Civil Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B.Tech (Civil Engineering)

Academic Semester IV

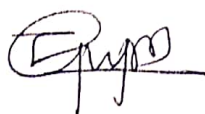| S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+T+P)
				L	T	P	PRE** Mid Sem	TA	ESE*	Total Marks	
1	SOE-B-CE401	CIVIL	Theory of Structures- I	4	0	0	30	20	50	100	4
2	SOE-B-CE402	CIVIL	Engineering Hydrology	4	0	0	30	20	50	100	4
3	SOE-B-CE403	CIVIL	Transportation Engineering-I	4	0	0	30	20	50	100	4
4	SOE-B-MA401	MATH	Numerical Methods and Computing	3	1	0	30	20	50	100	3
5	SOE-B-CE404	CIVIL	Surveying-II	4	0	0	30	20	50	100	4
6	SOE-B-CE405	CIVIL	Theory of Structures Lab (STAAD Pro based)	0	0	2	0	30	20	50	1
7	SOE-B-CE406	CIVIL	Material Testing Lab And Studio	0	0	2	0	30	20	50	1
8	SOE-B-CE407	CIVIL	Transportation Engineering Lab	0	0	2	0	30	20	50	1
9	SOE-B-CE408	HUMANITIES	Professional Development	0	0	2	0	30	20	50	2
10	SOE-B-CE409	CIVIL	***Certificate Coarse on MOOCs/NPTEL	1	0	0	0	0	50	50	1
			TOTAL	20	1	8	150	220	380	750	25

* End Semester Examination

** Progress Review Examination

***Certificate Coarse on MOOCs/NPTEL: Students required to enroll for the course (Minimum 4 weeks) approved by department of civil engineering and submit the certificate of completion. The students who failed to score the desired marks as per minimum passing criteria of MOOC shall be required to appear for end sem examination of the course conducted by OPJU. for backlog students in this course examination will be conducted by OPJU.

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Course Description

This course covers the basics of structural analysis with the central focus on energy methods. Analysis of interrelations of structural members using different methods. The subject also covers analysis of determinate and indeterminate structures.

Course Objectives

1. To know the difference between determinate and indeterminate structures.
2. To determine slopes and deflections of structures using different methods.
3. To study the behavior of structures under rolling loads.

Syllabus:

UNIT I

Determinate Structures: Introduction to determinate and indeterminate structures, static indeterminacy, external and internal indeterminacy, rules for determining degree of indeterminacy, pin jointed determinate plane trusses, analysis of simple and determinate plane trusses, method of joint and method of section.

UNIT II

Fixed and continuous beams: Statement of Clapeyron's theorem of three moments, analysis of fixed and continuous beams, effect of sinking of supports.

UNIT III

Slope and Deflection: Moment curvature relation, the elastic curve, relation between loading, SF, BM, slope and deflection, deflection and slopes of statically determinate beams by double integration method, Macaulay's method, moment area method, basics of conjugate beam method.

UNIT IV

Rolling Loads and Influence Lines: Introduction to rolling loads, concept of influence lines, influence lines for reaction, shear force and bending moment in simply supported beams, influence lines for forces in trusses, analysis for different types of rolling loads, single concentrated load - several concentrated loads, uniformly distributed load shorter and longer than the span, absolute maximum bending moment.

~~UNIT V~~

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UNIT V

Strain Energy Method: Strain energy due to axial load, bending, shear and torsion. Castigliano's theorems for deflection. Betti's law, Maxwell's theorem of reciprocal deflections, unit load and strain energy method for determination of deflections of statically determinate beams, pin-joined trusses and rigid determinate frames.

Text Books:
1. Structural Analysis-I, S. S. Bhavikatti, (2010), Vikas Publishing, Fourth Edition.
2. Structural Analysis, R. C. Hibbeler, (2017), Pearson Education, Ninth Edition.
3. Basic Structural Analysis, C. S. Reddy, (2017), McGraw Hill Education, Third Edition.

Reference Books:
1. Theory & Analysis of Structures Vol. – I, O. P. Jain, B. K. Jain, (1957), Nem Chand and Bros.
2. Structural Analysis: A Unified Classical and Matrix Approach, A. Ghali A. M. Neville, T. G. Brown, (2009), CRC Press, Sixth Edition.
3. Elementary Structural Analysis, J. B. Willbur, C. H. Norris, (2012), Literary Licensing.
4. Structural Analysis, L. S. Negi, R. S. Jangid, (2004), Tata McGraw Hill.

Course Outcomes:
Students will be able to understand:
1. Analysis of determinate and indeterminate structures.
2. Determination of slope and deflection of beams using different methods
3. Evaluation of shear force, maximum and absolute maximum moments using influence line diagrams.
4. Determination of deflections using energy methods

Assessment:
Assessment will be based on a combination of attendance, class work, tutorials, assignments and exams.

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Course Description:

The course serves as an introduction to the field of engineering hydrology. It covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. Determination rainfall intensity and hyetographs, peak flow estimation, hydrograph estimation, groundwater hydrology and modeling, and drought risk analysis / yield hydrology.

Course Objectives:

1. To comprehend basic concepts of the water cycle and hydrology.
2. To be able to perform engineering hydrologic computations.
3. To explain how rainfall, stream flow and evapotranspiration data are measured and presented.
4. To be able study rainfall-runoff relationship of an area.
5. To calculate peak flow discharges.

Syllabus:

UNIT I

Introduction: Definition and scope, hydrology in relation to water resources development, Hydrologic cycle, the necessity for hydrologic data, the global water budget, practical applications, water balance equation.

Hydrometeorology: Introduction, constituents of atmosphere, the weather and the atmosphere, the general circulation, air masses and fronts, climate and weather seasons in India.

UNIT II

Precipitation: Forms of precipitation, measurement of precipitation, recording and non-recording type of rain gauges, typical and record rainfall data, errors in measurement of rainfall. Location of rain gauge stations, analysis and interpretation of rainfall data, average depth of rainfall over area, most modern method of measurement of rainfall, Probable Maximum Precipitation (PMP).

UNIT III

Infiltration and Run off: Introduction, factors affecting infiltration, measurement of infiltration, infiltrometers, infiltration equations, infiltration indices, effect of infiltration on runoff and recharge of ground water, runoff, components of runoff, estimation of runoff, calculations by infiltration method, rainfall-runoff relationship, rational method of estimating runoff, basin yield.

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UNIT IV

Hydrograph Analysis: Introduction, characteristics of the hydrograph, effect of rainfall distribution on the shape of hydrograph, hydrograph separation, unit hydrograph, derivation of the unit hydrograph, storms-hydrograph, applications of unit hydrograph, direct runoff hydrograph, S-hydrograph hyetograph and isohyets.

UNIT V

Evaporation and Evapotranspiration: Introduction, evaporation process, factors affecting evaporation, estimation of evaporation, measurement of evaporation, reducing evaporation from water surfaces, transpiration, Evapotranspiration

Ground Water: Introduction, occurrence of ground water, aquifer parameters, ground water movement, Darcy's Law, permeability, steady and unsteady flow to wells in confined and unconfined aquifers.

Text Books:

1. Engineering Hydrology, Subramanya K. (2017), Tata McGraw Hill, 3rd Edition.
2. A Text Book of Hydrology, Reddy PJR, (2011), Laxmi Publications, 3rd Edition.

Reference Books:

1. Hydrology Principles, Analysis, Design, Raghunath HM, (2105), New Age International Pvt Ltd, 3rd Edition.
2. Applied Hydrology, Chow V, Maidment D, Mays L, (2017), McGraw Hill, 1st Edition.
3. Applied Hydrology, Linsley RK, Kohler MA, Paulhus JLH, (1949), McGraw Hill, 1st Edition.
4. Hydrology for Engineers and Planners, Hjelmfelt AT, (1975), Iowa State University Press, 1st Edition.
5. Ground Water Hydrology, Todd DK, Mays MW, (2005), Wiley publication, 3rd Edition.

Course Outcomes

Students will be able to understand

1. Essential components and function of the hydrologic cycle including precipitation, evaporation/evapotranspiration, overland flow and surface storage, groundwater flow and storage, and channel flow, storm water runoff and water quality.
2. Computation of hydrologic mass balance in a closed basin.
3. Unit hydrographs analysis.
4. Ground water resource, contamination of ground water and unified presentation of ground water hydrology.

Assessment:

Combination of class work, tutorials, assignments, quizzes, surprise test, online test, and exams.

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Course Description:

This course emphasizes on the basics of highway elements and their design including practical applications. Further, it gives an idea of materials being used in the modern road construction techniques and practices. It also covers the transportation planning, traffic studies and airport planning.

Course Objectives:

1. To provide knowledge of principles of highway planning and geometric design.
2. To provide fundamental concepts of traffic engineering.
3. To gain knowledge of different highway materials and their testing.
4. To understand procedure of pavement design and its construction.
5. To know different aspects of airport planning.

SYLLABUS

UNIT I

Principles of Highway Planning: Elements of transportation engineering, different modes of transportation, road development and planning in India, requirements of highway alignment, engineering surveys for highway location, maps and drawing.

Geometric Design: Cross section elements of horizontal and vertical alignment. Highway drainage, surface and subsoil drainage, geometry of hill roads, curve layout.

UNIT II

Traffic Engineering: Introduction to traffic flow theory, PIEV theory, speed-density, speed-flow and flow-density relation, data collection techniques for traffic parameters and delay studies, parking facilities and their uses. Traffic control devices, prevention of road accidents, rotary intersection, highway lighting.

Highway Materials: Behavior of highway materials, properties of sub grade and pavement component materials. Tests on sub grade soil, aggregate and bituminous materials, I.R.C. recommendations, MoRTH recommendations.

UNIT III

Pavement Design: Study of flexible and rigid pavements, basic concepts of pavement analysis and design. Stresses in rigid pavements. I.R.C. recommendations, ideal pavement or perpetual pavement design method.

UNIT IV

Pavement Construction Techniques and Quality Control: Types of Pavements water bound macadam, bituminous and cement concrete pavements. Joints in cement concrete pavements, pavement failures. Innovative materials in pavements.

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UNIT V

Airport Planning: Definition of terms related to airport engineering, factors affecting site, selection, obstructions, various surveys for site selection, zoning laws. Classification of obstructions runways orientation, basic runway length and its corrections. Geometric design of runway, runway configuration, taxiways layout, exit taxiways.

Text Books:

1. Principle and Practices of Highway Engineering, Kadiyali, (2005), Khanna Publishers, Delhi, Tenth Edition.
2. Highway Engineering, S. K. Khanna and C.E.G. Justo, (2015), Khanna Publishers, Delhi, Tenth Edition.
3. Air-port planning and Design, Khanna and Arora, (2017), Khanna Publishers, Delhi, Sixth Edition.
4. Principles of Transportation Engineering, Partha Chakroborty and Animesh Das, (2011), Prentice Hall India Learning Private Limited, Sixth Edition.

References Books:

1. Highway Engineering, Rangawala S.C, (2017), Charotar Publishers, Eleventh Edition.
2. Standard Specifications and Code of Practice for Road Bridges, Section I – General Features of Design, IRC6, (2017), Eight Revision.
3. Specifications for Road and Bridge Works, Transport and Highways (MORTH, formerly MOST), Published by Indian Roads Congress, Fifth Edition.
4. Manual for Survey, Investigation and Preparation of Road Projects Published (Rights of Publication and of Translation Reserved), IRC Publication2001.
5. Traffic and Highway Engineering, Nicholas J. Garber and Lester A. Hoel, (2002), Bill Stenquist, Third Edition.

Course Outcomes:

Students will be able to understand

1. Highway planning and design.
2. Different aspects of traffic engineering
3. Application of highway construction material.
4. Design of pavements.
5. The planning process of airport.

Assessment:

Assessment will be based on a combination of attendance, class work, tutorials, assignments and exams.

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Course Objectives:

1. To make students proficient in understanding basics of finite element method.
2. To make students familiar with different types of algorithms.
3. To make students understand basic concepts of neural networks.
4. To make students familiar with the methods for the numerical solution of ordinary differential equations.
5. To make students learn the process of fitting standard curves to the tabulated data.

Syllabus

Unit I

Finite Element Method: Introduction, history and applications, finite element formulation using minimum potential energy principle, assembly of global stiffness matrices, element strain and stress, spring element, bar and beam elements.

Unit II

Introduction to Evolutionary Algorithms: Introduction to Optimization: Engineering application of optimization, statement of an optimization problem, optimal problem formulation, classification of optimization problem, single variable optimization algorithm, bounding phase method, dual simplex method.

Unit III

Introduction to neural networks: Optimization algorithms for solving constrained optimization problems, direct methods, penalty function methods, engineering applications of constrained and unconstrained algorithms, simulated annealing, neural-network based optimization.

Unit IV

Numerical Solution of Ordinary Differential Equations: Numerical Solution of Ordinary Differential Equations, Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Range-Kutta Methods, Predictor-corrector Methods, Milne's Method, Adams-Bashforth Method. C Programming of Euler's and Runge-Kutta method of order 4.

Unit V
Algebraic Eigen Value Problem:
Introduction, Classification of numerical computation methods, Theorems, Power Methods, Inverse Iteration Method, Generalized Eigen Value Problem, Jacobi Method.

Text Books:
1. Engineering Optimization: Theory and Practice, S. S. Rao, (2009), John Wiley & Sons, Fourth Edition.
2. Optimization for Engineering Design: Algorithms and Examples, K. Deb, (2012), Prentice Hall India Learning Private Limited, Second Edition
3. Numerical Methods in Engineering & Science with Programs in C, C++ & MATLAB, B. S. Grewal, (2013), Khanna Publishers, Eleventh Edition.
4. Numerical Methods for Scientific and Engineering Computation, M. K. Jain, S. R. K. Iyengar, R. K. Jain, (2007), New Age International (P) Limited, Fifth Edition.

Reference Books:
1. Introduction to Evolutionary Algorithms, X. Yu, M. Gen, (2012), Springer.
2. Higher Engineering Mathematics, B. Ramana, (2017), McGraw Hill Education, First Edition.
3. Numerical Methods for Scientists and Engineers, K. S. Rao, (2007), Prentice Hall India Learning Private Limited, Third Edition.
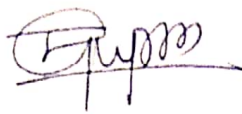
Course Outcomes:

Students will be able to

1. Solve the problems using finite element method.
2. Evaluate the engineering problems using different optimization techniques.
3. Obtain the numerical solution of ordinary differential equations.
4. Fit the linear and non linear curves to the tabulated data.

Assessment:

Assessment includes attendance, performance, record work and exams.

Semester: IV
Subject: Surveying-II

Branch: Civil Engineering
Code: SOE-B-CE404

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Course description:

This course emphasizes on the aspects of triangulation. Further it gives a fair idea of computational errors and observations in survey work. It also covers the total station surveying, photographic, aerial and hydrographic surveying.

Objective:

1. Aspects of triangulation.
2. Computational errors and observations.
3. Tacheometry, various systems, instruments etc.
4. Mapping of earth surface using total station.
5. Concepts of photographic, aerial surveying GIS, GPS and remote sensing.
6. Application of the concept of hydrographic surveying.

Syllabus

UNIT I

Triangulation: Principle and classification of triangulation system, triangulation chains, strength of figures, station marks and signals, satellite station, intersected and resected points.

Field Work: Reconnaissance, intervisibillty of stations, angular measurements, base line measurements and its extension, adjustment of field observations and computation of co-ordinates.

UNIT II

Total Station: Components of total station, basics of total station, setting of instrument, linear measurements, horizontal and vertical angle measurements, traversing, differential leveling, contouring and earthwork measurement, extraction of data to computer, interpretation of data, use of survey data for drawing preparation.
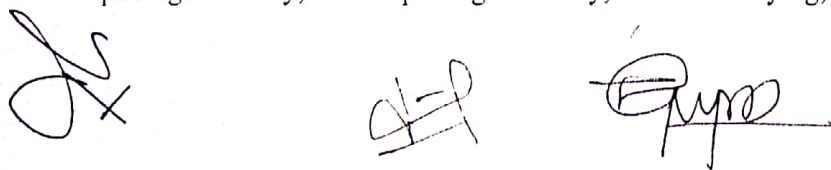
UNIT III

Total Station: Mini projects using total station (Outstation survey camp)

1. Profile surveying of road project (2 days).
2. Contour topographical mapping (2 days).

UNIT IV

Photographic and Aerial Surveying: Photo theodolite, principle of the method of terrestrial photogrammetry, stereo photogrammetry, aerial surveying, scale and distortion of the vertical

and tilted photograph, comparison between air photograph and map, study of GPS, GIS and Remote Sensing.

UNIT V

Hydrographic Surveying: Introduction, shore line survey, soundings methods, gauges, equipment required for hydrographic surveying, sounding party, methods of locating soundings, reduction of soundings and plotting of soundings, problems related to hydrographic surveying.

Text Books:

1. Surveying I and II, B.C. Punmia, A. K. Jain, Arun Jain, (2016), Laxmi Publications, Seventeenth Edition.
2. Surveying (Vol. II & III), R. Agor, (1995), Khanna publications, Delhi, First Edition.

References Books:

1. Engineering Surveying Technology, T.J.M Kennie, and G Petrie. (1990), Blackie & Sons Pvt. Ltd., London.
2. Solving Problems in Surveying, A. Bannister and R. Baker, (1994), Longman Scientific Technical, U.K.
3. Surveying (Vol. II & III), K.R. Arora, (1993), Standard Book House, Delhi.
4. Surveying (Vol. I & II), T.P. Kanetkar, (1988), Pune Vidyarthi Griha Prakashan, Pune.
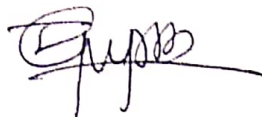5. Surveying (Vol. I & II), C. Venkataramaih, (2011), Universitires Press, Hyderabad.

Course Outcomes:

Students will be able to:

1. Deal with the various aspects of Triangulation.
2. Evaluate computational errors and observations.
3. Work in actual surveying field with total station.
4. Apply the knowledge of Tacheometery, various systems, instruments etc.
5. Understand the concepts of photographic and aerial surveying.
6. Understand the concepts of hydrographic surveying.

Assessment:

Assessment will be based on a combination of attendance, class work, tutorials, assignments and exams.

Semester: IV   **Branch: Civil Engineering**

Subject: Theory of Structures-I Lab (STAAD.Pro)   **Code: SOE-B-CE405**

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Course Description

The course covers flexural rigidity of beams, verification of Maxwell's theorem, deflection of curved beams, analysis of determinates and indeterminate beams, determinate pin-jointed frames, determinate rigid frames and multistoried rigid frame using STAAD.Pro.
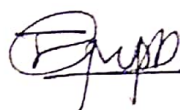
Course Objectives

1. To study the concept of flexural rigidity of beams and Maxwell's theorem.
2. To determine deflections of curved bars.
3. To Analyze determinate and indeterminate beams.
4. To Analyze determinate pin-jointed frames, determinate rigid frames and multistoried rigid frame.

List of Experiments:

(At least ten experiments are to be performed by each student)

1. To determine the flexural rigidity (EI) for a given beam.

2. To verify the Maxwell's theorem of reciprocal deflection.

3. To determine the vertical deflections of a variety of curved bars.

4. Analysis of determinate beams on a standard structural analysis package such as STAAD.Pro V8i.

5. Analysis of indeterminate beams on a standard structural analysis package such as STAAD.Pro V8i.

6. Analysis of determinate pin-jointed frames on a standard structural analysis package such as STAAD.Pro V8i.

7. Analysis of indeterminate pin-jointed frames on latest version of a standard structural analysis package such as STAAD.Pro V8i.

8. Analysis of determinate rigid frames on latest version of a Standard Structural Analysis package such as STAAD.Pro V8i.

9. Analysis of indeterminate rigid frames on latest version of a standard structural analysis package such as STAAD.Pro V8i.

10. Analysis of multistoried rigid frame on latest version of a standard structural analysis package such as STAAD.Pro V8i.

11. Analysis of multistoried pin-jointed frame on latest version of a standard structural analysis package such as STAAD.Pro V8i.

12. Analysis of industrial structure on latest version of a standard structural analysis package such as STAAD.Pro V8i.

13. Analysis of composite structure on latest version of a standard structural analysis package such as STAAD.Pro V8i.

Equipment/Machines/Instruments/Tools/Software Required:

1. Elastic properties of beam apparatus.
2. Maxwell's law of reciprocal deflection apparatus.
3. Universal frame with variety of curved bars.
4. Dial gauges for measuring deflections.
5. Weights and hangers to apply loads.
6. Latest release of software Package STAAD.Pro

Recommended Books:

1. Structural Analysis-I, II, S. S. Bhavikatti, (2010), Vikas Publishing, Fourth Edition.
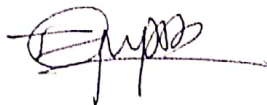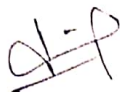2. Verification Manual of STAAD.Pro Software.

Course Outcomes

Students will be able to understand

1. Determination of flexural rigidity of beams and verification of Maxwell's theorem.
2. Evaluation of deflections of curved bars.
3. Analysis of determinate and indeterminate beams.

4. Analysis of determinate pin-jointed frames, determinate rigid frames and multistoried rigid frame.

Assessment:

Assessment includes attendance, performance, record work and exams.

Course Description:

This course gives a broad understanding of common materials related to civil engineering with an emphasis on the fundamentals of structure-property-application relationships of the materials.
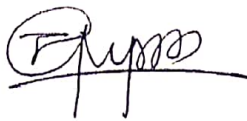
Course objectives:

1. To know professional and ethical responsibility in the areas of material testing.
2. To function on multidisciplinary teams in the area of materials testing.
3. To use the techniques, skills, and modern engineering tools necessary for engineering.
4. To communicate effectively the mechanical properties of materials

List of Experiments

(At least ten experiments are to be performed by each student)

1. Determination of fineness of cement by sieving method.

2. Determination of compressive strength of cement.

3. Determination of tensile strength of cement.

4. Determination of consistency of cement.

5. Determination of the initial and final setting time of cement.

6. Determination of soundness of cement.

7. Determination of specific gravity of cement.

8. Determination axial tensile strength of mild steel.

9. Determination impact value by Izod and Charpy of mild steel specimen material.

10. Determination of the Rockwell Hardness of mild steel specimen material.

11. Determination of compressive strength of wood: (a) Along with the fiber and (b) Across the fiber.

12. Determination of specific gravity of aggregates.

13. Determination of abrasion value of tiles.

14. Determination of impact value of tiles.

15. Determination of flexural strength of tiles.

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Material Studio:

Students have to present a report and PowerPoint presentation and model / charts on topics given below.

1. Cement

   (Contents/ chemical composition of cement, cement types, hydration of cement, chemical reaction, the structure of cement paste, consistency, and setting.)

2. Aggregate.

   (Origin, types, sizes, uses, effects on workability, tests on aggregates)

3. Concrete.

   (Constituents of concrete, transition zones, batching, mixing, curing)

4. Workability of concrete.

   (workability of fresh concrete and harden concrete, testing on fresh concrete and harden concrete)

5. Brick Masonry

   (Technical terms, bonds in brick work- English bond, Flemish bond, garden wall bond, raking bond, Dutch bond.)

6. Admixtures.

   (Details of admixture like its types, chemical composition, Uses of it)

7. Structural Steel.

   (Structure and properties of steel, use of metals in civil engineering, reinforcement steel)
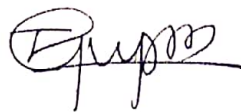
Course outcomes:

Students will be able to

1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear, and torsion.

2. Identify, formulate, and solve engineering problems of structural elements subjected to flexure.

3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding the failure of structures due to unsuitable materials

Recommended Books:

1. Concrete Manual: Laboratory Testing for Quality Control of Concrete, M.L Gambhir, (1992), Dhanpat Rai and Sons, Delhi, Fourth Edition.

2. Concrete Technology: Theory and Practice, M.S. Shetty and S.K.Jain, (2018), S. Chand Publication, Eight Edition.

Assessment:

Assessment includes attendance, performance, record work, and exams.

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Course Description

This course covers the basics of highway materials, their test, and applications in the field. Abrasion value and attrition value of aggregates, the shape of aggregates, softening point of bitumen, ductility of bitumen, flash and fire point of bitumen, impact value of aggregates performs.
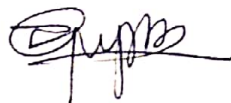
Course Objective:

1. To provide knowledge about the characteristics and behavior of highway materials used in highway engineering.
2. To conduct different tests to find various properties of aggregates, bitumen, and soil subgrade and hence to assess their suitability in pavement construction.
3. To know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.

List of Experiments:

(At least ten experiments are to be performed by each student)
1. Determination of 10 percent fines value of aggregates.
2. Determination of crushing value of aggregates.
3. Determination of abrasion value of aggregates by Los Angele's machine.
4. Determination of attrition value of aggregates by Deval's attrition machine.
5. Determination of impact value of aggregates.
6. Determination of specific gravity and water absorption of aggregates.
7. Determination of softening point of bitumen.
8. Determination of ductility value of bitumen.
9. Determination of viscosity value of bitumen.
10. Determination of Flash and Fire point of bitumen.
11. Determination of Shape of aggregates(a) Elongation index (b) Flakiness index.
12. Determination of penetration value of bitumen.
13. Determination of the angularity index of aggregates.
14. Determination flash and fire point of bitumen.
15. Study of Marshal Stability test of bitumen.

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Equipment/Machines/Instruments/Tools/Software Required:

- Standard penetrometer
- Ring and ball apparatus
- Los Angele's abrasion machine
- Deval's abrasion machine
- Ductility testing machine
- Tar viscometer
- Sieve shaker
- Standard I.S. sieves for fine and coarse aggregate
- Length gauge
- Thickness gauge
- Crushing value cylinder and mould with plunger
- Aggregate impact testing machine
- Flash and fire point apparatus
- Hot air oven
- Water bath
- Marshall stability machine and with mould
- Proving ring and dial gauge
- Weighing balance up to 10 kg capacity

Recommended Books:

1. Principle and Practices of Highway Engineering, Kadiyali, (2005), Khanna Publishers, Delhi, Tenth Edition.
2. Highway Engineering, S. K. Khanna and C.E.G. Justo, (2015), Khanna Publishers, Delhi, Tenth Edition.
3. Air-port planning and Design, Khanna and Arora, (2017), Khanna Publishers, Delhi, Sixth Edition.
4. Principles of Transportation Engineering, ParthaChakroborty and Animesh Das, (2011), Prentice Hall India Learning Private Limited, Sixth Edition.
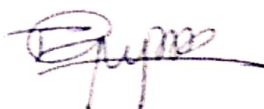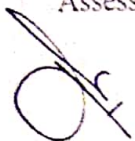
Course outcomes:
The student will be able to

1. Identify the functional role of different materials of highway engineering.
2. Understand the test procedures and recommended standards for limiting values of highway materials
3. Understand the quality of various pavement materials and their suitability in highway construction

Assessment:
Assessment includes attendance, performance, record work, and exams.

Semester: IV   Branch: Civil Engineering
Subject: Professional Development   Code: SOE-B-CE408

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Course description

'Effective Speaking Skills' course is designed to teach students to apply theories and principles of effective interpersonal and public speaking. This course provides instruction and experience in preparation and delivery of speeches within a public setting and group discussion. Emphasis is on research, preparation, delivery, and evaluation of informative, persuasive, and special occasion public speaking. Upon completion, students should be able to prepare and deliver well-organized speeches and participate in group discussion with appropriate audiovisual support. Students should also demonstrate the speaking, listening, and interpersonal skills necessary to be effective communicators in academic settings, in the workplace, and in the community.

Course objective:

The main objective of the course is to improve the students' spoken English and enable them to acquire the art of public speaking. The course is heavily practice oriented and has been designed to develop the skills of speech through presenting papers, giving seminars, participating in group discussions and appearing at interviews, etc.

Syllabus

UNIT I
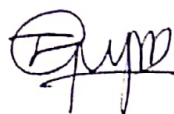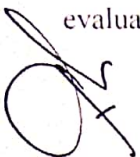**Speaking:** An Overview, Listening Effectively, Non-Verbal Communication, Art of Persuasion.

UNIT II
Dynamics of Professional Speaking: Introduction, Combating Stage Fright, Describing Objects/Situations/People, Delivering Just-a-minute Sessions, Delivering Different Types of Speeches.

UNIT III
Professional Presentations: Planning of a Presentation, Designing of a Presentation, Preparing Power Point Slides for Presentations, Individual and Group Presentations, Making Presentation.

UNIT IV
Group Discussions: Introduction, GD and Debate, Types of GD, Personality traits to be evaluated, Dynamics of group behavior, DOs and DON'Ts of GD.

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UNIT V

Job Interviews: Introduction, Process, Stages in Job Interviews, Types, Desirable Qualities, Preparation, Tips for Success.

Text books:

1. Soft Skills for Everyone, Jeff Butterfield, (2014), CENAGE LEARNING, Delhi.
2. Communication Skills, Sanjay Kumar and Pushp Lata, (2011), New Delhi: Oxford University Press.
3. Communicate or Collapse: A Handbook of Effective Public Speaking, Group Discussion and Interviews, Sanjay Kumar and Pushp Lata, (2007), New Delhi: Prentice Hall of India.
4. The Art of Public Speaking, Dale Carnegie, (2016), New Delhi: Ocean Paperbacks.

Reference books:

1. The Art of Public Speaking, Stephen E. Lucas,(1989), Singapore: McGraw-Hill, Third Edition.
2. How to Talk so People Listen, Sonya Hamlin,(1993), New York: Throson.
3. The Complete Guide to Public Speaking, Jeff Davidson, (2006) Manjul Books PVT. Bhopal.
4. Effective Speaking, Turk, Cristopher, (2010) Second Indian Reprint, Taylor and Francis Group, Delhi.

Course outcomes:

Students will be able to

1. Choose a topic and formulate the speech according to the purpose, audience, and time constraints.
2. Employ vocal variety in rate, pitch, and intensity as suitable to the message, occasion, and audience.
3. Use strategies and skills to manage communication anxiety.
4. Present speeches using an extemporaneous style with effective transitions that, establish connectedness, movement from one idea to another, and clarify relationships.
5. Use knowledge of digital presentation tools to create and make effective presentations.
6. Participate in GD effectively and face interviews confidently.

Assessment: Assessment includes attendance, performance, record work and exams.