Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2015

Subject Code:2130606 Date:21/12/2015

Subject Name: Geotechnics & Applied Geology

Time: 2:30pm to 5:00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1		**Short Questions**	**14**
	1	State the Darcy's Law.	
	2	When are you addressing the sediments as "Quick Sand".	
	3	Which parameter controls the coefficient of permeability in a soil?	
	4	What does Liquidity Index indicate?	
	5	Which clay mineral show swelling property?	
	6	State the Hardness of Apatite.	
	7	What is the significance of particle-size analysis?	
	8	Which soil can have more adsorbed water?	
	9	State the volcanic equivalent of Granite?	
	10	Which age rocks occupy the core of Anticline?	
	11	Is Color and Luster of Hematite same or different? State the reason.	
	12	What is the process involved when Feldspar changes into Kaolinite; when decomposition takes place?	
	13	What are the factors controlling the landslides?	
	14	Which silicate structure Quartz family crystallizes?	
Q.2	**(a)**	A coarse grained soil has a void ratio of 0.78 and specific gravity as 2.67. Calculate the critical gradient.	**03**
	(b)	Discuss briefly the scope of Geotechnical engineering in relation to Civil Engineering.	**04**
	(c)	How to identify the different soils in the field?	**07**
		OR	
	(c)	Discuss the structure of different Soils	**07**
Q.3	**(a)**	Describe the soils of Gujarat State	**03**
	(b)	Define Permeability. Discuss the factors affecting the permeability of the soils.	**04**
	(c)	The consistency limits of clay are: Liquid limit=52 %; Plastic limits=30 % and shrinkage limit=18 %. If a specimen shrinks from a volume of 39.5 cm^3, at liquid limit; to a volume of 24.2 cm^3, at shrinkage limit. Calculate true specific gravity, and shrinkage ratio?	**07**
		OR	
Q.3	**(a)**	Derive $\gamma_d=\gamma_b/(1+w)$	**03**
	(b)	Explain Laplace (2-D Flow) equation for permeability of a soil	**04**
	(c)	An undisturbed soil sample has total wt of 2060grams, volume of 2000cc, water content =11 % and specific	**07**

		gravity =2.68. Compute (i) Void ratio, (ii) porosity, (iii) degree of Saturation, (iv) Water content to make sample fully saturated and (v) Efficient unit weight of soil sample.	
Q.4	**(a)**	On what basis are the silicate minerals classified? Give with the examples.	**03**
	(b)	Discuss the tabular classification of igneous rocks.	**04**
	(c)	Define metamorphism. Explain different types of Metamorphism. State 4 metamorphic rocks and how are they formed?	**07**
		OR	
Q.4	**(a)**	Define Weathering and discuss the process involved in chemical weathering.	**03**
	(b)	Discuss the interior of Earth.	**04**
	(c)	Define the plate tectonic theory. Explain the convergent boundary margin with diagram	**07**
Q.5	**(a)**	What is a geological time scale? Indicate its purpose.	**03**
	(b)	Distinguish between the Pairs; a. Strike and dip; b. Normal and reverse faults;	**04**
	(c)	What are folds? How they are formed? Describe with neat sketches the different types of folds. Add note on the engineering significance of folds.	**07**
		OR	
Q.5	**(a)**	Define aquifer? How are they formed and classified?	**03**
	(b)	Define spatial, spectral and radiometric resolutions. Discuss their importance in remote sensing applications.	**04**
	(c)	Describe the important geological conditions for driving in tunnel and underground excavations. Discuss the geological problems.	**07**

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