

Program: **CIVIL ENGINEERING**

Curriculum Scheme: Rev2019

Examination: TE & Semester V

Course Code: CE-C503 and Course Name: GEOTECHNICAL ENGINEERING-1

Time: 2-hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Soils are formed by
Option A:	Physical disintegration.
Option B:	Chemical disintegration.
Option C:	Both A and B
Option D:	Neither A Nor B
2.	A soil has a bulk density of 1.80 g/cc at water content of 5%. If the void ratio remains constant, then the bulk density for water content of 10% will be
Option A:	2.1 g/cc
Option B:	1.88 g/cc
Option C:	1.22 g/cc
Option D:	1.95 g/cc
3.	For the soil $L_L = 45\%$, $P_L = 25\%$ and $S_L = 15\%$ the plasticity index is
Option A:	50%
Option B:	20%
Option C:	60%
Option D:	40%
4.	According to IS classification system, the soils can be classified in to
Option A:	15 groups
Option B:	18 groups
Option C:	3 groups
Option D:	7 groups
5.	The permeability of soil varies
Option A:	Inversely as square of grain size
Option B:	As square of grain size
Option C:	As grain size
Option D:	Inversely void ratio

6.	The effective stresses control the following properties of soils
Option A:	Shear strength
Option B:	Compressibility
Option C:	Both A and B
Option D:	Neither A nor B
7.	The line of optimums generally corresponds to percentage air void of about
Option A:	0%
Option B:	5%
Option C:	10%
Option D:	20%
8.	If percentage of soil retained on 4.75mm IS sieve is more than 20 % then what diameter of Mould should be used in compaction.
Option A:	100mm
Option B:	127.3mm
Option C:	2250mm
Option D:	150 mm
9.	For standard proctor test mass of rammer as per IS
Option A:	2.2 kg
Option B:	2.6 kg
Option C:	4.8 kg
Option D:	4.89 kg
10.	According to U.S.B.R a soil with coefficient of permeability of 10^{-4} mm/sec will be classified as
Option A:	Pervious
Option B:	Impervious
Option C:	Semi-pervious
Option D:	Highly pervious

Q2	
A	Solve any Two 5 marks each
i.	Write note on short on borehole logs.
ii.	Explain briefly effect of compaction on engineering properties of soil?
iii.	Derive an expression for coefficient of permeability for falling head permeability test?

B	Solve any One	10 marks each
i.	In falling head permeability test length and cross-section area of specimen are 0.17m and $2.18 \times 10^{-4} \text{ m}^2$. Calculate time required for the head drop from 0.25m to 0.10m. c/s area of standpipe $2 \times 10^{-4} \text{ m}^2$. Sample has three horizontal layers with permeabilities $3 \times 10^{-5} \text{ m/sec}$ for the 1 st 0.06m, $4 \times 10^{-5} \text{ m/sec}$ for 2 nd 0.06m and $6 \times 10^{-5} \text{ m/sec}$ for 3 rd 0.05m thickness. Flow take place perpendicular to bedding plane.	
ii.	The mass and volume of saturated clay specimen were 29.8gm and 17.7 cm^3 respectively. On oven drying the mass got reduced to 19 gm and volume to 8.9 cm^3 . Calculate shrinkage limit, shrinkage ratio, volumetric shrinkage, specific gravity, and linear shrinkage.	

Q3		
A	Solve any Two	5 marks each
i.	Define plasticity index, toughness index, activity of soil, sensitivity of soil and Shrinkage ratio?	
ii.	Write short note on application of flow net?	
iii.	Define D10, D30 and D60 and explain their uses?	
B	Solve any One	10 mark each
i.	There are two borrow areas A and B which have soil with void ratio of 0.8 and 0.7 respectively. The in-place water content is 20% and 15% respectively. The fill at the end of construction will have the volume of 10000 m^3 . unit weight 2 Mg/m^3 and placement water content is 22%. Determine the volume of soil to be excavated from both borrow areas. $G=2.67$ the cost of excavation and transportation for borrow pit A is $200/100 \text{ m}^3$.and $220/100 \text{ m}^3$ for borrow pit B. state which borrow pit is economical.	
ii.	Derive the relation between e,w,G and S.	

Q4		
A	Solve any Two	5 marks each
i.	Explain factor affecting compactions.	
ii.	Write a short note on particle size distribution curve and its use.	
iii.	Explain the necessity of soil exploration.	
B	Solve any One	10 mark each
i.	Write short note on SPT and SCPT	
ii.	In a site reclamation project 2.5 m of graded fill with unit weight 22 KN/m^3 was placed in compacted layer over an existing clay layer with unit weight of clay 18 KN/m^3 which is 3m thick. This was underlaid 2m thick layer of Gravel with unit weight 20 KN/m^3 . Assuming water table remains at a surface of clay Draw 1) total stress 2) neutral stress 3) effective stress. For the following case.	

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| | <ul style="list-style-type: none">• Case I : Before the fill is placed.• Case II : after the fill is placed. |
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