INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**ENGINEERING GEOLOGY**				
Course Code	ACEB05				
Programme	B. Tech				
Semester	IV	CE			
Course Type	Core				
Regulation	IARE-R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	5	-	3	3	2
Chief Coordinator	Mr K Tarun kumar, Assistant Professor				
Course Faculty	Mr K Tarun kumar, Assistant Professor Mr.H Apurva Rama, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Access engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides, soil-slope stability, settlement, and liquefaction.
II	Involves the collection, analysis, and interpretation of geological data and information required for the safe development of civil works.
III	Assessment and mitigation of geologic hazards such earthquakes, landslides, flooding; the assessment of timber harvesting impacts; and groundwater remediation and resource evaluation.

COURSE OUTCOMES (COs):

CO 1	Understand the role of geology in the design and construction process of underground openings in rock.
CO 2	Be able to apply geologic concepts and approaches on rock engineering projects.
CO 3	Be able to identify and classify rock using basic geologic classification systems.
CO 4	Be able to use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
CO5	Have knowledge of design and construction procedures required to safely control rock behavior in underground openings.

COURSE LEARNING OUTCOMES (CLOs):

ACEB05.01	Know the importance of geology in civil engineering.
ACEB05.02	Distinguish weathered rocks from fresh rocks.
ACEB05.03	Understand the effects of weathering on dams, reservoirs and tunnels.
ACEB05.04	Understand the case histories of failure of some Civil Engineering constructions due to geological draw backs. Identify the minerals based on their physical properties.
ACEB05.05	Identify and classify common minerals, rocks and soils, and understand their significance to different types of engineering projects.
ACEB05.06	Identify and classify rock using basic geologic classification systems
ACEB05.07	Study the minerals by their physical properties, chemical composition, optical properties and X- ray properties.
ACEB05.08	Study the rocks by their physical properties, chemical composition, optical properties and X-ray properties
ACEB05.09	Understand the geological classification of rocks into Igneous, Sedimentary and metamorphic rocks, their identification based on structure and texture.
ACEB05.10	Identify the major types of rock-forming minerals and rock under both field and laboratory conditions.
ACEB05.11	Understand the importance of various associated geological structures like folds, faults, joints and unconformities present at site for foundations.
ACEB05.12	Identify subsurface information and groundwater potential sites through geophysical investigations
ACEB05.13	Remember prediction of hazards and disasters.
ACEB05.14	Posses the Knowledge and Skills for employability and to succeed in national and international level competitive examinations.
ACEB05.15	Understand to select a suitable site for dams and reservoirs to avoid seepage, silting and tilting.
ACEB05.16	Understand internal geological processes (e.g. faults, earthquakes, volcanoes) and how they affect engineering studies.
ACEB05.17	Locate various subsurface mines and rock bodies by applying geophysical investigations.
ACEB05.18	Gravity methods, magnetic methods, Electrical methods, seismic methods, radio metric methods and geothermal methods
ACEB05.19	Understanding of impact of engineering solutions on the society and also will be aware of Contemporary issues.
ACEB05.20	Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.
ACEB05.21	Posses the Knowledge and Skills for employability and to succeed in national and international level competitive examinations.
ACEB05.22	Determination of shear strength of soil using direct shear test and tri-axial test in various drainage conditions.
ACEB05.23	Recognize the behavior of soil in normal, over and under consolidated soil. Understand the concept of dilatancy in sandy soil.

TUTORIAL QUESTION BANK

MODULE-I				
INTRODUCTION				
Part - A (Short Answer Questions)				
S No	**QUESTIONS**	**Blooms Taxonomy Level**	**Course Outcomes (COs)**	**Course Learning Outcome (CLOs)**
1	What is mean by engineering geology?	Remember	CO 1	ACEB05.01
2	Define branches of Geology.	Understand	CO 1	ACEB05.02
3	Name the different types of weathering.	Remember	CO 1	ACEB05.02
4	What is SEM and XRD.	Understand	CO 1	ACEB05.01
5	Define Mineralogy and its types.	Remember	CO 1	ACEB05.02
6	What is chemical weathering?	Understand	CO 1	ACEB05.01
7	What is scope of geological studies in various civil engineering projects	Remember	CO 1	ACEB05.01
8	Define Structural Geology.	Understand	CO 1	ACEB05.03
9	What is physical weathering?	Remember	CO 1	ACEB05.01
10	Write any two importance of geology in civil engineering	Remember	CO 1	ACEB05.03
11	Define Rock forming minerals.	Understand	CO 1	ACEB05.03
12	Give the example for main rock forming minerals?	Remember	CO 1	ACEB05.03
13	What is Stratigraphy?	Remember	CO 1	ACEB05.01
14	Define the Optical Mineralogy?	Remember	CO 1	ACEB05.04
15	List the various branches of geology.	Understand	CO 1	ACEB05.04
16	Define biological weathering.	Understand	CO 1	ACEB05.01
Part - B (Long Answer Questions)				
1	Describe the importance of Engineering Geology in Engineering.	Remember	CO 1	ACEB05.01
2	Discuss the various branches of Engineering Geology?	Understand	CO 1	ACEB05.02
3	Explain briefly few case studies of civil engineering failures due to Geological drawback.	Understand	CO 1	ACEB05.01
4	Write short notes on weathering.	Remember	CO 1	ACEB05.02
5	Give the importance of physical geology & structural geology.	Understand	CO 1	ACEB05.03
6.	What is meant by weathering of rocks? Explain in detail different Geological agents responsible for weathering of rocks.	Understand	CO 1	ACEB05.03
7.	Describe the chemical and biological weathering.	Remember	CO 1	ACEB05.01
8	Explain in detail the weathering due to air & water.	Remember	CO 1	ACEB05.02
9.	Discuss the physical weathering and frost weathering.	Remember	CO 1	ACEB05.01
10	"The knowledge of geology is very essential at planning stage, design stage and construction stage of any civil engineering project". Justify this statement with a reference to a dam site selection.	Remember	CO 1	ACEB05.02
11	Explain physical and chemical weathering process in detail. Add a note on weathering grade and its engineering significance.	Understand	CO 1	ACEB05.01
12	Give an account of geological work of wind explaining briefly some major geological features.	Understand	CO 1	ACEB05.03
13	Describe in detail about structural geology.	Remember	CO 1	ACEB05.03
14	Write in detail about the scope of geology and importance of geology in Civil engineering.	Understand	CO 1	ACEB05.03
15	Explain the process associated with river, wind and sea. Write the engineering significance.	Remember	C0 1	ACEB05.04
16	Write short notes on weathering of rocks and its significance in engineering point of view.	Understand	C0 1	ACEB05.04

MODULE- II				
PETROLOGY				
Part - A (Short Answer Questions)				
1	What is Petrology?	Remember	CO 2	ACEB05.05
2	Give the various types of structure in igneous rock?	Remember	CO 2	ACEB05.06
3	List the various physical properties of minerals.	Remember	CO 2	ACEB05.05
4	Write the difference between lustre and streak.	Understand	CO 2	ACEB05.06
5	Define Mohrs scale of hardness.	Remember	CO 2	ACEB05.06
6	What are the various fractures present in a mineral?	Remember	CO 2	ACEB05.05
7	Write any two structure of a mineral	Understand	CO 2	ACEB05.05
8	Define specific gravity of a mineral.	Understand	CO 2	ACEB05.07
9	What are the different types of clay minerals?	Remember	CO 2	ACEB05.07
10	List any four uses of clay minerals.	Remember	CO 2	ACEB05.08
11	Define Specific gravity of minerals.	Understand	CO 2	ACEB05.08
12	Write the physical properties of a mineral Quartz?.	Remember	CO 2	ACEB05.08
13	Give the various types of rocks?	Remember	CO 2	ACEB05.09
14	What is meant by Volcanic Rock?	Understand	CO 2	ACEB05.09
15	Define Igneous rock?	Remember	CO 2	ACEB05.08
16	List the various types of igneous rock?	Remember	CO 2	ACEB05.09
17	What do you understand by metamorphism?	Understand	CO 2	ACEB05.07
Part - B (Long Answer Questions)				
1	How can you identify a mineral by the help of their physical and chemical properties?	Remember	CO 2	ACEB05.05
2	Add notes on the following physical characteristics that are useful for the identification of rocks and minerals. (I) Colour (ii) Streak (iii) Hardness (iv) Form	Understand	CO 2	ACEB05.05
3	Give a detailed account on chemical composition, Physical properties, origin occurrence, engineering behaviour and uses of Clay minerals.	Remember	CO 2	ACEB05.05
4	Differentiate between: a. Quartzite and Marble b. Gneiss and Schist c. Gneiss and Slate	Remember	CO 2	ACEB05.06
5	Describe the different types of rocks. Give the classification, texture and structure of igneous, sedimentary and metamorphic rocks.	Understand	CO 2	ACEB05.06
6.	With the help of neat diagrammatic sketches, describe briefly on Primary Sedimentary Structures.	Remember	CO 2	ACEB05.06
7.	Differentiate between calcite and magnetite.	Remember	CO 2	ACEB05.07
8	Discuss about the various properties of quartz?	Understand	CO 2	ACEB05.07
9.	Explain the significance of different Physical properties in mineral identification.	Remember	CO 2	ACEB05.08
10	Discuss the physical properties of the following minerals. 1.Feldspar 2.Hornblende 3.Talc	Understand	CO 2	ACEB05.08
11	Define Mineral. How are the minerals classified?	Understand	CO 2	ACEB05.08
12	What are sedimentary rocks? Explain the properties of any 4 sedimentary rocks?	Remember	CO 2	ACEB05.08
13	Differentiate between Igneous, sedimentary and metamorphic rocks on the basics of structures and texture.	Understand	CO 2	ACEB05.08

14	Describe the engineering properties of igneous rocks.	Understand	CO 2	ACEB05.09
15	Explain the term Fracture and types of Fracture in detail.	Remember	CO 2	ACEB05.09
16	State the term Form and discuss the different types of Form in detail	Understand	CO 2	ACEB05.09
17	Illustrate the different methods of study of Minerals.	Understand	CO 2	ACEB05.09
18	Explain the physical properties of Feldspar group of Minerals.	Understand	CO 2	ACEB05.09
MODULE-III				
PHYSICAL GEOLOGY AND ROCK MECHANICS				
Part - A (Short Answer Questions)				
1	Define structural geology.	Understand	CO 3	ACEB05.10
2	What is Erosion?	Remember	CO 3	ACEB05.10
3	Define Denudation.	Remember	CO 3	ACEB05.10
4	Classify different types of folds.	Remember	CO 3	ACEB05.11
5	List out two causes of folding from civil engineering point of view.	Understand	CO 3	ACEB05.11
6	Define Folds	Remember	CO 3	ACEB05.11
7	What are the engineering considerations of a fold?	Remember	CO 3	ACEB05.12
8	Write about the origin of joints.	Understand	CO 3	ACEB05.11
9	State the Radial faults.	Remember	CO 3	ACEB05.12
10	Distinguish between heave and throw fault.	Remember	CO 3	ACEB05.11
11	Differentiate between foot wall and hanging wall.	Understand	CO3	ACEB05.11
11	Define Stress deformation of rocks.	Understand	CO 3	ACEB05.13
12	Write the difference between Solifluction deposits and Mudflows.	Remember	CO 3	ACEB05.13
13	Define Sub surface investigations in rocks and engineering characteristics or rocks masses	Remember	CO 3	ACEB05.14
14	Define water logging	Understand	CO 3	ACEB05.14
15	Draw and describe the parts of folds.	Understand	CO 3	ACEB05.14
16	List the types of folds.	Remember	CO 3	ACEB05.14
Part – B (Long Answer Questions)				
1.	Write about Geological controls on Groundwater Movement.	Remember	CO 3	ACEB05.10
2.	Explain briefly (Illustrate your answer with neat diagrammatic sketches) a. Fold b. Fault c. Joint.	Remember	CO 3	ACEB05.10
3.	What is a joint? Discuss the various types of faults and write about the engineering applications.	Remember	CO 3	ACEB05.11
4.	Write in detail about landslides and their causative effects and give the about the measures to prevent them.	Remember	CO 3	ACEB05.11
5.	Discuss thoroughly about the dip and strike.	Understand	CO 3	ACEB05.12
6.	Describe the Civil Engineering Considerations in Seismic Areas with reference to building Construction.	Understand	CO 3	ACEB05.13
7.	Write an essay on classification and causes of earthquakes?	Remember	CO 3	ACEB05.13
8.	What is a fault? Discuss the various types of faults and write about the engineering applications.	Remember	CO 3	ACEB05.12
9.	Discuss the various Groundwater movements.	Understand	CO 3	ACEB05.12
10.	Discuss thoroughly about the types of unconformity. Classify folds and faults and explain how they influence the design of dams.	Remember	CO 3	ACEB05.13
11.	What is a water table and what are the types of ground water which	Remember	CO 3	ACEB05.13

	occurs in the zone of aeration and saturation.			
12.	Discuss, in brief, the causes and effects of earthquakes. In the connection enumerate some of the major Indian earthquakes and comment on the possible mode of origin.	Understand	CO 3	ACEB05.14
13.	What are faults? Explain in detail with sketches on (i) Normal faults (ii) Reverse faults (iii) Strike slip fault (iv) Oblique fault.	Remember	CO 3	ACEB05.14
14.	Illustrate with neat sketches about landslides and their types. What are the various measures to control landslides?	Remember	CO 3	ACEB05.14
15.	Explain water table and types of ground water.	Remember	CO 3	ACEB05.13
16.	Classify different types of Aquifers and briefly explain.	Remember	CO 3	ACEB05.12
17.	Write a note on geological investigation of ground water.	Remember	CO 3	ACEB05.12
18.	What is cone of depression? Explain neatly with diagram.	Remember	CO 3	ACEB05.13
19.	Explain hydrological investigation of ground water.	Understand	CO 3	ACEB05.14
20.	What causes earthquakes?	Understand	CO 3	ACEB05.14
	MODULE-IV			
	GEOLOGICAL HAZARDS			
	Part – A (Short Answer Questions)			
1.	What is Rock Instability and Slope movement?	Remember	CO4	ACEB05.15
2.	Define concept of sliding blocks.	Remember	CO4	ACEB05.15
3.	Write about instability in vertical rock structures and measures to prevent collapse.	Remember	CO4	ACEB05.15
4.	Define factors controlling water bearing capacity of rock.	Remember	CO4	ACEB05.16
5.	Brief on the structure of dam with a neat sketch.	Understand	CO4	ACEB05.16
6.	Define the term Seismic sea waves.	Understand	CO4	ACEB05.16
7.	Give the application of Seismic Zone in India.	Remember	CO4	ACEB05.17
8.	Explain about Lowering of water table and Subsidence.	Remember	CO4	ACEB05.17
9.	What are the types of landslide, Prevention by surface drainage.	Understand	CO4	ACEB05.17
10.	List the different controlling factors of Landslides.	Understand	CO4	ACEB05.18
11.	What is Earthquake and Magnitude and intensity of earthquake.	Remember	CO4	ACEB05.18
12.	List out the factors contributing Pervious and impervious rocks .	Remember	CO4	ACEB05.18
13.	Write a case study on black clay.	Understand	CO4	ACEB05.18
	Part – B (Long Answer Questions)			
1.	What are the geological considerations necessary in the selection of a Dam Site?	Remember	CO4	ACEB05.15
2.	List the instruments used in Seismic Studies. Explain any one in detail	Remember	CO4	ACEB05.16
3.	Discuss in detail electrical method of investigation for ground water Exploration.	Remember	CO4	ACEB05.16
4.	Explain in detail about Profiling?	Remember	CO4	ACEB05.15
5.	What are dams and reservoirs? Explain the purpose of construction of major dams and reservoirs in India.	Understand	CO4	ACEB05.17
6.	Discuss in detail about Seismic method.	Understand	CO4	ACEB05.17
7.	Explain in detail about Magnetic method?	Remember	CO4	ACEB05.17
8.	Describe in detail the role of electrical methods of subsurface investigation in civil engineering practice.	Remember	CO4	ACEB05.18
9.	Explain different kinds of gravity methods that are followed during the Investigations.	Understand	CO4	ACEB05.18
10.	Discuss in detail electrical method of investigation for ground water	Remember	CO4	ACEB05.18

	Exploration.			
11.	Write about the various electrical conductivity and resistivity Methods.	Remember	CO4	ACEB05.16
12.	Describe the principle of gravity method with the help of a neat Sketch. What are the different parameters measured?	Remember	CO4	ACEB05.16
13.	Write the short note on the following Geophysical methods. (a) Seismic methods. (b) Geothermal methods.	Remember	CO4	ACEB05.16
14.	What is the design philosophy adopted for earthquake resistant structure?	Understand	CO4	ACEB05.17
15.	Compare Magnitude and Intensity of an earthquake.	Understand	CO4	ACEB05.17
16.	What are the causes of Earthquake?	Remember	CO4	ACEB05.18
17.	What are the types of Seismic waves and their magnitudes.	Remember	CO4	ACEB05.18
18.	What are the methods used to analyses earthquake resistant structures?	Understand	CO4	ACEB05.18
19.	Explain the important points in mitigating the effects of earthquake on structures.		CO4	ACEB05.18
	MODULE-V			
	GEOLOGY OF DAM AND RESERVOIR SITE			
	Part - A (Short Answer Questions)			
1.	Define failure of Reservoir.	Remember	C05	ACEB05.19
2.	Write a short note on structural failures of Dams.	Remember	C05	ACEB05.19
3.	What are the effects of tunnels?	Remember	C05	ACEB05.20
4.	List the different purposes of tunnels	Remember	C05	ACEB05.20
5.	Write a short note on Over break.	Understand	C05	ACEB05.20
6.	Give the required geological consideration for selecting dam and reservoir site.	Understand	C05	ACEB05.21
7.	Write the importance of ground water condition	Remember	C05	ACEB05.21
8.	What are the precautions to be taken to counteract unsuitable conditions at site.	Remember	C05	ACEB05.22
9.	Define diversion tunnels.	Understand	C05	ACEB05.21
10.	Differentiate between pressure tunnels and diversion tunnels.	Remember	C05	ACEB05.22
11.	What are public utility tunnels?	Remember	C05	ACEB05.23
12.	Define Pressure tunnels?	Understand	C05	ACEB05.23
13.	What is mine subsidence?	Understand	C05	ACEB05.22
14.	Define underground mining?	Remember	CO5	ACEB05.23
	Part - B (Long Answer Questions)			
1.	What is a tunnel? Explain the terms that are used in tunnels with neat Sketches. Also explain the purpose of tunnelling.	Remember	C05	ACEB05.19
2.	Explain the role of litho logy and geological structures in successful tunnelling?	Remember	C05	ACEB05.19
3.	Mention the deteriorating effects produced in the ground during the excavation of tunnels.	Remember	C05	ACEB05.19
4.	Write a short notes on a) effects of tunnelling on the ground and b) Over break	Understand	C05	ACEB05.20
5.	What is the role of Igneous and metamorphic rocks at the tunnel site?	Understand	C05	ACEB05.20
6.	Define the term tunnel and give purposes of tunnelling. Discuss in detail about the role of geological consideration for proper tunnelling.	Remember	C05	ACEB05.22
7.	What are the effects on Inclined beds of tilted Strata at the tunnel site?	Remember	C05	ACEB05.21
8.	Differentiate between tunnels and underground excavation. Discuss the purpose of tunnelling.	Remember	C05	ACEB05.21
9.	Illustrate the standard methods for the selection of suitable tunnel?	Remember	C05	ACEB05.22
10.	Explain the considerations of different types of rocks at the dam site Construction.	Understand	C05	ACEB05.22

11.	Discuss the influence of Geological Structures over Dams	Understand	C05	ACEB05.22
12.	Explain the geological factors influencing water tightness and life of reservoirs and write a short note on geological considerations in the Leakage of reservoirs.	Understand	C05	ACEB05.21
13.	Outline the geological causes for the failure of dams, with a few Case Histories.	Remember	C05	ACEB05.20
14.	Discuss the foundation and abutment competency of rocks with reference to dams.	Remember	C05	ACEB05.22
15.	What are the geological considerations necessary in the selection of Dam site?	Remember	C05	ACEB05.23

Prepared by:
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