

2220122 - APPLIED MECHANICS

B. Tech. I Year II Sem

L T P C

Prerequisites: Nil

3 0 0 3

Course Objectives:

1. To solve the resultant of any force system.
2. To analyze the types of friction for moving bodies and problems related to friction.
3. To determine the centroid of an area and center of gravity of body.
4. To understand the concept of area moment and mass moment about any axes.
5. Understand the work-energy principle

Course Outcomes: After completion of the course the student is able to

1. Determine the resultant of coplanar concurrent and special force systems and analyse the bodies for equilibrium to find the unknown forces.
2. Analyze the bodies on rough horizontal and inclined planes and connected Bodies
3. Determine the centroid of composite areas, centre of gravity of composite bodies
4. Determine the moment of inertia of simple areas and mass moment of inertia of simple bodies.
5. Apply work-energy principle to solve the rigid body problems.
6. Appraise the influences of human factor considerations on engineering design.

UNIT - I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space -Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

UNIT - II

Friction: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions – Types of friction – Dry friction – Ladder friction – Wedge friction – Screw friction – Simple Screw Jack

UNIT - III

Centroid and Center of Gravity: Introduction – Centroids of lines – Centroids of area - Centroids of Composite figures - Theorem of Pappus -Centre of Gravity - Center of gravity of composite bodies.

UNIT - IV

Area moments of Inertia: Introduction – Definition of Moment of Inertia -Polar Moment of Inertia – Radius of gyration - Transfer Theorem for moment of inertia – Moments of inertia by integration - Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Introduction - Moment of Inertia of Masses – Radius of gyration - Transfer Formula for Mass Moments of Inertia – Mass moments of inertia by integration - Mass moment of inertia of composite bodies – Product of Inertia.

UNIT - V

Kinetics of Rigid Bodies: Types of motion, D'Alemberts principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; kinetic of rigid body rotation.

TEXT BOOKS:

1. Engineering Mechanics by R.K.Bansal, Laxmi Publications (P) Ltd.
2. Engineering Mechanics by S.S. Bhavikatti and K.G.Rajashekarappa, New Age International (P) Ltd Publishers.

REFERENCES:

1. Engineering Mechanics by S.P. Timoshenko & D.H. Young, J.V.Rao, Sukumar Pati, McGraw Hill Education.
2. Engineering Mechanics Statics and Dynamics by R.C. Hibbeler, Pearson Education India.
3. Engineering Mechanics Statics and Dynamics by Tayal A.K, Umesh Publications.
4. Engineering Mechanics: Statics and Dynamics by S.Rajasekaran and G.Sankarasubramaniam, Vikas Publishing house Pvt Ltd.

2220123 - SURVEYING

B.Tech. I Year II Sem

L T P C

Prerequisites: Nil

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Course Objectives: The objective of the course is

1. To know the principles and methods of surveying
2. To measure horizontal and vertical- distances and angles
3. To recording of observation accurately and Perform calculations based on the observation
4. To Identify source of errors and rectification methods
5. To apply surveying principles to determine areas and volumes and setting out curves
6. To use modern surveying equipment's for accurate results

Course Outcomes: At the end of the course the student will able to

1. Apply the knowledge to calculate angles, distances and levels
2. Identify data collection methods and prepare field notes for levels, Interpret survey data and compute areas and volumes
3. Understand working principles of survey instruments and apply the knowledge of trigonometric levelling
4. Understand and apply the corrective measures on measurement errors
5. Apply the knowledge on curve alignment by different methods
6. Understand & apply the principles and concepts of modern equipment and its methodologies

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Different methods of distance measurement, direct methods of distance measurement using chain/tape, ranging, Tape corrections.

Compass and its types, Bearings, Included angles, Local Attraction, Magnetic Declination and dip

UNIT - II

Levelling and Contouring: Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas and volumes - Determination of areas for regular and irregular boundary, Determination of volume of earth work for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry

UNIT - IV

Traversing: Methods of Traversing, traverse computations and adjustments, Omitted measurements.

Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves.

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

TEXT BOOKS:

1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi.
2. Duggal S K, “Surveying (Vol – 1 & 2)”, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
3. N N Basak, “Surveying and Levelling”, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Chandra A M, “Plane Surveying and Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Arora K R “Surveying (Vol 1, 2 & 3), Standard Book House, Delhi.
3. R. Subramanian, “Surveying and Levelling”, Oxford University Press, New Delhi.

2210175 - ELEMENTS OF CIVIL ENGINEERING

B. Tech. I Year I Sem.

L T P C

Pre-requisites: Nil

0 0 2 1

Course objectives:

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement, Coarse & Fine aggregates.

Course Outcomes: At the end of the course, the student will be able to:

- Understands the method and ways of investigations required for Civil Engineering projects
- Identify the various rocks, minerals depending on geological classifications
- Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

List of Experiments:

- 1. Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
- 2. Identification of Rocks** – Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
- 3.**
 1. Study of topographical features from Geological maps. Identification of symbols in maps.
 2. Simple structural Geology Problems (Folds, Faults & Unconformities)
- 4. Tests on Cement**
 - a. Fineness test & Normal Consistency test.
 - b. Specific gravity test, Initial and Final setting time of cement.
- 5. Tests on Fine Aggregates**
 - a. Specific Gravity test.
 - b. Bulking of sand & Fineness modulus of Fine aggregate.
- 6. Tests on Coarse Aggregate**
 - a. Specific Gravity test.
 - b. Fineness modulus of Coarse aggregate.

TEXT BOOK:

1. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete”.

2220176 - SURVEYING LABORATORY – 1

B. Tech. I Year II Sem

L T P C

Pre-requisites: Surveying

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Course Objectives: The objective of the course is

1. To learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. To learn and understand various instrument used in surveying.
3. To understand how to calculate Area of plot and Ground.
4. To understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.
5. To determination of distance, area using chain, compass and plane table surveying
6. To Recording the observation accurately and Perform calculations based on the observation

Course Outcomes: At the end of the course the student will able to

1. Prepare Map and Plan for required site with suitable scale.
2. Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
3. Judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
4. Measure the distance, area of the field using the instruments chain, compass, plane table and plot the same.
5. Know the concepts of leveling, and perform & plot the cross & longitudinal sectioning.
6. Judge the profile of ground by observing the available existing contour map.

List of Experiments

Chain surveying

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging.

Compass surveying

3. Traversing by compass and adjustments in included angles and measurement of area - graphical adjustments.
4. Distance between two inaccessible points by compass.

Plane Table Surveying

5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method
7. Traverse by Plane table Survey.

Levelling

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal levelling.
10. Longitudinal Levelling
11. Cross – section Levelling
12. Plotting of Contours by Indirect Method

References

1. Surveying Theory and Practice by James M. Anderson and Edward M. Mikhail, 7th Edition, McGraw Hill, 2001.
2. Surveying by Bannister and S. Raymond, 7th Edition, Longman 2004.
3. Fundamentals of Surveying by Roy S.K, 2nd Edition, Prentice' Hall of India, 2004.
4. Surveying Vol I & II by Arora K.R, Standard Book house, 10th Edition 2008.