Devi Ahilya Vishwavidhyalaya, Indore, India **Institute of Engineering & Technology**					**II Year B.Tech.** **(Civil Engineering)**	
Course Code & Name	**Instructions Hours per Semester and Credits**					
4RVPC1 **Engineering Geology**	**Classroom Instruction (CI)**		**Lab Instruction (LI)**	**Term Work (TW) and Self Learning (SL)**	**Total no. of Hours Per semester**	**Total Credits (Total Hours/ 30)**
	L	**T**	**P**	**TW+SL**	**90**	**3**
	20	**10**	**0**	**60**		

Course Learning Objectives:

1. To understand about Soil formation, soil profile, geological classification of soil and concept of plate tectonics.
2. To know about physical properties for identification of common rock forming minerals
3. To know about Classification and detailed studies of geological structures
4. To understand the Engineering properties of rocks for suitability for structures
5. To understand about Hydrology

Prerequisites: Basic knowledge of earth science

COURSE CONTENTS

UNIT-I

Introduction: Objects and scope of engineering geology. The origin, age and internal structure of the earth. Volcanoes, earthquakes, continental drift and isostasy, weatherting, denudation and deposition, wind, river, glacial and marine erosion.
Soil formation, soil profile, geological classification of soil and concept of plate tectonics.

UNIT-2

SECTION A:- mineralogy and crystallography:
Fundaments of mineralogy, study of common rock forming minerals, their origin, occurrence and physical properties for identification. Elements of crystallography and introduction to crystal systems.

SECTION B:-Petrology:
Composition of earth crust. Igneous sedimentary and metamorphic rocks and their mode of occurrence, structure and texture, characteristics, classification of rocks and their importance in civil engineering.

SECTION C :- Stratography and Indian geology:
General principles of stratigraphy, geological time scale, division of India in three units. Study of important Geological formation of the peninsular India. Archeans, Dharwars, Cuddapah, Vindhyan, Gondwana systems, Deccan traps.

UNIT-3

SECTION A: - Rock mechanics
Rock classification, engineering classification of intact rocks, rock quality designation, mechanical properties of rocks, tensile, compressive, shear strength, hardness, brittle failure of

rock, stress deformation characteristics of rock masses, deformation modulas and elastic constants laboratory tests on rock spacing, point load index text, high pressure permeability test, triaxial test, brazillian test, instu test on rocks.

SECTION B: -Structural geology:
Structures related to rocks. Dip, strike and out crops. Classification and detailed studies of geological structures i.e., Folds, fault, joints unconformity and their importance in civil engineering.

UNIT-4
Applied geology: -
Engineering properties of rocks and their relation to rock mass deformation. Physical characters of building stones and road metals.
Influence of geological conditions of foundation and designs of buildings, stability of hill slopes and transportation routes. Geology of reservoir and dam sites, it's location, strength, stability and water tightness of foundation rocks, their depth, physical characters and effects of structural features.
Tunnels-Effect of the structure of rocks competency of rocks, suitable location of a tunnels, problem of ground water seepage.

UNIT-5
Hydrology: - hydrological cycle, ground water in hydrological cycle. Origin of ground water and springs. Geological structures favouring ground water occurrence. Classification of aquifers, ground water provinces of India- their acquifers characteristics. Ground water occurrence and flow in Igneous, sedimentary and metamorphic rocks. Geophysical prospecting and water logging.

Course Outcomes:

CO. No.	CO	PO
CO1	Apply the basic concepts of geological processes and their importance in civil Engineering	PO-1, PO-2
CO2	Identify rocks and minerals on the basis of their characteristics	PO-1, PO-2
CO3	Examine engineering and construction problems associated with earth processes.	PO-1, PO-2, PO-4
CO4	Develop geophysical investigations.	PO-3
CO5	Apply geological principles for selecting sites for dams, reservoirs and tunnels	PO-1, PO-2, PO-4,

BOOKS RECOMMENDED:
1. Subinoy Gangopadhyay, Engineering geology: Oxford university press.
2. Mukerjee P.K.A, Textbook of Geology, World Press Pvt. Ltd., Calcutta.
3. Legget R.F., Geology and Engineering, Mcgraw Hill.
4. Krgnine D.P. and Judd W.R., Principles of Engineering Geology, Mchgraw Hill

CO-PO-PSO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO 1	PSO 2	PSO 3
4RVPC1.CO1	2	3										3	3	2
4RVPC1.CO2	2	3										3	3	2
4RVPC1.CO3	2	3		3								3	2	2
4RVPC1.CO4			3									3	3	1
4RVPC1.CO5	3	3	3									3	2	1

List of Practical Assignment:

1. **Identification of Rock-Forming Minerals:** Study of physical properties (hardness, cleavage, luster, streak, color) of common minerals like quartz, feldspar, mica, calcite, hornblende, etc.
2. **Identification of Important Ores:** Recognition of ores such as hematite, magnetite, bauxite, galena, chalcopyrite, and their engineering relevance.
3. **Identification and Classification of Rocks:** Igneous, sedimentary, and metamorphic rocks based on texture, structure, and composition.
4. **Crystallography Exercise:** Study of crystal systems (cubic, tetragonal, hexagonal, orthorhombic, monoclinic, triclinic) using models and specimens.
5. **Geological Map Exercises:** Interpretation of contour maps, strike and dip measurement, preparation of cross-sections.
6. **Stratigraphy Study:** Preparation of geological time scale chart and identification of major Indian geological formations (Archeans, Gondwana, Deccan Traps).
7. **Rock Mechanics Laboratory Tests:** Point load test, Brazilian test, triaxial test (demonstration/experiment depending on lab facility).
8. **Structural Geology Exercise:** Identification and sketching of folds, faults, joints, and unconformities from given diagrams and field samples.
9. **Applied Geology Field Visit:** Geological excursion to study rock outcrops, soil profiles, or engineering sites (dam, tunnel, quarry, or hill slope). Submission of field report.
10. **Hydrology & Groundwater Exercise:** Preparation of hydrological cycle chart, identification of aquifer types, and study of groundwater occurrence in different rock types.