

Dec-25-0225

CE-605 (Engineering Geology and Rock Mechanics)

B.Tech. 6th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Section E is compulsory and it contains 10 questions for each of 2 marks. Attempt four more questions selecting one question (along with sub-parts) each from Section A to D. Each section carries equal 10 marks.

**SECTION - A**

1. Analyze the impact of geological work by glaciers on the suitability of a site for constructing a large dam. What specific glacial features would you investigate? (10)
2. Compare and contrast the engineering applications of igneous, sedimentary, and metamorphic rocks in the construction of a highway. Discuss how the choice of rock type affects the design. (10)

**SECTION - B**

3. (a) Given a site with complex fold structures and fault zones, how would you approach the design of a tunnel through this region? Discuss the potential geological challenges. (5)  
(b) Briefly explain stratification, apparent dip, true dip, and strike. Why are these concepts important in civil engineering? (5)
4. (a) Evaluate how the presence of joints and faults in rock can influence the design and construction of a foundation for a high-rise building. (5)

- (b) What are the key geological factors to consider when planning the alignment of a tunnel, and how do they influence the tunnel's design and construction? (5)

**SECTION - C**

5. What are the various modes of failure of slopes in hard rocks? Discuss with neat and clean diagrams. (10)
6. How would the results from uniaxial compression and shear tests influence the design of a foundation for a reservoir? (10)

**SECTION - D**

7. (a) Identify and explain the factors that contribute to glacial erosion. (5)  
(b) Discuss the different types of faults and their impact on the stability and safety of dams and tunnels. (5)
8. (a) What are internal stresses within a rock mass? Describe an indirect method used to determine these stresses. (5)  
(b) List and describe the various types of grouting techniques. Which technique is most effective for stabilizing fractured rock masses with large voids? (5)

**SECTION - E (Compulsory)**

9. (a) What is the difference between physical and chemical weathering? Provide an example of each.  
(b) Describe two methods for identifying minerals in the field and explain how they help determine mineral properties.  
(c) How is the apparent dip different from the true dip in geological mapping? Why is this distinction important?

- (d) What are geological joints, and how do they affect the stability of rock masses in construction projects?
- (e) What is the Rock Mass Rating (RMR) system, and how is it used in tunnel design?
- (f) What information can be obtained from stress-strain curves of rocks, and why is it important in rock mechanics?
- (g) Explain how permeability testing is conducted on rock samples and its significance in civil engineering projects.
- (h) How does confining pressure influence the results of a uniaxial compression test on rock samples?
- (i) What geological factors should be considered when selecting a site for a reservoir, and why are they important?
- (j) Describe the role of geological investigations in the design of a highway. What aspects of geology are most critical to examine?  
(10×2=20)