



K.S. SCHOOL OF ENGINEERING AND MANAGEMENT,
BANGALORE-560109
DEPARTMENT OF CIVIL ENGINEERING
CO-PO Mapping

Course: Engineering Geology			
Type: Core		Course Code: 18CV36	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities/Tutorials	Total/Week	Total teaching hours
3	0	3	40
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	3
Aim/Objectives of the Course			
<ol style="list-style-type: none"> 1. To understand the importance of earth's interior and application of Geology in civil engineering and able to highlight the industrial applications of minerals. 2. To create awareness among Civil engineers regarding the use of rocks as building materials. 3. To provide knowledge on dynamic Geology and its importance in modifying the physical character of rocks which cause rocks suitable or unsuitable in different civil engineering projects such as Dams, bridges, tunnels and highways. 4. To educate the ground water management regarding diversified geological formations, climatologically dissimilarity which are prevailed in the country and to highlight the concept of rain water harvesting. 5. To understand the application of Remote Sensing and GIS, Natural disaster and management and environmental awareness. 			
Course Learning Outcomes			
After completing the course, the students will be able to			
CO1	Explain the internal structure of the earth and physical properties of the minerals.	Understanding (K2)	
CO2	Explain the properties of rocks, their classification, uses, weathering processes and different types of land forms.	Understanding (K2)	
CO3	Write a note on different geological structures and their effects in civil engineering projects.	Understanding (K2)	
CO4	Explain the electrical resistivity and seismic methods for ground water exploration.	Understanding (K2)	
CO5	Explain the earthquakes, seismic waves, volcanic activities, remote sensing, GIS processes and natural disasters and their mitigation.	Understanding (K2)	

Syllabus Content

<p>Module 1: Introduction: Application of earth science in civil engineering practices, Understanding the earth, internal structure and composition. Mineralogy: Mineral properties, composition and uses, Use in the manufacture of construction materials – Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile); Asbestos (AC sheets); Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals – Iron ores (Steel); Chromite (Alloy); Bauxite (aluminium); Chalcopyrite (copper). LO: At the end of this session the student will be able to</p> <ol style="list-style-type: none"> 1. Define Engineering geology and explain the applications of geology in civil engineering. 2. Explain the internal structure of the earth. 3. Define minerals and explain the properties of minerals, their classifications and engineering uses. 	<p>CO1</p> <p>8 hrs</p> <p>PO1-3 PO6-2 PO7-1 PO12 -1 PSO1-3 PSO2-1</p>
<p>Module 2: Petrology and Geomorphology: Formation, Classification and Engineering Properties of: Igneous rocks-Types of Granite, Dolerite, Basalt, Pumice, Granite Porphyry. Sedimentary Rocks- Sandstone, Limestone, Shale, Late rite, Conglomerate. Metamorphic Rocks- Gneiss, Slate, Muscovite & Biotite schist, Marble, Quartzite. Rock weathering: types and their effects on Civil Engineering Projects. Landforms, Drainage pattern and types. Soil formation and soil profile. The apprehension of Index properties of rocks: Porosity, Density, Permeability, and Durability. Selection of rocks as materials for construction, as a foundation, Decorative, Flooring, and Roofing, Concrete Aggregate, Road Metal, Railway Ballast with examples. LO: At the end of this session the student will be able to</p> <ol style="list-style-type: none"> 1. Define and identify the rocks based on their properties and their engineering uses. 2. Explain the rock weathering, land forms and soil formation 3. Write a note on the rocks as materials for construction as a foundation, Decorative, Flooring, and Roofing, Concrete Aggregate, Road Metal and Railway Ballast. 	<p>CO2</p> <p>8 hrs.</p> <p>PO1-3 PO6-2 PO7-1 PO12 -1 PSO1-3 PSO2-1</p>
<p>Module 3: Structural Geology & Rock Mechanics Structural aspects of rocks like Outcrop, Dip and strike, Folds, Faults, Joints, Unconformities and their influence on Engineering Projects/structures like dam, tunnels, slope treatment; ground improvement, recognition of the structures in field and their types/classification. Rock Quality Determination (RQD) & Rock Structure Rating (RSR). Geological site characterization: Dam foundations and rock Foundation treatment for dams and Reservoirs</p>	<p>CO3</p> <p>8 hrs.</p> <p>PO1-3 PO5-2 PO6-2</p>

<p>heavy structures by grouting and rock reinforcement. Tunnels: Basic terminology and application, site investigations, Coastlines and their engineering considerations.</p> <p>LO: At the end of this session the student will be able to</p> <ol style="list-style-type: none"> 1. Write a note on geological structures like outcrop, Dip and strike, folds, faults, Joints, Unconformities and their influence on engineering projects. 2. Explain the Rock Quality Determination (RQD) and Rock Structure Rating (RSR). 3. Explain the coastline and their engineering considerations. 	<p>PO7-1 PO12-1 PSO1-3 PSO2-1</p>
<p>Module 4: Hydrogeology: Hydrological cycle, Vertical distribution of groundwater, artesian groundwater in soil and rock. Water Bearing Formations, Aquifer and its types – Aquitard, Aquifuge, and Aquiclude. Porosity, Specific yield and retention, Permeability, Transmissibility and Storage Coefficient. Determination of Quality - SAR, RSC and TH of Groundwater. Groundwater Exploration- Electrical Resistivity and Seismic methods, Artificial Recharge of Groundwater, Rain water harvesting and methods, Seawater intrusion in coastal areas and remedies. Groundwater Pollution. Floods and its control, Cyclone and its effects.</p> <p>LO: At the end of this session the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the hydrological cycle and water bearing formations of rocks. 2. Explain the electrical resistivity and seismic methods to explore the ground water. 3. Explain the artificial recharge of ground water and rain water harvesting methods. 	<p>CO4 8 hrs PO1-3 PO5-2 PO6-2 PO7-1 PO12-1 PSO1-3 PSO2-1</p>
<p>Module 5: Seismology And Geodesy: Earthquakes- Causes and Effects, Seismic waves, engineering problems related to Earthquakes, Earthquake intensity, Richter scale, Seismograph, Seismic zones- World and India. Tsunami- causes and effects, Volcanic Eruptions. Landslides (Mass movements) causes, types and remedial measures –stability assessment for soil and rock slopes. Study of Topographic maps and Contour maps; Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS) and Global Positioning System (GPS) – Concept and their use resource mapping. Aerial Photography, LANDSAT Imagery – Definition and its use. Impact of Mining, Quarrying and Reservoirs on Environment. Natural</p>	<p>CO5 8 hrs PO1-3 PO5-1 PO6-2 PO7-2 PO12-1 PSO1-3 PSO2-2</p>

<p>Disasters and their mitigation.</p> <p>LO: At the end of this session the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the Earthquakes, seismic waves, engineering problems related to earthquakes 2. Explain the remote sensing, GIS, GPS and their applications. 3. Explain the impact of mining, quarrying and reservoirs on Environment. 	
<p>Text Books</p> <ol style="list-style-type: none"> 1. P.K. Mukerjee, “A Text Book of Geology”, World Press Pvt. Ltd. Kolkatta, 2015 2. Parbin Singh, “Engineering and General Geology”, S.K. Kataria & Sons, New Delhi, 2014 	
<p>Reference Books (specify minimum two foreign authors text books)</p> <ol style="list-style-type: none"> 1. Dimitri P Krynine and William R Judd, “Principles of Engineering Geology and Geotechnics”, CBS Publishers and Distributors, New Delhi, 2005 2. M P Billings, “Structural Geology”, CBS Publishers and Distributors, New Delhi, 2016 	
<p>Useful Websites</p> <ul style="list-style-type: none"> • W1 Nptel.ac.in • W2 www. ocw.mit.edu • W3 www.alljntuworld.in 	
<p>Useful Journals</p> <ul style="list-style-type: none"> • Journal of Earth science • Journal of Groundwater Hydrology • Journal of Geoscience 	
<p>Teaching and Learning Methods</p> <ol style="list-style-type: none"> 1. Lecture class: 40 hrs 2. Practical Classes: 3 hrs 	
<p>Assessment</p> <p>Type of test/examination: Written examination</p> <p>Continuous Internal Evaluation(CIE) : 40 marks (Average of three tests will be considered)</p> <p>Semester End Exam (SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.</p>	

Test duration: 1 :30 hrs

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge PO2: Problem Analysis PO3: Design & Development PO4: Investigations of Complex Problems PO5: Modern Tool Usage PO6: Engineer & Society	PO7: Environment and Society PO8: Ethics PO9: Individual & Team Work PO10: Communication PO11: Project Mngmt & Finance PO12: Life long Learning
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PSO1: The proficiency in mathematics, physical and management sciences helps to excel in the areas of planning, analysis related to Civil Engineering systems.

PSO4: Identify and recommend sustainable materials and technologies for alternate engineered building and Transportation Systems with services provided

CO	PO	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	PO 7	P O 8	P O 9	P O 10	P O 11	P O 12	PSO 1	PSO 4
18 CV 36	K- leve 1														
CO 1	K2	3	-	-	-	-	2	1	-	-	-	-	1	3	2
CO 2	K2	3	-	-	-	-	2	1	-	-	-	-	1	3	2
CO 3	K2	3	-	-	-	2	2	1	-	-	-	-	1	3	2
CO 4	K2	3	-	-	-	2	2	1	-	-	-	-	1	3	2
CO 5	K2	3	-	-	-	1	2	2	-	-	-	-	1	3	2

[Signature]
Course In charge

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Head Dept

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Principal