SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-301	Subject Name:	Mechanics of Materials

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Physics and Mathematics.

Course Objective:

Students are expected to learn basic concepts of mechanical properties of materials, concept of stress, strain and deformation of solid and state of stress, strain energy, principal stress and principal planes, theory of torsion and stresses in springs, fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior so that the students can solve real engineering problems and design engineering systems.

Course Outcomes:

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

1. Develop an understanding of the engineering fundamentals of structural mechanics of deformable bodies.
2. Determine stress, strain, deflection and rotation in members subjected to combination of loadings.
3. Design simple bars, beams and circular shafts for allowable stresses and loads using appropriate material considering engineering properties.

UNITs	Descriptions	Hrs.	CO's
I	Simple Stress and Strains: Mechanical Properties of material, Concept of Elastic body, Stress and Strain, Hooke's law, various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses and strain. Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses.	10	CO1, CO2
II	Shear Force, Bending Moment & Deflection of Beams: Shear Force and Bending moment Diagram in beams with various loads and couple, Simply Supported, Cantilever and Overhanging beams, Point of Contraflexure, Relationship between bending moment and shear force. SFD and BMD by Graphical Method. Theory of Bending: Concept of pure bending. Equation of bending, Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to various loads and couples, Shear Stress distribution across a section in beams of various cross sections, Built-up beams and Shear flow.	9	CO1, CO2, CO3
	Deflection of beams: Double Integration Method, Macaulay's Method, Deflection by Method of Superposition, Conjugate Beam method, Moment Area Method.	5	CO1, CO2
IV	Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsional Moment Diagram (TMD), Hollow shafts, ,	7	CO1, CO2, CO3

	Transmission of power by circular shafts, Open and closed coil springs, Leaf Spring, Spiral Spring Pressure Vessels: Thin and Thick-walled cylinders and spheres, Stress due to internal pressure, change in diameter and volume, Compound cylinders and shrink fittings, Theories of failure.		
V	Columns and Struts: Eccentric loading on columns, Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Secant formula. Unsymmetrical Bending and Curved beams: Bending of a beam in a plane which is not a plane of symmetry, Shear center, Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.	9	CO1, CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To find Modulus of Elasticity 'E' of Mild Steel and Wood by Deflection method.
2. To find Modulus of Rigidity 'N' of Mild Steel by Barton's vertical torsion apparatus.
3. To find Modulus of Rigidity 'N' of spring material by Spring test apparatus.
4. To verify Shear Force at a given section of a Simply Supported Beam.
5. To verify Bending Moment at a given section of a Simply Supported Beam.
6. To verify Maxwell's Theorem of Reciprocal Deflection.
7. To perform Tensile Test on M.S. and C.I. specimen and draw stress strain curve.
8. To perform Compression test on Teak and Jungle wood and R.C.C. C.I. cubes and compare their results.
9. To determine Ultimate Shear Strength of M.S., C.I. and Brass.
10. To determine Modulus of Rupture of Teak and Sal wood beam by Flexural Test

Text Book-

11. Mechanics of Materials, by R.C. Hibbeler, Pearson Publications.
12. Mechanics of Materials, by Barry J. Goodno& James M.Gere, Cengage Publications.
13. Strength of Materials (Schaum's), Nash William; McGraw Hill International

Reference Books-

1. Strength of Materials, Pytel and Singer, Harper International.
2. Mechanics of Materials, Beer and Johnston, McGraw Hill.
3. Strength of Materials, Subramanian R, Oxford Publications

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce50/preview
https://swayam.gov.in/nd1_noc20_ce34/preview

Recommendation by Board of studies on	08-06-2023
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-302	Subject Name:	Building Planning & Construction

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Engineering Graphics

Course Objective:

Students are expected to learn the principles of planning, bylaws of building construction; to draw plan, elevation and section of load bearing and framed buildings; to learn about to draw various building services facilities; to prepare detailed working drawing for joinery in buildings, stair cases and to learn to draw the perspective drawing.

Course Outcomes:

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

1. Draw the various elements of buildings like staircase, joineries etc.
2. Apply the principles of planning and bylaws used for building planning & its functional design.
3. Draw plan, elevation and section for various types of buildings - residential and public buildings.
4. To select suitable type of foundation and various types of brick masonry, door and windows for buildings.
5. Classify different types flooring and various building services like water supply, drainage, electrification, fire safety and acoustics in the building.

UNITs	Descriptions	Hrs.	CO's
I	Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, Drawing of frames of doors, window, various types of doors, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.	10	CO1
II	Building Planning – Provisions of National Building Code, Building bye-laws, open area, setbacks, FAR terminology, Principles of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation, energy efficient buildings.	7	CO2
III	Design and Drawing of Building – Functional design and preparation of detailed drawings of residential, institutional and commercial buildings, detailing of doors, windows, ventilators and staircases etc.	7	CO3
IV	Foundation: Types of foundations, wall footings, grillage, foundations, well foundation, under reamed piles, Damp proof courses. Masonry and Walls: Brick masonry, Bonds, Stone masonry, masonry construction, code provisions regarding load bearing and non-load bearing walls, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection. Doors, Windows and Ventilators: Types, based on material etc., size location, fittings, construction of sunshades, sills and jambs, RCC doors/windows frames.	8	CO4
V	Floors and Roofs: Types, minimum thickness, construction, floor finishes, Flat roofs, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Ferrocement roofing units, water proofing. Services: Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation.	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators,
3. One drawing sheet of lintels and arches.
4. One drawing sheet of various types of foundations.
5. One drawing sheet of staircases,
6. One drawing sheet containing detailed planning of a single-story residential building (common to all students)
7. One drawing sheet of residential building (Each student will make a different drawing).
8. One drawing sheet of public building (Each student will make a different drawing).

Text Book-

1. Chakraborty; Building Drawing
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction

Reference Books-

1. Gurucharan Singh & Jagdish Singh Building Planning, Design and Scheduling.
2. Malik & Meo; Building Design and Drawing.
3. Building Construction, Metchell
4. Construction Technology, Chudley R.

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-ar06/
https://nptel.ac.in/courses/124/107/124107001/
https://nptel.ac.in/courses/105/107/105107156/

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Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		III/II		Program		B.Tech
Subject Category	DC	Subject Code:	CE-303	Subject Name:		Surveying & Geomatics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Nil

Course Objective:

The students are expected to understand the importance of surveying in the field of civil engineering and to learn the basics of linear/angular measurement methods like chain surveying, compass surveying, plane table surveying in plan making, levelling and theodolite survey in elevation and angular measurements & tachometric survey for distance and height measurement

Course Outcomes:

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

1. Identify the concept of surveying, leveling and contouring and carry out linear and angular measurements required by different methods of surveying
2. Carry out traversing, trigonometrically leveling and tachometry using appropriate instruments and perform calculations
3. Identify different types of curves and perform calculations for setting out
4. Explain the triangulation principle and its application in control survey
5. Demonstrate the knowledge of hydrographic surveying, photographic surveying and remote sensing.

UNITs	Descriptions	Hrs.	CO's
I	Introduction to Surveying- Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Local attraction, Declination, Dip, Latitude and Departure. Levelling: Principles of levelling- Dumpy level booking and reducing levels, Methods- simple, differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling, Trigonometric levelling: Indirect levelling, levelling on steep ground-methods. Contouring: Characteristics, methods, uses.	9	CO1
II	Traversing by theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling. Tachometry: Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tachometers, use of tachometry for traversing and contouring.	8	CO2
III	Curves: Classification and use; elements of circular curves, calculations, setting outcurves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out.	7	CO3
IV	Control Surveys: Providing frame work of control points, triangulation principle, conaissance, selection and marking of stations, angle	8	CO4

	measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.		
V	Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Remote sensing, simple equipments, elements of image interpretation, image-processing systems.	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Chain Surveying
2. Plane table Surveying
3. Compass surveying
4. Leveling by auto level
5. Measurement of Angle by theodolite
6. Plotting a closed Traverse in field by using Theodolite.
7. Plotting an open Traverse in field by sing Theodolite
8. Determination of constants of Tachometers
9. Measurement of Horizontal Distance by stadia Tachometer
10. Measurement of Height and distances by Tangential Tachometry.
11. To Settling and simple curve by linear methods.

Text Book-

1. T.P. Kanetkar, Surveying & Leveling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York

Reference Books-

1. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co, London.
2. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
3. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
4. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce51/preview

Recommendation by Board of studies on	08-06-2023
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-304	Subject Name:	Concrete Technology

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Building Materials

Course Objective:

Students are expected to learn to understand the properties of ingredients of concrete; to study behavior of concrete in its fresh and hardened state; to study about the concrete design mix; to know about the procedures in concreting;

Course Outcomes:

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

1. Test all the concrete materials as per IS code.
2. Determine the properties of fresh and hardened of concrete
3. Design the concrete mix using IS code methods
4. Ensure quality control while testing/ sampling and acceptance criteria
5. Design special concretes and their specific applications

UNITs	Descriptions	Hrs.	CO's
I	**Concrete Making Materials:** Cement, Fine Aggregate, Coarse aggregate, Water, Chemical & Mineral admixtures. Different test on cement as per Indian standards, Tests on aggregates as per Indian standards, Bulking of sand, Sieve analysis – Grading.	8	CO1
II	**Properties of Fresh and Hardened Concrete:** Properties of fresh concrete- Workability – different tests of workability- Factors influencing workability. Tests on hardened concrete as per IS codes – Relationship between different strengths – factors influencing strength.	8	CO2
III	**Design of Concrete Mix:** Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials.	9	CO3
IV	**Production and Quality Control of Concrete:** Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater hot & cold weather condition, statistical quality control, field control, Inspection & Testing of Concrete.	8	CO4
V	**Special Concretes:** Light weight concrete, Ready mix concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Testing of Cement: Consistency of cement, initial and final setting time, Fineness and Specific Gravity of cement.
2. Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.
3. Testing of coarse aggregate: Specific Gravity, sieve analysis, water absorption & moisture content.
4. Concrete Mix design by IS code method (as per IS:10262-2019 & IS:456-2000)
5. Tests on Concrete- Workability tests – Slump cone test, compaction factor test, Vee-Bee consistometer test, strength tests- compressive strength, flexural strength, split tensile strength.

Text Book-

1. Properties of Concrete – A.M. Nevelli – 5th Ed, Prentice Hall Publishers, 2012.
2. Concrete Technology – M. S. Shetty – S Chand Co., Publishers – 2006.
3. Concrete Technology – M. L. Gambhir – Tata McGraw Hill Publishers – 2012.

Reference Books-

1. Concrete Technology – R.S. Varshney – Oxford& IBH publishing co.
2. Hand books on Materials & Technology - Published by BMTPC & HUDCO
3. Mohan Rai& M.P. Jai Singh; Advances in Building Materials & Construction
4. IS:456 (2000)
5. IS:10262 (2019)

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/102/105102012/
https://nptel.ac.in/courses/105/104/105104030/
https://nptel.ac.in/courses/105/106/105106176/
https://nptel.ac.in/courses/105/105/105105106/
https://nptel.ac.in/courses/105/105/105105170/#

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Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		III/II		Program		B.Tech
Subject Category	OE	Subject Code:	OE-305	Subject Name:		Road Safety Engineering

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic knowledge on Road safety Engineering.

Course Objective:

To provide the basic knowledge on road safety engineering and acquaint them with evaluation of safety hazardous locations and remedial road safety measures.

Course Outcomes:

After the completion of the course the student should be able to

1.Able to acquire knowledge methods and application of road safety engineering and accident analysis.

2.Able to remember the process of road safety audit and the measures of improving road safety.

3. Able to Qualified to evaluate the effectiveness of various management techniques adopted in reducing road accidents

UNITs	Descriptions	Hrs.	CO's
I	Introduction to Road safety: Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors, Road safety improvement strategies; Elements of a road safety plan.	9	CO1
II	Understanding and Analysis of road accident Data: Before-after methods in accident analysis, Recording of accident data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.	8	CO1
III	Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.	7	CO2
IV	Road Accident Reconstruction: Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to accident reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.	8	CO2

V	Remedial safety Measures: Accident prevention by better planning, Accident prevention by better design of roads, Accident remedial measures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law.	8	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. C. Jotin Kishty& B. Kent Lall, Transportation Engineering-An Introduction, Thrid Edition, Prentice Hall of India Private Limited, New Delhi, 2006
2. Khanna and Justo, Text book of Highway Engineering, Nemchand Brothers, Roorkee.
3. GeetamTiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.B.C. Punmia; Building Construction.
4. nstitute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.
5.

Reference Books-

6. J. Stannard Baker, Traffic Collision Investigation, Northwestern University Center for Public Safety, 2002.
7. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
8. AthelstanPopkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105215/

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Subject handled by department	Civil Engineering Department