COURSE CURRICULUM

for

B.TECH. DEGREE

in

COMPUTER SCIENCE & ENGINEERING

(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

(Applicable from the academic session 2024-2025)

Dr. B. C. Roy Engineering College

An Autonomous Institution

Approved by: All India Council for Technical Education (AICTE)

Affiliated to: Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly Known as -WBUT)

Jemua Road, Durgapur, West Bengal, India,713206

The first year (First Semester) syllabus is unanimously accepted and approved in the first BoS meeting held in the Department of a) Physics, b) Mathematics, c) English, d) Electrical Engineering, e) Mechanical Engineering. The BoS of CSE (AIML) in its first meeting (held in the Department of CE (AIML) on 6th November, 2024 has unanimously accepted and approved the four-year course structure of CSE (AIML).

Head of the Department
Computer Science & Engineering (AIML)
Dr. B. C. Roy Engineering College
Durgapur

Course Name: Mathematics-I
Course Code: BSC-M 101
(Semester I)
Course Broad Category: Basic Science

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1. **Course Prerequisite:**
   Concept of Mathematics in 10+2 standard.

2. **Course Learning Objectives:**
   The objective of this courses to familiarize the prospective engineers with techniques in calculus multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advance level that will serve them well towards tackling more advance level of mathematics and applications that they would find useful in their disciplines.

3. **Teaching methodology and evaluation system for the course:**
   Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies, Guest Lectures.

   Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. **Course Content:**
   Course Name: Mathematics-I
   Course Code: BSC-M 101
   Hours per Week: 3L: 0T: 0P
   Credits: 3

Module	Topics	45L
1.	**Sequence and Series:** Sequences: Limit of a Sequence, Boundedness, Convergence, Divergence and Oscillation of a Sequence. Infinite Series: Necessary Condition for Convergence, Tests for Convergence and Divergence, Comparison Test: Only for Series with Positive Terms, Cauchy's Integral Test, D Alembert's Ratio Test, Cauchy's Root Test, Raabe's Test (Higher Ratio Test), Logarithmic Test, Alternating Series Leibnitz's Theorem, Absolute Convergence and	8L

Module	Topics	45L
	Conditional Convergence, Power Series.	
2.	**Differential Calculus (Single Variables):** Functions of single variable: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Series and Maclaurin's Series Expansions with Different forms of Remainders (Only statements and applications in all cases).	6L
3.	**Differential Calculus (Several Variables):** Functions of Several Variables: Limit and Continuity, Partial Differentiation, Total Derivative. Partial Differentiation of Composite Functions: Change of Variables, Differentiation of an Implicit Function, Euler's Theorem for Two variables (statement only), Jacobian, Taylor's Theorem for Function of Two Variables (statement only), Maxima and Minima of Functions of Two Variables: With and Without Constraints, Lagrange's Method of Undetermined Multipliers.	10L
4.	**Integral Calculus:** Improper Integrals: Different types of Improper Integrals and their Convergence, Beta and Gamma function and their properties. Double Integrals and Triple Integrals - Application of Double Integrals and Triple Integrals, Change of Order of Integration.	9L
5.	**Linear Algebra:** Real Matrices: Symmetric, Skew-Symmetric, and Orthogonal Matrices (examples and uses), Inverse of a Matrix, Rank of a Matrix, Diagonalization of a Matrix. Complex Matrices: Hermitian, Skew-Hermitian, Unitary Matrices (examples and uses). Determinants, Solutions of Linear System of Equations-- Existence, Uniqueness. Cramer's Rule, Gauss–Jordan Elimination., Gauss Elimination Method, LU-decomposition Method from Gaussian Elimination. Basics of Group Theory. Vector Spaces, Basis, Dimension and Nullity. Linear Dependence and Independence. Matrix Eigenvalue Problem - Determining Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem (statement only and uses), Some Applications of Eigenvalue Problems, Linear Transformations.	12L

5. References:

Text Book:

- B. S. Grewal-- Higher Engineering Mathematics; **Publisher.** Khanna **Publishers.**
- Ramana B. V. --- Higher Engineering Mathematics; **Publisher.** McGraw Hill Education**.**

Reference Books:

- G. B. Thomas & R.L. Finney--- Calculus and Analytic Geometry; **Publisher.** Penguin Random House Australia**.**
- E. Kreyszig--- Advanced Engineering Mathematics (9th Edition); **Publisher.** Wiley.
- Veerarajan T.--- Engineering Mathematics for 1st year (TMG); **Publisher.** McGraw Hill Education**.**
- D. Poole---- Linear Algebra: A Modern Introduction; **Publisher.** Cengage Learning India Private Limited.
- Bali & Goel--- Text Book of Engineering Mathematics; **Publisher**. Laxmi **Publications**
- H. K. Das---Higher Engineering Mathematics; **Publisher**. Visionias.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
BSC-M 101.1	Remember to identify different tools in algebra and calculus which would enable them to devise engineering solutions to encounter in their profession life.	Identify	Remember
BSC-M 101.2	Understand the concept to explain applications of functions of single and several variables in applied sciences and engineering problems.	Explain	Understand
BSC-M 101.3	Apply to implement the concept of partial derivatives in finding the maxima and minima of a function of several variables in the area of real-life problems.	Implement	Apply
BSC-M 101.4	Analyze the ideas of mentioned mathematical tools to organize complex real-life problems.	Organize	Analyze
BSC-M 101.5	Evaluating the gradation of described mathematical tools in linear algebra to assess the right approach to solve multidisciplinary engineering problems.	Assess	Evaluate
BSC-M 101.6	Construct logical and analytical skills to create a new idea appreciated by academics, research & emerging trends in industry.	Construct	Create

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	2	-	1
2	2	3	-	1	-	1
3	2	3	3	2	-	1
4	3	-	-	2	-	1
5	2	-	-	1	3	1

8. Mapping of the Course outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	2	-	-	-	-	-	-	1
CO2	1	2	3	1	-	-	-	-	-	-	-	1
CO3	1	2	2	1	1	-	-	-	-	-	-	1
CO4	1	2	1	1	2	-	-	-	-	-	-	2
CO5	2	2	2	2	3	-	-	-	-	-	-	1
CO6	1	1	1	1	-	-	-	-	-	-	-	1

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	3	2

***** End of Syllabus*****

Course Name: PHYSICS
Course Code: BSC-PH 101
(Semester – I)
Course Broad Category: Basic Science

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1. **Course Prerequisite:**
   Class-XII level knowledge of Physics and Mathematics.

2. **Course Learning Objectives:**
   i. Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

   ii. To compile all the knowledge acquired from the course and to apply in industry, academia, and research keeping in the mind about ethical awareness and impact in the field of pollution, social and safety.

3. **Teaching methodology and evaluation system for the course:**
   Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies.

Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. **Course Content:**
   Course Name: PHYSICS
   Course Code: BSC-PH 101
   Hours per Week: 3L: 0T: 0P
   Credits: 3

Module	Topics	45L
1.	Vector Algebra and Vector Calculus: Concepts of Vector Algebra, Vector calculus. Gradient, Divergence and Curl. Physical meaning of gradient, divergence and curl. Solenoidal vector (Definition only), Irrotational vector (Definition only), Conservative and non-conservative forces. Vector integration: Line Integral, Surface Integral, Volume Integral. Gauss Divergence Theorem, Stoke's Theorem.	7L
2	Oscillations: Introduction to S.H.M., Lissajous Figure, Damped Oscillations: Differential Equation and its solution, Different conditions of damping of harmonic oscillations, Logarithmic Decrement, Relaxation Time, Forced oscillations: Differential equation (Qualitative analysis only), Resonance: Amplitude and Velocity Resonance, Quality Factor, Sharpness of Resonance. Formation of Progressive wave and wave equation.	7L
3	Optics: Basic Concept of interference of light (No derivation), Types of interference, Diffraction of light, Difference between Interference and Diffraction, Difference between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction at a single slit, Conditions for maxima and minima, Plane Transmission grating, Dispersive and Resolving power of grating. Polarization: Polarization by Reflection and refraction-Brewster's law, Polarization by double refraction, Nicol Prism, Polaroids and its uses. Retardation Plate, Circular and elliptical polarization.	5L 5 L
4	**Dielectric and Magnetic Properties of Materials:** Dielectric material, Polar and Non-polar Dielectric, Dielectric constant, Polarization($\vec{P}$), Electrical Susceptibility ($\square_e$). Relation between Dielectric Constant (K) and Electrical Susceptibility ($\square_e$) Polarizability ($\square_e$), Applications of Dielectric. Magnetic Induction Vector or Magnetic Flux Density($\vec{B}$), Magnetic Field Intensity($\vec{H}$), Magnetization ($\vec{M}$), Magnetic Permeability(μ), Magnetic Susceptibility (χ), Relation between Magnetic Flux Density($\vec{B}$), Magnetic Field Intensity($\vec{H}$) and Magnetization($\vec{M}$), Classification of Magnetic Materials, Hysteresis Loop.	2L 5L
5	Electromagnetic Induction and Maxwell's Equation: Faraday's law of electromagnetic induction, Biot-Savart Law, Ampere's Circuital Law and displacement current, Maxwell's equations - Differential and Integral forms. Electromagnetic wave equations in terms of Electric and Magnetic field, Poynting Vector, Transverse nature of electromagnetic wave. Velocity of electromagnetic wave.	7L
6	Quantum Physics: Inadequacy of classical mechanics, Blackbody radiation, Planck's Law of Radiation Demonstration of Wien's Radiation Law, Wien's Displacement Law, Rayleigh-Jean's Law and Stefan Boltzmann Law as limit.	5L

Module	Topics	45L
	Photoelectric effect. de-Broglie's hypothesis, Phase Velocity, Group Velocity, Heisenberg's uncertainty principle.	2L

5. References:

Text & References Books:

- Vector Analysis: Murray Spiegel (Author), Seymour Lipschutz, Dennis Spellman
- Waves & oscillation, A. P. French
- Waves and Oscillations, N. K. Bajaj, Tata McGraw-Hill
- Physics of waves, W. C. Elmore & M. A. Heald
- Optics , Hecht, Pearson Education
- Optics, A. K. Ghatak, McGraw Hill Education India Private Limited
- A textbook on light, Ghosh, Mazumdar
- Fundamental of Optics, Jankins and White, McGraw-Hill
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Electricity and Magnetism: D. Chattopadhyay & P. C. Rakshit
- Quantum Physics, R. Eisberg and R. Resnick, John Wiley and Sons
- Quantum Mechanics, Leonard I. Schiff, Tata McGraw Hill Education Pvt. Ltd.
- Engineering Physics, Satya Prakash
- Engineering Physics, Sujay Kumar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.
- Principles of Engineering Physics- 1, S P Kuila, New Central Agency (P) Ltd.
- Principles of Engineering Physics- 2, S P Kuila, New Central Agency (P) Ltd.
- Engineering Physics, Malik & Singh, Tata McGraw Hill Education Pvt. Ltd.

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	**Details/Statement**	**Action Verb**	**Knowledge Level**
BSC-PH 101.1	Know basic concepts of vector algebra and vector calculus.	Explain	Understand
BSC-PH 101.2	Understand the concepts of oscillation	Identify, Select	Understand
BSC-PH 101.3	Elaborate the concept of optics and introduction to polarization.	Implement	Apply

BSC-PH 101.4	Impart basic knowledge of the dielectric and magnetic properties of materials.	Design	Create
BSC-PH 101.5	***Rationalize the electromagnetic induction and Maxwell's equation.***	Identify, Implement	Apply
BSC-PH 101.6	Familiarize with the basic of Quantum Physics	Recognize	Understand

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	3	-	-	-	-
3	-	-	3	-	-	-
4	-	-	-	3	-	-
5	-	-	-	-	3	-
6	-	-	-	-	-	3

8. Mapping of the Course outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	-	-	-	-	-	-	-	2
CO2	2	1	1	1	-	-	-	-	-	-	-	2
CO3	2	1	1	1	-	-	-	-	-	-	-	2
CO4	2	1	1	1	-	-	-	-	-	-	-	2
CO5	2	1	1	1	-	-	-	-	-	-	-	2
CO6	2	1	1	1	-	-	-	-	-	-	-	2

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	1	-	-
CO3	1	-	-
CO4	1	-	-
CO5	1	-	-
CO6	2	-	-

***** End of Syllabus*****

Course Name: BASIC ELECTRICAL ENGINEERING
Course Code: ESC EE 101
(Semester I)
Course Broad Category: Engineering Science

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1. Course Prerequisite:

Class-X+2 level knowledge of Physics and Mathematics.

2. Course Learning Objectives:

i. Foundational understanding of electrical circuits, machines, and systems.
ii. DC and AC circuit analysis: Kirchhoff's laws, circuit theorems, and transient responses of RL, RC, RLC circuits.
iii. Single-phase and three-phase systems: Power calculations, resonance, star-delta connections, and power measurement.
iv. Understanding of following Electrical machines:
    - DC generators, motors, and transformers (construction, operation, and performance).
    - Three-phase induction motors (torque-speed characteristics and control methods).
v. Practical application: Real-world problem-solving using electrical engineering principles.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Lectures and Presentations, Interactive Discussions

Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: Basic Electrical Engineering
Course Code: ESC-EE-101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	40L
1.	Electrical circuit elements (R, L and C), Dependent voltage and current sources, independent voltage and current sources, Star-Deltaconversion. Kirchhoff current and voltagelaws, Analysis of simple circuits with dc excitation. Superposition theorem, Nodal analysis, Mesh analysis, Thevenin theorem, Norton theorem and Maximum power transfer theorem, Time-domainanalysis offirst-order and second order RL, RC and RLC circuits.	10L
2.	Representation of sinusoidal wave forms, peak and rms values, phasor representation and analysis, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L,C,R-L,R-C,R-L-Combinations (series and parallel), resonance. Poly phase system: Phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections, 3 Phase power measurement using two wattmeter method.	10L
3.	Construction, Basic concepts of winding (Lap and wave), DC generator: Principle of operation, EMF equation, characteristics (open circuit, load), DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), 3-point starter, speed control (armature voltage and field control).	6L
4.	Magnetic materials, BH characteristics, ideal and practical transformer, Core and shell type construction, EMF equation, no-load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation. Auto-transformer and three-phase transformer connections.	6L
5.	Types, Construction, Production of rotating magnetic field, Principle of operation, Equivalent circuit and phasor diagram, rating, Torque-speed characteristics (qualitative only). Starter for induction motor. Brief introduction of speed control of 3-phase induction motor (voltage control, frequency control, rotor resistance control)	8L

5. References:

Text Book:

1. A. Chakrabarti, S. Nath, C.K. Chanda,"Basic Electrical Engineering", McGraw Hill Education, 2023.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. Ritu Sahdev, "Basic Electrical Engineering", Khanna Book Publishing Co. (P) Ltd., Delhi.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

6. **Course Outcomes (CO):**

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
ESC-EE-101.1	Illustrate &analyse the characteristics of the electric and magneticcircuits	Analyse, Identify	Understand
ESC-EE-101.2	To study the working principles and construction of DC machines, concepts of different windings used in DC machines and their characteristics and testing	Identify, Select	Understand, Apply
ESC-EE-101.3	To study the working principles of different AC machines (Transformer, 3-phase induction motor) and their characteristics and testing	Identify, Select	Understand, Apply
ESC-EE-101.4	To study different speed control techniques and applications of different electrical motors used in different industrial applications (DC motor, 3 phase induction motor)	Identify, Select	Understand, Apply
ESC-EE-101.5	Solve numerical problems of basic electrical circuits (both dc and ac)and different electrical machines.	Identify, Implement	Apply

7. **Mapping of course outcomes to module / course content**

Module	CO1	CO2	CO3	CO4	CO5
1	3	2	-	-	3
2	3	2	-	-	3
3	2	3	-	2	3
4	3	-	3	-	3
5	3	-	3	2	3

8. **Mapping of the Course outcomes to Program Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	-	-	-	-	2	-	-	-	-	-
CO2	1	2	3		2	-	2	-	-	-	-	1
CO3	1	2	3	2	2	-	2	-	-	-	-	1
CO4	1	2	3	3	2	-	2	-	-	-	-	2
CO5	1	2	2	2	-	-	2	-	-	-	-	-

9. **Mapping to Program Specific Outcome (PSO)**

	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	1	-	-
CO3	1	-	-
CO4	1	-	-
CO5	2	-	-

***** End of Syllabus*****

Course Name: ENGINEERING MECHANICS
Course Code: ESC-ME101
(Semester I)
Course Broad Category: Engineering Science

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1. **Course Prerequisite:**

Class XI and XII level knowledge of Mechanics, Mathematics (Vector Algebra and Coordinate Geometry, Differential and Integral Calculus)

2. **Course Learning Objectives:**

iii. This course introduces Statics and Dynamics of Engineering Mechanics with elaborate concepts on equilibrium of forces and motion under forces.
iv. Students will also get introduced to the subject of Mechanics of Deformable Bodies.

3. **Teaching methodology and evaluation system for the course:**

Teaching methodology –Lectures and Presentations, Interactive Discussions and real world problem discussion.

Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. **Course Content:**

Course Name: Engineering Mechanics
Course Code: ESC-ME101
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	42L	CO
1.	**Introduction to Statics:** Importance of Mechanics in engineering; Fundamental idealization: Particle and Rigid body concept; Types of forces (collinear, concurrent, parallel, concentrated and distributed); Vector and scalar quantities; Transmissibility of a force (sliding vector); Lami's Theorem. **Introduction to Vector Algebra:** Parallelogram law; Addition and subtraction of vectors; Free vector, Bound Vector; Representation of	12L	CO1 and CO2

Module	Topics	42L	CO
	Forces and Moments in terms of i, j, k; Cross product and Dot product and their applications. Two and Three Dimensional Force Systems: Moment and Couple; Varignon's theorem; Resolution of a coplanar force by its equivalent Force-couple system. Concept of Equilibrium in Two and Three dimensions; Free body concept; Equations of Equilibrium.		
2.	**Concept of Friction:** Laws of Coulomb friction; Angle of Repose; Coefficient of friction; Types of friction. **Distributed Force:** Centroid and Centre of Gravity; Centroids of a triangle, circular arc, quadrilaterals, circular sector, triangular lamina, composite areas. **Moment of Inertia:** M.I of plane figure with respect to an axis in its plane; M.I of plane figure with respect to an axis perpendicular to the plane of the figure, Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. circular plate, ring, cylinder, sphere, rod.	12L	CO3 and CO4
3.	**Introduction to Dynamics:** Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and nonuniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs. **Plane Curvilinear Motion of Particles:** Rectangular components (Projectile motion); **Normal and Tangential components (Circular motion).**Kinetics of Particles and Rigid bodies: Newton's second law; Equation of motion; D. Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Principle of Linear Impulse and Momentum; Power and efficiency with simple examples.	16L	CO5
4.	**Concept of Simple Stresses and Strains:** Normal stress, Shear stress, Bearing stress, Normal strain, Shear strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Proportional limit; Elastic limit; Yielding; Ultimate stress; Modulus of elasticity; Working stress; Factor of safety; Definition of malleability, ductility, toughness and resilience; Basic concept of thermal stress and strain.	5L	CO6

5. References:

Text Book:

1. Engineering Mechanics by S. S. Bhavikatti, New Age International Publishers, 9th Edition, 2023.

2. Engineering Mechanics by S. Rajasekaran & G. Sankarasubramanian, Vikas Publishing House Pvt Ltd., Noida.

Reference Books:

1. Engineering Mechanics: Statics & Dynamics by I. H. Shames, 4th ed. – PHI.
2. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson.
3. Engineering Mechanics by R.S. Khurmi, S. Chand Publications, Delhi.
4. A Text Book of Engineering Mechanics by Bansal R. K.(2010), Laxmi Publications.
5. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P.
6. Engineering Mechanics by M.P. Poonia & D.S. Bedi, Khanna Publishing House, 2019.
7. Mechanics for Engineering by Beer, F.P. and Johnston.
8. Fundamental Concepts In Engineering Mechanics by Suman Chakraborty, Everest PublishingHouse
9. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH.
10. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
11. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda – ChhayaPrakashani
12. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. – Wiley India

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO1	Explain the fundamental principles of mechanics, including the importance of mechanics in engineering and the concepts of particles and rigid bodies.	Explain	Understand
CO2	Determine analytically the forces and moments acting on statically determinate structure.	Identify, Select	Understand
CO3	Understand the presence and effects of friction in statics and dynamics.	Implement	Understand
CO4	Compute the centroid of lamina and centre of gravity of solids, area moment of inertia,mass moment inertia of solids.	Compute	Evaluate
CO5	Apply the fundamental concept of kinematics and kinetics to determine displacement, velocity and acceleration of particle and rigid body during linear/ angular/ general plane motions and the extension of Newton's law of motion to work energy principle and Impulse momentum principle.	Apply	Apply

CO6	Understand the deformation and mechanical behaviour of bodies under various load conditions.	Recognize	Understand

7. Mapping of course outcomes to module / course content (hrs)

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	6	6				
2			6	6		
3					16	
4						5

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	1					1		1
CO2	3	2	1	1	1					1		1
CO3	3	1	1	1			1					1
CO4	2	2	1	1	1	1				1		1
CO5	2	1	1	1	1	1			1	1		1
CO6	3	2	1	1	2	2						1

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	1	-	-
CO3	1	-	-
CO4	1	-	-
CO5	2	1	-
CO6	1	-	-

***** End of Syllabus*****

Course Name: English Language and Technical Communication
Course Code: HS-MC 101
(Semester I)
Course Broad Category: Humanities

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1. Course Prerequisite:

Class- XII level knowledge of English grammar and reading, listening, writing skills.

2. Course Learning Objectives:

i. This course introduces the concepts of sustainability in civil engineering and explores the role of construction materials in developing green infrastructure.
ii. Students will also learn to design energy-efficient buildings, implement sustainable site planning, navigate green building certifications, and evaluate the economics and ethics of sustainable construction practices.

3. Teaching methodology and evaluation system for the course:

Teaching methodology – Lectures and Presentations, Interactive Discussions and Case Studies, Guest Lectures and Field Visits.

Evaluation System –

A. Mid-Term Exam (20 Marks)- Summative Assessment (CIA-1)
B. Internal Assessment (20 Marks)- Formative Continuous Assessment [Continuous Assessment 1 (CIA-2)]
C. End-Semester Exam (60 Marks)- Summative Assessment.

4. Course Content:

Course Name: English Language and Technical Communication
Course Code: HSMC – 101/201
Hours per Week: 3L: 0T: 0P
Credits: 3

Module	Topics	36L
1.	Introduction to communication: types, features and criteria for effectiveness.	2L
2.	Definition, Types, Criteria for Effectiveness, Practice Said/Unsaid(Explicit / Implicit) Short stories used as resource (Ruskin Bond/Maupassant/R.K.Laxman etc)	4L

Module	Topics	36L
3.	Professional Communication, Definition, Types, Features of types, Media, Barriers, Effectiveness Criteria, Practice Sessions Short stories used as resource for discussion/debate (Ruskin Bond/Maupassant/R.K.Laxman etc)	10L
4.	Types, Purposes, Barriers, Effectiveness Criteria, Note Taking, Note Making, Jargon, Technical Content Reading, Visual Information Reading, Comprehension Short stories used as resource (Ruskin Bond/Maupassant/R.K.Laxman etc)	10L
5.	Syntactical Grammar, Comprehension, Business Correspondence, Academic Writing, Proposals, Reports, Posters, SOP, SoP, Essay/ Precis Short stories used as resource – for Grammar/Comprehension/ Precis /Creative content (Ruskin Bond/Maupassant/R. K. Laxman	10L

5. References:

Text Book:

- Effective Technical Communication. Dr. Bharti Kukreja, Dr. Anupam Jain. Katson Books. First Edition 2019, Reprint 2023.
- Effective Technical Communication. (Late) M. Ashraf Rizvi, Priyadarshi Patnaik. McGraw Hill.
- Communication Skills. Sanjay Kumar, Pushp Lata. Rainbow Book Distributors.

Reference Books:

- Practical English Usage Fully Revised International Edition. Michael Swan. Oxford.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO 1	Acquire basic proficiency in English, including reading, listening comprehension, writing, and speaking skills, and demonstrate a basic understanding of English.	Application	Understand
CO 2	Communicate confidently in English, using appropriate grammar, vocabulary, and syntax, and demonstrate effective speaking and presentation skills in different contexts.	Application	Apply, create

CO 3	Communicate appropriately in professional and social situations, using appropriate language.	Application	Apply
CO 4	Improve teamwork, leadership skills, and problem-solving skills through group activities.	Understand	Apply
CO 5	Organize and write business correspondence properly and correctly, using appropriate knowledge of language.	Understand,	Apply
CO 6	Develop active listening skills, including effective listening strategies and note-taking.	Understand	Apply

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	2	2	2	2	2
2	2	3	3	3	3	2
3	3	2	3	2	2	3
4	2	2	2	3	2	3
5	3	3	3	2	3	2
6	3	3	3	2	2	2

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	1	1	3	1	3
CO2	3	2	2	1	1	1	1	1	3	3	2	3
CO3	1	2	2	1	1	1	1	3	3	3	1	2
CO4	3	3	3	3	1	2	1	2	3	3	3	3
CO5	2	3	3	2	2	2	2	2	3	3	3	3
CO6	3	3	3	2	1	1	1	1	2	3	2	3

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	1	1	1
CO3	1	-	1
CO4	-	-	2
CO5	1	1	1
CO6	-	-	1

***** End of Syllabus*****

Course Name: PHYSICS LAB
Course Code: BSC-PH 191
(Semester – I)
Course Broad Category: BASIC SCIENCE

……

1. Course Prerequisite:

Class-XII level knowledge of Physics Practical.

2. Course Learning Objectives:

i..Expose students to various experimental skills and tools

ii. To gain practical knowledge by applying experimental methods to correlate with the theory. Apply the analytical techniques and graphical analysis to the experimental data.

3. Teaching methodology and evaluation system for the course:

Teaching methodology: Instruction: This method recognizes that students have different learning styles, abilities, and backgrounds, and aims to create a learning environment that accommodates these differences.

Evaluation System –

A. **Internal Assessment (60 Marks)-** Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. **End-Semester Exam (40 Marks)-** Summative Assessment.

4. Course Content:

Course Name: PHYSICS LAB
Course Code: BSC-PH 191
Hours per Week: 0L: 0T: 2P
Credits: 1

Module	Topics	10P
1.	**Experiments in General Properties of matter:** 1. Determination of Young's modulus of material of a bar by Flexure Method. 2. Determination of modulus of rigidity of the material of a rod by static method. 3. Determination of rigidity modulus of the material of a wire by	3P

Module	Topics	10P
	dynamic method. 4. **Determination of coefficient of viscosity by Poiseuille's capillary flow method**	
2.	**Experiments in Optics:** 1. Determination of dispersive power of the material of a prism. 2. Determination of the wavelength of a given laser / mercury lamp source by diffraction method. 3. Specific rotation of Sugar Solution using polarimeter.	1P
3.	**Electricity & Magnetism experiments:** 1. Determination of dielectric constant of a given dielectric material. 2. Determination of the thermo-electric power at a certain temperature of the given thermocouple. 3. Study of series resonance of LCR circuit. 4. Determination of specific charge (e/m) of electron by J J Thompson's Method. 5. Determination of unknown resistance using Carey Foster's bridge.	2P
4.	**Quantum Physics Experiments:** 1. Determination of Planck's constant using photoelectric cell. 2. Determination of Stefan's radiation constant. 3. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment. 4. Determination of Hall co-efficient of semiconductors. 5. Determination of band gap of semiconductors by four probe method. 6. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.	4P

Minimum of eight experiments to be performed taking at least one from each module mentioned above.

5. References:

Text books

- Advanced Practical Physics (vol.1 and vol.2) B. Ghosh and K. G. Mazumdar.
- Advanced course in practical physics D. Chattopadhyay and P. C. Rakshit.

Reference Books

- Optics –Eugene Hecht Pearson Education India Private Limited.

- Introduction to Electrodynamics, David J. Griffiths, Pearson Education India Learning Private Limited.
- Waves and Oscillations by N.K. Bajaj.
- Principles of Physics, 10ed, David Halliday, Robert Resnick Jearl Walker, Wiley.
- Electricity, Magnetism, and Light, Wayne M. Saslow, Academic Press.
- Classical mechanics, Narayan Rana, Pramod Joag, McGraw Hill Education.
- Introduction to Classical Mechanics, R Takwale, P Puranik, McGraw Hill Education.
- Optics, Ghatak, McGraw Hill Education India Private Limited.
- Refresher Course in B.Sc. Physics –Vol1 and Vol 2 –C.L.Arora.

6. Course Outcomes (CO):

After going through this course the Students will be able to:

Course Outcomes	**Details/Statement**	**Action Verb**	**Knowledge Level**
BSC-PH 191.1	*Understand the general property of matters like Viscosity, Young's Modulus and Modulus of Rigidity*	Explain	Understand
BSC-PH 191.2	Know the concepts of optics	Identify, Select	Understand
BSC-PH 191.3	Measure the electrical parameters.	Implement	Apply
BSC-PH 191.4	*Understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell.*	Design	Create
BSC-PH 191.5	*Analyze Electricity and Magnetism with the help of experiments like Hall Effect of Semiconductors.*	Identify, Implement	Apply
BSC-PH 191.6	Measure the Specific charge of electron	Recognize	Understand

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	-
2	-	3	-	-	-	-
3	-	-	3	-	-	-
4	-	-	-	3	-	-
5	-	-	-	-	3	-
6	-	-	-	-	-	3

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	-	-	-	-	-	-	-	2
CO2	2	1	1	1	-	-	-	-	-	-	-	2
CO3	2	1	1	1	-	-	-	-	-	-	-	2
CO4	2	1	1	1	-	-	-	-	-	-	-	2
CO5	2	1	1	1	-	-	-	-	-	-	-	2
CO6	2	1	1	1	-	-	-	-	-	-	-	2

10. **Mapping to Program Specific Outcome (PSO)**

	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	1	-	-
CO3	1	-	-
CO4	2	-	-
CO5	1	-	-
CO6	1	-	-

***** End of Syllabus*****

Course Name: Basic Electrical Engineering Lab
Course Code: ESC EE 191
(Semester I)
Course Broad Category: Engineering Science

……

1. Course Prerequisite:

Class-X+2 level knowledge of Physics and Mathematics.

2. Course Learning Objectives:

i. Understand the basic demonstration and application of electrical instruments and machines.
ii. Analyze the response of R-L-C series circuit
iii. Determine parameters of transformer equivalent circuit and analyze the operational behaviour of DC machine and three phase induction motor
iv. Study the working principles of synchronous generators
v. Introduce the components of low voltage electrical installations

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Practical

Evaluation System

A. Internal Assessment (60 Marks)- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]
B. End-Semester Exam (40 Marks)- Summative Assessment.

4. Course Content:

Course Name: Basic Electrical Engineering Lab
Course Code: ESC-EE-191
Hours per Week: 0L: 0T: 2P
Credits: 1

Exp. No	Title
1.	Introduction to Basic Electrical Lab (Do's and Don'ts), Familiarization of measuring Instruments (Voltmeter, Ammeter, Multimeter, Wattmeter), circuit parameters (real life resistors with colour code, capacitors, inductors and autotransformer).

Exp. No	Title
2.	i) Verification of Superposition Theorem ii) Verification of Norton's Theorem
3.	I) Verification of Thevenin's Theorem II) Verification of Maximum power Transfer Theorem
4.	Determination of steady state response of R-L and R-C and R-L-C circuit and calculation of impedance and power factor.
5.	Determination of resonance frequency and quality factor of series and parallel R-L- C circuit
6.	Calibration of Ammeter and Wattmeter
7.	Measurement of power in a three phase balanced circuit by two wattmeter method.
8.	Open circuit and short circuit test of a single-phase transformer
9.	Load test of the transformer and determination of efficiency and regulation
11.	No load characteristics of DC Separately Excited Generator
12.	Determination of Torque –Speed characteristics of separately excited DC motor
13.	Determination of Torque speed characteristics and observation of direction reversal by change of phase sequence of connection of Induction motor.

5. References:

Text Book:

1. A. Chakrabarti, S. Nath, C.K. Chanda,"Basic Electrical Engineering", McGraw Hill Education, 2023.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. Ritu Sahdev, "Basic Electrical Engineering", Khanna Book Publishing Co. (P) Ltd., Delhi.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

3. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
ESC-EE-191.1	Understand the basic demonstration and application of electrical instruments and machines	Analyse, Identify	Understand
ESC-EE-191.2	Analyze the response of R-L-C series circuit	Identify, Select	Analyze
ESC-EE-191.3	determine parameters of transformer equivalent circuit and analyze the operational behaviour of DC machine and three phase induction motor	Identify, Select	Apply
ESC-EE-191.4	Study the working principles of synchronous generators and power converters	Identify, Select	Understand
ESC-EE-191.5	Introduce the components of low voltage electrical installations	Identify, Implement	Understand

7. Mapping of course outcomes to experiments

EXP No	CO1	CO2	CO3	CO4	CO5
EXP1	3	3	3	3	0
EXP2	0	2	2	0	0
EXP3	2		2	0	0
EXP4	0	0	2	2	0
EXP6	2	2	0	0	0
EXP7	2	2	0	0	0
EXP 8	0	2	2	2	0
EXP 9	2	2	0	0	2
EXP 10	2	0	2	0	0
EXP 11	2	2	2	0	0
EXP 12	3	3	3	3	0

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	1	1	-	-	-	-	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	1	-	-	-	-	-	-	-	-	2
CO5	3	2	2	2	-	-	1	-	-	-	-	2

9. Mapping to Program Specific Outcome (PSO)

	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	2	-	-
CO3	2	-	-
CO4	1	-	-
CO5	1	-	-

***** End of Syllabus*****

Course Name: Language Lab
Course Code: HS-MC 191
(Semester I)
Course Broad Category: HUMANITIES

……

1. Course Prerequisite:

Class- XII level knowledge of English grammar and reading, listening, writing skills.

2. Course Learning Objectives:

i. This course introduces the concepts of sustainability in civil engineering and explores the role of construction materials in developing green infrastructure.

ii. Students will also learn to design energy-efficient buildings, implement sustainable site planning, navigate green building certifications, and evaluate the economics and ethics of sustainable construction practices.

3. Teaching methodology and evaluation system for the course:

Teaching methodology – Lectures and Presentations, Interactive Activities

Evaluation System –

A. Internal Assessment (60 Marks)- Formative Continuous Assessment [Continuous Assessment; Note Book (30 Marks), Viva Voce (20 Marks), Attendance (10 Marks)]

B. End-Semester Exam (40 Marks)- Summative Assessment.

4. Course Content:

Course Name: Language Lab
Course Code: HS-MC 191
Hours per Week: 0L: 0T: 2P
Credits: 1

Module	Topics	30 L
1.	**Listening** (Telephonic Communicatiion, Motivational Speeches)	4
2.	**Speaking** (Self Introduction, Role Playing, JAM, Extempore, News	6

Module	Topics	30 L
	reading)	
3.	**Presentation** (Poster + Audio Visual + short skits)	12
4.	**Body Language** (Debate, Group Discussion, Public speaking)	6
5.	**Professional Etiquette** (Conducting a programme, Presentation)	2

5. References:

Text Book:

- Effective Technical Communication. Dr. Bharti Kukreja, Dr. Anupam Jain. Katson Books. First Edition 2019, Reprint 2023.
- Effective Technical Communication. (Late) M. Ashraf Rizvi, Priyadarshi Patnaik. McGraw Hill.
- Communication Skills. Sanjay Kumar, Pushp Lata. Rainbow Book Distributors.

Reference Books:

- Practical English Usage Fully Revised International Edition. Michael Swan. Oxford.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO 1	Acquire basic proficiency in English, including reading, listening comprehension, writing, and speaking skills, and demonstrate a basic understanding of English.	Application	Understand
CO 2	Communicate confidently in English, using appropriate grammar, vocabulary, and syntax, and demonstrate effective speaking and presentation skills in different contexts.	Application	Apply, create
CO 3	Communicate appropriately in professional and social situations, using appropriate language.	Application	Apply
CO 4	Improve teamwork, leadership skills, and problem-solving skills through group activities.	Understand	Apply
CO 5	Organize and write business correspondence properly and correctly, using appropriate	Understand,	Apply

	knowledge of language.		
CO 6	Develop active listening skills, including effective listening strategies and note-taking.	Understand	Apply

7. Mapping of course outcomes to module / course content

Module	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
1	3	2	2	2	2	2
2	2	3	3	3	3	2
3	3	2	3	2	2	3
4	2	2	2	3	2	3
5	3	3	3	2	3	2

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	1	1	3	1	3
CO2	3	2	2	1	1	1	1	1	3	3	2	3
CO3	1	2	2	1	1	1	1	3	3	3	1	2
CO4	3	3	3	3	1	2	1	2	3	3	3	3
CO5	2	3	3	2	2	2	2	2	3	3	3	3
CO6	3	3	3	2	1	1	1	1	2	3	2	3

10. Mapping to Program Specific Outcome (PSO)

	PSO1	**PSO2**	**PSO3**
CO1	1	-	-
CO2	1	1	1
CO3	1	-	2
CO4	-	-	2
CO5	1	1	1
CO6	-	-	1

***** End of Syllabus*****

Course Name: WORKSHOP PRACTICES
Course Code: ESC-ME192
(Semester I)
Course Broad Category: Engineering Science

……

1. Course Prerequisite:

Class-XII level knowledge of Physics and Mathematics.

2. Course Learning Objectives:

a. Understand and Apply Fundamental Workshop Practices:
To comprehend the principles of basic manufacturing processes (moulding, casting, forming, joining, machining), workshop safety rules, and the use of tools and machines across various workshops, while fostering ethical and safety-conscious behavior on the shop floor.

b. Develop Practical Skills in Fabrication and Machining:
To acquire hands-on experience in machining, welding, fitting, forging, carpentry, pattern-making, and sheet metal fabrication, enabling students to manufacture components and assemblies as per specified dimensions and quality standards.

3. Teaching methodology and evaluation system for the course:

Teaching methodology –Theoretical Instruction, Demonstration, Hands-on Practice, Guided Group Activities, Assessment & Feedback, Interactive Learning Methods, Documentation & Reporting.

Evaluation System –
Section 1: Practical Continuous Internal Assessment (PCIA) - **60 Marks**
Includes practical performance, reports, and viva voce after each experiment. Throughout the Semester
Section 2: Practical End Semester Examination (PESE) - **40 Marks**
Final comprehensive practical examination covering the entire syllabus. At the end of the semester

4. Course Content:

Course Name: Workshop Practices
Course Code: ESC-ME192
Hours per Week: 0L: 0T: 4P
Credits: 2

Module	Topics	44hrs
1.	General: Introduction to workshop practice, Safety precautions, Shop floor ethics, Basic First Aid knowledge. Study of mechanical tools, components and their applications **Machine Shop** a. Study of Lathe, Shaper and Milling machine and their operations b. To make a threaded pin from a mild steel rod in a lathe c. To make V- slot in a shaping and a rectangular slot in milling machine in a block of cast iron or mild steel	8
2.	**Fitting Bench Working Shop** a. Study of tools and operations b. Making a Gauge (V-Fit) from MS plate involving drilling/tapping/dieing	8
3.	**Black Smithy Shop** a. Study of tools and operations b. A simple job of making a square rod from a round bar	4
4.	**Welding Shop** a. Study of Arc welding & Gas welding b. To join two thick (approx 6mm) MS plates by manual metal arc c. To join two thin mild steel plates or sheets by gas welding	8
5.	**Sheet Metal Shop** a. Study of tools and Operations b. Fabrication of tool box/ tray with soldering	4
6.	**Carpentry Shop** a. Study of tools and Operations and carpentry joints. b. To prepare T- lap joint/Cross Lap Joint.	8
7.	**Foundry** a. Study of tools and operations b. Making a mould using single piece pattern.	4

5. References:

Text Book:

- Hajra Choudhury S. K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

Reference Books:

- "Workshop Technology, Vol. I" by W A J Chapman
- Kalpakjian S. and Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,”Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

6. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
ESC-ME192.1	Discuss workshop safety rules and manufacturing methods namely, moulding, casting, forming, joining, machining.	Discuss	Understand
ESC-ME192.2	Acquire skill set of machining on Lathe, milling and shaping as per given dimensions.	Acquire	Apply
ESC-ME192.3	Build wooden pattern and sand mould using pattern and moulding tools.	Build	Apply
ESC-ME192.4	Fabricate components of given dimensions using Arc and Gas welding	Fabricate	Apply
ESC-ME192.5	Make jobs as per given dimensions in fitting and forging shops.	Make	Apply
ESC-ME192.6	Demonstrate sheet metal work.	Demonstrate	Apply

7. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	3	-	-	-	-
2	-	-	-	-	3	-
3	-	-	-	-	3	-
4	-	-	-	3	-	-
5	-	-	-	-	-	3
6	-	-	3	-	-	-
7	-	-	3	-	-	-

8. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	1	-	1	-	1
CO2	2	3	2	-	-	-	-	-	-	1	-	1
CO3	2	3	2	-	-	-	-	-	1	1	-	1
CO4	2	3	2	-	-	-	-	-	1	1	-	1
CO5	2	3	2	-	-	-	-	-	1	1	-	1
CO6	2	3	1	-	-	-	-	-	1	1	-	1

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	PSO2	PSO3
CO1	1	-	1
CO2	1	-	-
CO3	-	-	-
CO4	1	-	-
CO5	-	-	-
CO6	1	-	-

***** End of Syllabus*****

Course Name: National Service Scheme (NSS)
Course Code: EC-NSS 101
(Semester- I)
Course Category: Extra Curricular Activity

……

1. Course Prerequisite:

NA

2. Course Learning Objectives:

i. The course helps students to understand the community in which they work and identify the needs and problem of the community and their solutions.
ii. Develop capacity to meet emergencies and natural disasters
iii. Practice national integration and social harmony

3. Teaching methodology and evaluation system for the course:

Teaching methodology –
Practical learning through different activities in community immersion programmes throughout the semester. One orientation seminar conducted by a guest lecturer.

Evaluation System –

i. Participation and organizing in community immersion programmes (2 for each student); Each programme contains maximum 25 marks)
ii. Project report submission on activities done (50 marks)

4. Course Content:

Course Name: National Service Scheme (NSS)
Course Code: EC-NSS 101
Hours per Week: 0
Credits: 0

Module	Topics	No.
1.	Orientation Seminar	1
2.	Activities generating environmental awareness	2
3.	Activities focusing on health and hygiene improvement of community	2

Module	Topics	No.
4.	Activities generating literacy awareness	2
5.	Activities enabling youth and gender empowerment	2

5. Course Outcomes (CO):

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
EC-NSS 101.1	Understand the meaning NSS and its importance in society.	Explain	Understand
EC-NSS 101.2	Identify and implement solutions to environmental hazards	Identify, Implement	Create
EC-NSS 101.3	Implementation of basic activities, method and adaptation done by NSS	Implement	Apply
EC-NSS 101.4	Uphold the concept of volunteerism & leadership among youth and women	Design	Apply
EC-NSS 1 101.5	Be able to identify organizational structure and responsibilities	Identify, Select	Analysis

6. Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5
1	3	-	-	-	-
2	-	3	2	-	-
3	-	-	2	-	-
4	-	-	2	-	2
5	-	-	2	3	2

7. Mapping of the Course outcomes to Program Outcomes (PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1				2		2	1			2
CO2		1				2	3	2	1			2
CO3		1				2		2	1			2
CO4		1				2		2	1			2
CO5		1				2		2	1			2

9. Mapping to Program Specific Outcomes (PSO)

	PSO1	PSO2	PSO3
CO1	-	-	3
CO2	-	-	3
CO3	-	-	2
CO4	-	-	3
CO5	-	-	2

***** End of Syllabus*****