-	-	-	-	-	-	1

SYLLABUS

Unit I: Introduction and Fundamental principles [07 Hours]

Force, Rigid body, Types of force system, Principals of Statics, composition and resolution of forces, Moment of forces, Couples, Varignon's theorem, Resultant of concurrent force system in plane, Resultant of non-concurrent force system in plane.

Unit II: Equilibrium [07 Hours]

Introduction, Conditions of static equilibrium, free body diagram, Lami's theorem, various types of supports and support reactions, various types of loads, Determination of reactions at supports for beams.

Unit III: Centre of Gravity & Friction [07 Hours]

a) Centre of Gravity: Centre of mass and Centroid: Introduction, Centre of gravity, Centre of mass, centroid of composite plane figures, Numerical on Centroid of composite plane figures.

b) Friction -Introduction, laws of friction, simple contact block friction , application of friction on horizontal and inclined planes. ladder friction.

Unit IV: Kinematics of rectilinear & curvilinear motion of particle [07 Hours]

a) Kinematics of rectilinear motion of particle: Introduction, basic concepts, types of rectilinear motions, motion under gravity , constant and variable acceleration.

b) Kinematics of curvilinear motion of particle: Introduction, basic concepts, motion along curved path, normal and tangential components of motion, rectangular and path coordinate systems, projectile motion.

Unit V: Kinetics of rectilinear motion of particle [07 Hours]

a) D Alembert's Principle, Newton's second law of motion,

b) Conservation of energy and work energy principle for motion of particles.

c) Impulse, momentum, direct central impact and coefficient of restitution. Conservation of momentum & impulse momentum principle of particle.

Text Books:

1. S. C. Gupta, Engineering Mechanics, Nirali Prakashan
2. Sanju Unadkat, Engineering Mechanics, Techmax Publication.
3. Engineering Mechanics A. K. Tayal, Umesh Publications
4. Engineering Mechanics, Jayant Asnare,Nirali Publication.

Reference Books:

8. Engineering Mechanics, R.S. Khurmi, S. Chand Publications
9. Bhavikatti S.S., Rajashekarappa K.G., Engineering Mechanics , New Age International Publications
10. S.Ramamrutham, Engineering Mechanics, Dhanpat Rai Publication.
11. Engineering Mechanics Timoshenko and Younge, McGraw Hill Publications

Subject: **Basics of Civil and Mechanical Engineering** Subject Code: **BT25PCOCM105/ BT25PCECM105**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	20	20	60	

Course Description:

Objective of this course is to provide an insight and inculcate the essentials of Civil Engineering discipline to the students of all branches of Engineering and to provide the students an illustration of the significance of the Civil Engineering Profession in satisfying the societal needs. To introduce the students to the basic principles of mechanical engineering.

- **Course Objectives:**

1. To Identify various Civil Engineering materials and choose suitable material among various options.
2. To know and apply principles of surveying to solve engineering problem
3. To Identify various Civil Engineering structural components and select appropriate structural system among various options
4. To Explain and define various properties of basic thermodynamics, materials and manufacturing processes.
5. To know and discuss the working principle of various power consuming and power developing devices.

- **Course Outcomes:**

CO1: Identify various Civil Engineering materials and choose suitable material among various options.

CO2: Apply principles of surveying to solve engineering problem

CO3: Identify various Civil Engineering structural components and select appropriate structural system among various options

CO4: Explain and define various properties of basic thermodynamics, materials and manufacturing processes.

CO5: Know and discuss the working principle of various power consuming and power developing devices

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	1	-	-	-	-	-
CO2	3	2	-	-	-	1	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-
C04	3	2	-	-	-	-	-	-	-	-	-
C05	3	2	-	-	-	-	-	-	-	-	-

SYLLABUS

Unit I: Introduction to Civil Engineering [05 Hours]

Various Branches, role of civil engineer in various construction activities, basic engineering properties and uses of materials: bricks, timber, stones, sand, aggregates, cement, mortar, concrete.

Unit II: Building Components & Building Planning [05 Hours]

Foundation and superstructure, functions of foundation, types of shallow and deep foundations, suitability in different situation, plinth, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, ventilation, basics of plumbing and sanitation

Unit III: Surveying [05 Hours]

Principles of surveying, introduction to compass, bearing, Whole Circle Bearing & reduced Bearing System and measurement of included angles. introduction to levelling, concept of bench marks, reduced level, contours

Unit IV: Introduction to Laws of Thermodynamics, Basic terminology [05 Hours]

Introduction to Laws of Thermodynamics with simple examples pertaining to respective branches, IC Engines: Classification, Applications, Basic terminology, 2 and 4 stroke IC engine working principle, Power Plant: Types of Power plant; Gas power plant, Thermal power plant, Nuclear power plant, Automobiles: Basic definitions and objectives.

Unit V: Design Basics [05 Hours]

Machine and Mechanisms, Factor of safety, Engineering Materials: types and applications, basics of Fasteners Machining and Machinability, Introduction to Lathe

machine, Drilling machine, Milling machine, basics of machining processes such as turning, drilling and milling, Introduction to casting.

Text Books:

1. Basic Civil & Mechanical Engineering, Nirali publication
2. Anurag Kandya, “Elements of Civil Engineering”, Charotar Publishing,Anand
3. M. G. Shah, C. M. Kale, and S. Y. Patki, “Building Drawing”, Tata McGrawHill
4. Punmia, “Surveying”, Vol.- I, Vol.-II, Vol.-III, Laxmi Publications
5. Sushil Kumar, “Building Construction”, Standard PublishersDistributors
6. Gopi Satheesh, “Basic Civil Engineering”, PearsonEducation
7. G. K. Hiraskar, “Basic Civil Engineering”, Dhanpat RaiPublications
8. V. B. Bhandari, “ Deisgn of Machine Elements”, Tata McGraw Hill Publications, NewDelhi

Reference Books:

1. Kanetkar T. P. and Kulkarni S. V., “Surveying and Levelling”, Vols. I, II and III, Vidyarthi Gruh Prakashan,Pune
2. Ghosh, A K Malik, “Theory of Mechanisms and Machines”, Affiliated East West Press Pvt. Ltd. NewDelhi.
3. P. K. Nag “Engineering Thermodynamics”, Tata McGraw Hill, New Delhi 3rd ed.2005

Subject Code: **BT25VSODT106/ BT25VSEDT106**

Subject: **Design Thinking**

Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	--	50	--	

- **Course Description:**

  Design Thinking and Innovation will teach you how to leverage fundamental design thinking principles and innovative problem-solving tools to address business challenges and build products, strategies, teams, and environments for optimal use and performance.

- **Course Objectives:**

  1. A design thinking course aims to equip individuals with a human-centered, iterative problem-solving approach.

  2. Participants learn to empathize with users, define problems, generate innovative ideas, prototype solutions, and test them iteratively

  3. The overall objective is to foster creativity, collaboration, and a practical, solution-oriented mindset applicable to various fields.

  4. Individuals can become more innovative, empathetic, and effective problem solvers by cultivating these skills and mindsets.

  5. The course will cover various prototyping methods (e.g., low-fidelity, high-fidelity) and testing techniques to gather feedback and iterate on designs.

- **Course Outcomes:**

CO1: Compare and classify the various learning styles and memory techniques apply them in engineering education.

CO2: Analyze emotional experience and inspect emotional expressions to better understand users while designing innovative products.

CO3: Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products.

CO4: Propose real-time innovative engineering product design and choose appropriate frameworks, strategies, techniques during prototype development.

CO5: Perceive individual differences and its impact and everyday decisions and further create better customer experience.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	1	1	1	1	--	--	1	--	1
CO2	2	2	3	2	--	--	--	1	--	--	1
CO3	2	2	2	--	2	1	1	--	2	1	--
C04	2	--	2	1	3	--	--	--	2	--	--
C05	1	--	--	1	--	2	1	--	1	2	--

SYLLABUS

Unit I: Memory Understanding the Learning Process, Kolb's Learning Style, Assessing and Interpreting, Understanding the Memory Process, Problem in Retention, Memory Enhancement Techniques. **[04 Hours]**

Unit II: Understanding the emotions: Experience and Expressions, Assessing Empathy, Application with Peers, Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concept and Brain Storming, Stages of Design Thinking Process (explain with examples) Empathize, Define, Ideate, Prototype, Test. **[04 Hours]**

Unit III: Understanding the Creative Design Thinking Process, Understanding Problem Solving, Testing Creative Problem Solving, Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of Best Product Design and Function, Assignment Engineering Product Design. **[04 Hours]**

Unit IV: What is Prototype?, Why Prototype?, Rapid Prototype Development Process, Testing, Sample Examples. **[04 Hours]**

Unit V: Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product Experience, Alignment of Customer Expectations with Product Design. **[04 Hours]**

Text Books:

12. Karmic Design Thinking by Prof. BalaRamadurai
13. Muhammad MashhoodAlam, Transforming an idea into Business with Design Thinking. First Edition, Taylor and Francies Group, 2011.

14. S. Balarara, Thinkig Design, Stage Publications, 2011

Reference Books:-

1. Tim Brown, Change by Design. How Design Thinking Transforms Organizations end Inspires Innovation. HarperCollins e-books, 2009.
2. Michael Lewrick, Patrik Link, Larry Leifer, Fire Design Thinking Toolbox, John Wiley & Sons, 2020
3. Kristin Fontichiaro, Design Thinking, Cherry Lake Publishing, USA, 2015
4. Walter Brenner, Falk Uebemickel, Design Thinking for Innovation- Research and Practice, Springer Series, 2016.
5. Gavin Ambrose, Paul Hands, Design Thinking, AVA Publishing, 2010

Subject: **Yoga Education**

Subject Code:**BT25CCOYG107/ BT25CCEYG107**

Teaching scheme	Examination scheme		Credit
(Hrs/week)	CA (PR)	ESE (PR)	2
4	50	--	

- **Course Description:**

This course is aimed at introducing the fundamentals of Yoga to undergraduate students. Yoga education can supplement university education by preparing the students physically and mentally for the integration of their physical, mental and spiritual faculties so that the students can become healthier, saner and more integrated members of the society and of the nation. The importance of Yoga Education is also evident in how it helps in self-discipline and self-control, leading to immense amount of awareness, concentration and higher level of consciousness.

- **Course Objectives:**

1. To enable the student to have good health.
2. To practice mental hygiene.
3. To possess emotional stability.
4. To integrate moral values.
5. To attain higher level of consciousness.

- **Course Outcomes:**

CO1: To provide Increased Physical Fitness along with improved muscular strength, endurance, flexibility, and overall physical health.

CO2: To Reduced Stress and Anxiety levels along with lower levels of stress hormones, improved sleep quality, and a greater sense of calm.

CO3: To Enhanced Cognitive Function by improved attention span, memory, and cognitive performance.

CO4: To Greater Emotional Regulation, have sense of inner peace with improved social interactions.

CO5: To develop spiritual growth among themselves.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	3	2	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-
C04	-	-	-	-	-	-	-	3	3	-	-
C05	-	-	-	-	-	-	3	3	-	-	-

SYLLABUS

Unit I: Concept of Yoga [02 Hours]

Introduction, Concept of Yoga – Meaning of Yoga, Definition of Yoga, Importance of Yoga, Scope of Yoga, Aims and Objectives of Yoga, Misconceptions on Yoga, Forms (Schools) of Yoga – Jnana Yoga, Bhakti Yoga, Karma Yoga, Raja Yoga.

Unit II: Introduction to Asan [06 Hours]

Prayer of Yoga, Warm up Activities – 1. Neck Bending – Forward and Backward Bending, Right and Left Bending. Right and Left Twisting, Neck Rotation. Shoulder Movement : Shoulder Rotation, Hands Movement : Hand Rotation, Wrist Movement ; Wrist Rotation, Finger Movement : Finger Rotation,Trunk Movement : Trunk Twisting (KatishaktiVikasak), Knee Movement : Sthiti : SamaSthiti (Alert Posture), Hip Movement : Hip Rotation, Ankle Movement : Ankle Rotation.

Unit III: Surya Namaskar [06 Hours]

Surya Namaskar –Pranamasana, Hasta Uttanasana, Hasta Padasana, AshwaSanchalanasana, Dandasana, AshtangaNamaskara, Bhujangasana, AdhoMukhaSvanasana, AshwaSanchalanasana, Hasta Padasana, Hasta Uttanasana, Pranamasana. Benefits of Surya Namaskar.

Standing Postures - Tadasana – Technique, Benefits, A word of caution, Vrksasana – Technique, Benefits, A word of Caution, Pada – Hastasana – Technique, Benefits, A word of Caution, ArdhaChakrasana – Technique, Benefits, A word of Caution, Trikonasana – Technique, Benefits, A word of Caution.

Unit IV: Sitting Asan [06 Hours]

Sitting Postures - Bhadrasana – Technique, Benefits, A word of Caution, Vajrasana – Technique, Benefits, A word of Caution, Sasankasana – Technique, Benefits, A word of Caution, Vakrasana – Technique, Benefits, A word of Caution, Padmasana – Technique, Benefits, A word of Caution.

Unit V: Prone Asan [06 Hours]

Prone Postures - Bhujangasana – Technique, Benefits, A word of Caution, Salabhasana – Technique, Benefits, A word of Caution, Makarasana – Technique, Benefits, A word of Caution.

Supine Postures - Setubandhasana – Technique, Benefits, A word of Caution, Pavanamuktasana – Technique, Benefits, A word of Caution, Savasana – Technique, Benefits, A word of Caution.

Unit VI: Pranayama [06 Hours]

Pranayama - Kapalabhati – Technique, Benefits, A word of Caution, AnulomaViloma Pranayama – Technique, Ratio and timing, Breathing, Benefits, Bhramari pranayama – Technique, Type – 1, Type – 2, Benefits, A word Caution, Dhyana in Sambhavi Mudra – Technique, Benefits.

Text Books:

11. Yoga Sutras of Patanjali – Talks by Dr. Jayadeva& Smt. HansajiYogendra. https://theyogainstitute.org/shop/product/626f63859a61db00132255eb
12. Yoga for All (New Edition): The National Bestseller on Wellness for Your Mind, Body and Soul – Hansajihttps://theyogainstitute.org/shop/product/626cdfec9a61db0013225241
13. Yoga - Physical Education for Women – Smt. SitadeviYogendra https://theyogainstitute.org/shop/product/6502dc2ff925df00181e2bb3
14. Guide to Yoga Meditation – Shri Yogendraji https://theyogainstitute.org/shop/product/626cea8c9a61db0013225339

Subject: **Engineering Chemistry Lab**

Subject Code:**BT25BSOCL108/ BT25BSECL108**

Teaching scheme	Examination scheme		Credit
(Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

This course is aimed at introducing the fundamentals of basic sciences (Chemistry) to under graduate students. The background expected includes a prior knowledge of chemistry from HSC (science) and familiarity with basic fundamental theories. The goals of the course are to understand the basic Principles of Chemistry and their applications in different branches of engineering.

- **Course Objectives:**

1. To impart the knowledge of Chemistry in the area of Engineering and Technology.
2. To capable the student to explain the importance of chemistry in various fields of Engineering.
3. To identify the concept of Chemistry to lay the ground work for subsequent studies.
4. To impart the knowledge of Chemistry in the area of Engineering and Technology.

- **Course Outcomes:**

CO1: Demonstrate knowledge of chemistry in technical fields.

CO2: Bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer

CO3: Develop the importance of water in industrial and domestic usage

CO4: Identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields

CO5: Demonstrate knowledge of chemistry in technical fields.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--
CO3	--	--	--	3	--	--	--	--	--	--	--
CO4	--	--	3	--	--	--	--	2	--	--	--
CO5	--	--	3	--	--	--	--	--	--	--	--

SYLLABUS

List of Practicals to be performed

(Atleast 10 experiments should be performed from the following list)

1. Determination of Hardness of water sample by EDTA method.
2. Determination of Chloride content in water sample by precipitation titration method.
3. Determination of Dissolve Oxygen in water by Iodometric method.
4. Determination of Percent purity of Bleaching Powder.
5. pH-metric Titration(Acid-Base titration)
6. Conductometric Titration(Acid-Base titration)
7. Determination of Surface tension of given liquid sample.
8. Determine the Viscosity of the given sample.
9. To determine Acidity of water sample.
10. To determine Calorific value of a fuel.
11. Determination of Acid value of an oil sample.
12. Determination of Saponification value of an oil sample.
13. To verify Beer's-Lambert's law.
14. To determine Alkalinity water sample.
15. To determine the maximum wavelength of absorption of a given solution by colorimeter.
16. Experiments on Chromatography

Resources for reference (if any)

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.
2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.
3. Practical in Engineering Chemistry, S. S. Dara

Subject: **Programming for Problem Solving Lab** Subject Code:**BT25AEOPL109/ BT25AEEPL109**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

This course focuses on programming for problem-solving using Python. It provides a comprehensive understanding of core programming concepts, including problem-solving techniques, basic and advanced Python constructs, file handling, and object-oriented programming. The course includes practical experiments designed to enhance students' problem-solving abilities through real-world Python applications, preparing them for more advanced programming tasks and applications in various domains.

- **Course Objectives:**

1. To provide an experimental foundation for the theoretical concepts introduced during theory lectures
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner

- **Course Outcomes:**

CO1: Develop Python programs to solve various real-world problems, including number manipulation and string processing.

CO2: Write Python programs using loops, conditionals, functions, and string operations to handle different problem-solving tasks.

CO3: Implement Python file operations, including opening, reading, and writing files, as well as analyzing file data.

CO4: Apply object-oriented principles in Python programs, using classes, objects, and special methods for problem-solving.

CO5: Work with Python to perform data analysis tasks, such as calculating percentages of vowels and consonants in files, and counting specific characters

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	-	3	-	-	2	2	-	2
CO2	3	3	3	-	3	-	-	2	3	-	2
CO3	2	3	2	3	3	-	-	2	2	-	2
CO4	3	3	3	-	3	-	-	2	3	-	3
CO5	3	3	3	2	3	2	-	2	3	-	3

SYLLABUS

List of Practicals to be performed

(At least 10 experiments should be performed from the following list)

1. Installation of Python
2. Program to display data of different types using variable and literal constants.
3. Program to perform all operation (addition, multiplication, subtraction, division, modules) and expression.
4. Program to demonstrate operation on lists.
5. Program to find whether the given number is even or odd.
6. Program to calculate the sum and average of first 10 numbers
7. Program to find whether the given number is an Armstrong number or not.
8. Program to demonstrate slice operation on string objects.
9. Program that counts the occurrences of a character in a string. Do not use built in function
10. Write a python program that accepts a string from user and perform following string operations- i. Calculate length of string ii. Check palindrome
11. Program to open a file and print its attribute values
12. Program to display the contents of a file.
13. Program that reads data from a file and calculates the percentage of vowels and consonants in the file.
14. Program that counts the number of tabs, space and newline character in a file.
15. Program to illustrating the use of __int__() method and __del__() method.
16. Program to differentiate between class and object variable.

Resources for reference (if any)

1. Python Official Documentation: https://docs.python.org
2. Real Python: https://realpython.com
3. GeeksforGeeks: https://www.geeksforgeeks.org

Subject: **Engineering Mechanics Lab.**

Subject Code: **BT25ESOML110/ BT25ESEML110**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

In these laboratories students will be introduced to the applications of different theorems of mechanics to solve problems in statics and dynamics.

- **Course Objectives:**

1. To understand basic laws of engineering mechanics
2. To know various conditions of equilibrium of forces
3. To verify law of machines
4. To calculate frictional forces.
5. To understand Centroid of irregular shaped bodies.

- **Course Outcomes:**

CO1: To understand basic laws of engineering mechanics & apply the same to solve problems.

CO2: Understand the conditions of equilibrium of forces.

CO3: Describe efficiency, load, efforts, velocity ratio, frictional effort verify law of machines.

CO4: Describe frictional forces, limiting friction, coefficient of friction and verify law of friction

CO5: Centroid of irregular shaped bodies

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	--	--	--	--	--	--	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--
C04	2	1	--	--	--	--	--	--	--	--	--
C05	2	1	--	--	--	--	--	--	--	--	--

SYLLABUS

List of Practicals to be performed

(Atleast 10 experiments should be performed from the following list)

1. To calculate analytically resultant of concurrent force system.
2. Support reaction for beam.
3. Forces in Jib crane.
4. Verification of Lami's theorem.
5. Compound pendulum.
6. Verification of law of Machine using Screw jack
7. Verification of law of Machine using Worm and Worm Wheel
8. Centroid of irregular shaped bodies.
9. To determine coefficient of friction by using belt and pulley.
10. Study of collision of elastic bodies.
11. Determining the moment of inertia of flywheels
12. Verification of Polygon Law of Forces

Subject: **Energy and Environmental Engineering**

Subject Code: **BT25MDOEE111/ BT25MDEEE111**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	1
1	--	--	50	--	

- **Course Description:**

This course is aimed at introducing the basic Energy and Environmental concepts to undergraduate students. The background expected includes a prior knowledge of Energy and Environment from 12th science and familiarity with various concepts. The goals of the course are to understand the basic principle of Energy and its application in different area.

- **Course Objectives:**

1. To impart the knowledge of Environmental education to the students of Engineering and Technology.
2. To make students understand in detail about nuclear, gas turbine, hydro and steam power plants that play an important role in power generation.
3. To make students familiar with importance of alternative fuels and respective power plants.
4. To understand the sources, effects and control methods of air pollution.
5. To understand the effects and control methods of water pollution and noise pollution.

- **Course Outcomes:**

CO1: Know and understand about components and segments of environment, ecosystem and its types.

CO2: Understand power consuming and power developing devices for the effective utilization.

CO3: Understand and to explain types of Energies such as wind energy, solar energy, hydro energy etc.

CO4: Understand and explain various types of air pollution, their effects and control measures.

CO5: Know the various types of water pollution, sources, waste water treatment, effect of water pollution on health and soil pollution.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	1	1	-	-	-	-	-	-	2
CO2	-	2	2	1	-	-	-	-	-	-	2
CO3	1	-	-	2	1	-	-	-	-	-	2
C04	1	-	-	-	2	-	-	-	-	-	2
C05	1	-	-	-	2	-	-	-	-	-	2

SYLLABUS

Unit I: Environment [04 Hours]

Introduction, Components of Environment, Types of Environment, Discussion on Segments of Environment, Environmental Pollution, Ecosystem, Types of Ecosystem, Components of Ecosystem.

Unit II: Conventional Power Generation [04 Hours]

Introduction, Sources of Energy, conventional sources of energy, Thermal Power Plant and its site selection Criteria, Gas Turbine power plant and its site selection Criteria, Hydro Power Plant and its site selection Criteria, Nuclear Power Plant and its site selection Criteria.

Unit III: Non- Conventional Power Generation [04 Hours]

Introduction, Sources of Energy, Non- Conventional sources of energy, Solar Power plant, , Wind power plant, Biogas and Biomass power plant, Tidal power plant.

Unit IV: Air Pollution [04 Hours]

Introduction, Brief discussion on air pollutants, Sources of Air pollution, Acid Rain, Green House Effect, Methods to Control of Air Pollution.

Unit V: Water Pollution [04 Hours]

Water pollution- Sources of Water pollution, effects- control measures, Noise pollution – effects and control measures, Disposal of solid wastes, Bio-medical wastes-Thermal pollution, Soil pollution- Sources, Its Effect and Control of Soil pollution.

Text Books:

15. A Textbook on Power System Engineering, A, Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai and Co. Pvt. Ltd.
16. Environmental Chemistry (II edition), Ane Books Pvt.Ltd. V. K. Ahluwalia.
17. Environmental Chemistry (sixth edition), A. K. De
18. Essential Environmental Studies, S. P. Mishra and S. N. Pandey

Reference Books:

4. Environmental Science, sixteenth edition, G. Tyler Miller and S. E. Spoolman, Cengage publication.
5. A Textbook of Engineering Chemistry, Dr. S. S. Dara and Dr. S. S. Umare
6. Textbook On Experiments & Calculations In Engineering Chemistry: S. S. Dara, S Chand & Company Pvt Ltd.

SEMESTER-II

Subject: **Engineering Mathematics-II** Subject Code: **BT25BSEM2112**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from 12th science and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

- **Course Objectives:**

1. The solution of differential equations of first order and first degree having their applications in mechanical, electrical, etc.
2. To understand and obtain numerical solution of ordinary differential equations using numerical methods.
3. To determine Fourier series representation of periodic functions over different intervals.
4. To understand evaluation of improper integrals using Gamma, Beta functions and Differentiation Under Integral Sign.
5. To know and discuss the need and use of complex variables to find roots, to separate complex quantities, and to establish a relation between circular and hyperbolic functions.

- **Course Outcomes:**

CO1: Solve first order and first degree ordinary differential equations and apply them as mathematical modeling in electric and mechanical systems.

CO2: Solve ordinary differential equations by numerical methods and obtain numerical solution

CO3: Determine Fourier series representation of periodic functions over different intervals.

CO4: Evaluate improper integrals by using integral calculus.

CO5: Discuss the need and use of complex variables to find roots, separate complex quantities, and to establish relation between circular and hyperbolic functions.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	2	-	-	-	-	-	-	-	2
CO2	3	-	2	-	-	-	-	-	-	-	2
CO3	3	-	-	-	2	-	-	-	-	-	2
C04	3	-	-	-	1	-	-	-	-	-	2
C05	3	-	2	-	-	-	-	-	-	-	2

SYLLABUS

Unit I: Ordinary Differential Equations of First Order and First Degree and Their Applications **[07 Hours]**

Linear equations; Reducible to linear equations (Bernoulli‘s equation); Exact differential equations; Equations reducible to exact equations; Applications to temperature, heat transfer and electrical circuits.

Unit II: Numerical Solutions of ODE **[07 Hours]**

Introduction to numerical solution; solution of ODE by- Taylor’s series method; Picard’s Method; Euler’s Modified Method; Runge - Kutta Method (Fourth order).

Unit III: Fourier series **[07 Hours]**

Introductory remarks- Euler‘s formulae; Conditions for Fourier series expansion – Dirichlet‘s conditions ; Full range Fourier series; Odd and even functions; expansions of odd and even periodic functions; Half-range series.

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

Gamma function; Beta function; Differentiation under integral sign (without proof); Reduction Formulae for

$$\int_0^{\pi\backslash 2} \sin^n \theta \, d\theta \, , \int_0^{\pi\backslash 2} \cos^n \theta \, d\theta \text{ and } \int_0^{\pi\backslash 2} \sin^m \theta \cos^n \theta \, d\theta$$

Unit V: Complex Numbers **[07 Hours]**

Definition and geometrical representation; De-Moivre‘s theorem(without proof); Roots of complex numbers by using De-Moivre‘s theorem; Circular functions of complex variable

definition; Hyperbolic functions; Relations between circular and hyperbolic functions; Real and imaginary parts of circular and hyperbolic functions; Logarithm of Complex quantities.

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3. A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw- Hill Publishing Company Ltd., New Delhi.

Subject: **Engineering Physics**

Subject Code: **BT25BSEPH113/ BT25BSOPH113**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	3
3	--	20	20	60	

- **Course Description:**

Physics is a fundamental aspect of science on which all engineering sciences are made. The fundamental concepts of physics have given the way for the development of various branches of engineering and technologies. Engineering Physics course primarily deals with the basic concept and applications of principles of physics to understand the underlying rules of engineering disciplines, to solve everyday problems and to come up with innovative systems and machinery. The Engineering Physics syllabus provides an in-depth understanding to students on how all the engineering fields work by smartly using scientific and mathematical knowledge. This course is for first year of engineering (common to all branches of engineering) primarily intended with for engineering and science majors. The Engineering Physics syllabus helps students to gain important skills like logical thinking, scientific bent of mind, technical proficiency, problem-solving, attention to detail and creativity.

- **Course Objectives:**

1. To provide a firm grounding in the basic physics principles and concepts to resolve many Engineering and Technological problems
2. To understand and study the Physics principles behind the developments of Engineering materials
3. To be able to apply critical thinking and problem solving skills
4. Demonstrate knowledge of physical concepts by their applications in problem solving
5. To implement the concept of physics to study various phenomenon in daily life

- **Course Outcomes:**

CO1: Interpret, apply & demonstrate principle of motion of charged particles in EF & MF and understand the concept of Schrodinger's equation

CO2: Explain & compare between Interference & Polarisation of light, working Principle of Lasers & Fiber optics

CO3: Explain & apply the concept of types of Oscillation, Acoustic properties & Ultrasonic's

CO4: Identify Types of energy and understand X-rays

CO5: Know and apply the difference between Diamagnetic, Paramagnetic and Ferromagnetic materials, Superconducting and Semiconducting materials

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	--	--	--	--	--	--	--	2
CO2	--	--	--	--	1	--	--	--	--	--	2
CO3	--	--	--	--	1	--	--	--	--	--	2
CO4	3	--	--	--	--	--	--	--	--	--	2
CO5	3	--	--	2	--	--	--	--	--	--	2

SYLLABUS

Unit I: Electron Optics and Quantum Mechanics [06 Hours]

Motion of electron in Electric field (parallel and perpendicular), Motion of electron in magnetic field, motion of electron in combined effect, Heisenberg's uncertainty principle, Schrodinger's time independent and time dependent wave equations, physical significance of wave function.

Unit II: Optics, Fibre Optics and Laser [07 Hours]

Optics: Interference of light in thin film, wedge shaped film, Newton's ring, polarization of light, methods for production of polarized light (Reflection, Refraction & Double refraction), Huygen's theory of double refraction.

Fibre Optics: Introduction, Principle, critical angle, acceptance angle, acceptance cone, numerical aperture.

Laser: Principle, spontaneous emission and stimulated emission, Ruby Laser, Applications.

Unit III: Acoustics Ultrasonis and Dielectrics [08 Hours]

Acoustics: Introduction, Reflection of sound (reverberation and echo), absorption coefficient, Sabine's formula, Acoustical planning of building and factors affecting architectural acoustics of building.

Ultrasonic waves: Properties, production of ultrasonic's (Piezoelectric effect, Magnetostriction effect) and its applications

Dielectrics: Polar and non-polar dielectrics (only defination), Types of Dielectric Polarization

Unit IV: Nuclear Physics and X-rays [05 Hours]

Nuclear Physics: Nuclear Reaction, Nuclear Fission, Nuclear Fusion, Q value of nuclear reaction

X-rays: Production of X-ray, Line and Continuous Spectrum of X-ray

Unit V: Physics Of Advanced Materials [09 Hours]

Magnetic Materials: Types of magnetic materials (Diamagnetic, Paramagnetic and Ferromagnetic), B-H curve,

Superconductors: Superconductivity, types of superconductors, Meissner's effect, properties and applications of superconductor,

Semiconductors: Band theory of solids, conductivity of semiconductors.

Nanomaterials: Top-down and Bottom-up approach, definitions of XRD, FESEM, VSM and CNT

Text Books:

1. Engineering Physics M.N.Avadhanulu and P.G. Kshirsagar. S.Chandand Company LTD.
2. Engineering Physics – Dr. L. N. Singh. SynergyKnowledgeware-Mumbai.
3. Engineering Physics-R.K. Gaur and S. L.Gupta.Dhanpat Rai Publications Pvt. Ltd.-NewDelhi.
4. Fundamental of Physics - Halliday and Resnik. Willey EasternLimited.

Reference Books:

1. Introduction to Electrodynamics –David R.Griffiths.
2. Concept of Modern Physics–Arthur Beizer.Tata McGraw-Hill Publishing Company Limited.
3. Optics – Ajoy Ghatak, Mac Graw Hill Education (India) Pvt.Ltd.
4. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt.Ltd.
5. Solid State Physics – A.J. Dekker. McMillan India–Limited.
6. The Feynman Lectures on Physics VolI,II,III.
7. Introduction to solid state physics – Charles Kittel. John Willey andSons

Subject: **Basics of Electrical and Electronics Engineering** Subject Code:**BT25ESEEE114/ BT25ESOEE114**

Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	20	20	60	

- **Course Description:**

To get basic knowledge of Electrical and Electronics devices and their applications including with their analysis and measurements

- **Course Objectives:**

1. To equip the students with an understanding of the fundamental principles of DC and AC electrical circuits.
2. To introduce the working principles and applications of fundamental electronic devices and circuits.
3. To identify various measurement instruments and their use in electric and electronic measurements.

- **Course Outcomes:**

CO1: Apply fundamental concepts and circuit laws to solve simple DC and AC circuits.

CO2: Interpret the construction and working of different types of electrical machines

CO3: Analyze building blocks of basic dc power supply

CO4: Outline the principle of BJT as an amplifier.

CO5: Apply the knowledge of measuring instruments in electronic instrumentation system

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	--	--	--	--	--	--	--	--
CO2	3	3	2	1	--	--	--	--	--	--	--
CO3	--	--	2	1	--	--	--	--	--	--	--
CO4	3	2	2	--	--	--	--	--	--	--	--
CO5	3	2	2	--	--	--	--	--	--	--	--

SYLLABUS

Unit I: **[07 Hours]**

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor, Ohm‘s Law, Kirchhoff‘s Laws, Independent and Dependent Sources, Simple problems - Nodal Analysis, Mesh analysis with independent sources only (Steady state).

AC Circuits: AC Signal Parameters, Waveforms, Average value, RMS Value, Instantaneous power, active power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only).

Unit II: **[07 Hours]**

Difference between Generator & motors, DC motors: Construction, working principle, types, characteristics. Working principle of Induction motor. Single Phase Transformer: Construction and working (no load & on load), EMF Equation, Losses, Efficiency, Regulation.

Unit III: **[07 Hours]**

PN Junction diode: Principle of operation, V-I characteristics, Diode current equation. , working of Zener diode.Block diagram description of a dc power supply, Working of a full wave bridge rectifier Working of linear voltage regulators – 78xx and 79xx

Unit IV: **[07 Hours]**

Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration, Biasing Techniques. Amplifiers: Transistor as an amplifier.

Unit V: **[07 Hours]**

Functional elements of an instrument, working principle of: Moving Coil and Moving Iron instruments, Ammeter, voltmeter, Block diagram & working of: Multi-meter, Function Generator

Text Books:

19. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
20. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
21. A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware,
15. Mumbai.
22. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar,
16. Pune Vidyarthi Griha Prakashan,Pune.
23. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO.
17. Pvt. Ltd., New Delhi.

Subject: **Engineering Graphics**

Subject Code:**BT25ESEEG115/ BT25ESOEG115**

Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	20	20	60	

- **Course Description:**

Engineering graphics is a foundational course that teaches the principles of technical drawing and spatial reasoning, enabling students to communicate ideas visually and interpret engineering designs. It focuses on developing skills in creating and understanding engineering drawings, utilizing various instruments and software, and applying industry standards. The course equips students with the ability to visualize 3D objects, translate them into 2D representations, development of surfaces and ultimately contribute to the design and construction of various engineering projects.

- **Course Objectives:**

1. To create awareness and emphasize the need for Engineering Graphics in all the branches of engineering.
2. To follow basic drawing standards and conventions.
3. To develop skills in 2 &3 dimensional visualization of engineering component.

- **Course Outcomes:**

CO1: Prepare drawings as per standards.

CO2: Solve specific problems involving points and lines.

CO3: Solve specific problems in plane geometry involving plane figures.

CO4: Understand the geometries of development of engineering projects.

CO5: Produce orthographic / isometric projection of engineering components working from pictorial 3D / 2D drawing.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	-	3	-	3	-	-	-	-	3	-
CO2	3	2	-	-	2	-	-	-	-	2	-
CO3	3	2	1	-	1	-	-	-	1	2	-
C04	3	2	2	1	2	1	1	-	1	2	-
C05	3	2	2	-	3	-	_	1	1	3	-

SYLLABUS

Unit I: Introduction to Engineering Drawing [07 Hours]

Principles of Engineering Graphics, usage of drawing instruments, Types of line and lettering & dimensioning, Geometrical construction, Orthographic Projection; Isometric Projection, Surface Development; Sectional Views, Introduction to computer aided drawing.

Unit II: Projection of Points and Lines [07 Hours]

Points is situated in different quadrants, Projection of lines inclined to both the planes, True length of straight lines and its inclination with reference plane, traces of line

Unit III: Projection of Planes & Solids [07 Hours]

Projection of planes inclined to one plane & perpendicular to other plane, Auxiliary Plane, Projection of solid with axis inclined to both the planes

Unit IV: Sections of solids & Development of Surfaces [07 Hours]

Sections of solids, Section planes perpendicular to one plane and parallel or inclined to other plane, Method of development, Developments of lateral surfaces of right solids.

Unit V: Orthographic & Isometric Views [07 Hours]

Principal of projection, Methods of projection, Orthographic projection, Isometric axes, lines & planes, Isometric Scale, Isometric drawing or isometric View.

Reference Books /Text Books:

1. N.D.Bhatt,EngineeringDrawing,CharotarPublishingHouse,46thEdition, 2003
2. Dr. H. G. Phakatkar, Engineering Graphics, NiraliPrakashan, Pune, first edition, sep 2024.
3. K.V.Nataraajan,AtextbookofEngineeringGraphic,DhanalakshmiPublishers, Chennai,2006
4. K.VenugopalandV.PrabhuRaja,EngineeringGraphics,NewAge International (P) Ltd, 2008.
5. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar,
6.DhananjayA.Jolhe,EngineeringDrawingwithanIntroductiontoAutoCAD,McGrawHill Education, 2017.

Subject: **Effective Communication Skills**

Subject Code:**BT25HMECS116/ BT25HMOCS116**

Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	20	20	60	

- **Course Description:**

This course equips students with the knowledge and practical skills necessary for effective communication in academic, professional, and social contexts. It covers the fundamentals of verbal and non-verbal communication, listening, reading, speaking, and writing skills. Students will learn oral communication techniques for interviews, group discussions, and public speaking; study English phonetics for accurate pronunciation; and apply essential grammar rules for error-free communication. The course also emphasizes written communication through email drafting, content creation, letter writing etc.

- **Course Objectives:**

1. Understand the basic concept of communication skills grammar and principles and acquire the fundamentals of Listening and reading skills. Enhance reading and Listening comprehension.
2. Understand the application of oral communication into various situation like Interview, GD etc. Speak and address on the given topic without fear in mind.
3. Pronounce the English words accurately and Understand the basic concepts of Phonetics , vowels, Consonants etc.
4. Apply the various grammar rules in English speaking. Write clear and coherent passages, Speak an errorless English communication
5. Write effective contents and letters for job application and complaints and Prepare technical reports and drafting work.

- **Course Outcomes:**

CO1: Use and apply the basic concept of communication skills and enhance the ability to read and Listening comprehension.

CO2: Apply the oral communication into various situation like Interview, GD , speeches etc.

CO3: Articulate and pronounce the English words and expressions precisely and practically apply and define the basic concepts of Phonetics, vowels, Consonants etc.

CO4: Uses grammar rules in English speaking in day today conversation and talk in English without the grammatical mistakes.

CO5: Draft an successful correspondence for job application and complaints and produce effective contents etc.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-		-	-	-	2	-	3	-	2
CO2	-	-		-	-	-	1	-	3	-	1
CO3	-	-		-		-	-	-	2	-	1
C04	-	-		-		-	-	1	2	-	1
C05	-	-		-	-	-	1	1	1	-	1

SYLLABUS

Unit I: Basics of Communication [04 Hours]

Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them Verbal and Non-verbal Communication, Listening and Reading Skills- types, barriers.

Unit II: Oral Communication [04 Hours]

Principles and Practice of Group Discussion, Public Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Presentation Skills, Telephonic Etiquettes, Extempore.

Unit III: Study of Sounds in English [04 Hours]

Introduction to phonetics, Study of Speech Organs, Articulation of Different Sounds in English, Stress Mark.

Unit IV: English Grammar [04 Hours]

Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.

Unit V: Written Communication [04 Hours]

Writing Emails, Content Writing-blogs, Letter Writing-Writing Job Application Letter and Resume, Complaint Letter, Project Proposal Writing

Text Books:

24. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
25. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
26. A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware,
18. Mumbai.
27. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar,

19. Pune Vidyarthi Griha Prakashan,Pune.
28. Higher Engineering Mathematics by H. K. Das and Er. RajnishVerma, S. Chand & CO.
20. Pvt. Ltd., New Delhi.

Reference Books:

7. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
8. A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
9. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw- Hill Publishing
21. Company Ltd., New Delhi.

Subject: **Workshop Practices**

Subject Code: **BT25VSEWP117/ BT25VSEOWP117**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	2
4	50	+---	

- **Course Description:**

The objective of this course is to get a hands-on knowledge of several Workshop Practices like carpentry, fitting, welding, machining etc. and learn safety regulations to be maintained in a shop floor. This laboratory is scheduled for 1st and 2nd semester for all engineering students. Apart from curriculum, some additional experimental setups are there which helps the students to enhance their knowledge. Students also get opportunity to implement their ideas through various application oriented micro projects.

- **Course Objectives:**

1 To impart training to help the students develop engineering skill sets.

2 To develop right attitude, team working, precision and safety at workplace.

3 It explains the construction, function, use and application of different working tools, equipment and machines.

4 To educate about safe handling of machines and tools

5 To study commonly used carpentry joints.

- **Course Outcomes:**

CO1 Understand the safety norms to prevent any mishap in the workshop.

CO2 Develop the necessary skill required to handle/use different fitting tools.

CO3 Able to prepare the edges of jobs and do simple arc welding. (Understand))

CO4 Develop the necessary skill required to handle/use different plumbing tools. (Apply)

CO5 Demonstrate the turning operation with the help of a simple job. (Apply)

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	--	--	--	2	--	2	--	3	--	2
CO2	3	--	--	--	2	--	2	--	3	--	2
CO3	3	--	--	--	2	--	2	--	3	--	2
C04	3	--	--	--	2	--	2	--	3	--	2
C05	3	--	--	--	2	--	2	--	3	--	2

Instructions to the student: Each student is required 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.

SYLLABUS

Contents:

a) Carpentry: Technical Terms related to wood working, Types of wood, Joining materials, types of joints -
Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) Welding: Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

b) Fitting and Plumbing: Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc.,
Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safety precautions.

d) Sheet Metal Work: Simple development and cutting, bending, Beading, Flanging, Lancing and shearing of sheet metal, Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, Fluxes and their use.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions.

List of Practicals to be performed

(Atleast 6practicals should be performed from the following list)

1 Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.

2 A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping operation on M.S. plates.

3 Demonstration on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.

4 Making a small part using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i) Tray ii) Funnel and similar articles.

5 Exercise in Arc welding (MMAW) to make a square butt joint.

6 Exercise in Resistance (Spot) welding to make a lap joint.

7 Exercise in oxy-acetylene gas welding to make a lap joint.

8 Practical of step turning of a Mild Steel cylindrical job using center lathe.

9 To make a S-hook from a given round rod, by following hand forging operation.

10 Demonstration of power operated tools related to sheet metal work, welding, fitting, plumbing, carpentry and pattern making.

References: -

1. K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.
2. Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

Subject: **IKS Bucket (General Metrology)**

Subject Code: BT25IKEIK118/ BT25IKOIK118

Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	2
2	--	--	50	--	

- **Course Description:**

The "IKS Bucket" subject, titled "General Meteorology," within the Indian Knowledge System (IKS) framework, likely focuses on understanding weather phenomena and atmospheric science through an Indian perspective. This may involve exploring traditional knowledge systems related to weather forecasting, understanding the impact of weather on agriculture, and examining the role of weather in Indian culture and traditions.

- **Course Objectives:**

1. To give an overview of science of meteorology
2. Be aware of the working of world meteorological organization and different met communications/telecommunication network in India.
3. To make aware of effect of physical geography and earth's interior on meteorology.
4. To provide a foundational understanding of atmospheric processes and weather phenomena, enabling them to interpret weather maps, understand weather forecasting techniques, and grasp the principles behind weather patterns.
5. The student will be able to express how meteorology impacts their daily life and affects decisions relevant to society as a whole

- **Course Outcomes:**

CO1: Remember various components of world meteorological organizations. (Remember)

CO2: Understand the met communications, telecommunications network in India and channels used in IAF. (Understand)

CO3: Understand the effect of physical geography, motions of the earth and on meteorological process. (Apply)

CO4: Apply the knowledge of earth‟s interior to analyse the meteorological phenomena. (Analyze)

CO5: Evaluate the measurement of time in prospective of meteorology. (Evaluate)

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	1	1	1	1	1	1	1	1	2
CO2	2	2	1	1	2	1	1	1	2	1	2
CO3	3	3	2	2	2	3	1	1	1	1	2
C04	3	3	2	3	2	3	1	1	1	1	3
C05	3	2	1	2	2	2	1	1	1	1	3

SYLLABUS

Unit I: **Science of Meteorology- An Overview** **[04 Hours]**

Introduction to meteorology, History of meteorology, General circulation.

Unit II: **Meteorological Organization** **[04 Hours]**

World meteorological organization (WMO), Regional met centers, Indian Meteorological Department, Met organization in Indian Air force.

Unit III: **Motion of Earth and Measurement of Time** **[04 Hours]**

Introduction, Orbital and rotational characteristics of earth, Conversion of time and sidereal time

Unit IV: **Physical Geography and Structure of Earth** **[04 Hours]**

Insulation, The earth and its interior, Impact of physical geography

Unit V: **Met Telecommunication** **[04 Hours]**

Global Telecommunication System, National Data Exchange Network, Meteorological Telecommunications in IAF.

Text Books:

22. WMO Training Manuals.
23. Manual of Meteorology for Air Crew - IAF Publication
24. General Meteorology - Byers HR.

Reference Books:

1. Training Notes. Dept of Meteorology - AFA(Volume - 3)
2. Meteorology for Airman in India Part I - I Met D.

Subject: **Health & Wellness**

Subject Code:**BT25CCEHW119/ BT25CCOHW119**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	2
4	50	--	

- **Course Description:**

A health and wellness course lab description should outline the practical, hands-on components of a program designed to improve overall well-being, encompassing physical, mental, and emotional health

- **Course Objectives:**

1. To be well versed with health and wellness and understand the dimensions of the health.
2. To be able to understand the importance of biomolecules, micro and macronutrients ,energy content of food and calories requirements of the body.
3. To understand the risk factors and understand the role of happy hormones in maintaining health and wellness.
4. To understand the risk factors and understand the role of happy hormones in maintaining health and wellness.
5. To introduce the learners to the relation between mind-body and its relevance

- **Course Outcomes:**

CO1: To help understand the importance of a healthy lifestyle

CO2: To familiarize students about physical and mental health

CO3: To create awareness of various life style related diseases

CO4: To provide understanding of stress management

CO5: demonstrate adequate knowledge on well-being and promotion of healthy behavior

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	1	1	1	3	3	1	1	1	2
CO2	2	1	1	1	1	3	3	1	1	1	2
CO3	2	1	1	1	1	3	3	1	1	1	2
CO4	1	1	1	1	1	2	3	1	1	1	3
CO5	2	1	1	1	1	3	3	2	2	1	3

SYLLABUS

List of Practicals to be performed

Module 1 Gratitude Journaling & Sharing Circle

Develop the habit of recognizing and appreciating positive aspects of life.

Module 2 Breaking Bad Habits & Building New Ones

Understand triggers of bad habits and practice strategies to replace them with healthier routines

Module 3 Acts of Kindness Challenge

Experience the effect of selfless giving on happiness

Module 4 Physical Well-being: Integrated Fitness & Mindful Nutrition

Promote holistic physical health via simple exercises, mindful eating, and breathing

Module 5 Mindful Nature Walk

Practice present-moment awareness and reduce stress

Module 6 Emotional Well-being & Self-Acceptance

Manage stress, practice saying no, and foster body positivity

Module 7 Positive Thinking & Affirmation Session

Replace self-limiting thoughts with empowering ones

Module 8 Social Well-being: Gratitude, Kindness & Digital Detox

Cultivate gratitude, kindness, compassion, forgiveness, and practice intentional disconnection from devic

Module 9 Signature Strength Identification

Recognize personal strengths and learn to apply them

Module 10 Intellectual Well-being: Lifelong Learning & Digital Literacy

Empower continual learning and skill-building in the digital age

Module 11 The Flow Activity

Experience deep engagement in an activity

Module 12 Environmental Well-being: Connection & Responsibility

Develop awareness of environmental impact and engage in sustainable practices

Module 13 Social Connection & Listening Exercise

Improve active listening and build emotional connections

Module 14 Understanding Addiction & Mental Well-being

Raise awareness on addiction mechanisms and build strategies for mental health

Reference Books:

1 W. Weiten, and M. A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21st Century, Wadsworth Publishing, 2007

2 R. Harington, Stress, Health and well-being: Thriving in the 21st century, Wadsworth Publishing, 2013.

3 I. Boniwell, Positive psychology in a nutshell, McGraw-Hill Education, 2012.

4 S. Lyubomirsky, The how of happiness, Penguine Press, 2008.

Subject: **Engineering Physics Lab**

Subject Code: **BT25BSEPL120/ BT25BSOPL120**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

The laboratory (taken concurrently) presents exercises that are designed to reinforce the concepts presented and discussed during the lectures

- **Course Objectives:**

1. To provide an experimental foundation for the theoretical concepts introduced during theory lectures
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner

- **Course Outcomes:**

CO1: Apply the principle of interference to determine radius of curvature using Newton's ring

CO2: Understand and apply the principle of laser

CO3: Understand the concept of P-N junction, measure the band gap of semiconductor and study solar cell characterstics

CO4: Apply the principle of fibre optics and ultrasonics

CO5: Study the nature of Magnetic materials

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	--	2	--	2	--	--	--	--	--	--
CO2	3	--	--	--	2	--	--	--	--	1	--
CO3	--	3	--	3	--	--	1	--	--	--	--
CO4	--	--	--	--	2	--	--	--	--	--	--
CO5	--	--	--	1	--	--	--	--	--	--	--

SYLLABUS

List of Practicals to be performed

(Atleast 10 experiments should be performed from the following list)

1. Newton‟s rings - Determination of radius of curvature of Plano convex lens/wavelength of light
2. Wedge Shaped film - Determination of thickness of thin wire
3. Half shade Polarimeter - Determination of specific rotation of optically active material
4. Laser - Determination of wavelength of He-Ne laser light
5. Magnetron Tube - Determination of ‘e/m’ of electron
6. G.M. Counter - Determination of operating voltage of G.M. tube
7. Crystal Plane – Study of planes with the help of models related Miller Indices
8. Hall Effect - Determination of Hall Coefficient
9. Four Probe Method - Determination of resistivity of semiconductor
10. Measurement of Band gap energy of Semiconductors
11. Study of I-V characteristics of P-N junction diode
12. Experiment on fibre optics
13. Ultrasonics Interferometer
14. B-H Curve Experiment
15. Susceptiblity measurement experiment
16. Solar Cell Characteristics

Resources for reference (if any)

4. “Semiconductor Physics and Devices: Basic Principles” by Donald A Neamen 2.“Optics, Principles and Applications” by K K Sharma.

25. “Principles of Optics” by M Born and E Wolf.

26. “Oscillations and Waves” by Satya Prakash and Vinay Dua

10. “Waves and Oscillations” by N Subrahmanyam and Brij Lal

Subject: **Basics of Electrical and Electronics Engineering Lab** Subject Code:**BT25BSEEL121/ BT25BSOEL121**

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Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

This Lab Practice mainly focused on to get handon practices over different electronic devices and to get identification and analysis of components.

- **Course Objectives:**

1. To understand the basics of electrical connections and analyse the performance of electrical machines and electronic Circuits.

- **Course Outcomes:**

CO1: To create basic electrical and electronic circuit connections for domestic applications

CO2: To measure the various electrical parameters in the circuit

CO3: To Analyse the performance of electrical machines.

CO4: To Analyse basic electronic circuits.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	--	--	--	--	--	--	--	--
CO2	3	2	1	--	--	--	--	--	--	--	--
CO3	3	2	1	--	--	--	--	--	--	1	1
C04	3	2	1	--	--	--	--	--	--	1	1

SYLLABUS

List of Practicals to be performed

(Atleast 10 experiments should be performed from the following list)

1. To verify KCL and KVL.
2. To analyze series RLC circuit
3. Calculate RMS, average and peak value of the signal using multi-meter and CRO.
4. Study of V-I characteristics of PN Junction Diode
5. Study of Full Wave Rectifier using PN Junction Diode
6. Study of voltage regulator
7. Study of V-I Characteristics of BJT
8. To analyze voltage divider biasing.
9. Study of BJT as an amplifier.
10. Measurement and testing of various electronic components using multimeter
11. Study of Electronic Instruments.
12. Mini-project.

Subject: **Engineering Graphics Lab**

Subject Code:**BT25BSEGL122/ BT25BSOGL122**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	50	

- **Course Description:**

An Engineering Graphics lab course typically focuses on developing students' abilities to visualize, interpret, and create technical drawings using various tools and techniques. The course aims to build a foundation in orthographic projection, isometric projection, descriptive geometry. Students will learn to represent 3D objects in 2D and understand the principles of engineering drawing.

- **Course Objectives:**

1. To impart fundamental knowledge of engineering drawing techniques.
2. To develop the ability to visualize and represent three-dimensional objects.
3. To teach the principles of orthographic and isometric projections
4. To introduce sectioning of solids and development of surfaces
5. To instill the importance of neatness, clarity, and accuracy in engineering communication

- **Course Outcomes:**

CO1: Apply principles of engineering graphics to construct geometrical drawings.

CO2: Use orthographic projection techniques to represent 3D objects in 2D.

CO3: Convert between isometric and orthographic views of engineering components

CO4: Draw sectional and auxiliary views to visualize internal and inclined features.

CO5: Develop surface drawings for sheet metal applications and fabrication processes.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	--	--	--	--	--	--	--	--	--
CO2	2	2	--	--	--	--	--	--	--	--	--
CO3	3	3	--	--	--	--	--	--	--	--	--
C04	3	2	--	--	3	--	--	--	--	--	--
C05	2	3	--	--	--	--	--	--	--	--	--

SYLLABUS

List of Practicals to be performed

(Atleast8 experiments should be performed from the following list)

1. Lines, lettering and dimensioning.
2. Geometrical Constructions.
3. Projections of points and straight lines
4. Projections of planes
5. Projections of solids
6. Section of solids
7. Orthographic projections
8. Isometric Projections
9. Draw one simple example of above any one example using Autocad

Resources for reference (if any)

27. Dr. H.G.Phakatkar, A text book of Engineering Graphics, NiraliPrakashan,Pune,Sep 2024
28. K.V.Nataraajan,AtextbookofEngineeringGraphic,DhanalakshmiPublishers, Chennai,2006.

Subject: **Effective Communication Skills Lab**

Subject Code:**BT25AEECL123/ BT25AEOCL123**

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	1
2	50	--	

- **Course Description:**

The practical component develops hands-on communication abilities through interactive exercises and real-life simulations. Students engage in self-introduction, phonetic drills, articulation and pronunciation practice, stress and intonation training, group discussions, presentations, interview techniques, and extempore speaking. These activities aim to build confidence, accuracy, and fluency in English, while enhancing

- **Course Objectives:**

1. Groom the students to use correct English Pronunciations
2. Enhance the linguistic abilities with the help of language learning skills LSRW
3. Application of knowledge while participating in the GD, Presentations etc.
4. Prepare the students for competitive examinations and the examinations required for higher studies in Indian and foreign universities
5. Ability to develop well-worded communications and face interviews.

- **Course Outcomes:**

CO1: Students would be more confident while using English

CO2: Engage in analysis of speeches or discourses and several articles

CO3: Identify and control anxiety while delivering speech

CO4: Write appropriate communications(Academic/Business)

CO5: Prepared to minimize the latent fear of expression.

CO6: Identify and control the tone while speaking

CO7: Develop the ability to plan and deliver the well-argued presentations and interview.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	--	--	--	--	--	--	--	1	3	--	1
CO2	--	--	--	--	--	--	1	--	2	--	1
CO3	--	--	--	--	--	--	--	1	2	--	1
C04	--	--	--	--	--	--	1	--	3	--	1
C05	--	--	--	--	--	--	1	1	2	--	1
C06	--	--	--	--	--	--	1	2	3	--	1
C07	--	--	--	--	--	--	1	2	2	--	1

SYLLABUS

List of Practicals to be performed

(Atleast 10 experiments should be performed from the following list)

1. How to introduce yourself.
2. Introduction to Phonemic symbols.
3. Practice and exercises on articulation of sounds with manner.
4. Practice and exercises on articulation of words.
5. Introduction to stress and intonation.
6. Group discussion.
7. Presentation techniques.
8. Interview techniques.
9. Introduction to the sounds according to the Manner
10. Extempore Speech.
11. Content Writing- Blog.

12 Debate.