### Scheme of Teaching & Examination

#### B.E. V Semester Civil Engineering

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject Code Description</th>
<th>Periods per Week</th>
<th>Theory / Practical</th>
<th>Total Marks</th>
<th>Credit</th>
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<td>L</td>
<td>T</td>
<td>P</td>
<td>ESE</td>
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<tr>
<td>1</td>
<td>Civil Engg.</td>
<td>320511 (20)</td>
<td>Structural Analysis - II</td>
<td>4</td>
<td>1</td>
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<td>Geotech Engineering - I</td>
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<td>4</td>
<td>Civil Engg.</td>
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<td>Transportation Engineering - I</td>
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<td>5</td>
<td>Civil Engg.</td>
<td>320515 (20)</td>
<td>Numerical Methods and Computer Programming</td>
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<td>1</td>
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<td>6</td>
<td>Civil Engg.</td>
<td>320516 (20)</td>
<td>Engineering Hydrology</td>
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<td>320521 (20)</td>
<td>Structural Analysis - Lab</td>
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<td>320522 (20)</td>
<td>Geotech Engineering - I Lab</td>
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<td>320523 (20)</td>
<td>Transportation Engineering - lab</td>
<td>-</td>
<td>-</td>
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<td>320524 (20)</td>
<td>Numerical Methods and Computer Programming lab</td>
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<td>-</td>
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<tr>
<td>11</td>
<td>Humanities etc.</td>
<td>300525 (46)</td>
<td>Personality Development</td>
<td>-</td>
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<tr>
<td>12</td>
<td>Civil Engg.</td>
<td>320526 (20)</td>
<td>*Practical Training Evaluation and Library</td>
<td>-</td>
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</tbody>
</table>

**Total**

|               | 19 | 6 | 15 | 640 | 120 | 240 | 1000 | 35   |

L- Lecture  T- Tutorial  P- Practical  ESE- End Semester Exam  
CT- Class Test  TA- Teacher's Assessment  

*To be completed after IV Sem. and before the commencement of V sem.*
Unit 1
Indeterminate beams, Principle of superposition., Analysis by consistent deformation method, Theorem of three moments, shear force and bending moment diagrams, Sinking of support.

Unit 2
Strain energy application to beams, frame & trusses, Lack of fit

Unit 3
Moment Distribution Method, Application to indeterminate beams and rigid frames without sway & with sway problem.

Unit 4

Unit 5
Qualitative and Quantitative Influence lines of indeterminate beams by Muller Breslau Principle and its use.

Name of Text Books:
Structural Analysis – Punmia B.C. (Laxmi Publications)
Structural Analysis (Vol. – II) – Bhabhi Katti S. (Vikas Publishers)

Name of Reference Books:
Fundamentals of Structural Analysis – Lect & Vari (Tata McGraw Hill)
Structural Analysis – Pandit & Gupta (Tata McGraw Hill)
Theory of Structure – Ramamurtham S. (Dhanpat Rai Publication)
Unit 1 General Design Considerations
Properties of Concrete and reinforcing steel, characteristic strengths, stress-strain curves, workmanship, I.S. specifications, Basis for design, loads and forces, requirements governing reinforcement and detailing.

Unit 2 Working Stress Method – Beams and Slabs
Analysis and design by working Stress method - Singly and doubly reinforced sections, rectangular and T-sections.
One way and two way slabs, staircases.

Unit 3 Working Stress Method – Columns and Column Footings
Analysis and design by working Stress method - Short and long columns, eccentrically loaded columns. Uniaxial and Biaxial bending, Isolated Column Footings.

Unit 4 LIMIT STATE METHOD - BEAMS AND SLABS.
Analysis and design by Limit State method - Singly and doubly reinforce sections, rectangular and T-sections.
One way and two way slabs, staircases.

Unit 5 Limit State Method – Columns and Column Footings
Analysis and design by Limit State method - Short and long columns, eccentrically loaded columns. Uniaxial and Biaxial bending, Isolated Column Footings.

Name of Text Books:
Reinforced Concrete Design – Sinha N.C. & Roy S.K. (S. Chand & Co.)
RCC Design – Punmia, Jain & Jain (Laxmi Publications)

Name of Reference Books:
Relevant IS codes IS: 456:2000, IS 875, Part 1, 2
Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi)
Unit 1 INTRODUCTION
Introduction to Geotechnical Engineering; Unique nature of soil; Soil formation and soil types, interrelationship of soil, soil mechanics and geotechnical engineering, aim and scope of soil mechanics.

Index Properties of Soil
Basic definitions; phase relations; physical and engineering properties of soil, soil grain and properties coarse and fine grained soils, Stoke’s law, method of fine grained analysis.

Unit 2 SOIL CLASSIFICATION AND EFFECTIVE STRESS
Indian standard soil classification system, Purpose of soil Classification, Different System of soil Classification, Field Identification, Principal of Effective Stress and Related Phenomena, Types of soil moisture, principal of effective stress; capillarity; seepage force and quicksand condition;

Unit 3 COMPACTION, PERMEABILITY AND SEEPAGE ANALYSIS OF SOIL
Clay mineralogy, soil structure, compaction theory, laboratory compaction tests, method of compaction control, permeability, one dimensional flow, permeability of soil, Darcy’s law, laboratory methods of determination, pumping out tests for field determination of permeability, seepage through soils, two-dimension flow problems, confined flow and unconfined flow, flow ness and their characteristics, exit gradient and failure due to piping, criteria for design of filters.

Unit 4 STRESSES DUE TO APPLIED LOADS AND CONSOLIDATION
Stresses due to applied Loads, Boussinesq equation of vertical pressure under concentrated loads, rectangularly loaded area, circular Loaded Area Newmart’s Chart, Westergoard’s equation, compressibility, effects of soil type, stress history and effective stress on compressibility, consolidation, factors affecting consolidation and compressibility parameters. normally consolidated and over consolidated soils, different forms of primary consolidation equation – transient flow condition, Terzaghi theory of one-dimensional consolidation and time rate of consolidation.

Unit 5 Shear Strength and Soil Exploration
Introduction, stress at a point and Mohr’s stress circle; Mohr-Columb Failure criterion: Laboratory tests for shear strength determination; shear strength parameters; UU, CU and CD tests and their relevance to field problems; Shear strength characteristics of normally consolidated and reconsolidated clays; Shear strength Characteristics of sands, Soil Exploration, Various Method of field Exploration, Undisturbed Soil Sampling equipments and Field test (Static & Dynamic Penetration Test, PLT), cyclic plate load test and modern electronic test of site characterisation.

Name of Text Books:
- Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
- Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)

Name of Reference Books:
- Soil Mechanics and Foundation Engineering – S.N. Murthy (Dhanpat Rai Publications)
- Geotechnical Engineering Principles and Practice – Donald P. Coduto (Prentice Hall of India, New Delhi)
Unit 1 PRINCIPAL OF HIGHWAY PLANNING

Unit 2 TRAFFIC ENGINEERING
Traffic characteristics, studies such as volume Speed. ‘O’ and ‘D’ parking etc. and their uses. Traffic control. Devices, Prevention of road accidents, rotary intersection, highway lighting, Highway Materials: Behaviour of highway materials, properties of Subgrade and pavement component materials. Tests on subgrade soil, Aggregate and bituminous materials.

Unit 3 PAVEMENT DESIGN
Factors in design of flexible and rigid pavements, Group index and C. B. R. methods, Westergoord analysis of wheel loads. Stresses in rigid pavements. I.R.C. recommendations

Unit 4 Pavement Construction Techniques and Quality Control
Types of Pavements water bound macadam, bituminous and cement concrete pavements. Joints in cement concrete pavements, pavement failures

Unit 5 AIRPORT PLANNING

Name of Text Books:
Principle and Practices of Highway Engineering – Kadiyali & Lab (Khanna Publishers, Delhi)
Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi)

Name of Reference Books:
Principles of pavement Design – Yoder and witzak (-----)
Air-port planning and Design – Khanna and Arora (Khanna Publishers, Delhi)
Highway Engineering – Rangawala S.C. (Charotar Publishers)
Specifications for Road and Bridge Works – MOST (IRC Publishers)
Unit 1 BASIC CONCEPTS OF C++ PROGRAMMING LANGUAGE
Constants and variables, arithmetic operators, integer mode and real mode operations, arithmetic expressions, assignment statements, logical operations, input/output statements, loop statements, break and continue statements, go to statement, nesting of loops, file handling. Simple Civil engineering applications.

Unit 2 FUNCTIONS
Necessity of functions, defining functions, calling functions, passing values between functions. Simple Civil engineering applications.
Arrays
Array initialization, inputting & outputting arrays, passing arrays to functions.

Introduction to structures and classes. Programming of matrix operations, programming of matrix inversion. Simple Civil engineering applications.

Unit 3 GRAPHICS PROGRAMMING AND ITS APPLICATION IN CIVIL ENGINEERING.

Unit 4 Solution of simultaneous linear algebric equations by Gauss elimination and Gauss Jordan methods. Curve Fitting and Correlation Index. C++ programs for above.


Name of Text Books:
Let Us C++ – Yeshwant Kanitkar (BPB Publications)
Numerical Methods in Engineering and Science – Dr. B.S. Grewal (Khanna Publishers)

Name of Reference Books:
Problem Solving with C++ – Savitch (Addison Wesley Publications)
Programming in C and PC Applications – Raj Gopalan (Vikas Publishers)
Computer Graphics (C-Version) – Hearnt & Beaker (Pearson Publications)
Numerical Methods for Engineering – Chopra and Kanale (Tata McGraw Hill)
Unit 1 Introduction
Definition and scope, Hydrology in relation to water resources development, Hydrologic Cycle, The necessity for hydrologic data, the global water budget, Practical applications.

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

Unit 2 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, Probable maximum precipitation (PMP).

Unit 3 Infiltration and Run off

Unit 4 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, Unit hydrograph from the complex storms-hydrograph, applications of Unit hydrograph.

Unit 5 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, ground water exploration, Safe yield, Pumping test and recuperation test.

Name of Text Books:
Engineering Hydrology – K. Subramanya (Tata McGraw Hill)
A Text Book of Hydrology – Dr. P. Jaya Rami Reddy (Laxmi Publications)

Name of Reference Books:
Hydrology Principles and Analysis – H.M. Raghunath (New Age International Publication)
Applied Hydrology – Ven Te Chow, David R. Maidment, Larry W. Mays (McGraw Hill)
Hydrology for Engineers and Planners – Cassidy W.C. (Iowa State University Press)
Experiments to be performed (Min 10 experiments)

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. To obtain the horizontal deflection and deformed shape of portal frames with different end conditions.
5. To determine the strain in an externally loaded beam with the help of digital strain indicator.
6. Analysis of determinate beams on a Standard Structural Analysis Package such as SAP2000.
7. Analysis of indeterminate beams on a Standard Structural Analysis Package such as SAP2000.
8. Analysis of determinate pin-jointed frames on a Standard Structural Analysis Package such as SAP2000.
9. Analysis of indeterminate pin-jointed frames on latest version of a Standard Structural Analysis Package such as SAP2000.
10. Analysis of determinate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
11. Analysis of indeterminate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
12. To draw influence lines for determinate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
13. To draw influence lines for indeterminate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
14. Introduction to the latest version of a Standard Finite Element Analysis Package such as ANSYS.
15. Analysis of a plate with a hole on the latest version of a Standard Finite Element Analysis Package such as ANSYS.

List of Equipments / Machine Required:
- Elastic properties of beam apparatus
- Maxwell's law of reciprocal deflection apparatus
- Universal frame with variety of curved bars
- Universal frame with variety of portal frames
- Digital Strain Indicator
- Dial gauges for measuring deflections
- Weights and hangers to apply loads
- Latest Release of Software Package SAP2000 (Computers & Structures Inc., USA)
- Latest Release of Software Package ANSYS (ANSYS Inc., USA)

Recommended Books:
- Reference Manual of Respective Software
- Verification Manual of Respective Software
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: 5th  Branch: Civil Engineering
Subject: Geotech Engineering - I Lab  Practical Code: 320522 (20)
Total Practical Periods: 40  Total Marks in End Semester Exam: 40

Experiments to be performed (Min 10 experiments)
1. To determine the mass density of soil by core cutter method.
2. To determine the specific gravity of soil sample by pycnometer method.
3. To determine the water content of soil (%) by oven dry method.
4. To determine in situ dry density of soil by sand replacement method.
5. To determine the particle size distribution of a soil by dry mechanical analysis (sieve analysis).
6. To determine the liquid limit of a soil sample.
7. To determine the plastic limit of a soil sample.
8. To determine the shrinkage limit of soil sample.
9. Study of permeability by falling head and constant head methods.
10. To determine the grain size distribution by wet mechanical analysis (Hydrometer apparatus).
11. To determine the liquid limit of soil sample by static cone penetrometer method.
13. Study of various field control test method.
14. Study of Skempton’s pore pressure parameters.
15. Determination of density for contaminated soil.

List of Equipments / Machine Required:
- Core Cutter Mould
- Pycnometer of capacity 500 ml and 1000 ml
- Small and Big Soil Container
- Hydrometer Apparatus
- Oven
- Liquid Limit Apparatus
- Shrinkage Limit Apparatus
- Constant Head Permeability Test Apparatus
- Following Head Permeability Test Apparatus
- Mechanical Sieve Analysis (Complete Sets of Sieves)
- Static Cone Penetrometer Test Apparatus
- Skempton’s Core Pressure Apparatus
- Soil Sampling Tube, Piston Tube
- Rammer for Compaction
- Soil Extractor
- Measuring Jar Cylinder (1000 CC)

Name of Text Books:
- Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
- Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)
Experiments to be performed (min 10 experiments)

1. Determination of crushing value of aggregates.
2. To determine 10 percent finer value.
7. Determination of Softening Point of Bitumen.
10. Determination of Elongation Index of Aggregate.
11. Determination of Flakiness Index of aggregate.
13. Flash and Fire Point Test.
15. Study of Benkelman Beam.

List of Equipments / Machine Required:

- Ring and Ball Apparatus
- Standard Penetrometer
- Los Angles 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 Fine Point Apparatus
- Benkelman Beam
- Hot Air Oven
- Water Bath
- Marshall Stability Machine and with Mould
- Proving Ring and Dial Gauge
- Weighing Balance up to 10 kg capacity

Name of Text Books:

- Highway Engineering – Justo & Khanna (Khanna Publishers)
Experiments to be performed (Min 10 experiments)

1. A C++ program for determination standard deviation of any number of observations.
2. A C++ program for determination of correlation index.
3. A C++ program to perform regression analysis.
4. A C++ program to add any desired number of matrices.
5. A C++ program to multiply any desired number of matrices.
6. A C++ program to determine the inverse of a matrix.
12. A C++ program for the computation of area of any section by trapezoidal rule.
13. A C++ program for the computation of area of any section by Simpson's rule.
14. Graphics programming for the generation of line of different styles.
15. Graphics programming for the generation of a rectangle, circle, ellipse of given dimensions.

List of Equipments / Machine Required:

- PC system.
- Turbo C++ compiler.

Recommended Books:

- Let us C++ – Yeshwant Kanitkar (BPB Publications)
- Problem Solving with C++ – Savitch (Addison Wesley Publication)
Objective: The course is introduced to develop one's outer and inner personality tremendously and enrich the abilities to enable one to meet the challenges associated with different job levels. Personality Development is essential for overall development of an individual apart from gaining technical knowledge in the subject.

Unit – I
Personality concepts:
- What is Personality – its physical and psychic aspects. How to develop a positive self-image. How to aim at Excellence. How to apply the cosmic laws that govern life and personality.
- How to improve Memory. How to develop successful learning skills. How to develop and effectively use one’s creative power.
- How to apply the individual MOTIVATORS that make you a self-power personality.

Unit – II
INTERPERSONAL SKILLS:
- Leadership: Leaders who make a difference, Leadership: your idea, What do we know about leadership? If you are serious about Excellence. Concepts of leadership, Two important keys to effective leadership, Principles of leadership, Factors of leadership, Attributes.
- Listening: Listening skills, How to listen, Saying a lot- just by listening, The words and the music, How to talk to a disturbed person, Listening and sometimes challenging.
- How to win friends and influence people, How to get along with others. How to develop art of convincing others. How can one make the difference. How to deal with others particularly elders. Conflicts and cooperation.

Unit – III
Attitudinal Changes:
- Meaning of attitude, benefits of positive attitudes, how to develop the habit of positive thinking.
- Negative attitude and wining: What is FEAR and how to win it. How to win loneliness. How to win over FAILURE. How to win over PAIN. How to win over one's ANGER and others anger. How to overcome CRITICISM. What is stress and how to cope up with it? What is crisis and how to manage it.
- How to apply the character MOTIVATORS that elevate you and your personality to the top, the art of self motivation.
- How to acquire mental well-being.
- How to acquire physical well-being.
- How to formulate effective success philosophy.

Unit –IV
DECISION MAKING:
How to make your own LUCK. How to plan goals/objectives and action plan to achieve them. How to make RIGHT DECISION and overcome problems. How to make a Decision. Decision making : A question of style. Which style, when? People decisions : The key decisions. What do we know about group decision making ? General aids towards improving group decision making. More tips for decisions of importance.

Unit – V
Communication Skills:
- Public Speaking: Importance of Public speaking for professionals. The art of Speaking - Forget the fear of presentation, Symptoms of stage fear, Main reason for speech failure, Stop failures by acquiring Information; Preparation & designing of speech, Skills to impress in public speaking & Conversation, Use of presentation aids & media.
- Study & Examination: How to tackle examination, How to develop successful study skills.
- Group discussions: Purpose of GD, What factors contribute to group worthiness, Roles to be played in GD.

Reference Books:
4. The powerful Personality by Dr Ujjawal Patni & Dr Pratap Deshmukh, Medident Publisher, 2006.