B.TECH. SYLLABUS

Mechanical Engineering

Mechanical Engineering Department
Faculty of Technology
Dharmsinh Desai University
Nadiad – 387 001, Gujarat, India

(Effective from 2025-26)

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Department of Mechanical Engineering
Dharmsinh Desai University

Vision

To be a center of excellence in Mechanical engineering education with an interdisciplinary approach where knowledge transfer and research activities synergize to develop world-class professionals and human beings.

Mission

Core Competence: To provide facilities and infrastructure for academic excellence in the field of Mechanical engineering.

Research and Innovation: To focus on training, knowledge transfer, projects, applications, research and innovations through an interdisciplinary approach.

Employability: To enhance efforts for preparing industry-ready engineers with improved employability and competence in entrepreneurship.

Value addition: To educate students in all aspects such as professional and society ethics, communication and interpersonal skills.

Programme Educational Objectives (PEOs)

PEO-1	To strengthen fundamental concepts of science and engineering to solve real-life engineering problems.
PEO-2	Provide thorough practical and theoretical knowledge through interactive sessions with well-equipped state-of-the-art facilities
PEO-3	To prepare students to innovate and create an interdisciplinary environment and engage them in lifelong learning for ethical, professional and technical Development
PEO-4	To mould them into good human beings possessing professional ethics and social commitment

Program Articulation Matrix

Mission statement/PEO	PEO-1	PEO-2	PEO-3	PEO-4
Core Competence	3	3	3	1
Research and Innovation	3	3	3	2
Employability	3	3	2	2
Value addition	2	2	3	3

1-Slightly; 2-Moderately; 3-Substantially

Program Outcomes (POs):

PO-1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO-2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO-3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO-4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO-5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO-6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)
PO-7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO-8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams
PO-9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO-10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments
PO-11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSOs):

PSO-1	Apply technical knowledge to solve industrial problems, ensuring efficiency and safety with emphasis on integrating social values in decision-making.
PSO-2	Prepared for higher education, ethical research and entrepreneurship

TEACHING SCHEME FOR THE COURSE
B. TECH., MECHANICAL ENGINEERING (w.e.f. 2025-26)

SEMESTER I

Subject Code	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
25BS102	MATHEMATICS -I	3	1	0	60	40	0	0	100	4.0
25BS103	MECHANICS	3	1	0	60	40	0	0	100	4.0
25BS117	APPLIED CHEMISTRY	3	0	0	60	40	0	0	100	3.0
25ES113	COMPUTER PROGRAMMING	3	0	2	60	40	50	0	150	4.0
25ES120	ELEMENTS OF MECHANICAL ENGINEERING	3	0	2	60	40	50	0	150	4.0
25SM102	ENVIRONMENTAL SCIENCE	2	0	0	40	40	0	0	80	2.0
25ES114	WORKSHOP PRACTICE - I	0	0	2	0	0	50	0	50	1.0
									730	22.0

SEMESTER II

Subject Code	Subject Title	Teaching Scheme & Credit			Examination Scheme					
25BS203	MATHEMATICS-II	3	1	0	60	40	0	0	100	4.0
25ES203	ENGINEERING GRAPHICS	2	1	2	60	40	50	0	150	4.0
25ES205	MECHANICS OF SOLIDS	3	0	2	60	40	50	0	150	4.0
25ES211	ELECTRICAL ENGG. AND ELECTRONICS	3	0	2	60	40	50	0	150	4.0
25ES206	WORKSHOP PRACTICE - II	0	1	2	0	0	50	0	50	2.0
25HS203	INDIAN KNOWLEDGE SYSTEM AND ANCIENT YOGA	1	0	2	40	0	0	50	90	2.0
									690	20.0

SEMESTER III

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
NUMERICAL TECHNIQUES	3	0	2	60	40	25	25	150	4.0
APPLIED THERMODYNAMICS	3	0	2	60	40	25	25	150	4.0
MEASUREMENT AND METROLOGY	3	0	2	60	40	25	25	150	4.0
KINEMATICS OF MACHINES	3	0	2	60	40	25	25	150	4.0
MATERIAL SCIENCE AND METALLURGY	3	0	2	60	40	25	25	150	4.0
COMMUNICATION SKILLS	2	0	2	40	0	50	0	90	3.0
								840	23.0

SEMESTER IV

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
DYNAMICS OF MACHINES	3	0	2	60	40	25	25	150	4.0
ADVANCED SOLID MECHANICS	3	0	0	60	40	0	0	100	3.0
MANUFACTURING SCIENCE - I	3	0	2	60	40	25	25	150	4.0
FLUID MECHANICS AND HYDRAULIC MACHINES	3	1	2	60	40	25	25	150	5.0
INDUSTRIAL ENGINEERING	3	0	0	60	40	0	0	100	3.0
UNIVERSAL HUMAN VALUES	2	0	0	40	0	0	0	40	2.0
MACHINE DRAWING & INDUSTRIAL DRAFTING	0	1	2	0	0	25	25	50	2.0
								740	23.0

SEMESTER V

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
HEAT TRANSFER	3	1	0	60	40	0	0	100	4.0
MANUFACTURING SCIENCE - II	3	0	2	60	40	25	25	150	4.0
MACHINE DESIGN - I	3	0	2	60	40	25	25	150	4.0
ELECTRICAL MACHINES AND DRIVES	3	0	2	60	40	25	25	150	4.0
OPEN ELECTIVE - I	3	0	0	60	40	0	0	100	3.0
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	1	0	2	0	0	25	25	50	2.0
PRODUCT INNOVATION AND ENTREPRENEURSHIP	2	0	0	40	40	0	0	80	2.0
								780	23.0

SEMESTER VI

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
MACHINE DESIGN - II	3	0	0	60	40	0	0	100	4.0
CAD / CAM	3	0	2	60	40	25	25	150	4.0
MECHATRONICS	3	0	2	60	40	25	25	150	4.0
PROFESSIONAL ELECTIVE - I	3	0	2	60	40	25	25	150	4.0
PROFESSIONAL ELECTIVE - II	3	0	0	60	40	0	0	100	3.0
OPEN ELECTIVE - II	3	0	0	60	40	0	0	100	2.0
PROJECT - 1 (LITERATURE REVIEW AND DESIGN)	0	0	2	0	0	100	0	100	1.0
								730	22.0

SEMESTER VII

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	TW	Prac	Total	Credit
FINITE ELEMENT ANALYSIS	3	0	2	60	40	25	25	150	4.0
PRODUCTION TECHNOLOGY	3	0	2	60	40	25	25	150	4.0
PRODUCTION AND OPERATION MANAGEMENT	3	0	0	60	40	0	0	100	3.0
OPERATION RESEARCH	3	1	0	60	40	0	0	100	4.0
PROFESSIONAL ELECTIVE - III	3	0	0	60	40	0	0	100	3.0
OPEN ELECTIVE - III	3	0	0	60	40	0	0	100	3.0
PROJECT - 2 (ANALYSIS, PROTOTYPE AND TESTING)	0	0	4	0	0	100	0	100	2.0
								800	23.0

SEMESTER VIII

Subject Title	Teaching Scheme & Credit			Examination Scheme					
	Lect	Tut	Prac	Ext	Sess	Prac	TW	Total	Credit
SEMINAR	0	6	0	0	0	100	0	100	6
INDUSTRIAL TRAINING	0	0	24	0	0	100	300	400	24
								500	30.0

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B. TECH. SEMESTER – I

SUBJECT: (25BS102) MATHEMATICS-I (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	1	0	60	40	-	-	100	3	1	0	4

DETAILED SYLLABUS:

1 CALCULUS: INTEGRAL CALCULUS

Evolutes and involutes, Applications of definite integrals to evaluate surface areas and volumes of revolutions. Rolle's Theorem, Langrage Mean value theorems, Cauchy's Mean value theorem.

2 LINEAR ALGEBRA MATRICES, VECTORS, DETERMINANTS, LINEAR SYSTEMS

Matrices: Addition and Scalar Multiplication, Matrix Multiplication, Symmetric and Skew- symmetric matrix, Rank of a matrix, Consistency of a Linear System of equations: Existence and Uniqueness of solution, Inverse of a matrix by Gauss-Jordan method, Eigen values and eigen vectors, Linear Independence of vectors, Diagonalization of a matrix

3 FOURIER SERIES

Introduction, Euler's Formulae, Functions having points of discontinuity, Change of interval, Expansion of even and odd functions, Half range sine and cosine series, Parseval's theorem

4 MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Partial derivatives: Functions of two or more variables, Chain Rule, Total derivative: Differentiation of Implicit and composite functions

APPLICATIONS OF PARTIAL DIFFERENTIATION

Jacobians, Taylor and Maclaurin's series expansion for function of two variables, Maxima and minima of function of two variables, Lagrange's method of undetermined multipliers

5 VECTOR DIFFERENTIAL CALCULUS

Scalar and vector point functions – Vector operator del, Del operator applied to scalar point functions – Gradient, Physical interpretation of gradient (normal to the surface), Directional derivatives, Del operator applied to vector point functions – divergence and curl, Physical interpretation of div $F\rightarrow$ and Curl $F\rightarrow$

6 PROBABILITY

Probability, Independent and dependent events, Permutations and Combination, Conditional Probability, Baye's theorem

TEXT/REFERENCE BOOKS:

1. Grewal, B.S., 2007. Higher engineering mathematics. 40th ed. Khanna Publishers.
2. Thomas, G.B. and Finney, R.L., 2002. Calculus and analytic geometry. 9th ed. Pearson.
3. Kreyszig, E., 2006. Advanced engineering mathematics. 9th ed. Hoboken, NJ: John Wiley & Sons.
4. Poole, D., 2005. Linear algebra: A modern introduction. 2nd ed. Brooks/Cole.
5. Veerarajan, T., 2008. Engineering mathematics for first year. Tata McGraw-Hill.
6. Ramana, B.V., 2010. Higher engineering mathematics. Tata McGraw-Hill.
7. Bali, N.P. and Goyal, M., 2010. A textbook of engineering mathematics. Reprint ed. Laxmi Publications.
8. Krishnamurthy, V., Mainra, V.P. and Arora, J.L., 2005. An introduction to linear algebra. Reprint ed. Affiliated East-West Press.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Demonstrate the ability to model and solve problems involving the computation of geometrical quantities such as area and volume using definite integrals in a variety of coordinate systems.
CO2	Apply fundamental concepts of linear algebra to analyze the structure of vector spaces, determine the solvability of linear systems, and perform transformations using eigen structure methods.
CO3	Represent periodic and piecewise-defined functions in terms of orthogonal series and utilize these representations to analyze convergence and energy content.
CO4	Analyze functions of multiple variables through differentiation, including computation of total derivatives, and apply expansion techniques for local approximations.
CO5	Investigate the behaviour of multivariable functions to determine optimal points under constraints using advanced analytical techniques involving auxiliary functions.
CO6	Evaluate vector-valued functions and interpret physical phenomena by computing directional rates of change and characterizing field behavior using vector operators; also, solve problems involving discrete and conditional probability.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	2	-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-
CO6	3	2	-	1	-	-	-	-	-	-	-	-	-

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – I
SUBJECT: (25BS103) MECHANICS (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	1	0	60	40	-	-	100	3	1	0	4

DETAILED SYLLABUS:

1 Resultant force for 2D and 3D force system

2 Centroid and Centre of Gravity and Moment of Inertia

3 Equilibrium for concurrent forces, Moment of force about a point, Couples, Varignon's Theorem. and Equilibrium of Beams

4 Equilibrium of Beams: Types of beams, simple and compound beams, type of supports and reaction: Determination of reactions at supports for various types of loads on beams

5 Kinematics in a Coordinate System Rotating and Translating in a Plane, The concept of Instantaneous canter of rotation, Simple harmonic motion

6 Kinetics of a Particle: Newton's Laws motion, Dependent motion

7 Kinetics of a Particle: Impact and collision, Law of conservation of momentum

TEXT/REFERENCE BOOKS:

1. Beer, F.P. and Johnston, E.R., 2017. Vector mechanics for engineers: Statics, Vol. 1; Dynamics, Vol. 2. 10th SI ed. McGraw-Hill Education.
2. Meriam, J.L. and Kraige, L.G., 2017. Engineering mechanics: Statics, Vol. 1; Dynamics, Vol. 2. 5th ed. Wiley.
3. Shames, I.H., 2005. Engineering mechanics: Statics & dynamics. 4th ed. Prentice Hall.
4. Harbola, M.K., 2012. Engineering mechanics. 2nd ed. Cengage Learning.
5. Thomson, W.T., 2008. Theory of vibrations with applications. 5th ed. Pearson Edu.

COURSE OUTCOMES

After successful completion of the course, students will be able to:

CO1	Applying fundamental principles of mechanics
CO2	Solve practical problems of engineering by Force system and Equilibrium condition. Student will be able to learn of the Center of Gravity and Moment of Inertia of any type of the section.
CO3	To develop the understanding of modeling dynamic systems of engineering
CO4	Application of Newton's laws to particles and learn the laws of motion.
CO5	To ability to analyses the collision of body and impact and momentum

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	2	2	1	2	3	1	2	3	3
CO2	3	3	3	3	2	2	1	1	3	1	3	3	3
CO3	3	3	2	3	3	1	2	2	3	1	2	3	3
CO4	3	3	2	3	2	2	1	1	3	1	3	3	3
CO5	3	3	3	2	2	1	1	2	3	1	3	3	3

1-Slightly; 2-Moderately; 3-Substantially

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B. TECH. SEMESTER – I

SUBJECT: (25BS117) APPLIED CHEMISTRY (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	0	0	60	40	-	-	100	3	0	0	3

DETAILED SYLLABUS:

1 ELECTROCHEMISTRY AND ENERGY STORAGE

Basic concepts of electrochemistry; electrochemical cells: galvanic cell (Daniel cell); electrode potential; electrochemical series and its applications; Nernst equation; types of electrodes: Calomel electrode, quinhydrone electrode. Introduction and classification of battery and fuel cell, applications of Li-ion battery, H_2 fuel cell and photovoltaic cells

2 MATERIALS FOR ENGINEERING APPLICATIONS

Alloys: Introduction, classification, composition, properties, and application of stainless steel, solders, Brass and Alnico. **Ceramics:** Introduction, classification based on chemical composition; properties and applications of perovskites (CaTiO3). **Nano chemistry:** Introduction, size -dependent properties of nanomaterial (surface area, catalytical and thermal), synthesis and applications of nanoparticles (sol-gel, and co-precipitation method)

3 CORROSION SCIENCE AND ENGINEERING

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion - differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement). **Corrosion control:** (i) Cathodic protection – sacrificial anode method and impressed current method and corrosion inhibitors. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)- numerical problems. **Metal finishing:** Introduction, technological importance. **Electroplating:** Introduction, electroplating of chromium (hard and decorative). **Electroless plating:** Introduction, electroless plating of nickel

4 LUBRICANTS

Lubricant, classification, chemical properties of lubricants, understanding of an efficient and reliable lubrication systems, selection and comparison, preservation of lubricants

5 FUELS AND COMBUSION:

Fuels: definition, classification of fuels and characteristics of a good fuels; Introduction, calorific value, determination of calorific value, octane and cetane number, Solid, liquid and gaseous fuels. **Green fuels:** Introduction, power alcohol, synthesis, and applications of biodiesel

6 WATER TECHNOLOGY

Water: Types of Hardness, Determination of temporary and permanent hardness of water by EDTA method. **Boiler troubles:** Priming, foaming, scales, sludges and caustic embrittlement **Treatment of water:** Internal treatment of boiler feed water- carbonate, Calgon and phosphate conditioning, softening of water by Zeolite process and Ion exchange process; Potable water-its specifications, steps involved in the treatment of potable water

TEXT/REFERENCE BOOKS:

1. Gadag, R.V. and Shetty, N., 2016. A textbook of engineering chemistry. 2nd ed. I.K. International Publishing House.
2. Pushpalatha, K., 2014. Textbook of Engineering Chemistry. 2nd ed. Wiley Publications.
3. Tiwari, G.N., n.d. Solar energy: Fundamentals, design, modelling and applications. Narosa Publishing House.
4. Mahesh, B. and Roopashree, B., 2022. Engineering chemistry. Bengaluru: Sunstar Publisher. ISBN 978-93-85155-70-3.
5. Jain, P.C. and Jain, M., 2013. A textbook of engineering chemistry. 15th ed. Dhanpat Rai Publishing Co (P) Ltd.
6. Puri, B.R., Sharma, L.R., and Pathania, M.S., 2019. Principles of physical chemistry. S. Nagin Chand and Co.
7. Fontana, M.G., 2017. Corrosion engineering. McGraw-Hill Publications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand the different fuels, green fuels and energy storage devices.
CO2	Understand the basics of material science, Having comprehensive knowledge in the field of engineering materials.
CO3	Understand the concept of corrosion, preventive actions and electroplating
CO4	Understand lubrication, necessity, lubricants, their comparison and selection, preservation.
CO5	Understanding of fuels and its combustion
CO6	Understand different types water hardness, boiler troubles caused due to water and water treatment

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	2	2	-	-	-	2	3	2
CO2	3	2	-	-	-	2	2	-	-	-	2	3	2
CO3	3	2	-	-	-	2	2	-	-	-	2	3	2
CO4	3	2	-	-	-	2	2	-	-	-	2	3	2
CO5	3	2	-	-	-	2	2	-	-	-	2	3	2
CO6	3	2	-	-	-	2	2	-	-	-	2	3	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – I

SUBJECT: (25ES113) COMPUTER PROGRAMMING (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	0	2	60	40	50	-	150	3	0	1	4

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 INTRODUCTION

Introduction to components of computer system, Idea of algorithm, Introduction to C, Constants, Variables & Data types in C, Managing input and Output operators

2 OPERATORS AND EXPRESSIONS

C Operators: Arithmetic, relational, logical, increment &decrement, assignment and conditional, Arithmetic Expressions & Precedence Rule, Type conversion in C, Mathematical Functions

3 DECISION-MAKING AND BRANCHING

Decision making with If & If...else statements, goto statements

4 DECISION-MAKING AND LOOPING

The while statement, the break statement & the do... while loop, the for loop, Jump within loops - Programs

5 ARRAYS

Array 1D, 2D, Character Array as Strin

6 USER DEFINED FUNCTIONS

Categories of Functions (Including using built in library), Call by Value, Parameter passing to function, Recursion

7 STRUCTURE

Defining structure, Assigning value to the structure members, Array of structure

8 POINTER

Idea of pointer, declaration and Initialization of pointer, passing address as function argument, passing array to function using pointer

9 FILE HANDLING

Introduction, Defining and opening a file, Closing a file, Input/Output operations on Files, Random access to files

TEXT/REFERENCE BOOKS:

1. Bala Guruswamy, E., 2012. Programming in ANSI C. Tata McGraw-Hill.
2. Gottfried, B., 1996. Schaum's outline of programming with C. McGraw-Hill.
3. Kanetkar, Y., 2004. Let us C. 12th ed. BPB Publications.
4. Kernighan, B.W. and Ritchie, D.M., 2015. The C programming language. Prentice Hall of India.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand the basics of C, C-tokens and input-output functions.
CO2	Develop correct mathematical and logical expressions with C-operators.
CO3	Apply appropriate decision-making statements and loops for structured programs.
CO4	Develop programs with Array and Structure data types to handle large data.
CO5	Create user defined function for structured programs.
CO6	Understand the use of pointer and file management in C programs.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	2	-	1	-	-	-	-	1	-	-	1	-
CO2	3	2	2	3	-	-	-	-	3	-	-	3	-
CO3	1	3	-	3	-	-	-	-	3	-	-	3	-
CO4	1	1	-	3	3	-	-	-	3	-	-	3	-
CO5	3	3	-	3	3	-	-	-	3	-	-	3	-
CO6	-	-	-	3	-	-	-	-	1	-	-	1	-

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – I
SUBJECT: (25ES120) ELEMENTS OF MECHANICAL ENGINEERING
(w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	0	2	60	40	50	-	150	3	0	1	4

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 INTRODUCTION

Prime movers and its types, concept of force, pressure, energy, work, power, system, heat, temperature, specific heat capacity, change of state, path, process, cycle, internal energy, enthalpy, statements of zeroth law and first law

Energy: Introduction and applications of energy sources like fossil fuels, nuclear fuels, hydel, solar, wind, and bio-fuels, environmental issues like global warming and ozone depletion

2 HEAT ENGINES AND STEAM BOILERS

Heat Engines: Heat engine cycle and heat Engine, working substances, classification of heat engines, description and thermal efficiency of Carnot; Rankine, Otto cycle and Diesel cycles

Steam Boilers: Introduction, classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories

3 INTERNAL COMBUSTION ENGINES

Internal Combustion Engines: Introduction, classification, engine details, four-stroke/two-stroke cycle Petrol / Diesel engines, indicated power, brake power, efficiencies

Couplings, Clutches and Brakes: Construction, working and applications of couplings, clutches and brakes

Transmission of Motion and Power: Shaft and axle, belt drive, chain drive, gear drive

4 PUMPS AND COMPRESSORS

Pumps: Types and operation of reciprocating, rotary and centrifugal pumps

Air Compressors: Types and operation of reciprocating and rotary air compressors, significance of multi staging

5 REFRIGERATION, AIR CONDITIOING AND HEAT EXCHANGERS

Refrigerant, vapor compression refrigeration system, vapor absorption refrigeration system, domestic refrigerator, window and split air conditioners. Construction and working of Condensers, evaporators and heat exchangers

6 ENGINEERING MATERIALS

Types and applications of ferrous & non-ferrous metals, timber, abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymers

TEXT/REFERENCE BOOKS:

1. Bhatt, N.M. and Mehta J.R., 2018. Elements of mechanical engineering. Mahajan Publishing House.
2. Kumar, P., 2013. Basic mechanical engineering. Pearson.
3. Sawhney, G.S., 2006. Fundamentals of mechanical engineering. PHI Publications.
4. Singh, S., 2010. Elements of mechanical engineering. S. Chand Publications.
5. Agrawal, B.K., 2017. Introduction to engineering materials. Tata McGraw-Hill.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	To understand the fundamentals of mechanical systems and energy
CO2	To understand the functions of heat engines and steam boilers
CO3	To understand the fundamentals of I.C. Engines and its components including brakes, clutches and power transmission systems
CO4	To understand the fundamentals of pumps and compressors and industrial their applications
CO5	To understand the fundamentals of R&AC, heat exchangers,
CO6	To understand the fundamentals of different engineering materials and their applications

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	1	-	2	-	-	2	3	2
CO2	3	2	1	-	-	1	-	2	-	-	2	3	2
CO3	3	2	1	-	-	1	-	2	-	-	2	3	2
CO4	3	2	1	-	-	1	-	2	-	-	2	3	2
CO5	3	2	1	-	-	1	-	2	-	-	2	3	2
CO6	3	2	1	-	-	1	-	2	-	-	2	3	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – I

SUBJECT: (25SM102) ENVIRONMENTAL SCIENCE (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
2	0	0	40	40	-	-	80	2	0	0	2

DETAILED SYLLABUS:

1 INTRODUCTION TO ECOLOGY AND ENVIRONMENTAL SCIENCE

Definition, scope and importance of Ecology and Environmental Science. Basic principle of ecosystem functioning, Biodiversity and its conservation.

2 NATURAL RESOURCES

Renewable and non-renewable resource, Role of an individual in conservation of natural resources.

3 ENVIRONMENTAL POLLUTION

Air pollution: Composition of air, Structure of atmosphere, Ambient Air Quality standards, Classification of air pollutants, Sources of common air pollutants like PM, CO, NOx, Sox. Effects of common air pollutant

Water pollution: Sources and significance of water, Sources and types of water pollution, Impacts of water pollutants on eco system and human health.

Noise pollution: Sources and types of noise pollution, Noise measurement, Impacts of noise pollution on human health,

Solid waste management: Generation and Management of Solid Waste

Bio-Medical Waste: Generation and Management of Bio-medical waste

E-Waste: Generation and Management of E-waste

4 GLOBAL ENVIRONMENTAL ISSUES

Sustainable development, Climate change, Global Warming and Green House Effect, Acid Rain, Depletion of Ozone Layer, Carbon Footprint, Cleaner Development Mechanism (CDM), International Environmental treaties and Protocols for mitigating Global Changes.

5 SOCIAL ISSUES AND THE ENVIRONMENT

Role of individual in prevention of environmental pollution, Environmental Ethics, Wasteland reclamation, Consumerism and waste products.

6 CONCEPT OF 4R'S

Principles, Application of 4R's: Reduce, Reuse, Recycle, Recovery

TEXT/REFERENCE BOOKS:

1. Bharucha, E., 2013. Textbook of Environmental Studies. 2nd edn. Universities Press.,
2. Varandani, N.S., 2013. Basics of Environmental Studies. Lambert Academic Publishing.
3. Basak, A., 2009. Environmental Studies. Dorling Kindersley.
4. Dhameja, S.K., 2007. Environmental Studies. S.K. Kataria and Sons.
5. Rao, C.S., 2006. Environmental Pollution Control Engineering. Wiley Publishers.
6. Cunningham, W.P., Cooper, Gorhani, T.H.E., and Hepworth, M.T., 2001.Environmental Encyclopedia. Jaico Publishing House.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand the scope and importance of ecology and environmental science, and relate the importance of natural resources,
CO2	Differentiate between various types of environmental pollution along with their impacts.
CO3	Understand the importance of global environmental issues.
CO4	Develop ethical value for sustainable development and Inculcate the concepts of Reduce Reuse, Recycle and recovery.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	1	-	3	3	1	2	1	3	1	1
CO2	3	3	2	1	1	3	3	2	2	1	3	1	2
CO3	3	3	2	1	-	3	3	2	2	1	3	1	2
CO4	3	3	1	1	1	3	3	2	2	1	3	1	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – I
SUBJECT: (25ES114) WORKSHOP PRACTICE-I (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
0	0	2	-	-	50	-	50	0	0	1	1

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 HOUSE KEEPING AND SAFETY

Definition of housekeeping in industry or workplace, Rules of safety (Personnel hygiene, Behaviour in workshop, Carrying, Hazards associated with hand tools and power tools, Electrical hazards, etc) to be followed while working with workshop.

2 FAMILIARIZATION WITH WORKSHOP

Introduction to workshop, basic types of workshops, various departments of training workshop and how we can utilize their tools and accessories at workplace.

3 CARPENTRY SHOP

Introduction to Carpentry tools: saws, planner, chisels, hammers, marking gauge, vice, try square, rule etc., Demonstration of carpentry operations such as marking, sawing, planning, chiseling, grooving, boring, joining, type of woods, safety precaution. Making job of carpentry shop.

4 PLUMBING SHOP

Introduction to Plumbing, Demonstration of Plumbing tools and it's accessories, application of plumbing in domestic as well as in industry. To understand how to make threads on pipe. Making job of plumbing shop.

5 TIN SMITHY SHOP

Introduction and demonstration of Tin smithy tools, understanding mechanical properties of tin material, SWG for Sheet thickness measurement, Making job for tin smithy shop.

TEXT/REFERENCE BOOKS:

1. Hajra Choudhury, A.K. and Hajra Choudhury, S.K., 2005. Workshop Technology.
2. Engineering Industry Training Board, 2001. ITB Handbook.
3. Gupta, and Kaushi, 2007.Workshop Technology. Vol. I & II.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand basic housekeeping and safety requirement while working in workshop.
CO2	Identify and use tools / Accessories of different workshop departments which could result in skill improvement of students.
CO3	Remember, analyse and apply theoretical and practical knowledge for prototype development by completing workshop assignments and jobs.
CO4	Enhance their creativity by performing various practical tasks in different workshop trade.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	2	-	-	2	1	1	2	-	2	2	2
CO2	2	1	2	-	-	2	1	1	2	-	2	2	2
CO3	2	1	2	-	-	2	1	1	2	-	2	2	2
CO4	2	1	2	-	-	2	1	1	2	-	2	2	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – II
SUBJECT: (25BS203) MATHEMATICS-II (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	1	0	60	40	-	-	100	3	1	0	4

DETAILED SYLLABUS:

1 FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AND INTRODUCTION TO HIGHER ORDER DIFFERENTIAL EQUATIONS

Exact, linear and Bernoulli's equations, Introduction to second order linear differential equations with variable coefficients, Method of variation of parameters, Cauchy-Euler equation.

2 PARTIAL DIFFERENTIAL EQUATIONS

Introduction, Solutions of partial differential equations: Equations solvable by direct integration, Lagrange's linear equation of first order, Non-linear equations of first order, Charpit's method, Homogenous linear equations with constant coefficients, Rules to find the complementary functions and the particular integral, working procedure to solve homogeneous linear equations of any order, non-homogenous linear equations with constant coefficients

Applications of partial differential equations

Method of separation of variables.

3 MULTIVARIABLE CALCULUS (INTEGRATION)

Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar).

4 VECTOR INTEGRAL CALCULUS

Vector line integrals – Circulation – Work, Surface integrals, Green's theorem in a plane, Gauss-Divergence theorem, and Stoke's theorem.

5 LAPLACE TRANSFORM

Introduction, Definition, transform of elementary functions, Properties of Laplace transform: Linearity property, first shifting property, change of scale property, transforms of derivatives, Transforms of integrals, Multiplication by tn, Division by t, Evaluation of integrals by Laplace transform. Finding inverse Laplace transform by partial fraction, Convolution theorem

Application of Laplace Transforms

Solving ordinary differential equations using Laplace transform.

TEXT/REFERENCE BOOKS:

1. Grewal, B.S., 2007. Higher Engineering Mathematics. 40th edn. Khanna Publishers.
2. Thomas, G.B. and Finney, R.L., 2002. Calculus and Analytic Geometry. 9th edn. Pearson.
3. Kreyszig, E., 2006. Advanced Engineering Mathematics. 9th edn. John Wiley & Sons.
4. Boyce, W.E. and DiPrima, R.C., 2009. Elementary Differential Equations and Boundary Value Problems. 9th edn. Wiley India.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Develop and apply methods to find analytical solutions of scalar-valued functions defined through relations involving derivatives, including linear and nonlinear forms.
CO2	Formulate equations representing physical processes in multiple independent variables and solve them using direct, systematic, and characteristic-based approaches.
CO3	Evaluate integrals over regions in two or more dimensions using transformations and change of order, and apply them to solve engineering problems involving mass, charge, or fluid distribution.
CO4	Analyze and compute integrals over curves and surfaces in vector fields, and verify the validity of integral theorems by converting between differential and integral forms.
CO5	Transform time-domain mathematical models into an alternate domain to simplify the solution of initial value problems and apply operational techniques for system analysis.
CO6	Reverse transform expressions in the transformed domain back to the original domain using algebraic and integral methods, and interpret the results in the context of system dynamics.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-		-	-	-	-	-	-	-	-	-
CO6	3	2	-	1	-	-	-	-	-	-	-	-	-

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – II

SUBJECT: (25ES203) ENGINEERING GRAPHICS (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
2	1	2	60	40	50	-	150	2	1	1	4

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 ENGINEERING CURVES

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic section curves (Ellipse, Parabola, Hyperbola), Cycloidal Curves (Cycloid, Epicycloid, Hypocycloid), Involutes; Archimedean Spiral

2 SOLID GEOMETRY

Projection of points, projection of lines and their applications, projection of regular planes such as square, rectangle, triangle, circle, pentagon, hexagon, rhombus, projection of right and regular solids inclined to both the planes (prisms, pyramids, cylinder and cone)

3 ORTHOGRAPHIC PROJECTIONS

Concept of orthographic projections, first angle and third angle projection methods, conversion of pictorial views into orthographic projections with dimensioning, computer aided drawing of orthographic projection views

4 SECTIONAL ORTHOGRAPHIC PROJECTIONS

Concept of sectional orthographic projections, special sections, computer aided drawing of sectional orthographic projection views

5 ISOMETRIC PROJECTIONS

Principles of isometric projection, isometric scale, isometric projection and view, conversion of orthographic views to isometric projections and views

6 DEVELOPMENT OF SURFACES

Introduction, engineering applications of development of surfaces, methods of development, development of surfaces of right regular solids - prism, pyramid, cylinder and cone

TEXT/REFERENCE BOOKS:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., 2014, Engineering Drawing, Charotar Publishing House
2. Narayana, K.L. & P Kannaiah 2008, Text book on Engineering Drawing, Scitech Publishers
3. Shah P. J., 2014 Engineering Graphics, S. Chand Publishing
4. Luzadder W., Duff J., 1992, Fundamentals of Engineering Drawing, Peachpit Press
5. Gill P. S., 2009, Engineering Drawing, S. K. Kataria & Sons
6. Agrawal B. & Agrawal C. M. 2012, Engineering Graphics, TMH Publication

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	understand primary concepts of Engineering Drawing, geometrical construction and various engineering curves
CO2	illustrate correct usage of methods, concepts, and theories to solve problems of solid geometry
CO3	select an appropriate standard projection system, break down complex 3D problem into various orthographic views, understand and apply computer aided drawing software to solve orthographic projection problems
CO4	break down complex 3D problems into sectional orthographic views, understand apply computer aided drawing software to solve the problems of sectional orthographic projections
CO5	generate isometric projection from two-dimensional drawings
CO6	create development of surfaces for various parts / components in real life situations

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	1	1	1	1	1
CO2	3	1	1	1	-	-	-	-	1	1	1	2	2
CO3	3	2	1	1	-	-	-	-	1	1	1	2	1
CO4	3	2	1	1	2	-	-	-	1	1	1	2	2
CO5	3	2	1	1	2	-	-	-	1	2	1	2	2
CO6	3	2	1	1	-	-	-	-	1	2	1	2	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – II

SUBJECT: (25ES205) MECHANICS OF SOLIDS (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	0	2	60	40	50	-	150	3	0	1	4

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1. Simple Stress and Strain analysis
2. Three Elastic Constant, Volumetric strain and temperature analysis
3. Shear force and bending moment diagrams for beams subjected to different types of loads
4. Bending stress and shear stress
5. Torsion
6. Principal stresses and strains and Mohr's Circle method
7. Mechanical properties, elasticity, plasticity, strain hardening, hardness, toughness, fatigue, Stress-strain relationship for ductile and brittle material

TEXT/REFERENCE BOOKS:

1. Timoshenko, S., 2002. Strength of Materials: Part I and II. 3rd edn. CBS Publishers.
2. Singh, S., 2016. Strength of Materials. 11th edn. Khanna Book Publishing Company.
3. Srinath, L.S., 2017. Advanced Mechanics of Solids. 3rd edn. McGraw-Hill Education.
4. Popov, E.P., 2015. Engineering Mechanics of Solids. 2nd edn. Pearson Education.
5. Hibbeler, R.C., 2018. Mechanics of Materials. 10th edn. Pearson Education.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Apply the fundamental concepts of force deformation and stress-strain relationships to basic engineering structures.
CO2	The student will have the basic understanding of stress, strain & Deformation, Bending, Bending Stress in members.
CO3	Ability to draw shear force diagram and banding moment for different types of beams
CO4	Solve practical problems of Bending, Bending Stress in members.
CO5	To be able to determine the shear stress and twist in shafts subjected to torque
CO6	Apply the concept of principal stresses and theories of failure to determine stresses on a 2-D element.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	2	2	1	2	3	1	2	3	3
CO2	3	3	3	3	2	2	1	1	3	1	3	3	3
CO3	3	2	3	2	1	1	2	2	3	2	3	3	3
CO4	3	3	3	3	2	2	2	1	3	1	3	3	3
CO5	3	3	3	3	2	1	1	1	3	2	3	3	3
CO6	3	3	2	3	2	1	1	1	3	2	3	3	3

1-Slightly; 2-Moderately; 3-Substantially

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B. TECH. SEMESTER – II
SUBJECT: (25ES211) ELECTRICAL ENGINEERING AND ELECTRONICS
(w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
3	0	2	60	40	50	-	150	3	0	2	4

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 FUNDAMENTALS OF DC CIRCUITS

Voltage and Current Sources, Basic Laws, Network Theorems, Superposition Theorem and Thevenin's Theorem

2 AC FUNDAMENTALS

A.C. through resistance, inductance and capacitance, simple RL, RC and RLC circuits. Power, power factor

3 THREE PHASE SYSTEMS

Three phase system of emfs and currents, Star and Delta connections, three phase power

4 SINGLE PHASE TRANSFORMERS

Principle of working, Efficiency, regulation

5 ELECTRICAL DRIVES

Basic concepts of different types of Electrical motors as drives, Their suitability for various applications

6 REGULATED POWER SUPPLIES

Diodes as rectifiers, Half wave and Full wave rectifier, Filters and Regulators

7 BIPOLAR JUNCTION TRANSISTORS

Different configurations, Characteristics, Concept of basic amplifier circuits, Amplifier gain, Transistor as switch

8 INTRODUCTION TO INTEGRATED CIRCUITS

Basic concepts of ICs

9 INTRODUCTION TO DATA ACQUISITION AND SIGNAL CONDITIONING

Basic concept and Block diagram, Concept of conversion of physical quantity to electrical signal, signal conditioning, Introduction to A/D and D/A converters

10 INTRODUCTION TO INSTRUMENTATION AMPLIFIERS AND THEIR APPLICATIONS

Operational Amplifier – Notation, Pin diagram, Differential and common mode gain, CMRR, Applications as non-inverting, inverting, summing, differential amplifiers, integrator, differentiator

TEXT/REFERENCE BOOKS:

1. Muthu Subramanian, R., Salivahanan, S. and Muraleedharan, K.A., 2010. Basic Electrical, Electronics and Computer Engineering. 2nd edn. Tata McGraw Hill.
2. Malvino, A.P., 1999. Electronic Principles. 6th edn. Tata McGraw Hill.
3. Deltoro, V., 1986 Electrical Engineering Fundamentals. Englewood Cliffs, Prentice Hall.
4. Boylestad, R.L. and Nashelsky, L., 2009. Electronic Devices and Circuit Theory. 10th edn. Upper Saddle River, Prentice Hall.
5. Nagrath, I.J. and Kothari, D.P. (2010) Electric Machines. 4th edn. Tata McGraw Hill.

6. Theraja, B.L. and Theraja, A.K. (2005) A Textbook of Electrical Technology. Vols. I, II and IV. S. Chand.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	To find DC Circuit parameters using KVL, KCL, Ohm's Laws in DC circuits and apply various Network Theorems to solve DC networks.
CO2	Compute various parameters of AC circuits consists of R, Land C.
CO3	Discriminate half wave / full wave rectifier circuit and analyze load line and operating point for different biasing circuits of NPN and PNP transistor.
CO4	Understand the operation of Transformer and three phase systems.
CO5	Understand the principles, types, and characteristics of various electrical motors and their suitability for selecting appropriate drives in various industrial and commercial applications.
CO6	To explore signal conditioning, A/D and D/A converters, and gain an understanding of the principles and applications of operational amplifiers, including their different configurations and functions.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	1	2	2	1	1	-	-	1	3	2
CO2	3	3	1	1	2	2	1	1	-	-	1	2	2
CO3	2	2	1	1	2	2	1	1	-	-	1	3	3
CO4	2	2	1	1	2	2	1	1	-	-	1	2	2
CO5	3	3	2	1	2	2	1	1	-	-	1	2	2
CO6	3	3	2	2	2	2	1	1	-	-	1	3	3

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – II

SUBJECT: (25ES206) WORKSHOP PRACTICE - II (w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
1	0	2	40	-	50	-	90	1	0	1	2

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 FITTING SHOP

Introduction to Fitting tools: files, vice, chisels, punch, scriber, hammers, surface plate, angle plate, try square, callipers etc., Demonstration of fitting operations such as marking, punching, sawing, filling, grinding, drilling, tapping, Making job of fitting shop.

2 SMITHY SHOP

Introduction to Smithy tools like hammer, anvil, swage block, flatteners etc. Demonstration of Smithy operations such as upsetting, drawing down, bending, setting down, fork cutting, punching and fullering etc., Making job of cold smithy shop. Safety rules.

3 FABRICATION SHOP

Introduction to Welding process, classification of welding, Basic electric arc welding process, arc welding machine and its accessories, welding electrodes, types of weld joints, safety requirement during working with fabrication shop, etc. Demonstration of arc welding process. Making job of fabrication shop.

4 MACHINE SHOP

Introduction and demonstration of machine tools: Lathe, Milling, Drilling, Grinding, etc.

5 ELECTRONIC WORKSHOP

Introduction and application of basic electronics components. To understand use of digital multimeter in electronics. Basic exercise related to series and parallel connection with the use of breadboard.

TEXT/REFERENCE BOOKS:

1. Engineering Industry Training Board, 1970. ITB Handbook. Watford: Engineering Industry Training Board.
2. Gupta, J.K. and Kaushik, R., 2012. Workshop Technology. Vol. I & II. Jain Brothers.
3. Hajra Choudhury, S.K., Hajra Choudhury, A.K. and Nirjhar Roy, S.K., 2010. Elements of Workshop Technology. Vol. I & II. 12th edn. Media Promoters & Publishers Pvt. Ltd.
4. Muthusubramanian, R., Salivahanan, S. and Muraleedharan, K.A., 2009. Basic Electrical, Electronics and Computer Engineering. 2nd edn. Tata McGraw Hill.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand and apply basic workshop tools for fitting.
CO2	Understand and apply basic workshop tools for smithy shop
CO3	Understand and apply basic workshop tools and accessories used for fabrication/welding shop
CO4	Understand working of various machine tools like lathe, milling, drilling, grinding etc…
CO5	Understand and apply basic electronics tools with breadboard

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	2	-	-	2	1	1	2	-	2	3	2
CO2	2	1	2	-	-	2	1	1	2	-	2	3	2
CO3	2	1	2	-	-	2	1	1	2	-	2	3	2
CO4	2	1	2	-	-	2	1	1	2	-	2	3	2
CO5	2	1	2	-	-	2	1	1	2	-	2	3	2

1-Slightly; 2-Moderately; 3-Substantially

B. TECH. SEMESTER – II
SUBJECT: (25HS203) INDIAN KNOWLEDGE SYSTEM & ANCIENT YOGA
(w.e.f. 2025-26)

Teaching Scheme (Hours)			Examination Scheme					Credit Structure			
Lect	Tut	Prac	Theory	Sess.	TW	Prac	Total	Lect	Tut	Prac	Total
1	0	2	40	-	50	-	90	1	0	1	2

*TW Marks includes Viva based on TW

DETAILED SYLLABUS:

1 INDIAN PHILOSOPHY AND ANCIENT LITERATURE

Exploring Indian philosophical concepts like consciousness, perception, and the nature of reality, and their potential implications for technology advances using Artificial Intelligence. Vedic mathematical concepts and their relevance in modern computation and algorithms

2 INDIAN KNOWLEDGE SYSTEM IN ENGINEERING

Study of Indian Knowledge System and its connection to modern technologies like hydraulics and mechanical systems, GPS and satellite communication, corrosion resistance, engineering metrology and measurements

3 THE USE OF IKS FOR SUSTAINABLE DEVELOPMENT

Living in harmony with nature, emphasizing community and social equity, promoting holistic well-being, encouraging local self-reliance, Fostering environmental stewardship. Traditional practices for sustainable resource management, water conservation, and climate resilience, case studies of ancient technologies inspiring modern design, the role of IKS in innovation and research, role of IKS in Industry 4.0 and smart manufacturing, Yoga for stress reduction & cognitive enhancement

TEXT/REFERENCE BOOKS:

Bag, A.K.,1997. History of Technology in India. Vol. Indian National Science Academy.

Kapoor, K. and Singh, A.K., 2022. Fundamentals of Indian Knowledge System. D.K. Print World Pvt. Ltd.

Mahadevan, B., Bhat, V.R. and Nagendra, P.R.N., 2022. Introduction to Indian Knowledge System: Concepts and Applications. PHI Learning Private Ltd.

Maharshi Patanjali. Yog Darshan. Gorakhpur: Gita Press.

Ramdev, S. Yog: Its Philosophy and Practice. Divya Publications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Understand basics of Indian Knowledge System
CO2	Apply of Indian Knowledge System concepts to modern engineering
CO3	Apply IKS for sustainable development, Yoga for stress reduction & cognitive enhancement

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	1	3	2	2	1	2	2	3	2
CO2	3	2	-	-	1	3	2	2	-	2	2	3	2
CO3	2	-	-	-	-	2	2	3	-	1	2	2	-

1-Slightly; 2-Moderately; 3-Substantially