

MATS School of Engineering & Technology

MATS University

Raipur



Syllabus Scheme
(5th Semester)
For
Bachelor of Engineering
In
CIVIL Engineering

**Subject Code For
MATS School of Engineering & Tech. Deptt.**

5th Semester (Civil)

S.No.	Subject Code	Subject Name
1	BE540	Structural Analysis II
2	BE541	Structural Engineering Design-I
3	BE542	Geo-tech Engineering-I
4	BE543	Transport Engineering-I
5	BE544	Engineering Hydrology
6	BE545	Elements of Management
7	BE546	Structural Analysis II Lab
8	BE547	Geo-tech Eng-I Lab
9	BE548	Transport Engg Lab-I
10	BE549	Practical Training Evaluation



**MATS School of Engineering &
Technology**
MATS University, Raipur
Scheme of Teaching & Examination
Vth Semester
Civil Engineering



S. No.	Course code	SUBJECT	Periods per week		Evaluation Scheme		Total Marks
			L	P	IM	ESE	
THEORY							
1	BE540	Structural Analysis I	5	0	30	70	100
2	BE541	Structural Engineering Design-I	5	0	30	70	100
3	BE542	Geo-tech Engineering-I	5	0	30	70	100
4	BE543	Transport Engineering-I	5	0	30	70	100
5	BE544	Engineering Hydrology	5	0	30	70	100
6	BE545	Elements of Management	5	0	30	70	100
PRACTICAL							
7	BE546	Structural Analysis II Lab	0	3	20	30	50
8	BE547	Geo-tech Engg Lab	0	3	20	30	50
9	BE548	Transport Engg Lab	0	3	20	30	50
10	BE549	Practical Training Evaluation	0	0	20	30	50

L-Lecturer, P-Practical, ESE- End Semester Examination, IM-Internal Marks

MATS UNIVERSITY
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Semester: B.E.5th Sem

Subject:-Structural Analysis II

Total Theory Periods: - **40**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch:- Civil Engineering

Code:-BE540

Total Tutorial Periods: **10**

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

Slope deflection method, Application to indeterminate beams and rigid frames without sway & with sway problem. Basics of Column analogy method.

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:

Intermediate Structural Analysis – Wang. C.K. (McGraw Hill Book Company, 1983)

Matrix analysis of Framed Structures – Weaver, W. & Gere J.M. (CBS Publishers and Distribution, Delhi 1990)

Fundamentals of Structural Analysis – Lect & Vari (Tata McGraw Hill)

Structural Analysis – Pandit & Gupta (Tata McGraw Hill)

Theory of Structure – Ramamurtham S. (Dhanpat Rai Publication)

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Semester: B.E.5th Sem

Branch: - Civil Engineering

Subject:- Structural Engineering Design-I Code:-BE541

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

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.

Working stress, ultimate strength and limit states of design. Serviceability

Conditions- Limit states of deflection and cracking, calculation of deflections.

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.

Units 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

Reinforced Concrete Structures – Dayaratam P. (Oxford and IBH Publishing Co. 1986)

Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand & Bros. Roorkee,1993)

Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi)

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Semester: B.E.5th Sem

Subject:- Geo-tech Engineering-I

Total Theory Periods: - **40**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch:- Civil Engineering

Code:-BE542

Total Tutorial Periods: **10**

Unit 1 INTRODUCTION

Introduction to Geotechnical Engineering; Unique nature of soil; Soil formation and soil types, inter relationship 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, flowness 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 characterization.

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)

Basic and Applied Soil Mechanics – Gopal Ranjan & Rao A.S.R. (New Age International, New Delhi, 1998)

Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi)

Geotechnical Engineering Principles and Practice – Donald P. Coduto (Prentice Hall of India, New Delhi)

Soil Mechanics and Foundation Engineering – Garg S.K. (Khanna Publishers)

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Semester: B.E.5th Sem

Branch: - Civil Engineering

Subject:-Transportation Engineering-I

Code:-BE543

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Unit 1 PRINCIPAL OF HIGHWAY PLANNING

Road development and planning in India Highway alignment, requirements. Engineering Surveys for highway location Maps and Drawing. Geometric Design: Cross Section elements of horizontal and vertical Alignment. Highway drainage, Surface and subsoil drainage.

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, Westergoard 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

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, runway configuration taxiways layout geometric, Standards, exit taxiways fillets separation.

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)

Manual for Survey, Investigation and Preparation of Road Projects – IRC Publication 2001.

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Semester: B.E.5th Sem

Branch:- Civil Engineering

Subject:-Engineering Hydrology

Code:-BE544

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

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

Introduction, factors affecting in filtration, 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.

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)

Applied Hydrology – Linsely R.K. Kohler, M.A. and J.L.H. Paulhus (McGraw
Hill)

Hydrology for Engineers and Planners – Cassidy W.C. (Iowa State University
Press)

**MATS UNIVERSITY
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Semester: B.E.5th Sem

Branch:- Civil Engineering

Subject:- Elements of Management

Code:-BE545

Total Theory Periods: - **40**

Total Tutorial Periods: **10**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

UNIT - I

Definition of Management, Nature and Basics concepts of Management, Management and Administration, Functions of Manager in Information age, Science, Theory and practice of Management, Managerial objectives and role, Business environment, Social attitudes beliefs and values, Social responsibilities of business.

UNIT – II

Function of management, planning, nature and important, Organizing and process of organizing, Staffing, Directing, Controlling and process of controlling, Decision making.

UNIT – III

Motivation – Meaning, Need for motivation, Theories of motivation.
Leadership – Meaning and styles, Group and team working.
Human resource management.

UNIT – IV

Marketing function –Market and marketing environment, Consumer/buyer behavior, Marketing mix, Advertisement and sales promotion. Financial management, Introduction to book keeping and financial statements, Break even analysis.

UNIT – V

Concept of disaster management, Types of disasters, Overview of Disaster situations in India, Tsunami, Land slide, Earthquake and its impact. Role of remote sensing, science & technology. Prevention and mitigation, Preparedness and response, Institutional framework

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Semester: B.E.5th Sem

Branch:- Civil Engineering

Subject:- Structural Analysis-II Lab Code:-BE546

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

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

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Semester: B.E.5th Sem

Branch:- Civil Engineering

Subject:-Geotech Engineering- I Lab Code:-BE547

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.
12. Study of cyclic plate load test.
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)

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Semester: B.E.5th Sem

Branch: - Civil Engineering

Subject:-Transportation Engineering-I Lab Code:-BE548

Total Practical Periods: 40

Experiments to be performed (min 10 experiments)

1. Determination of crushing value of aggregates.
2. To determine 10 percent finer value.
3. Determination of abrasion value by Los Angle's Machine.
4. Determination of abrasion value by Deval's Abrasion Machine.
5. Determination of Impact Value of aggregates.
6. Determination of Specific Gravity and Water Absorption of aggregate.
7. Determination of Softening Point of Bitumen.
8. Determination of Ductility Value of Bitumen.
9. Determination of Viscosity Value of Bitumen.
10. Determination of Elongation Index of Aggregate.
11. Determination of Flakiness Index of aggregate.
12. Determination of Penetration Value of Bitumen.
13. Flash and Fire Point Test.
14. Study of Marshal Stability 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)

Highway Engineering Manual – Justo & Khanna (Khanna Publishers)