Modified Syllabus w.e.f June 2022 onwards

CIVIL ENGINEERING AND APPLIED MECHANICS DEPARTMENT

B. E. I YEAR (4YDC)

CE: 10003: FUNDAMENTALS OF CIVIL ENGINEERING AND APPLIED MECHANICS

CREDITS:

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
(3+1)	2	-	3	1	-	30	70	40	60	200

PRE-REQUISITE: XII standard (HSSC)

COURSE OBJECTIVES:

1. To study various force systems, equilibrium of force system, frictional forces
2. To learn the concepts of centroids, centers of gravity and moments of inertia of simple and complex geometrical shape. Transmission of power through belt & ropes.
3. To learn the behavior of beams, frames and trusses under different loading conditions and to determine the shear force and bending moment diagram for beams subjected to simple point loads.
4. To study methods and equipments for chaining, linear & angular measurements.
5. To understand the fundamental concepts of leveling.

COURSE OUTCOMES:

The students shall be able to

1. Identify and analyze system of forces, calculate support reactions for beam subjected to various types of loading and determine forces in members of trusses and.
2. Determine the Center of Gravity and moment of Inertia of a given Plane Lamina & Solid Bodies
3. Determine and analyze the Shear force, Bending moment of beams and analyze the trusses and problems related to frictions
4. Understand the working principles of chaining instruments and measuring distance, perpendicular and oblique offsets from the given reference line
5. Apply the knowledge of surveying and leveling in different operations in civil engineering projects.

COURSE CONTENTS:

THEORY:

PART - A: (67 % Weightage)

APPLIED MECHANICS

UNIT-1

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and Non-concurrent Co-planner forces, Free Body Diagram, Force Diagram and Bow's notations.

Application of Equilibrium Concepts:, Frictional force in equilibrium problems.

UNIT-2

Centre of Gravity and Moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Area and Mass, Radius of Gyration, Introduction to Product of Inertia and Principle Axes.

Power Transmission and its applications

UNIT-3

Beams: Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame: Roller, Hinged and Fixed Supports. Load on the Beam and Frame: Different Types of Loading. Support Reaction of a Beam or Frame: Analytical Method. Analysis of Plane Trusses: Method of Joints, Method of Sections. Support Reactions, graphical methods.

Introductions to shear force and Bending Moment and to draw shear force and bending moment diagram for UDL and Point Load for Cantilever and Simply supported beam without overhang.

PART - C: (33 % Weightage)

SURVEYING:

UNIT-4

Linear Measurements: Chain and Tape Surveying, Errors and Correction, Obstacles, Area Measurement by Planimeter.

Angular Measurements: Bearing, Prismatic Compass, Local Attraction, Declination, Bowditch rule of correction for traverse, Accuracy and Precision.

UNIT-5

Levelling: Types of Levels, Levelling Methods, Height of Instrument and Rise and Fall Method, Measurements, Recording, Reciprocal Levelling, Contours and Properties.

ASSESMENT:

Continuous: Two midterm tests in a semester and a makeup test if required, Evaluation of Practical calculations & drawing sheets, internal submission and Viva Voice examination by internal examiner during. Semester-end: Theory examination of 3 Hours duration and Practical Viva Voice Examination by external examiner

PRACTICALS:

LAB COURSE OBJECTIVES:

1. To acquire practical knowledge on handling basic survey equipment's
2. To possess knowledge about chain, compass surveying and open traverse survey.
3. To have the ability to understand leveling and area of irregular figures.
4. To study the principles of friction for different surfaces on horizontal plane and inclined plane.
5. To study and analyze the polygon law of forces.

LAB COURSE OUTCOMES:-

After performing different experiments, students shall be able to

1. Understand the working principles of chaining instruments and measuring distance, perpendicular and oblique offsets from the given reference line.
2. Understand the principle of prismatic compass, open traverse survey.
3. Compute the RL of different points on the ground by spot leveling and alsocompute the area and volume of irregular figure.
4. Apply the principles of friction for different surfaces on horizontal plane and inclined plane.
5. Apply the analytical method to verify and compare the polygon law of forces.

List of Experiments:

1. To study the colour/sign conventions and various instruments used in chaining.
2. To determine the horizontal distance between two points by doing ranging and chaining.
3. To measure perpendicular and oblique offsets from a given reference line.
4. To study prismatic compass and perform open traverse survey.
5. To do traversing of any regular figure with the help of compass and eliminate local attraction.
6. To determine RL of different points on the ground by fly differential leveling and compute RL's byheight of instrument (HI) method and rise and fall method
7. To determine planimeter constants and area of an irregular figure with the help of a planimeter
8. To verify the principal of moment using bell crank level
9. To determine the coefficient of friction for different surface on horizontal plane.
10. To determine the coefficient of friction for different surface on inclined plane
11. Verify the polygon law of forces and compare with analytical method.

ASSESMENT:

Sessional work will be based on syllabus of Engineering Mechanics and Surveying.

TEXT BOOKS RECOMMENDED:

1. Rajput .R.K., *Engineering Mechanics, Dhanpat Rai and Sons New Delhi.*
2. D.S. Bedi, *Engineering Mechanics,* , Khanna Book Publishing Co. (P) Ltd., Delhi
3. R. S. Khurmi, *Engineering Mechanics,* , S.Chand Publishing
4. R.K. Bansal, *A Textbook of Engineering Mechanics,* , Laxmi Publications
5. Engineering Mechanics, Sharma, Pearson.
6. Prasad I. B., *Applied Mechanics, Khanna Publication New Delhi*
7. Rammamurtham S., *Applied Mechanics, Dhanpat Rai and SonsNew Delhi*
8. Duggal S.K., Surveying *Vol. 1, Tata McGraw- Hill Education New Delhi*
9. Punmia, B.C., *Surveying, Laxmi Publications, New Delhi.*

REFERENCE BOOKS:

1. Kumar KL, *Engineering Mechanics, Tata McGraw- Hill Education New Delhi, Edition 4th* , 2011
2. Ferdinand.P. Beer. E, Russell, Jr Johnston., David Mazurek, Philip J Cornwell, "*Vector Mechanics for Engineers: Statics and Dynamics", McGraw – Hill Education New Delhi Edition 11th 2005.*
3. Timoshenko, and Young D.H., "*Engineering Mechanics", Tata Mc-Graw Hill Education New Delhi Edition 4th 2007.*
4. Chanchandramouli P.N., *Engineering Mechanics, PHI Learning Private Limited New DelhiEdition 2011*