

Courses offered for Minor in Civil Engineering

Semester	Course
V	1. Construction Materials and Building Design
VI	2. Fundamentals of Geomechanics
VII	3. Structural Analysis
VIII	4. Basics of Transportation Engineering

(Minor-1) Construction Materials and Building Design

Teaching Scheme

Lectures : 3 hrs / week

Examination Scheme

Internal Test 1: 20 marks

Internal Test 2: 20 marks

End Sem. Exam: 60 marks

Course Outcomes: Students will be able to

- A. identify different building materials.
- B. demonstrate properties of different material.
- C. apply various principles of building planning.

Unit I

(6 hrs)

Building materials

A) Stones :Stones Requirements of good building stones, IS specification and tests on stones ; stone masonry

B) Brick and block masonry:Characteristics of good building bricks, IS specifications and test; Classification of bricks

Unit II Materials for Doors and windows

(6hrs)

Functional requirements, materials of doors and windows, glazing, method of fixing doors and windows, fixtures and fastenings.

Timber Types and properties, seasoning, testing; Glass – Types and properties;

Unit III

(7 hrs)

Flooring and Roof material,

(A) Flooring materials , tests and IS specifications:

Ground and upper floors; Flooring functional requirements of flooring material, varieties of floor finishes and their suitability.

(B) Roofing materials:

GI, AC, fibre sheets, Mangalore tiles; Roof construction – types and their suitability.

Unit IV

(6 Hrs)

Miscellaneous materials

Properties, types and uses of following materials, Lime, Ferrous metals, Polymers, Plastics types, Mastic, Gypsum, Ferro Crete, Clay Tiles and glazed ware, Plaster of Paris. Artificial stone; Aluminium and alloys– Properties.

Unit V

(8Hrs)

Building planning

Principle of Building planning, Integrated approach in Built Environment, Building Rules and Byelaws, Necessity of laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line control line, height regulation, Built-up area, floor area, carpet area, Landscape elements and elements of interior decoration.

Unit VI

(7hrs)

Building Design

Introduction, Types of load, thermal insulation of roofs and walls. Ventilation: Necessity of ventilation, stack effect, wind effect, Mechanical ventilation, objectives, selection of ventilation system, ventilation rate,

Lighting: Principles, Day lighting, design of windows, sky component, E.R.C, Orientation, artificial illumination, supplementary illumination

Text Books:

- Shah M.G., Kale C.M. and Patki S.Y., "Building drawing an Integrated approach to Built environment", Tata McGraw Hill (Fifth edition).
- Mentt, "Building Design and Constructions", Tata McGraw Hill (Second edition)

Reference Books:

- National Building Code of India 2016, Bureau of Indian Standard, New Delhi
- Ghosh, "Materials of Construction" Tata McGraw Hill
- M. S. Mamlouk and J. P. Zaniwski, Materials for Civil and Construction Engineers, 3rd Ed., Prentice Hall, USA, 2010.
- P. C. Varghese, Building Materials, PHI Learning Pvt. Ltd., India, 2005.
- TTTI Chandigrah, "Civil Engineering Materials", Tata McGraw Publication

(Minor-2) Fundamentals of Geomechanics

Teaching Scheme

Lectures : 3 hrs / week

Examination Scheme

Internal Test 1: 20 marks

Internal Test 2: 20 marks

End Sem. Exam: 60 marks

Course Outcomes: Students will be able to

- A. identify type of soil.
- B. understand and apply basic soil mechanics principle to identify various properties of soil.
- C. suggest suitable compaction method.
- D. identify lateral force and slope stability problems.

Unit 1

(7hrs)

Properties of Soil:

Introduction to Soil Mechanics, major soil deposits of India such as marine deposits, black cotton soils, lateritic soils, alluvial deposits and desert soils. Three phase soil system, weight volume relationships, index properties of soil - methods of determination and its significance, I.S. classification of soil.

Unit 2

(7 hrs)

Permeability and Seepage: Darcy's law. Factors affecting permeability. Determination of permeability by constant head and falling head method as per IS - 2720, field permeability tests.

Unit 3

(7 hrs)

Compaction:

Soil compaction phenomenon. Factors affecting compaction. Dry density and moisture content relationship. Zero air voids line. Effect of compaction on soil structure. Standard Proctor test and Modified Proctor test as per IS - 2720. Field compaction.

Unit 4

(7 hrs)

Shear Strength of Soil :

Mohr circle of stress, Mohr-coulomb failure criteria, pore pressure, total and effective stress. Factors affecting shear strength. Laboratory measurement of shear strength by direct, unconfined test, triaxial tests and Vane shear test.

Unit 5

(7 hrs.)

Stress Distribution in Soils:

Boussinesq theory- point load, pressure distribution due to line load, strip load, pressure bulb, approximate stress distribution method.

Unit 6

(7 hrs)

a) Lateral Earth Pressure:

Earth pressure on vertical wall, effect of wall movement on earth pressure, earth pressure at rest, Rankine's theory, lateral earth pressure due to submerged backfill, backfill with uniform surcharge.

b) Stability of Slopes:

Slope failure, Infinite slope in cohesive and cohesionless soil, slope stability analysis using Swedish Slip Circle Method.

Text Books

- Gopal Ranjan and A S Rao, "Basic and Applied Soil Mechanics", G. K. Publications Pvt. Ltd
- V. N. S. Murthy, "Soil Mechanics and Foundation Engineering", B.S.Publications (3rd Edition)
- B. C. Punmia, "Soil Mechanics and Foundation Engineering", Laxmi Publishing Co., New Delhi.
- Dr. B. J. Kasmalkar, "Geotechnical Engineering", Pune Vidyarthi Griha Prakashan, 1986