Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
END Semester Examination, DECEMBER 2019

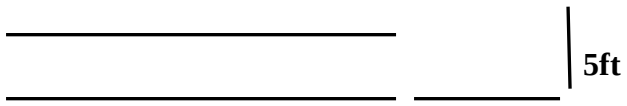
Program: B-Tech GSE & GIE **Semester: V**
Course: Rock Mechanics and Geotechnical Engineering **Time 03 hrs.**
Course Code: PEGS-3003 **Max. Marks: 100**
Instructions: All the questions of section A & B are compulsory. In Section C attempt any two questions. Wherever necessary do with neat sketches**.**
Number of Pages:03

SECTION A

S. No.		Marks	CO
Q 1	Write a note on the following terms: a) Shotcrete b) Vertisol c) ANFO and VOD d) Clogging e) Pedalfer	**10**	**CO1**
Q.2	Differentiate between the following terms: i) Foliation and Lineation ii) Saturated density and submerge density iii) Grittiness and Toughness texture iv) Reinforced earth wall & Crib wall v) qns and qs	**10**	**CO2**

SECTION B

Q .3	Fill in the blanks with suitable answer: a) A state of 'soil liquefaction' occurs when the …….of soil is reduced to essentially zero. b) …….. forms when water saturates an area of loose sand and the ordinary sand is agitated. c) An…… dam is constructed in a low spot or "saddle" through which the reservoir to permit higher water elevation. d) …….. dams were timber crib dams used to help float logs downstream in the late 19th and early 20th centuries. e) When such an emergency bank is added on top of an existing levee it is known as a ……. f) …….. is concrete conveyed through a hose and pneumatically projected at high velocity onto a surface, as a construction technique.	**10**	**CO3**

	g) After a threshold region the rock begins to show ……. deformation under confining pressure h) The……. are form as result of extensional stress acting on brittle rock. i) ……. is the ratio of uniaxial compressive (tensile) stress to the resultant strain. j) The Poisson's ratio of an…… material is different in each direction (x, y and z).		
Q. 4	Define liquefaction? Discus in brief causes, hazards and prevention of Liquefaction	**10**	**CO4**
Q.5	Discuss and Justify the role of following term analysis in geotechnical Engineering: a)Compressive strength b) Fatigue strength c) yield strength d) Impact strength	**10**	**CO5**
Q.6	i) Determine the vertical stress increases in a point at a depth of 6m below the center of the invert of a newly built spread footing, 3m breadth and 4m length placed on the ground surface carrying a columnar axial load of N=2000 KN and I_4=0.0645 ii)The soil sample collected from foundation site, the specification of soil is as follows; the moist unit weight of a soil is 16.5 KN/m^3, moisture content (w) is 15% and specific gravity (Gs) is 2.7 g/cc. Determine the Dry unit weight, porosity, degree of saturation and the mass of water in kg/m^3 that must be add to reach full saturation.	**6+4**	**CO2 & CO3**
SECTION-C Attempt any two question (2 X 20) = 40 Marks			
Q .7	**a)**  The sanitary pipe is located at a point C the footing shown above and Z = 5ft below the footing and 3ft away from its edge. The footing has a uniform load q=1800psf. The virtual B is 3m X 5m is L (I_4 is 0.136) and expanded B is 5m X 13m is L (I_4 is 0.200). Determine the increase in the vertical stress at the depth of the pipe. b)An embankment for a highway 30m wide an 1.5m thick is to be constructed form a sandy soil, trucked in from a borrow pit, the water content of the sandy soil in borrow pit is 15% and it void ratio is 0.69. Specification require the embankment to be compacted to dry unit weight of 18kn/M^3. Determine for 1km length of embankment for the following; Dry unit weight (assuming Gs is 2.70 g/cc), the number of 10 m^3 truckloads of sandy soil required, the weight of water per truck load of sandy soil and the degree of saturation of the in-situ sandy soils. c) Calculate the vertical stress for given depth **Z = 16m** under the center of Raft **8m X 8m** for foundation with uniform Load **Q = 50 ton/m^2**. **Note: See the Table for Ip value**	**5+7+8**	**CO4, CO5, CO6**

R/Z	Corner	Centre	Interm
0.1	0.067	0.064	0.100
0.2	0.133	0.128	0.200
0.3	0.200	0.192	0.300
0.4	0.267	0.256	0.400
0.5	0.333	0.32	0.500
0.6	0.400	0.384	0.600
0.7	0.467	0.448	0.700
0.8	0.533	0.512	0.800
0.9	0.600	0.576	0.900
1.0	0.667	0.64	1.000
1.25	1.00	0.82	1.023
1.50	1.23	0.95	1.035
1.75	1.45	1.00	1.052
2.0	1.76	1.07	1.073

Q.8	**a)** Discuss in brief with justification how the following terms are very essential during geotechnical engineering rock mass classification**.** i) RSR ii) RMR iii) GSI iv) Q.System v) RQD	**20**	**CO5**
Q.9	a) Describe in brief various types of Blasting and their effect in excavation site and controlling methods. b) The proposed levee is to be build along the side of a river to protect a nearby town from the flooding. If the natural soil below the levee is sandy rich with ϕ =34°, and the shear stress at point A **is 500lb/ft.^{2}** Compute the factor of safety against sliding at point A. Assume point A is nearly horizontal with C'=0**, If the gamma (γ) value is as follows; 22ft at (river) 62.4 lb/ft^2, γ=135 lb/ft^2 at levee and γ=120 lb/ft^2 at point A.** **c)** In the quarry Limestone slab were cut and measured length is **3 meters** and **0.4 meter** diameter. It Carries a Load of **60 MN**. Given that the modulus of elasticity is **100 GPA.** Calculate the compressive stress and strain and also determine how much the limestone slab is compress.	**10+6+ 4**	**CO5 CO6**

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