UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec. 2022

Course: Rock Mechanics and Geotechnical Engineering   Semester: VII
Program: B. Tech. (GIE)   Time: 03 hrs.
Course Code: PEGS 3003   Max. Marks: 100

Instructions: All questions are compulsory

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Describe the following Index Properties of rock in Short (a) Porosity (b) Permeability	4	CO1
Q 2	Discuss the following properties of discontinuities in short (a) Fracture Density (b) Fracture Continuity	4	CO1
Q 3	Describe the importance of liquefaction phenomenon with suitable example.	4	CO2
Q 4	Discuss the principal of effective stress and its importance.	4	CO2
Q 5	In a rock core sampling method at site, the total length of drilling was 1.0 m in rocky strata. There were five intact pieces of rocks of lengths 150 mm, 200 mm, 75 mm, 50 mm, and 200 mm were collected. Determine the value of RQD of rock sample.	4	CO3

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain the Rock Structure Rating (RSR) with suitable example: OR Write detailed notes on the Geological classification of Rock with suitable examples	10	CO1
Q 7	Write detailed notes on the following excavation technique (a) Peat Excavation (b) Disposal of Excavated Material	10	CO2
Q 8	Describe the cause and effect of Soil Liquefaction. Also highlight the importance of Liquefaction and its remedial method.	10	CO3
Q 9	For a normally consolidated clay, the results of a drained triaxial test are as follows: Chamber confining pressure = 16lb/in^2	10	CO4

	Deviator stress at failure = 25lb/in^2 Find the normal stress and the shear stress on the failure plane		
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	(a) One cubic meter of wet soil weighs 19.80 kN. If the specific gravity of soil particles is 2.70 and water content is 11%, find the void ratio, dry density, and degree of saturation (b) Determine the (i) Water content, (ii) Dry density, (iii) Bulk density, (iv) Void ratio and (v) Degree of saturation from the following data: Sample size 3.81 cm dia. × 7.62 cm ht. Wet weight = 1.668 N Oven-dry weight = 1.400 N Specific gravity = 2.7 OR The dry unit weight of a sand sample in the loosest state is 13.34 kN/m^3 and in the densest state, it is 21.19 kN/m^3. Determine the density index of this sand when it has a porosity of 33%. Assume the grain specific gravity as 2.68.	**20**	**CO3**
Q 11	Estimate the Q system of the rock for determination of tunnel support and develop an interrelation between Q and RMR.	**20**	**CO4**