

People's Education Society's (Mumbai)

P. E. S. COLLEGE OF ENGINEERING

(An Autonomous Institute)

Nagsen Vana, Chhatrapati Sambhajinagar, Maharashtra, 431002

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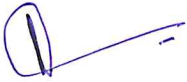


CURRICULUM for UNDER GRADUATE PROGRAMME

B. Tech. First Year Engineering

Common to All Branches

In line with National Education Policy 2020 Guidelines
[With Effect from the Academic Year 2025-2026]

			13/09/2025	1.00
First Year Coordinator	Dean Academics	Chairman Academic Council	Date of Release	Version

VISION

To create sound technical manpower with global competitiveness, morality, and social sense.

MISSION

- To provide the state-of art technical infrastructure and motivate students to realize their own potential.
- To provide an embellished academic and congenial environment to students for complete learning experience.
- To promote intellectual, moral, and social democracy to ensure all round development of the students.

Grading and Evaluation Process:

i) Based on the Examinations and Evaluation, students will be awarded letter grades after combining the performance of all evaluations for the respective course.

These letter grades will be derived from quantitative and qualitative Evaluation converted Into 10-point scale called as grade point for credit courses. The performance with grade points and equivalent letter grades for Absolute grading for admitted batches will be as mentioned in the following table:

Percentage of Marks	Letter Grade	Grade Points
91-100	EX	10.0
86-90	AA	9.0
81-85	AB	8.5
76-80	BB	8.0
71-75	BC	7.5
66-70	CC	7.0
61-65	CD	6.5
56-60	DD	6.0
51-55	DE	5.5
40-50	EE	5.0
0-39	FF	00

ii. Class is awarded based on CGPA of all eighth semester of B. Tech Program.

CGPA for pass is minimum 5.0	
CGPA upto <5.50	Pass class
CGPA ≥ 5.50 & <6.00	Second Class
CGPA ≥ 6.00 & <7.5	First Class
CGPA >7.50	Distinction
[Percentage of Marks = CGPA*10.0]	

 
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iii. Apart from credit courses, Non-credit courses will be awarded with letter grades based on quantitative and qualitative Evaluations as PP (Pass) and NP (Not Passed).

Passing Criteria:

Student should score minimum 20 out of 60 in End Semester Examination.

Passing Percentage: 40 out of 100

*Minimum 50% of total credits should be there to promote the student in the next year.

*National / State level sports/ cultural events/ NSS/ NCC/ Yoga etc certificates shall be considered at department level by HOD or Subject teacher for attendance and internal assessment.

*If the student is passed in all subjects of First year, then only that student can take admission in the Third year and if the student is passed in all subjects of Second year, then only that student can take admission in the Fourth/Final year.

Gracing Rule:

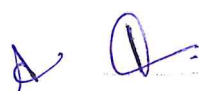
Three marks grace to maximum three subjects (total 09 marks), for every year subject to change in the result of the student (e.g. fail to pass). These 09 marks shall be distributed in three subjects as per requirement to change the result from fail to pass.

If student fails in more than three subjects, no grace will be given. Students those who have not availed any grace marks for any subject during the entire course then 1% grace marks (final year aggregate marks) shall be awarded to improve his/her class.

Calculation of SGPA and CGPA:

a. Semester Grade Point Average (SGPA):

The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken


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by the student in the semester and scaled to a maximum of 10. (SGPI is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^{i=n} c_i g_i]}{[\sum_{i=1}^{i=n} c_i]}$$

Where

'n' is the number of subjects for the semester,

'c_i' is the number of credits allotted to a particular subject, and

'g_i' is the grade-points awarded to the student for the subject based on his performance as per the above table.

SGPA will be rounded off to the second place of decimal and recorded as such.

b. Cumulative Grade Point Average (CGPA):

An up-to-date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (upto two decimal places). Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^{i=m} c_i g_i]}{[\sum_{i=1}^{i=m} c_i]}$$

Where,

'm' is the total number of subjects from the first semester onwards up to and including the semesters,

'c_i' is the number of credits allotted to a particular subject, and

'g_i' is the grade-points awarded to the student for the subject based on his/her performance as per the above table.

CGPA will be rounded off to the second place of decimal and recorded as such

It is to be noted that the CGPA is not the average of SGPA

CGPA to equivalent Percentage Conversion

CGPA shall be calculated with the following formula

$$\% = (CGPA * 10.0)$$



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P. E. S. College of Engineering,
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(An Autonomous Institute)
First Year Engineering
Common to All Branches
First Year Teaching and Evaluation Scheme



GROUP A
(Mechanical Engineering, Civil Engineering,
Electronics and Computer Engineering,
Electronics Engineering - VLSI Design and Technology)

Semester - I

Sr. No	Course Category	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	Total	
1	BSC	BTPES101T	Engineering Mathematics-I	3	--	--	20	20	60	100	3
2	BSC	BTPESA102T	Engineering Physics	3	--	--	20	20	60	100	3
3	ESC	BTPESA103T	Engineering Mechanics	3	--	--	20	20	60	100	3
4	ESC	BTPESA104T	Computer Programming	2	--	--	10	10	30	50	2
5	ESC	BTPESA105T	Fundamentals of Mechanical Engineering	2	--	--	10	10	30	50	2
6	AEC-01	BTPESA101L	Communication Skills Lab	--	--	4	60	--	40*	100	2
7	BSC	BTPESA102L	Engineering Physics Lab	--	--	2	30	--	20*	50	1
8	ESC	BTPESA103L	Engineering Mechanics Lab	--	--	2	30	--	20*	50	1
9	ESC	BTPESA104L	Computer Programming Lab	--	--	2	30	--	20*	50	1
10	VSEC	BTPESA105L	Workshop Practices	--	--	4	60	--	40*	100	2
11	CC	BTPESA106T1 BTPESA106T2 BTPESA106T3	Co-Curricular Courses - 1) Study of Thoughts of Dr. B. R. Ambedkar 2) Yoga Education 3) NSS	2	--	--	30	--	20*	50	2
Total				15	00	14	320	80	400	800	22

* Practical/Oral evaluation at the end of the semester.


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GROUP A

Semester - II											
Sr. No	Course Category	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	Total	
1	BSC	BTPES201T	Engineering Mathematics-II	3	--	--	20	20	60	100	3
2	BSC	BTPESA202T	Engineering Chemistry	3	--	--	20	20	60	100	3
3	ESC	BTPESA203T	Engineering Graphics	3	--	--	20	20	60	100	3
4	ESC	BTPESA204T	Basic Electrical Engineering	2	--	--	10	10	30	50	2
5	ESC	BTPESA205T	Fundamentals of Civil Engineering	2	--	--	10	10	30	50	2
6	BSC	BTPESA206AU	Energy and Environmental Engineering	2	--	--	50	--	--	50	AUDIT
7	IKS	BTPESA207IKS	Indian Knowledge System #	2	--	--	30	--	20*	50	2
8	BSC	BTPESA201L	Engineering Chemistry Lab	--	--	2	30	--	20*	50	1
9	ESC	BTPESA202L	Engineering Graphics Lab	--	--	2	30	--	20*	50	1
10	ESC	BTPESA203L	Basic Electrical Engineering Lab	--	--	2	30	--	20*	50	1
11	VSEC	BTPESA208T	Design Thinking	2	--	--	60	--	40*	100	2
12	CC	BTPESA209T1 BTPESA209T2	Co-Curricular Courses- 1) Integrated Personality Development 2)Health & Wellness	2	--	--	30	--	20*	50	2
Total				21	00	6	340	80	380	800	22

* Practical/Oral evaluation at the end of the semester.

Refer to the Institute website for the subjects under IKS bucket



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First Year Teaching and Evaluation Scheme



GROUP B

**(Computer Science Engineering,
Computer Science Engineering - Data Science,
Electrical Engineering)**

Semester - I											
Sr. No	Course Category	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	Total	
1	BSC	BTPES101T	Engineering Mathematics-I	3	--	--	20	20	60	100	3
2	BSC	BTPESB102T	Engineering Chemistry	3	--	--	20	20	60	100	3
3	ESC	BTPESB103T	Engineering Graphics	3	--	--	20	20	60	100	3
4	ESC	BTPESB104T	Basic Electrical Engineering	2	--	--	10	10	30	50	2
5	ESC	BTPESB105T	Fundamentals of Civil Engineering	2	--	--	10	10	30	50	2
6	BSC	BTPESB106AU	Energy and Environmental Engineering	2	--	--	50	--	--	50	AUDIT
7	IKS	BTPESB207IKS	Indian Knowledge System #	2	--	--	30	--	20*	50	2
8	BSC	BTPESB101L	Engineering Chemistry Lab	--	--	2	30	--	20*	50	1
9	ESC	BTPESB102L	Engineering Graphics Lab	--	--	2	30	--	20*	50	1
10	ESC	BTPESB103L	Basic Electrical Engineering Lab	--	--	2	30	--	20*	50	1
11	VSEC	BTPESB108T	Design Thinking	2	--	--	60	--	40*	100	2
12	CC	BTPESB109T1 BTPESB109T2	Co-Curricular Courses- 1) Integrated Personality Development 2) Health & Wellness	2	--	--	30	--	20*	50	2
Total				21	00	6	340	80	380	800	22

* Practical/Oral evaluation at the end of the semester.

Refer to the Institute website for the subjects under IKS bucket

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GROUP B

Semester - II											
Sr. No.	Course Category	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	Total	
1	BSC	BTPES201T	Engineering Mathematics-II	3	--	--	20	20	60	100	3
2	BSC	BTPESB202T	Engineering Physics	3	--	--	20	20	60	100	3
3	ESC	BTPESB203T	Engineering Mechanics	3	--	--	20	20	60	100	3
4	ESC	BTPESB204T	Computer Programming	2	--	--	10	10	30	50	2
5	ESC	BTPESB205T	Fundamentals of Mechanical Engineering	2	--	--	10	10	30	50	2
6	AEC-01	BTPESB201L	Communication Skills Lab	-	--	4	60	--	40*	100	2
7	BSC	BTPESB202L	Engineering Physics Lab	--	--	2	30	--	20*	50	1
8	ESC	BTPESB203L	Engineering Mechanics Lab	--	--	2	30	--	20*	50	1
9	ESC	BTPESB204L	Computer Programming Lab	--	--	2	30	--	20*	50	1
10	VSEC	BTPESB205L	Workshop Practices	--	--	4	60	--	40*	100	2
11	CC	BTPESB206T1 BTPESB206T2 BTPESB206T3	Co-Curricular Courses- 1) Study of Thoughts of Dr. B. R. Ambedkar 2) Yoga Education 3) NSS	2	--	--	30	--	20*	50	2
			Total	15	00	14	320	80	400	800	22

* Practical/Oral evaluation at the end of the semester.

Course Code Abbreviations: BTPESA/B1XXT/L (Only for the reference).

Where:

BT-Bachelor of Technology

PES- Institute Name

A/B-Group for FY / Branch name will be for Higher Classes (Group Name is not given for Engineering Mathematics – I & II as subject is same for both group in both semester).

1-Semester

XX- Serial no. for Theory or Lab

T/L- Theory subject or Laboratory subject



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SEMESTER-I

Engineering Mathematics-I

BTPE101T	Engineering Mathematics-I	BSC	3L- 0T – 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs

Course Objectives:	
1.	To develop logical understanding of the subject.
2.	To develop mathematical skills so that students are able to apply mathematical methods and principles in solving problems from different engineering fields.

Course Outcomes: At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem	K3
CO2	Demonstrate the concept partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions.	K2
CO3	Compute Jacobian of functions of several variables and their applications to engineering problems	K5
CO4	Identify and sketch of curves in various coordinate system.	K2
CO5	Solve first order differential equations and apply them as a mathematical modelling in electric and mechanical systems.	K3

Course Contents:
Unit 1: Matrices [8 hours] Rank of a matrix, Normal form of a matrix, Consistency of the system of linear equations (homogeneous and non-homogeneous equations). Characteristic equation of Matrix, Eigen values and Eigen vectors, Cayley-Hamilton Theorem, Linear dependence and independence of vectors, Linear Transformations
Unit 2: Partial Differentiation [8 hours] Partial Derivatives, Total Differentiation, Change of Independent Variables. Euler's theorem on Homogeneous functions (with proof).
Unit 3: Applications of Partial Differentiation [8 hours] Jacobian, properties of Jacobian, Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers, Taylor's and Maclaurin's theorems for functions of two variables (without proof).
Unit 4: Curve Tracing and Rectification [8 hours] Tracing of curves in Cartesian (explicit type), Parametric & Polar form, Rectification of Cartesian, Parametric and Polar curves.
Unit 5: Ordinary Differential Equations [8 hours] Exact differential equation, linear differential equation, reducible to linear differential equation. Applications to orthogonal trajectories Electrical systems and Mechanical systems.
Note: 01 additional lecture/period shall be included in time table due to numerical subject as per suggestion by the subject teacher.

Text Books:	
1.	A Text Book of Engineering Mathematics (Volume-I, II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publications, New Delhi

Reference Books:	
1.	Advanced Engineering Mathematics by H.K. Das, S. Chand & Company.
2.	Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
3.	Engineering Mathematics A Tutorial Approach by Ravish R Singh, Mukul Bhat, Mc Graw Hill
4.	A Text Book of Engineering Mathematics by N. P. Bali and Manish Goyal

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Engineering Physics

BTPESA102T/BTPESB202T	Engineering Physics	BSC	3L- 0T - 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs

Course Objectives:

1.	To provide foundational knowledge of Engineering physics concepts relevant to engineering.
2.	To develop analytical skills in Engineering physics concepts to real-world engineering problems.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Explain the principles of architectural acoustics and ultrasonic wave generation and discuss their applications in engineering.	K2
CO2	Apply concepts of laser technology and fibre optics to analyse and solve practical engineering problems.	K3
CO3	Analyze crystal structures using Miller indices and evaluate nuclear radiation detection techniques.	K4
CO4	Classify solids based on energy bands and analyze semiconductor junctions and magnetic properties with respect to their engineering applications.	K4
CO5	Analyse interference in optical systems and apply De-Broglie's hypothesis and Schrödinger's equations to solve engineering measurement and quantum problems.	K3

Course Contents:

Unit-I: Acoustics, Ultrasonic waves [8 Hours] Acoustics: Conditions for good acoustics, Reverberation, Reverberation time, Sabine's formula for reverberation time, Absorption coefficient, Factors affecting architectural acoustics and their remedy. Ultrasonic Waves: Properties of Ultrasonic Waves, Generation of ultrasonic waves (Magnetostriction & Piezoelectric method), Applications of ultrasonics in scientific field and engineering field.
Unit-II: Laser and Fiber Optics [8 Hours] Lasers: Spontaneous and stimulated emission, population inversion, pumping, active medium & active center, resonant cavity, Characteristics of lasers, He-Ne laser: construction and working. (i) Elementary knowledge of LiDAR(ii) Barcode reader (iii) Application of laser in metal work Optical fibers: Critical angle, acceptance angle, acceptance cone, numerical aperture, total internal reflection and propagation of light, Types of optical fibers: Single mode & multimode, step index & graded index, Fibre Optic Communication System, Advantages of optical fiber
Unit-III: Crystal Structure and Nuclear Physics [8 Hours] Crystal Structure: Fundamental concepts: lattice, basis, Unit Cell, Crystal systems cubic structure: Number of atoms, co-ordination number, Close packing and packing efficiency, atomic radius, relation between 'p' and 'a', interplanar distance, Miller indices, procedure to find the miller indices and examples. Nuclear Physics: properties of α , β , γ rays, GM Counter construction, working and principle.
Unit-IV: Semiconductor Physics and Magnetism [8 Hours] Semiconductor Physics: classification of solids on the basis of energy bands, Intrinsic and Extrinsic Semiconductors, Direct and Indirect Band Gap Semiconductors, Compound Semiconductors, Charge Carriers in Semiconductors, Metal-Semiconductor Junction – Rectifying Contact, Metal-Semiconductor Junction – Ohmic Contact, The $p-n$ Junction. Magnetism: Types of Magnetism, Magnetic Behavior of Materials, Ferromagnetism and Its Underlying Causes, Ferromagnetic vs Paramagnetic and Diamagnetic Materials, Curie-Weiss law, Domains, Domain walls, Hysteresis, Magnetic materials applications.
Unit-V: Engineering Optics and Quantum Mechanics [8 Hours] Interference: Interference in thin film of uniform thickness, conditions of maxima and minima for reflected system, Interference in wedge shaped film, Newton's rings-formation, diameter of newton's dark and bright rings in reflected light, engineering applications –

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(i) Newton's rings for determination of unknown monochromatic wavelength and refractive Index of transparent liquid (ii) Anti-reflecting Coating.

Quantum Mechanics: De-Broglie hypothesis of matter waves, De-Broglie wavelength for electron, problems on de Broglie wavelength, Need and significance of Schrödinger's equations, Schrödinger's time independent and time dependent Wave equations.

Note: 01 additional lecture/period shall be included in time table due to numerical subject as per suggestion by the subject teacher.

Text Books:

- | | |
|----|---|
| 1. | Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S.Chand and Company LTD |
| 2. | Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.-New Delhi |

Reference Books:

- | | |
|----|---|
| 1. | Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited. |
| 2. | Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd. |
| 3. | Solid State Physics – A.J. Dekker. McMillan India –Limited |
| 4. | Introduction to Solid State Physics – Charles Kittel. John Willey and Sons |
| 5. | Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited. |


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Engineering Mechanics

BTPESA103T/ BTPESB203T	Engineering Mechanics	ESC	3L- 0T - 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs
Course Objectives:				
1.	To introduce the fundamental concepts of force systems, equilibrium, and their applications in the analysis of statically determinate structures such as beams and trusses.			
2.	To develop understanding of mechanical properties such as centroid, moment of inertia, and friction, and their practical applications in solving engineering problems.			

Course Outcomes: At the end of this course, the students will be able:			Bloom's Taxonomy Level
CO1	Resolve force systems and determine resultants using composition and moments of forces.		K3
CO2	Construct free body diagrams and determine equilibrium conditions of force systems.		K4
CO3	Calculate support reactions and analyze statically determinate beams and plane trusses.		K3
CO4	Locate the centroid and compute moment of inertia of geometrical sections.		K3
CO5	Explain laws of friction and solve related problems in block, wedge, ladder, and belt friction systems.		K3

Course Contents:	
Unit 1: Resolution, Composition, Moment of Forces and Equilibrium of particle [10 hours] Resultant of force system: Basic concepts, force system, resolution and composition of forces, resultant of coplanar forces, moment of a force, Varignon's theorem, resultant of parallel force system, couple, equivalent force-couple systems.	
Unit 2: Equilibrium [07 hours] Free body diagram, conditions of equilibrium for various force systems, equilibrium of two, three and more than three forces.	
Unit 3: Analysis of Statically Determinate Beams and Truss [09 hours] a) Types of beams and types of supports b) Reactions of simple beams and reactions of Cantilever beams. c) Two force members, analysis of plane truss using method of joints and sections	
Unit 4: Centroid and Moment of Inertia [07 hours] Centre of gravity, center of mass and centroid, centroid of plane laminas. Area moment of inertia.	
Unit 5: Friction [07 hours] a) Nature and characteristic of friction, static and dynamic friction, laws of friction, angle of friction, angle of repose, cone of friction. b) Block friction on horizontal and inclined planes, wedge friction. Ladder friction and Belt friction.	

Note: 01 additional lecture/period shall be included in time table due to numerical subject as per suggestion by the subject teacher.

Text Books:	
1.	S. Timoshenko, D. H. Young, Engineering Mechanics, McGraw Hill, 1995.
2.	Tayal A. K., Engineering Mechanics, Umesh Publications, 2010.
3.	Bhavikatti S. S., Rajashekarappa K. G., - Engineering Mechanics, New Age International Publications, 2 nd Edition.
4.	Beer, Johnston, Vector Mechanics for Engineers, Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.
Reference Books:	
1.	Irving H. Shames, Engineering Mechanics -Statics and Dynamics, Pearson Educations, Fourth edition, 2003.
2.	McLean, Nelson, Engineering Mechanics, Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication
3.	Singer F. L., Engineering Mechanics -Statics & Dynamics, Harper and Row Pub. York.
4.	Junnarkar S.B., and Shah, H.J. —Applied Mechanics, Charotar Publication House Anand.

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Computer Programming

BTPEA104T/ BTPESB204T	Computer Programming	ESC	2L-0T-0P	2 Credits
Evaluation Scheme	CA-10 Marks	MSE-10 Marks	ESE-30 Marks	ESE Time Duration 2 Hrs

Course Objectives:

- To provide a strong foundation in computer fundamentals and problem-solving techniques through structured programming using the C language.
- To enable students to design and implement programs using python Programming Language

Course Outcomes:

At the end of this course, the students will be able:

Bloom's
Taxonomy
Level

CO1	Explain the working of a computer system, types of programming languages, and create basic algorithms and flowcharts for simple problems.	K2
CO2	Write C programs using appropriate data types, operators, control structures, and loops for solving computational problems and Use arrays and strings in C to perform basic data processing and manipulation tasks	K3
CO3	Apply knowledge of python programming for modular programming and effectively use OOP.	K3

Course Contents:

Unit 1: Fundamental of the Computer and C Programming Concepts [8 hours]

Generation of computers, Classification of computers, Basic Anatomy of Computer System, Input Devices, Processor, Output Devices, Memory Management, Types of Computer Software, Overview of Operating system, Concept of Networking. Introduction to Programming: Definition program, Designing Flowcharts and Algorithms for implementing program to solve computational problems.

Introduction to C Programming: Structure of a C Program, C-tokens and operators and expressions.

Unit 2: Control flow of C and fundamental of Python Programming Language [8 hours]

Control flow statement and loops in C Language, Arrays, Functions, Pointers.

Introduction to python: Difference Between Structural and Object-Oriented Languages, History, features and Need of Python Programming, Applications, Running Python Scripts, Basic syntax- Input/output, Indentation, Comments, Variables and Data Types-Integers, floats, Strings, Booleans.

Operators and Expressions: Operators-Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

Unit 3: Control flow, Functions, Data structure and OOP in Python [8 hours]

Control Flow –Conditionals- if, if-else-else, Loops and Statements- for, while, break, continue, pass.

Functions- Defining Functions, Scope of the Variables in a Function - Global and Local Variables.

Data Structures- Lists-Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions

Object Oriented Programming OOP using Python: Class and Object

Modules and Packages: Creating modules, import statement, Introduction to PIP

Text Books:

- Let-Us C- By Yashwant P. Kanetkar, ISBN-13. 978-8183331630 ; Edition. 15th ; Publisher. BPB Publications
- Herbert Schildt, C the Complete Reference, McGraw-Hill Publication, 2000.
- Balguruswamy, Programming in C, PHI
- Introduction to Computing using Python: An Application Development Approach, 4th Edition by Y. Daniel Liang, G. Bard Erlich, Pearson Education India, 4th Edition, 2019
- Fluent Python, 2nd Edition by Luciano Ramalho, O'Reilly Media, 2nd Edition, 2020

Reference Books:

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India.
- Head First Python, 2nd Edition by Paul Barry, Brian K. Jones, Elisabeth Robson, O'Reilly Media, 2nd Edition, 2010
- Automate the Boring Stuff with Python, 1st Edition by Al Sweigart, No Starch Press, 1st Edition, 2015

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Fundamentals of Mechanical Engineering

BTPESA105T/ BTPESB205T	Fundamentals of Mechanical Engineering	ESC	2L-0T- 0P	2Credits
Evaluation Scheme	CA-10 Marks	MSE-10 Marks	ESE-30 Marks	ESE Time Duration 2 Hrs
Course Objectives:				
1.	To introduce the fundamental principles of thermodynamics and familiarize students with thermal systems and machines such as IC engines, gas turbines, and power plants.			
2.	To develop a foundational for understanding of mechanical components, machine elements, engineering materials, manufacturing processes and their applications.			
Course Outcomes: At the end of this course, the students will be able:				Bloom's Taxonomy Level
CO1	Describe thermodynamics systems and its laws, properties, & thermal machines i.e. of IC engines, turbines and power plants.			K2
CO2	Identify types of energy sources, differentiate between mechanisms and machines. Engineering materials & its engineering applications. Understand basic power transmission system (clutches, brakes, couplings, belts drive), fluids and Pumps.			K2
CO3	Apply metrology techniques: use of precision tools to measure key engineering parameters. Classify manufacturing and machining processes.			K3

Course Contents:

Unit 1: Fundamentals of Thermodynamics and Thermal Machines [8 hours]

Introduction to Laws of Thermodynamics with simple examples, thermodynamics system, types of system and thermodynamics properties. Basic terminology of IC Engines: Classification, Applications, 2 and 4 stroke IC engine working principle, Application and working principle of Gas turbine, and steam turbine, thermal power plant & boilers, Renewable and non-renewable energy sources.

Unit 2: Basics of Mechanical Elements and Materials: [8 hours]

Engineering Materials: types and applications, Machine and Mechanisms. Elements of machine and mechanism, working principle of coupling, single plate clutch, brakes and belt drives, basics fasteners. Types of Fluids and Its Properties., Introduction to Pumps and its classifications.

Unit 3: Basic of Manufacturing Processes and Measuring Instruments: [8 hours]

Measurement: Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometers, Dial gauge, slip gauge, Sine-bar and Combination set. Production Engineering: Elementary theoretical aspects of production processes like casting, metal forming and welding processes, Introduction to Lathe machine, drilling machine, milling machine, basics of machining processes such as turning, drilling and milling.

Text Books:

1. P. K. Nag —Engineering Thermodynamics, Tata McGraw Hill, New Delhi 3rd ed.2005
2. M. Mahajan- Engineering Metrology: Dhanpat Rai & Co., New Delhi.
3. R. K. Bansal A Textbook of Fluid Mechanics and Hydraulic Machines.
4. P.N. Rao Manufacturing Technology – Vol. 1 & 2. McGraw-Hill Education
5. Serope Kalpakaji and Steven R Schmid- A manufacturing Engineering and Technology Addison Wsley Laongman India 6th Edition 2009.
6. R. S. Khurmi and J.K. Gupta - Textbook of Machine Design by S. Chand Publications

Reference Books:

1. Dr. P.N. Modi & S.M. Seth -Hydraulics & Fluid Mechanics Including Hydraulics Machine, Rajsons Publications.
2. Dr. V. D. Kodgire & S. V. Kodgire - Material Science & Metallurgy for Engineers, Everest Publication House Edition -2017.
3. O.P.Khanna - Production Technology (Manufacturing Processes) Vol.1 & 2 by Dhanpat Rai Publications, Edition - 2015
4. V. B. Bhandari, - Design of Machine Elements||, Tata McGraw Hill Publications, New Delhi.7.
5. Dr. B.S. Raghuwanshi - A Course in Workshop Technology Vol.1 & 2, Dhanpat Rai & Company.

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Communication Skills Lab

BTPEA101L/ BTPESB201L	Communication Skills Lab	AEC-01	0L- 0T - 4P	2 Credits
Evaluation Scheme	CA-60 Marks	ESE-40 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	Able students to listen English words' pronunciation properly.
2.	Improve students' ability of language skills and make them able to use apposite communication skill

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Identify and control the tone of students while speaking	K2
CO2	Students have to develop their pronunciations	K2
CO3	Students should be more confident while communicating	K2
CO4	Prepared to get rid of fearing of lack of confidence	K1
CO5	Students must not confuse while facing interview	K1

Minimum 10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

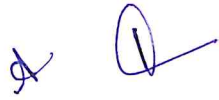
1.	How to introduce oneself?
2.	Know your friend
3.	Introduction to Phonemic symbols
4.	Articulation of sounds in English with proper manner
5.	Practice and exercises on articulation of sounds and Read Pronunciations/transcriptions from the dictionary
6.	Practice and exercises on pronunciations of words and Introduction to stress and intonation
7.	Letter Writing: Business letters including job application, leave application, offer letters and Emails.
8.	Other writing skills including Notices, Agendas and Minutes
9.	Rapid reading sessions
10.	Extempore
11.	Group discussion
12.	Participating in a debate
13.	Interview techniques

Text Books:

1.	Mohd. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill
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Reference Books:

1.	Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press, 2016
2.	Blass, Laurie, Kathy Block and Hannah Friesan. Creating Meaning. Oxford: OUP, 2007
3.	Teri Kwal Gamble, Michael Gamble, Communication Works, Tata McGraw Hill Education, 2010
4.	Aswalthapa, K. Organisational Behaviour, Himalayan Publication, Mumbai (1991).
5.	Meenakshi Raman, Sangita Sharma, Communication skills, Oxford University, Press 1973
6.	Andrson, Kennteh, Joan Maclean and Tossiny Lynch, study speaking: A Course in Spoken English for Academic Purpose, Cambridge: CUP, 2004
7.	Bhaskare, W.W.S. and Prabhu, N.S: English through reading, vols. 1 and 2. Macmillan, 1975


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Engineering Physics Lab

BTPESA102L/ BTPESB202L	Engineering Physics Lab	BSC	OL- OT - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	To develop practical skills in applying fundamental physics concepts such as optics, semiconductor physics, nuclear radiation, and crystallography through hands-on experiments and measurements.
2.	To enable students to operate scientific instruments and analyze experimental data for determining physical quantities like wavelength, band gap, numerical aperture, specific rotation, and material thickness, thereby enhancing their analytical and problem-solving abilities.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	To understand and apply the principles of wave optics and interference for determining physical parameters like wavelength, thickness of thin films, and radius of curvature using diffraction gratings and interference methods.	K2
CO2	To explore the working and characteristics of semiconductor devices such as diodes and study fundamental properties like band gap energy through practical experiments.	K3
CO3	To examine the behaviour of light in optical media by determining the numerical aperture of optical fibres and measuring specific rotation of optically active substances using polarimetry.	K3
CO4	To develop familiarity with radiation detection and crystal structures by studying Geiger-Müller counters and visualizing crystal lattice models or simulations.	K2
CO5	To cultivate scientific observation and instrumentation skills through hands-on and virtual experiments, enhancing understanding of core physics concepts applicable to engineering.	K3

Minimum 06 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1.	Determination of wavelength of LASER light using Plane Diffraction grating.
2.	Determination of Numerical Aperture of an optical fibre
3.	To study the forward and Reverse bias characteristics of a semiconductor diode
4.	To determine the Band gap of a semiconductor
5.	Determination of thickness of thin wire/paper using Wedge shape film method.
6.	Determination of Radius of curvature of a planoconvex lens using Newton's Ring
7.	To study G.M. Counter to plot a plateau curve
8.	To determine the specific rotation of given optical solution by Laurentz's half shade polarimeter
9.	Crystal Structure study
10.	Any other experiment based on syllabus may be included, which would help the learner to understand concept. Virtual lab may be developed and used for performing the experiments, after defining a suitable LO

Text Books:

1.	Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company Limited.
2.	Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd., New Delhi.

Reference Books:

1.	Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.
2.	Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd.
3.	Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt. Ltd.
4.	Solid State Physics – A.J. Dekker. McMillan India –Limited.
5.	The Feynman Lectures on Physics Vol I, II, III.
6.	Introduction to solid state Physics – Charles Kittel. John Wiley and Sons
7.	Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited

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Engineering Mechanics Lab

BTPESA103L/ BTPESB203L	Engineering Mechanics Lab	ESC	0L- 0T - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	To enable students to experimentally verify fundamental laws of mechanics, analyze coplanar force systems, and determine friction coefficients using graphical and practical methods.
2.	To provide hands-on experience in locating centroids, calculating moments of inertia, and evaluating the mechanical advantage and efficiency of simple machines.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Apply polygon law and Lami's theorem experimentally to determine unknown forces in coplanar systems.	K3
CO2	Determine support reactions and resultant of force systems using force table and graphical methods.	K4
CO3	Evaluate the coefficient of friction for horizontal and inclined planes using friction apparatus.	K3
CO4	Compute mechanical advantage, velocity ratio, and efficiency using screw jack, worm and worm wheel, and axle-wheel.	K3
CO5	Determine the centroid and moment of inertia of bodies using experimental setups.	K2

Minimum 08 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1.	Polygon law of coplanar forces.
2.	Determination of Support reactions for simply supported beam.
3.	Use friction apparatus to determine coefficient of friction for motion on horizontal plane.
4.	Use friction apparatus to determine coefficient of friction for motion on inclined plane.
5.	Moment of Inertia of fly wheel.
6.	Use force table to determine Resultant of Concurrent force system applying law of Polygon of forces.
7.	Verification of law of Machine using Screw jack.
8.	Analysis of concurrent and non-concurrent coplanar force system by graphical method.
9.	Verification of law of Machine using Worm and Worm Wheel
10.	Use Differential axle and wheel.
11.	Centroid of irregular shaped bodies.
12.	Use Lami's Theorem to determine unknown force.

Text Books:

1.	S. Timoshenko, D. H. Young, —Engineering Mechanics, McGraw Hill, 1995.
2.	Tayal A. K., —Engineering Mechanics, Umesh Publications, 2010.
3.	Bhavikatti S. S. Rajashekarappa K. G., - Engineering Mechanics, New Age International Publications, 2 nd Edition.
4.	Beer, Johnston, —Vector Mechanics for Engineers, Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.

Reference Books:

1.	Irving H. Shames, Engineering Mechanics -Statics and Dynamics, Pearson Educations, Fourth edition, 2003.
2.	McLean, Nelson, Engineering Mechanics, Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication
3.	Singer F. L., Engineering Mechanics -Statics & Dynamics, Harper and Row Pub. York.
4.	Junnarkar S.B., and Shah, H.J. —Applied Mechanics, Charotar Publication House Anand.

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Computer Programming Lab

BTPESA104L/ BTPESB204L	Computer Programming Lab	ESC	OL- OT - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	To provide a strong foundation in computer fundamentals and problem-solving techniques through structured programming using the C language.
2.	To enable students to design and implement programs using python Programming Language.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Explain the working of a computer system, types of programming languages, and create basic algorithms and flowcharts for simple problems.	K2
CO2	Write C programs using appropriate data types, operators, control structures, and loops for solving computational problems and Use arrays and strings in C to perform basic data processing and manipulation tasks.	K3
CO3	Apply knowledge of python programming for modular programming and effectively use OOP.	K3

Minimum 8 - 10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1.	Study of various types of computer components. To identify and understand the internal components of a computer by opening the CPU cabinet
2.	Write a C programs using different types of operators and also write a C code by using size of() operator to find the size of various data types.
3.	Write a following C programs using decision making statements: a) To check whether a number is even or odd. b) To check whether a number is positive or negative. c) To check whether a person is eligible or not.
4.	Write a following C programs using loops: a) To find sum of n natural numbers. b) To print the factorial of given number. c) To print sum of digits of number. d) To check whether a number is palindrome or not
5.	Write a C program to find the smallest and largest element from an 1D array.
6.	Two assignments related to creating and manipulating Variables and Operators: a) Program to print "hello world" b) Program to calculate area of triangle, rectangle, circle.
7.	Two assignments related to creating and manipulating Tuple. a) Program to find the Size of a Tuple. b) Program to find the Maximum and Minimum K elements in Tuple
8.	Two assignments related to creating and manipulating List. a) Program to find the union of two lists. b) Program to find the intersection of two lists
9.	Two assignments related to creating and manipulating String. a) Program to count the occurrences of each word in a given string sentence. b) Program to check if a substring is present in a given string.
10.	Two assignments related to creating and manipulating Dictionary. a) Program to map two lists into a dictionary. b) Program to count the frequency of words appearing in a string using a dictionary.

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11.	One assignment related to creating and manipulating Function. a) Program to find the length of a list using recursion.
12.	Program to compute the diameter, circumference, and volume of a sphere using class
13.	Create a Simple Calculator
14.	Create a command-line to-do list application that allows users to add tasks, view tasks, mark tasks as complete, and delete tasks.
15.	Develop a program to scrape data from a website using libraries like BeautifulSoup or Scrappy. Extract specific information like headlines, prices, or reviews from a webpage.

Text Books:

1.	Programming in C, Balguruswamy, PHI
2.	Let Us C, YashwantKanitkar, PHI
3.	Fluent Python, 2nd Edition by Luciano Ramalho, O'Reilly Media, 2nd Edition, 2020

Reference Books:

1.	Programming in ANSI C, Balagurusamy E, 8th Edition, Tata McGraw-Hill, 2019
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Workshop Practices

BTPESA105L/ BTPESB205L	Workshop Practices	VSEC	OL- OT - 4P	2 Credits
Evaluation Scheme	CA-60 Marks	ESE-40 Marks	ESE Time Duration 3 Hrs	

Course Objectives:	
1.	To impart knowledge and skills to use equipment and measuring instruments, tools, machines.
2.	To develop a skill in dignity of labour, precision, safety at workplace, team working.

Course Outcomes: At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Prepare simple wooden joints and parts using wood working tools and machines.	K3
CO2	Apply fitting and plumbing tools to produce job with specified dimensions.	K3
CO3	Apply sheet metal tools and machine to develop the sheet metal articles.	K3
CO4	Prepare simple Lap, Butt, T joint using Arc / Gas/ Resistance welding equipment.	K3
CO5	Understand Lathe machining processes.	K2

Minimum 06 experiments / jobs are to be performed based on contents from syllabus.

Sample List of Experiments:	
1.	Wood sizing exercises in planning, marking, sawing, chiselling and grooving to make half lap joint, cross lap joint, and mortise tendon joint and cylindrical wooden parts.
2.	A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
3.	A job 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 parts 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.	A job using power operated tools related to sheet metal work, Welding, Fitting, Plumbing, Carpentry and pattern making.
8.	A job on turning of a Mild Steel cylindrical job using center lathe.

Text Books:	
1.	K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.
2.	Hazra and Chaudhary, Workshop Technology- Volume - I, Media promoters & Publisher private limited.
3.	Hazra and Chaudhary, Workshop Technology – Volume - II, Media promoters & Publisher private limited.
4.	N Khurmi R.S Khurmi - A Textbook of Workshop Technology, Manufacturing Processes, S. Chand Publication.

Reference Books:	
1.	B S Raghuwanshi - A Course In Workshop Technology Volume - 1 By Edition 2017
2.	B S Raghuwanshi - A Course In Workshop Technology Volume - 2 By Edition 2017



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Study of Thoughts of Dr. B. R. Ambedkar

BTPESA106T1/ BTPESB206T1	Study of thoughts of Dr. B. R. Ambedkar	CC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:	
1.	Develop awareness of social justice, equality, and human rights principles in contemporary society
2.	Understand fundamental constitutional principles and their application in professional life

Course Outcomes: At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Understand the historical context that influenced social reform movements	K2
CO2	Appreciate Dr. Ambedkar's personal journey and its influence on his ideology	K2
CO3	Understand principles of social reconstruction and their contemporary relevance	K2
CO4	Appreciate constitutional values and democratic principles	K2
CO5	Develop ethical reasoning for technological decisions and social responsibility	K3

Course Contents:	
Unit 1: Historical Background and Pre-Ambedkar Movement [6 hours]	
- Social, cultural, and political background of colonial India - Pre-Ambedkar reform movements (Mahatma Phule, Savitribai Phule) - British policies and their impact on Indian society	
Unit 2: Dr. Ambedkar's Life and Early Movements [6 hours]	
- Brief biographical sketch of Dr. Ambedkar's childhood and education - Formation of Bahishkrit Hitkarini Sabha - Mahad Satyagraha and Temple Entry Movement	
Unit 3: Social Philosophy and Caste Analysis [6 hours]	
- Dr. Ambedkar's analysis of caste system and social stratification - Theory of origin of caste and untouchability	
Unit 4: Constitutional Contributions and Democratic Values [6 hours]	
- Dr. Ambedkar's role in making the Indian Constitution - Concept of political, social, and economic democracy	
Unit 5: Contemporary Relevance and Professional Ethics [6 hours]	
- Dr. Ambedkar's views on education and human development - Ethics in professional life and social responsibility of technologists	

Reference Books:	
1.	Kshirsagar, R. K.: Dalit Movement in India.
2.	Keer, Dhananjay: Dr. Ambedkar Life and Mission, Popular Prakashan, Mumbai.
3.	Dr. Babasaheb Ambedkar Writing and Speeches Vol. 1,2, 3, 5, 7, 9, 17, Education Dept., Govt of Maharashtra.


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Yoga Education

BTPESA106T2/ BTPESB206T2	Yoga Education	CC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:	
1.	Develop awareness of physical, mental, social and spiritual health
2.	Learn techniques to manage stress through the art of Yoga and meditation

Course Outcomes: At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Increase awareness of health and lead a peaceful life	K2
CO2	Understand and perform Yogaasanas and meditation	K2
CO3	Develop awareness of breathing techniques	K2
CO4	Practice breathing for societal peace and harmony	K3
CO5	Enhance understanding of Yogic diet, food and nutrition	K2

Course Contents:	
Unit 1: Fundamentals of Yoga [6 hours] Introduction, definitions, concepts, and the relationship between yoga, health, and fitness	
Unit 2: Yog Sutra [6 hours] Patanjali's Ashtanga Yog Sutra and Pancha Klesha (Five Afflictions)	
Unit 3: The Pancha Koshas [6 hours] Five Sheaths of Human Existence and The Seven Chakras–Energy Centres of the Body	
Unit 4: Pranayama and Meditation [6 hours] Types of Pranayama (minimum 5) and their benefits; Meditation–Importance types and benefits	
Unit 5: Diet and Nutrition [6 hours] The importance of diet, food, and nutrition in Yogic practice	

Text Books:	
1.	B. K. S. Iyengar, Light on Yoga, harper collins publisher, new Delhi.
2.	Swami Ramdev, Pranayam Rahasya, Divya prakashan

Reference Books:	
1.	Yoga Darshan of Patanjali (with Hindi translation)–Gita Press, Gorakhpur
2.	Gheranda Samhita – Commentary on the Yoga Teachings of Maharshi Gheranda
3.	Hatha Pradipika by Swami Swatmarama – Swami Satyananda Saraswati


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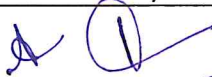
NSS

BTPESA106T3/ BTPESB206T3	NSS	CC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:	
1.	Social Awareness: Understand the philosophy and objectives of NSS and develop commitment to community service
2.	National Integration: Foster understanding of Indian culture, diversity, and the role of youth in nation-building

Course Outcomes: At the end of this course, the students will be able:			Bloom's Taxonomy Level
CO1	Appreciate the role of voluntary service in personal and social development		K2
CO2	Develop skills in organizing and implementing service programs		K3
CO3	Understand youth psychology and effective engagement strategies		K2
CO4	Develop emotional intelligence and interpersonal effectiveness		K2
CO5	Develop skills for constructive participation in nation-building activities		K2

Course Contents:
Unit 1: NSS Foundation and Philosophy [6 hours] History and Evolution: Origin and development of NSS in India, Philosophy and Motto: Not Me, But You- understanding the core philosophy, Aims and Objectives: Educational, social, and character development goals Organizational Structure: National, state, and institutional level organization, NSS Badge and Song: Significance and meaning
Unit 2: Community Engagement and Survey Methodology [6 hours] Village/Slum Adoption: Principles and criteria for community selection, Survey Methodology: Planning, conducting, and analyzing community surveys, Regular Activities: Types of ongoing community service activities, Special Camping Programs: Planning and execution of intensive service camps, Day Camps: Short-term focused community intervention programs
Unit 3: Youth Leadership and Mobilization [6 hours] Profile of Youth: Demographics, characteristics, and potential of Indian youth, Leadership Types: Democratic, transformational, and servant leadership styles, Leadership Qualities: Communication, decision-making, empathy, and integrity, Youth as Change Agents: Role in social transformation and development, Community Stakeholder Mapping: Identifying and engaging local partners, Mobilization Strategies: Effective methods for youth engagement and volunteerism
Unit 4: Life Skills and Personal Development [6 hours] Communication Skills: Verbal, non-verbal, and written communication for community work, Interpersonal Skills: Building relationships, active listening, and empathy, Problem-Solving: Systematic approaches to addressing community challenges, Decision-Making: Analytical thinking and consensus building, Self-Confidence and Self-Esteem: Building personal effectiveness for leadership, Stress and Time Management: Balancing academic, personal, and service commitments
Unit 5: National Integration and Youth Development [6 hours] Indian History and Culture: Unity in diversity and cultural appreciation, Peace-Building and Conflict Resolution: Youth role in promoting harmony, Nation-Building Activities: Contributing to national development goals, National Youth Policy: Government initiatives and frameworks, Youth Development Programs: National, state, and voluntary sector initiatives, Youth Organizations: Structure and role of youth-focused and youth-led organizations


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SEMESTER-II

Engineering Mathematics-II

BTPE201T	Engineering Mathematics-II	BSC	3L- 1T - 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs

Course Objectives:

1.	To build upon the mathematical knowledge acquired in Engineering Mathematics I, providing students with a stronger foundation in calculus, differential equations, and other relevant areas.
2.	To enable students to analyze and solve complex engineering problems using mathematical techniques and tools.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.	K2
CO2	Solve higher order differential equations.	K3
CO3	Determine Fourier series representation of periodic functions over different intervals.	K3
CO4	Evaluate multiple integrals in Cartesian and polar coordinates	K4
CO5	Evaluate multiple integrals and their applications to area and volume.	K4

Course Contents:

Unit 1: Complex Numbers and Applications

[8 hours]

Geometrical representation of a complex number, Standard forms of complex number, De'Moivre's Theorem, Roots of complex number, Complex functions: circular and hyperbolic functions, Relation between circular and hyperbolic functions, Separation into Real and Imaginary parts of complex functions, logarithm of complex numbers.

Unit 2: Linear Differential Equations with Constant Coefficients

[8 hours]

Introduction, complementary function, particular integral, rules for finding complementary functions and particular integrals, method of variation of parameters, Cauchy's homogeneous and Legendre's linear equations.

Unit 3: Fourier Series

[8 hours]

Definition, Dirichlet's conditions, Fourier Series in the interval $(0, 2\pi)$, Change of interval, Fourier series for Even and Odd functions in $(-\pi, \pi)$ and $(-l, l)$, Half Range Fourier series in $(0, \pi)$ and $(0, l)$

Unit 4: Multiple Integrals

[8 hours]

Double integration in Cartesian & polar coordinates, Evaluation of double integrals by changing the order of integration and changing to polar form, triple integration.

Unit 5: Applications of Multiple Integrals

[8 hours]

To find area by double integration in Cartesian and Polar coordinates, Surface Area & Volume of Solid of Revolution. volume by triple integration, mean value of function, Root Mean Square Values.

Note: 01 additional lecture/period shall be included in time table due to numerical subject as per suggestion by the subject teacher.

Text Books:

1.	A Text Book of Engineering Mathematics (Volume-I, II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publications, New Delhi

Reference Books:

1.	Advanced Engineering Mathematics by H.K. Das, S. Chand & Company.
2.	Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
3.	Engineering Mathematics A Tutorial Approach by Ravish R Singh, Mukul Bhat, Mc Graw Hill
4.	A Text Book of Engineering Mathematics by N. P. Bali and Manish Goyal

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Engineering Chemistry

BTPESA202T/ BTPESB102T	Engineering Chemistry	BSC	3L- 1T - 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs

Course Objectives:

1.	To bring adaptability to new developments in Engineering Chemistry and to acquire the skills Required to become a perfect engineer.
2.	To include the importance of water in industrial usage, fundamental aspects of battery Chemistry
3.	To imbibe the basic concepts of petroleum and its products.

Course Outcomes:

At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Students should be able to understand and explain the basic concepts of Water treatment and capable to explain softening processes and its usage in domestic and industrial purposes	K2
CO2	Students should be able to explain analysis, Calorific value of fuel and explain lubricants, its properties and industrial importance.	K2
CO3	Students should know the concepts of Electrochemistry and its importance.	K2
CO4	Student should be able to understand and explain various instrumental methods of Analysis.	K3
CO5	Student should be able to understand and explain properties and uses of engineering materials such as Cement, Gypsum plaster, Rubber etc.	K2

Course Contents:

Unit-I: Water Treatment	[8 Hours]
Introduction, Hard and Soft water, Disadvantages of hard water, softening of water: Zeolite, Ion exchange process, Hot lime –soda process, Reverse Osmosis (RO), Hardness and its determination by EDTA method, Dissolved oxygen (DO) and its determination by Winkler's method, Numerical based on hardness, Treatment of water for domestic purpose- aeration, sedimentation and disinfection.	
Unit-II: Fuels and Lubricants	[7 Hours]
Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, Analysis of coal: Proximate and Ultimate analysis, Liquid fuel- Refining of petroleum. Lubricant: Introduction, classification of lubricant - Solid, Semi –solid and Liquid lubricant, Properties of lubricant: Physical and Chemical properties of lubricant – viscosity surface tension, Flash point and Fire point, Acid value, Saponification value.	
Unit-III: Electrochemistry	[7 Hours]
Introduction, Electrical conductance, Conductance measurement by Wheatstone bridge method, Cell constant, conduct metric titrations, Glass electrode and its application for pH measurement, Ostwald's theory of acid- base indicator, Fuel cell, working of H ₂ -O ₂ fuel cell and its applications, Rechargeable Batteries: Lithium-ion batteries and Lithium batteries.	
Unit-IV: Instrumental Methods of Analysis	[7 Hours]
UV-Visible spectroscopy: Introduction, Laws of absorption: Lambert's- Beer's law, Instrumentation and working of double beam spectrophotometer. Flame Photometry: Introduction, Principle and working. Chromatography: Introduction, Classification, Thin layer chromatography (TLC). IR spectroscopy: Introduction, Principle, Range of IR radiations, Double beam IR Spectrophotometer and applications of IR Spectroscopy.	
Unit-V: Engineering Materials Cement	[6 Hours]
Engineering Materials Cement: Introduction, Portland cement, Chemical Composition of Cement Gypsum: Plaster of Paris, Properties and Uses High polymers: Introduction. Types of Polymerizations, Thermoplastic and Thermosetting resin, Constituent of Plastic, Synthesis of Urea formaldehyde and its Properties and Uses, Brief discussion on Natural Rubber, Synthesis of Styrene - butadiene rubber and its properties and uses.	

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Note: 01 additional lecture/period shall be included in time table due to numerical subject as per suggestion by the subject teacher.

Text Books:	
1.	Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2.	Bhal & Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi
3.	Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015.
4.	Gurudeep Chatwal and Sham Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing House, New Delhi
5.	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, Wiley India, New Delhi 2014.
4.	S. S. Dara, Engineering Chemistry, McGraw Hill Publication, New Delhi.
5.	Willard, Hobart H.; Merritt, Lynne L., Jr.; Dean, John A. Instrumental Methods of Analysis, American Chemical Society.


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Engineering Graphics

BTPESA203T/ BTPESB103T	Engineering Graphics	ESC	3L- 1T - 0P	3 Credits
Evaluation Scheme	CA-20 Marks	MSE-20 Marks	ESE-60 Marks	ESE Time Duration 3 Hrs

Course Objectives:

1.	To develop imagination and interpretation skills in Engineering drawing for better Engineering communication.
2.	To develop an ability for construction of Orthographic and Isometric views.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Develop different objects using basic rules and geometrical constructions	K3
CO2	Draw projections of points and lines according to given conditions.	K3
CO3	Draw projections of planes and solids according to the given conditions.	K3
CO4	Study the concept of orthographic projections to convert 3D drawing to 2D drawing with visualization and isometric projections to convert 2D drawing to 3D drawing with visualization.	K2
CO5	Draw the lateral development of given solid and by using Auto CAD to draw 2D & 3D drawings.	K3

Course Contents:

Unit 1: Introduction to Engineering Drawing

[08 hours]

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, types of lines, types of Scales, types of dimensioning, methods of dimensioning, division of lines into equal number of parts, division of arcs, different methods to draw regular polygons, inscribe a regular polygon in a given circle. Introduction to 1st and 3rd angle method of projection.

Unit 2: Projections Of Points and Lines

[08 hours]

Quadrant systems, Projections of points in different quadrants. Projections of lines when line is inclined to one and both the reference planes, traces of lines, Projections of planes when the plane is inclined to one and both the reference planes.

Unit 3: Projections Of Planes and Solids

[08 hours]

Projections of planes when the plane is inclined to one and both the reference planes. Types of solids, projections of solids when the solid is inclined to both the reference planes.

Unit 4: Orthographic Projections and Isometric Projections

[08 hours]

Projections of objects to draw front view, side views, top views of given objects. Introduction to sectional orthographic drawings. Isometric projections: Isometric scale, drawing of isometric projections from given orthographic views.

Unit 5: Development of Surfaces and Introduction to Auto CAD

[08 hours]

Development of prisms, cylinders, cones, pyramids and composite solids. Basic commands of Auto CAD software to draw simple 2D & 3D drawings.

Text Books:

1.	N. D. Bhatt, Engineering Drawing, Charotar Publishing House.
2.	K. V. Natarajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
3.	P. H. Jain- Engineering Graphics Soham publications.
4.	P.S. Gills, Engineering Graphics & Design, S. K. Kataria & Sons, New Delhi, Reprint 2023

Reference Books:

1.	K. Venugopal and, V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
2.	Kulkarni D.M, A. P. Rastogi and A. K. Sarkar - Engineering Graphics with Auto CAD, PHI Publication (2010).
3.	James H. Earle, Engineering Design Graphics - Peachpit Press; 9 th edition (5 August 1998)

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Basic Electrical Engineering

BTPESA204T/ BTPESB104T	Basic Electrical Engineering	ESC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-10 Marks	MSE-10 Marks	ESE-30 Marks	ESE Time Duration 2 Hrs

Course Objectives:

- To impart fundamental knowledge of electrical circuits and components with the analytical skills.
- To expose students to electrical safety measures, wiring types, and regulatory standards.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Explain the fundamental electrical quantities, circuit elements, and laws.	K2
CO2	Apply KVL, KCL, and network theorems for solving DC circuits.	K3
CO3	Analyse single-phase AC circuits and compute power, impedance, and power factor.	K4
CO4	Identify wiring systems and protection devices in real-world installations.	K2
CO5	Demonstrate awareness of electrical safety norms and Indian regulatory standards.	K3

Course Contents:

Unit 1: DC Circuits	[8 hours]
Electrical Circuit Elements: Resistance, Inductance, and Capacitance, their definitions, units, symbols. Circuit Analysis: Series and parallel connections. Sources and Dividers: Current and voltage sources, and current and voltage dividers. Theorems and Techniques: Kirchhoff's Laws (KCL, KVL), Mesh and Nodal analysis, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, and Maximum Power Transfer Theorems (MPT).	
Unit 2: AC Circuits	[8 hours]
Fundamentals, waveforms, (RMS, average, peak), form factor, peak factor, frequency, Single-phase AC circuits R-L-C series and parallel circuits, power factor, power triangle, impedance triangle, power and energy measurement.	
Unit 3: Electrical Wiring	[4hours]
Types of wires and wiring systems, including single core, two core, and flexible wire. Etc switches, fuses, MCCB, ELCB, and electrical shock causes, prevention, and treatment (including first aid), Safety Norms, Addresses the concept of earthing and relevant Indian Electricity (IE) & IS rules.	

Text Books:

- Electrical Technology (Volume I & II) B.L. Theraja and A.K. Theraja Publisher: S. Chand & Company Pvt. Ltd.
- Basic Electrical Engineering Authors: D.P. Kothari and I.J. Nagrath Publisher: McGraw Hill Education (India) Pvt. Ltd.

Reference Books:

- Principles of Electrical Engineering Authors: V.K. Mehta and Rohit Mehta Publisher: S. Chand & Company Pvt. Ltd.
- Electrical Engineering Fundamentals Author: Vincent Del Toro Publisher: Pearson Education
- Basic Concept of Electrical Engineering Authors: Kuldeep Sahay and Shivendra Pathak Publisher: New Age International Publishers



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Fundamentals of Civil Engineering

BTPESA205T/ BTPESB105T	Fundamentals of Civil Engineering	ESC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-10 Marks	MSE-10 Marks	ESE-30 Marks	ESE Time Duration 2 Hrs

Course Objectives:

1.	To provide fundamental knowledge of civil engineering, its scope, and commonly used construction materials.
2.	To develop understanding of building construction, structural foundations, and basic surveying techniques required in civil engineering practice.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Identify the branches, roles, and scope of Civil Engineering along with properties and uses of common Civil Engineering materials.	K1
CO2	Distinguish between various structural components and foundation types.	K2
CO3	Analyze building components, loads, masonry, and survey methods.	K4

Course Contents:

Unit 1: Introduction to Civil Engineering and Civil Engineering Materials [08 hours]

Introduction, Branches, Scope and Role of Civil Engineering, Type, Properties, Uses of materials: Cement, Aggregate, Sand, Brick, Steel, Stone, Soil, Concrete, Mortar, Timber, Fly ash, Steel slag, Bitumen.

Unit 2: Sub-structure and Super-structure [08 hours]

Types of Structure, Introduction to foundation, Depth of Foundation, Soil Type as Foundation Strata, Types of Foundation: Shallow foundation and Deep foundations

Unit 3: Building Construction and Basics of Survey [08 hours]

Type of building, Component of building and its functions, types of loads acting on building, types of masonry. Introduction to surveying, Principles of Survey, Linear Measurement: Different methods of measurement using tape and chain.

Text Books:

1.	Arora S. P. and Bindra S.P., "Building Construction", Dhanpat Rai and Sons, Delhi.
2.	Punmiya B.C., A.K.Jain and Ashok Kumar Jain, "Soil Mechanics and Foundations", Laxmi Publications Pvt Ltd, New Delhi
4.	K.A.Patil and I.K. Pateriya, "Basic Civil Engineering", Shree Laxmi Prakashan, Aurangabad.
5.	Punmia B. C. and Jain, "Surveying", Vol. 1, 2 & 3, Laxmi Publications, New Delhi. 17 th edition, 2015.
5.	Punmia B. C. and Jain, "Surveying", Vol. 1, 2 & 3, Laxmi Publications, New Delhi. 17 th edition, 2015.

Reference Books:

1.	Sushil Kumar, "Building Construction", Standard Publishers Distributors, Nai Sarak Delhi.
2.	Duggal S.K., "Surveying", Volume I, Tata Mc Graw Hill Publishing Company Limited New Delhi, Edition 2013.


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Energy and Environmental Engineering

BTPESA206AU/ BTPESB106AU	Energy and Environmental Engineering	BSC	2L- 0T - 0P	Audit
Evaluation Scheme	CA-50 Marks			

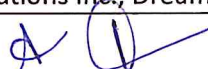
Course Objectives:	
1.	To understand energy generation methods & its effect on environment.
2.	To impart the knowledge of Environment, Ecosystem, and different types of pollutions.

Course Outcomes: At the end of this course, the students will be able:		Bloom's Taxonomy Level
CO1	Differentiate conventional and non-conventional energy sources with environmental effect.	K2
CO2	Gain knowledge of components and segments of environment, ecosystem and its types and Pollution.	K1
CO3	Follow environmental Ethics.	K3

Course Contents:	
Unit 1: Energy and Environment	[12 hours]
Introduction, Conventional Energy Sources: Hydro Power Plant: Introduction, General arrangement and operation, Hazard & Impact on Environment. Thermal Power Plant Layout, working and its Hazard & Impact on Environment. Gas Turbine Power Plant: Introduction, Simple Gas Turbine Plant, Fuels for Gas Turbine Plant Hazard & Impact on Environment, Nuclear Power Plant: Introduction, Nuclear materials, Selection of site, Working of Nuclear Power Plant, Hazard & Impact on Environment. Renewable sources of Energy: Solar Energy, Hydro Energy, Tidal Energy, Wind Energy, Biomass Energy, Geothermal Energy.	
Unit 2: Environment and Its Pollution	[08 hours]
Environment and its Segment, Component and types; Human interference with the environment, Ecosystem and its components, types of ecosystems, human induced ecosystem degradation. Human health and environment, Definition, Cause, Effects and control measures of Air pollution, Water pollution, Soil Pollution, Noise Pollution, and Solid Waste Management. Role of an individual in prevention of Pollution.	
Unit 3: Environment and Society	[04hours]
Global warming, climate change etc. Environmental Protection Act-1986, water (prevention and control of pollution) Act-1974, Air (prevention and control of pollution) Act-1981etc, Environment impact assessment. Environmental ethics in India.	

Text Books:	
1.	A Textbook on Power System Engineering, A. Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai and Co. Pvt. Ltd
2.	Environmental Studies, First Edition, S. Deswal, A. Deswal, Dhanpat Rai & Amp; Co Ltd.
3.	Environmental Studies, Second Edition, Benny Joseph, The MC Graw Hill Companies.
4.	Introduction to Environmental Science, First Edition Anjaneyulu, B. S. Publication

Reference Books:	
1.	Power Plant Engineering, by P.K. Nag, Publisher: McGraw Hill Education India.
2.	Environmental Studies, Third Edition, Dr. J. P. Sharma, University science press New Delhi.
3.	Environmental Studies, Fourth Edition, Dr. Suresh K. Dhameja, S. K. Kataria and Sons New Delhi.
4.	Energy, Environment, Ecology and Society, Kojent Learning Solutions Inc., Dreamtech Press New Delhi.


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Engineering Chemistry Lab

BTPESA201L/ BTPESB101L	Engineering Chemistry Lab	BSC	OL- OT - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	Provide the students with solid foundation in chemistry laboratory required to solve engineering problems.
2.	Practical implementation of fundamental concepts.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Understand the new development in Engineering Chemistry and to acquire the skills required to become a perfect engineer.	K2
CO2	Solve the problems related to use of water as an engineering material in industry and elsewhere.	K3
CO3	Perform methods such as conductometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.	K3
CO4	Determine Acid value, saponification value, surface tension and viscosity of lubricant oils.	K3
CO5	Prepare polymers like Urea Formaldehyde resin and Bakelite.	K3

Minimum 6 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

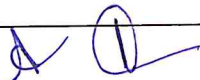
1.	Determination of Hardness of water sample by EDTA method.
2.	Determination of Dissolve Oxygen in water by Iodometric method.
3.	Determination of Chloride content in water sample by precipitation titration method.
4.	To determine alkalinity water sample.
5.	Determination of Acid value of an oil sample.
6.	Determination of Saponification value of an oil sample.
7.	Determination of Viscosity by Ostwald Viscometer.
8.	Determination of Surface tension by Stalagmometer.
9.	pH-metric Titration (Acid Base titration)
10.	Conductometric Titration (Acid Base titration)
11.	Preparation of Phenol Formaldehyde Resin (Bakelite).
12.	Preparation of Urea-Formaldehyde Resin.
13.	Experiments on Chromatography.

Text Books:

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

Reference Books:

1.	Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2.	Vogel's text book of practical organic chemistry 5 th edition
3.	Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi


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Engineering Graphics Lab

BTPESA202L/ BTPESB102L	Engineering Graphics Lab	ESC	OL- OT - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

- To develop imagination and interpretation skills in Engineering drawing for better Engineering communication.
- To develop an ability for construction of Orthographic and Isometric views.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	To draw Drawing Standards, and geometrical constructions.	K2
CO2	To draw projections of points and lines Inclined to one plane & both the planes.	K2
CO3	To draw projections of planes and solids Inclined to one plane & both the planes.	K2
CO4	To draw Development of surfaces engineering objects.	K2
CO5	To draw Orthographic and Isometric using drawing sheet and AUTO CAD Software.	K2

Minimum 10 drawing sheets from the list given below on half imperial (A3) drawing sheet & Sketch book

Sample List of Experiments:

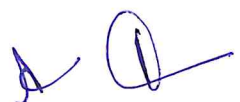
1.	Sheet No.1:- Drawings standards.
2.	Sheet No.2:- Geometrical constructions
3.	Sheet No.3:- Projections of points / projections of straight lines (inclined to one plane & both the planes).
4.	Sheet No.4:- Projections of planes. (inclined to one plane & both the planes).
5.	Sheet No.5:- Projections of solids. (inclined to one plane & both the planes).
6.	Sheet No.6:- Development of surfaces (inclined to one plane & both the planes).
7.	Sheet No.7:- Orthographic projections. (minimum 3 problems).
8.	Sheet No.8:- Isometric projections. (minimum 3 problems).
9.	Sheet No.9:- To draw/create simple geometrical shapes using AutoCAD software.
10.	Sheet No.10:- To draw simple orthographic drawings using AutoCAD software.
11.	Sheet No.11:- To draw simple isometric drawings using AutoCAD software.

Text Books:

- N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 46th Edition, 2003.
- K. V. Natarajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
- P. H. Jain- Engineering Graphics Soham Publications.
- P.S. Gills, Engineering Graphics & Design, S. K. Kataria & Sons, New Delhi, and Reprint 2023.

Reference Books:

- K. Venugopal and, V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
- Kulkarni D.M, A. P. Rastogi and A. K. Sarkar - Engineering Graphics with Auto CAD, PHI Publication (2010).
- James H. Earle, Engineering Design Graphics - Peachpit Press; 9th edition (5 August 1998)


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Basic Electrical Engineering Lab

BTPESA203L/ BTPESB103L	Basic Electrical Engineering Lab	ESC	0L- 0T - 2P	1 Credit
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	To develop a fundamental understanding of electrical circuits, components, and analytical skills through practical experiments.
2.	To familiarize students with electrical safety practices, various wiring systems, and relevant regulatory standards.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Explain the fundamental electrical quantities, circuit elements, and laws.	K2
CO2	Apply KVL, KCL, and network theorems for solving DC circuits.	K3
CO3	Analyse single-phase AC circuits and compute power, impedance, and power factor.	K4
CO4	Identify wiring systems and protection devices in real-world installations.	K2
CO5	Demonstrate awareness of electrical safety norms and Indian regulatory standards.	K3

Minimum 8 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1.	Study of Electrical Symbols, Wiring Materials, and Abbreviations Objective: To learn basic electrical symbols and commonly used wiring materials. Task: Draw at least 10 standard circuit symbols and list 5 types of wiring materials along with their applications.
2.	Electrical Safety Practices, Tools, and First Aid Objective: To understand the importance of electrical safety and learn about tools and first aid methods. Task: Identify 5 safety tools such as insulated gloves, tester, safety shoes, etc., and explain the basic steps of first aid in case of electric shock.
3.	Study of Ammeter, Voltmeter, and Multimeter (AC/DC) Objective: To learn the function and proper use of basic measuring instruments. Task: Use a Multimeter to measure resistance, Continuity, voltage and current in a simple DC circuit.
4.	Measurement of Earth Resistance and Study Earthing Methods Objective: To understand how to measure earth resistance using an Earth Resistance Tester (Megger). Task: Measure the resistance of an earthing setup and interpret the result with safety standards.
5.	Verification of Kirchhoff's Laws Objective: To verify that the sum of voltages in a closed circuit is equal to zero and to verify that the total current entering a junction is equal to the total current leaving. Task: Build a simple series circuit and measure voltage drops across components to confirm KVL and Construct a parallel circuit and use an ammeter to measure branch currents to validate KCL.
6.	Verification of Superposition Theorem in DC Networks Objective: To apply the superposition theorem in a linear DC circuit with multiple sources. Task: Use two DC voltage sources and measure current through a branch by activating one source at a time and summing the results.
7.	Verification of Thevenin's Theorem in DC Circuits Objective: To simplify a complex network into an equivalent circuit using Thevenin's theorem. Task: Calculate Thevenin voltage and resistance, then compare the result with original circuit behaviour under load.
8.	Study and Demonstration of Fuse, MCB, and ELCB Objective: To understand the operation of common protection devices. Task: Demonstrate the working of a fuse, miniature circuit breaker (MCB), and earth leakage circuit breaker (ELCB) in case of faults.

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9.	Study of Energy Storage Devices Objective: To understand basic energy storage components like batteries and capacitors. Task: Identify different types of batteries and measure the voltage of a charged cell using a voltmeter.
10.	Measurement of Illuminance and Study of Different Lamps Objective: To measure light intensity and study types of lamps used in lighting systems. Task: Use a lux meter to measure illumination under LED, CFL, and incandescent lamps and record comparative readings.

Text Books:

- | | |
|----|---|
| 1. | Electrical Technology (Volume I & II) Authors: B.L. Theraja and A.K. Theraja
Publisher: S. Chand & Company Pvt. Ltd. |
| 2. | Basic Electrical Engineering Authors: D.P. Kothari and I.J. Nagrath
Publisher: McGraw Hill Education (India) Pvt. Ltd. |

Reference Books:

- | | |
|----|--|
| 1. | Principles of Electrical Engineering Authors: V.K. Mehta and Rohit Mehta
Publisher: S. Chand & Company Pvt. Ltd. |
| 2. | Electrical Engineering Fundamentals Author: Vincent Del Toro
Publisher: Pearson Education |
| 3. | Basic Concept of Electrical Engineering Authors: Kuldeep Sahay and Shivendra Pathak
Publisher: NEW AGE INTERNATIONAL PUBLISHERS |


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Design Thinking

BTPESA208T/ BTPESB108T	Design Thinking	VSEC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-60 Marks	ESE-40 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	To enable the student to understand basic principles of design thinking
2.	To study the techniques of idea generation and Prototyping and to provide practical approach on test, design and final presentation.

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Understand the core concepts and Principles of Design Thinking, user needs and requirements.	K2
CO2	Define Problem statement to Frame user requirement and generate ideas.	K2
CO3	Evaluate real world challenges through case studies in Design Thinking	K5

Course Contents:

Unit 1: Introduction to Design Thinking	[8 hours]
What is Design Thinking? , Principles and Mindsets, Empathize- understanding users, user Research Techniques, Empathy Map & personas, problem Framing, Define -Refining the problem, Problem statements, Tools for clarity.	
Unit 2: Ideate-Generating Ideas	[8 hours]
Brainstorming Techniques, Group collaboration & Creativity, selecting ideas, Prototype- Bringing Ideas to life, Prototype Basics, Tools and Materials, rapid prototyping workshops	
Unit 3: Test, Design and final presentation in practice	[8 hours]
Testing Strategies, Iteration, Design Thinking in practice – Case Studies, design thinking in Business / Engineering, Ethics in Design Thinking, Final Presentations- project work, Review & Reflection	

Text Books:

1.	Design Thinking A comprehensive Text Book: Author(s): Shalini Rahul Tiwari, Rohit Rajendraswarup, Publisher: Wiley
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Reference Books:

1.	Change by Design Author(s): Tim Brown Publisher: Harvard Business Press
2.	The Design of Everyday Things Author(s): Don Norman Publisher: Basic Books
3.	Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days Author(s): Jake Knapp (Google Ventures) Publisher: Simon & Schuster
4.	Design Thinking: Understanding How Designers Think and Work Author(s): Nigel Cross Publisher: Bloomsbury
	Design a Better Business Author(s): Patrick Van Der Pijl, Justin Lokitz & Lisa Kay Solomon Publisher: Wiley
	Creative Confidence Author(s): Tom Kelley & David Kelley (IDEO) Publisher: Crown Business
	This is Service Design Thinking Author(s): Marc Stickdorn & Jakob Schneider Publisher: BIS Publishers
	Online Resources
	1. IDEO.org Design Kit – https://www.designkit.org
	2. Stanford d.school Resources – https://dschool.stanford.edu/resources
	3. Interaction Design Foundation – https://www.interaction-design.org
	4. NPTEL product Engineering and Design thinking by IIT Kharagpur.
	5. NPTEL –Design thinking a primer by IIT Madras.

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Integrated Personality Development

BTPESA209T1/ BTPESB109T1	Integrated Personality Development	CC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:

1.	Personal Growth: Develop self-awareness, positive habits, and effective goal-setting strategies for academic and professional success
2.	Holistic Well-being: Integrate physical, emotional, mental, and spiritual aspects of personality development

Course Outcomes:

At the end of this course, the students will be able:

		Bloom's Taxonomy Level
CO1	Develop clear personal and professional goals with actionable plans	K3
CO2	Appreciate cultural heritage and develop pride in Indian identity	K3
CO3	Develop positive social networks that support personal growth	K2
CO4	Develop effective stress management techniques for academic and career challenges	K2
CO5	Create action plans for continued personal development	K3

Course Contents:

Unit 1: Self-Discovery and Personal Foundation [6 hours]

Begin with the End in Mind: Goal setting and life visioning techniques, Power of Habit: Understanding habit formation and developing positive routines, SWOT Analysis: Self-assessment of strengths, weaknesses, opportunities, and threats, Addiction-Free Living: Recognizing and overcoming harmful dependencies

Unit 2: Character Building and Values [6 hours]

My India My Pride: Understanding Indian cultural values and heritage, An Ideal Citizen: Developing responsibility, integrity, loyalty, and punctuality, Learning from Legends: Case studies of inspirational leaders and their principles, Leading Without Leading: Humble leadership and service-oriented approach

Unit 3: Social Skills and Relationships [6 hours]

Teamwork and Harmony: Six steps of effective teamwork for professional success, From House to Home: Building strong family relationships and conflict resolution, Forgive and Forget: Importance of forgiveness in personal and professional relationships, Impact of Company: Choosing positive influences and creating supportive environments

Unit 4: Life Skills and Wellness [6 hours]

Stress Management: Coping strategies for academic and professional pressures, Better Health, Better Future: Physical fitness, nutrition, and mental well-being.

Unit 5: Professional Excellence and Future Readiness [6 hours]

Timeless Wisdom for Daily Life: Applying ancient wisdom to modern challenges, Words of Wisdom: Practical guidance from experienced mentors, Life After IPDC: Implementing learned principles in future endeavours, Professional Ethics: Integrating values into engineering practice

Reference Books:

1.	IPDC WORKBOOK 1: by Swaminarayan Aksharpith: A practical workbook for personality development.
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 Academic Council Meeting
 Dated :-.....13/03/2025.....

Health & Wellness

BTPESA209T2/ BTPESB109T2	Health & Wellness	CC	2L- 0T - 0P	2 Credits
Evaluation Scheme	CA-30 Marks	ESE-20 Marks	ESE Time Duration 3 Hrs	

Course Objectives:	
1.	To systematically addresses the issues of health, adjustment and well-being
2.	To provide insights from the field of psychology to make your life more satisfying and meaningful

Course Outcomes:		Bloom's TaxonomyLevel
At the end of this course, the students will be able:		
CO1	Learn how to deal with mental distress and disorders.	K2
CO2	Understand and enhance positive mental health and well-being.	K2
CO3	Gain happiness and well-being theory and research to enrich the understanding of both negative and positive side of human behaviour	K2
CO4	Learn to achieve happiness through flow and mindfulness	K2
CO5	Develop different stress management techniques	K3

Course Contents:	
Unit1: Psychology of Happiness [6 hours] What is the happiness? What make us happy? Socio-economic factors and happiness positive emotions.	
Unit2: Can we become Happier? [6 hours] Genetic set point and hedonic adaptation. Sustainable happiness model. Intentional activities.	
Unit3: Happiness Activities 1 [6 hours] Expressing gratitude and positive thinking. Love and kindness, Avoiding overthinking and social comparison	
Unit4: Happiness Activities 2 [6 hours] Identifying signature strengths. Achieving happiness with flow and mindfulness. Digital wellness	
Unit5: Is Happiness Sufficient? [6 hours] The concept of eudaimonic well – being. Self-determination and motivation. Resilience, Optimise man hope. Stress Management.	

Text Books:	
1.	Positive Psychology Author - Dr Reeta Kumari
2.	The psychology of happiness and wellbeing Author - Vali Nasser
Reference Books:	
1.	W. Weiten and M.A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21 st century Wadsworth Publishing, 2003
2.	R. Harington, tress, Health and well-being: Thriving in the 21 st century, Wadsworth Publishing 2013.
3.	I. Boniwell, Positive Psychology in a nutshell, McGraw - Hill Education, 2012.
4.	S. Lyubomirsky, The how of happiness, Penguin Press, 2008.

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