Name:

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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
END Semester Examination December 2021

Program: B-Tech GIE **Semester: VII**
Course: Rock Mechanics and Geotechnical Engineering **Time: 180 minute (3 hour)**
Course Code: PEGS-3003 **Max. Marks: 100**
Number of pages: 03

SECTION A

1. **Each questions carry 4 Marks** **4 X 5 = 20 M**
2. **Type answer for all the questions in the answer sheet using given space.**
3. **The maximum word limit is 30 or 3 lines (only question number 1& 2) and single word answer for question number 3, 4 and 5).**

Q.No	Question	COs
1	Define the following terms in context with Geotechnical Engineering a) Thermal conductivity b) USLE	CO1
2.	Distinguish between the following terms: i) Cohesive soil and Non-Cohesive soil and ii) Tenacity and Fracture	CO2
3	Fill in the blanks with suitable answer: i. A state of 'soil liquefaction' occurs when the …….of soil is reduced to essentially zero. ii. The effective inter granular normal pressure is……to the shear plane pressure. iii. The…….. Condition involving the spontaneous and violent detachment of rocks after blasting. iv. The …… Rocks below the water table exhibits the properties of water bearing sand.	CO3
4	MCQ (Choose correct answer and type the answer) / A) answer / B) answer / C) answer a) The soil composed of high Ph value, stony and dry out quickly / Chalky / Sandy / Alfisol b) The…….. strength of rocks decreases as temperature increases / Yield / Fracture / Impact c) The Sprayed concrete process is also called as / Gunite / Shotcrete / Both A & B d) The ,,,,,,,,,,,,, values are empirical constant representing joint and rock using in Hoek brown reactions for stress calculation / S / M / Both A & B	CO4

5	TRUE/False (Choose correct answer and type the answer)	A) True	B) False	CO5
	i) The strength of the materials decrease with time and stress corrosion effects	A) True	B) False	
	ii) The elastic and brittle deformation in structure is not due to seismic activity.	A) True	B) False	
	iii) The tensile and compressive strengths are always equal	A) True	B) False	
	iv) The hydrostatic stress is always equal distribution in all directions.	A) True	B) False	

SECTION B

1. **Each questions carry 10 Marks** **4 X 10 = 40 M**
2. **The maximum word limit is 500 or two page**

Q.No	Question	COs
1	Write a short note on role and significance of following term in Geotechnical engineering. a) Grain size analysis b) Consolidation analysis c) Porosity and permeability analysis.	CO1
2	Explain in brief the classification of blasting and blasting controls or precaution during rocks blast.	CO2
3	Write a short note on significance aspect of the following terms in context with Geotechnical engineering; i) RMR ii) RQD iii) SMR iv) RSR	CO3
4	Define excavation and Discuss in brief specific requirements and prevention measure should assure during excavation. **OR** A soil sample was collected from the foundation site and it was subjected to various test, the tested properties of soil is as follows; weight of soil is **42.25 lb**, volume of **0.486 ft^3** and moisture content of **10.35%,** specific gravity is **2.65**. Draw a phase diagram and compute the unit weight, dry unit weight, degree of saturation, void ratio and porosity of soils. **$\gamma w = 62.4$ lb/ft^3**.	CO4

SECTION C

1. **Question 1 is compulsory (a+b=10+10)** **2 X 20 = 40 M**
2. **In question 2 Answer either i), ii) iii) (5+8+7) OR iv) (20**

Q.No	Question	COs
1	a) Describe in brief classification Stress and strain in context with Geotechnical engineering b) Explain in brief classification of dams and their engineering properties.	CO5
2	i) Strike and true dip of the outcrop is **N 65° E, 35°SE.** Determine the apparent dip in Vertical section trending **S 50° E** by both numerical and Graphical method. ii) The soil samples were collected from the foundation site the values are as follows; soil layer length =10 ft and width 10 ft, Initial void ratio $\mathbf{e_0=0.191}$, Primary compressive index (CC/CI)=**0.318**, Stress or Effective pressure σ'=**2100** lb/ft^2, Change in pressure Δσ'=**900** lb/ft^2, secondary compressive index (Cα)=**0.03** and assume primary consolidation is **1.5** years. Calculate the Total consolidation of settlement of soil layer assuming after **5** years.. iii) The soil sample was collect from construction sites. The data as follows: Moisture content of soil (w) = 15 %, Moist unit weight (MUW) is 110 pcf, Specific gravity (SG)= 2.75. The minimum dry unit weight is (DUW) 105 pcf /per 20% moisture content. Determine How many cubic yard of excavated soil are need to produce 10000 yd3 of compacted fill and how many truck loads are need to be transport of soil, if each truck load carry 20 tons. **OR** iv) Describe in brief the classification and role during geotechnical design and plan ; i) Good man rock classification ii) Terzhaghi's rock classification and iii) Strength	CO6