Course Code	Course Title						Core/Elective
U21CE301	**STRENGTH OF MATERIALS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
ENGINEERING MECHANICS	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Concepts of the stress and strain for different materials and application to longitudinally stressedbars
2. Evaluating shear forces and bending moments in beams, pure bending theory and determination ofthe bending stresses in beams
3. Determining the stresses for the shearing stresses, combined action of direct load and bendingmoment
4. Pure torsion theory and application to different types of springs.
5. Evaluating principal stresses in multi-axially loaded members, applications in estimating the bestfailure criteria in solid materials and evaluation of stresses & strains in thin-walled pressure vessels

Course Outcomes

After completing this course, the student will be able to:

1. Apply the fundamental concepts of stress and strain in the analysis and design of axially loadedmembers.
2. Analyse determinate beams to determine shear forces, bending moments and determine the bendingstress distribution in beams.
3. Determine the shear stress distribution in beams and also the stresses in beams subjected to combined axial and bending loads.
4. Evaluate the stresses and strains of circular members subjected to torsion and calculate the powerrequired for torsional revolutions of shafts.
5. Analyse the combined stresses at a point to evaluate principal stresses, and their applications inevaluating failure criteria in various materials and pressure vessels

UNIT-I

Simple Stresses and Strains: Definitions of stresses and strains, Hooke's Law, Modulus of Elasticity, Stress - Strain curve for ductile materials, Elastic constants, compound bars and temperature stresses.

Strain Energy: Strain energy and resilience in statically determinate bars subjected to gradually applied,suddenly applied, impact and shock loads.

UNIT-II

Shear Force and Bending Moment: Different types of beams and loads, shear force and bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected to different kinds

of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples.

UNIT-III

Bending Stresses in Beams: Assumptions in theory of simple bending, Derivation of flexure equation, Moment of resistance, calculation of stresses in statically determinate beams for different loads and different types of structural sections.

Shear Stress in Beams: Derivation of equation of shear stresses, distribution across rectangular, circular, T and I section.

UNIT-IV

Direct and Bending Stresses: Direct loading, Eccentric loading, limit of eccentricity, Core of sections, rectangular and circular, solid and hollow sections.

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders.

UNIT-V

Principal Stresses: Introduction – Stresses on an oblique plane of a bar under axial loading, compound stresses, Normal and tangential stresses on an inclined plane for biaxial stresses, two perpendicular normal stresses accompanied by a state of simple shear, Principal stresses, and Mohr's circle of stresses, Analytical and graphical solutions.

Torsion: Theory of pure torsion in solid and hollow circular shafts, shear stress, angle of twist, strength and stiffness of shafts, Transmission of Power. Determination of principal stresses and maximum shear stress.

Springs: Close and open coiled helical springs under axial load and axial twist, Carriage springs.

Suggested Readings:
1. D.S. Prakash Rao, *Strength of Materials- A Practical Approach*, Universities Press, 1999.
2. R.K. Rajput, *A Textbook of Strength of Materials*, S. Chand Publications,2007.
3. R. Subramanian, *Strength of Materials*, Oxford University Press, New Delhi 2005.
4. S. S. Bhavikatti, *Strength of materials*, Vikas Publishing House,2002.
5. Ferdinand P Beer, Johnston and De Wolf., *Mechanics of Materials*, Tata McGraw-Hill, 2004.

Course Code	Course Title						Core / Elective
U21CE302	**ENGINEERING GEOLOGY**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**0**	**0**	**0**	**40**	**60**	**2**

Course Objectives:

The objectives of this course is to impart knowledge of:
1. Mineralogy, rock formation & types and geological structures
2. Utility of rocks as a construction material with qualifying properties
3. Geological problems associated with dams, reservoirs, tunnels and other geological hazards

Course Outcomes:

After completing this course, the student will be able to:
1. Identify various minerals, rocks and analyze geological structures.
2. Explain rock weathering, classify various soils and understand hydrogeology.
3. **Classify land forms based on their geomorphology and evaluate the engineering properties of rocks.**
4. Examine rocks for their suitability in various construction applications.
5. Investigate and identify the geological problems in dams, reservoirs and tunnels, and explain the geological causes of earthquakes, tsunamis and landslides.

UNIT-I

Introduction: Importance of geology from Civil Engineering point of view

Mineralogy: Mineral, Origin and Composition; Physical properties of minerals; Susceptibility of minerals to weathering; Rock forming minerals.

Petrology: Igneous, Sedimentary and Metamorphic Rocks; Geological description and Indian occurrence of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone Shale, Limestone Slate, Gneiss, Quartzite, Marble, Khondalite and Chamockite.

Structural geology: Folds, Joints and Faults; Fundamental types; Mechanism origin and Classification; Field identification and Engineering analysis of Geological structures.

UNIT-II

Weathering of rocks: Weathering processes and its end-products; Susceptibility of rocks to Weathering, Assessment of the degree of weathering and its classification

Geology of soils: Formation, Geological Classification, Description and Engineering use of soils; Indian soil types.

Hydrogeology: Hydrologic Cycle, Water Table, Aquifers, Occurrence of ground water in various

Lithological Formations, Geological control for Ground Water Movement, springs, Ground Water Exploration and Ground Water Provinces of India.

UNIT–III

Geomorphology: Evolution, Characteristics Features and Engineering considerations of Fluviatile, Aeolian, Glacial and Marine land forms.

Rock mechanics: Engineering properties of rocks; Stress-Strain behavior of rocks; Site investigation: Aerial Photographs; Geophysical studies: Electrical Resistivity and Seismic Refraction methods.

UNIT- IV

Construction Material - ROCK: Geological considerations for the selection of Concrete Aggregate, Highway and Runway Aggregates, Building Stones, Decorative Stones.

Geological Hazards: Geological aspects of Earthquakes, Tsunamis and Landslides.

UNIT–V

Geology of Dams: Types of dams, Problems associated with Dam Foundations and Analysis of dam failure; Engineering Geology of major dam sites of India.

Geology of Reservoirs: Problems associated with Reservoirs, Engineering Geological investigations for demand water tightness in reservoir site.

Geology of Tunnels: Stand-up time of different rocks, Engineering Geological investigations of tunnels in rock, Problems in tunneling.

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

SUGGESTED READINGS:

1. F.G.Bell, Engineering Geology, Elsevier, 2007.
2. Dimitri P. Krynine and William R. Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distributors, First Edition, 1998.
3. B.P.Attewel and I.W.fanner, principles of engineering geology, chapmanandhall 1976.
4. Officers of the Geological survey of India, Engineering Geology case histories, miscellaneous pub. No. 29, 1975.

Course Code	Course Title					Core / Elective
U21CE303	**Surveying and Geomatics**					**Core**
Prerequisite	**Contact Hours per Week**			**CIE**	**SEE**	**Credits**
	L	**T**	**D/P**			
Mathematics - I	**3**	**0**	**3**	**40**	**60**	**3**

Course Objectives

 The objectives of this course is to impart knowledge of:
  1. To Study the basic concept &principles of Surveying
  2. To know the field applications and concepts of leveling survey & Contouring.
  3. Study the basic concept of trignometrical leveling, and field applications.
  4. Know the principles of aerial photogrammetry and its applications.
  5. Study the Various applications of GPS and remote sensing for field work.

Course Outcomes

 After the completion of the course, the student will be able to:
  1. Understand the basic principles of Surveying.
  2. Computation of lengths, areas, bearings of given field work.
  3. Understand the basic working principles of theodolite and total station.
  4. Computation of setting out data for horizontal and vertical curves by various methods.
  5. Understand the basic concepts related to Photogrammetry, RS and GPS.

UNIT-I
Introduction to Surveying: Accessories for linear measurements; Ranging; Chain and Tape corrections; Principle of Chain surveying- Well conditioned triangle; Offset; Cross staff. Types of meridians; Bearing systems and conversions; magnetic declination; Fore & Back Bearings and local attraction. Principle of Compass surveying; Traversing – Open & Closed traverse and their checks. Prismatic and Surveyor's compass. Accessories of Plane Table; Orientation and its importance; methods of plane table surveying - Radiation, Intersection, Traversing, Resection-Two point problem; Advantages & Disadvantages of Plane Tabling.

UNIT-II
Levelling and Theodolite Surveying: Dumpy and Auto level; Types of levelling operations; Curvature & refraction corrections; Calculation of reduced level - HI & Rise and fall methods. Characteristics and uses of contours. Introduction to Theodolite; Definitions; Fundamental lines of a Theodolite; Temporary Adjustments; Measurement of horizontal and vertical angle; Coordinates & their computations, Omitted measurements. Basics of Tacheometry

UNIT-III
Trigonometric levelling: Calculations of elevations and distances of accessible and inaccessible objects by single and double plane methods.

UNIT-IV
Curves: Theory of simple curves, setting out of simple curves by linear and angular methods; Elements of simple compound curve & Reverse curve; Elements of Transition curve: length of transition curve; Vertical Curves-Types of vertical curves - Length of vertical curve.

UNIT-V
Modern Field Survey: Photogrammetric Surveying, Global Positioning Systems, Remote Sensing, Geographic Information System and their Applications.

Suggested Readings:

1. B.C.Punmia, Vol 1,2 &3,Lakshmi Publisher, New Delhi,1994.

2. Arora K.R, Vol 1,2 &3,Standard Book House, New Delhi,2005.

3. T.M lillesand and R.W. Kiefer Remote sensing and Image Interpretation, John Wiley &Sons 1994.

4. Anji Reddy, M., .Remote Sensing and Geographical Information System, B.S Publications,2001.

Course Code	Course Title		Core / Elective
U21CE3L1	**STRENGTH OF MATERIALS LAB**		Core

Prerequisite	Contact Hours per Week			CIE	SEE	Credits
	L	T	D/P			
Engineering Mechanics lab	**0**	**0**	**3**	**25**	**50**	**1.5**

Course Objectives

The objectives of this course is to impart knowledge of:

1. Stress-strain behavior of ductile material and compressive strength of brick.
2. Deflection for different types of beams for different materials.
3. Rigidity modulus by conducting spring and torsion test, hardness number and Impact strength of different materials

Course Outcomes

After the completion of the course, the student will be able to:

1. Demonstrate the Stress-strain behavior of ductile material.
2. Compare Young's modulus of different materials by conducting deflection test on different types of beams
3. Calculate rigidity modulus by spring test and torsion test.
4. Evaluate compressive strength of brick.
5. Find Hardness number and Impact strength of given Specimens.

List of Experiments:

1. Uni-axial tension test on a specimen of ductile material.
2. Stress–Strain characteristics of a ductile material.
3. Brinell`s hardness test.
4. Compression test on brick.
5. Bending test on simply supported beam of Timber.
6. Izod impact test
7. Compression test on close coiled helical spring.
8. Torsion test on a specimen of ductile material.
9. Bending test on Cantilever beam of Steel.
10. Bending test on simply supported beam of Steel.
11. Shear test on mild steel.
12. Charpy impact test.

Note: At least 10 experiments should be conducted.

Course Code	Course Title					Core / Elective
U21CE3L2	**ENGINEERING GEOLOGY LABORATORY**					**Core**
	Contact Hours per Week					
Prerequisite	L	T	D/ P	CIE	SEE	Credits
-	**0**	**0**	**3**	**25**	**50**	**1.5**

Course Objectives

The objectives of this course are to impart knowledge of:
1. Hands-on experience to study the Geological aspects of various rocks.
2. Evaluate the Physical and Engineering properties of Minerals and Rocks.
3. Provides exposure to various Geological tests.

Course Outcomes

After completing this course, the student will be able to:
1. Identify the Physical and Engineering properties of Minerals and Rocks.
2. Analyze and measure Structural aspects of rocks using models.
3. Carryout field experiment and studies such as VES.
4. Study the Topographical and GSI maps.
5. Perform studies such as Slake durability test.

LIST OF EXPERIMENTS
1. Identification and description of Physical properties of Minerals.
2. Identification and description of Geological and Geotechnical characteristics of Igneous rocks.
3. Identification and description of Geological and Geotechnical characteristics of Sedimentary rocks
4. Identification and description of Geological and Geotechnical characteristics of Metamorphic rocks.
5. Determination of apparent specific gravity, porosity and water absorption of different rocks.
6. Study of structural geology models (wooden models).
7. Measurement of dip of planar feature by clinometers compass.
8. Vertical electrical sounding VES field experiment.
9. Study of topographical maps.
10. Structural geology problems (strike, dip, three point problems).
11. Study of geological survey of India (GSI works) maps and reports.
12. Slake durability test on soft rock.

Note: At least 10 experiments should be conducted in the semester.

Suggested Readings:

1. F.G.Bell, Engineering Geology, Elsevier, 2007.
2. Dimitri P. Krynine and William R. Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distributors, First Edition, 1998.
3. B.P. Attewel and I. W. fanner, principles of engineering geology, chapmanandhall 1976.
4. Officers of the geological survey of India, engineering geology case histories, miscellaneous pub. No. 29, 1975.

Course Code	Course Title					Core / Elective
U21CE3L3	SURVEYING and GEOMATICS LAB					**Core**
Prerequisite	Contact Hours per Week			CIE	SEE	Credits
	L	T	D/P			
-	**0**	**0**	**3**	**25**	**50**	**1.5**

Course Objectives

The objectives of this course is to impart knowledge of:
1. To Study and understand the different methods in Survey field work
2. To Study the basic concept of trignometrical leveling, and field applications
3. To analyse the Curves for Survey work related to Roads and Railways

Course Outcomes

After the completion of the course, the student will be able to:
1. Compute lengths, areas and bearings of the given field work.
2. Understand the basic working principles of theodolite and total station.
3. Compute setting out data for setting out of horizontal curves by various methods
4. Computation of setting out data for horizontal and vertical curves by various methods.
5. Understand the basic concepts related to Photogrammetry, RS and GPS.

List of Experiments:

1. Chain Survey: Study of chains, Setting out works, Chaining and Marking Perpendicular offset.
2. Compass Traversing – Measuring Bearings & arriving included angles.
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting.
5. Measurement of Horizontal and vertical angle by theodolite.
6. Trigonometric leveling using theodolite.
7. Single plane and Double plane method.
8. Setting out Simple Curve by linear and angular method.
9. Introduction to Total Station and its Applications.
10. Determining the difference in elevation between two points using Total Station.
11. Determination of area enclosed in a closed traverse by using Total Station.
12. Global Positioning Systems(GPS):Determination of Latitutde and Longitude of any four stations and Compution of the area.

Note: Atleast 10 experiments should be conducted.

Suggested Readings:

1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , Pune Vidyarthi Griha Prakashan.
2. Surveying and Levelling by Subramanian, Oxford University Press.

3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK. Jain , Laxmi Publications.