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CBCS SCHEME - Make-Up Exam

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BCV502

Fifth Semester B.E/B.Tech. Degree Examination, June/July 2025
Geo-Technical Engineering

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: CO1urse outCO1mes.

		Module – 1	M	L	C
1	a.	With a neat sketch explain phase diagram.	6	L2	CO1
	b.	Prove that Gw = Se.	6	L3	CO1
	c.	Classify different types of soil structures.	8	L2	CO1
		OR			
2	a.	With a neat sketch explain consistency limits.	6	L2	CO1
	b.	A soil samples weighting 19 KN/m^3 has a water content of 30%. The specific gravity of soil particles is 2.68. Determine void ratio, porosity and degree of saturation.	6	L3	CO1
	c.	Explain soil classification by India standard.	8	L2	CO1
		Module – 2			
3	a.	State Darcy's law and list its assumptions.	6	L1	CO2
	b.	A soil profile of tree layers with the following properties is shown in the table below. Calculate the equivalent coefficients of permeability parallel and normal to the stratum.	6	L3	CO2
	c.	With a neat sketch explain effective stress concept and its impact in construction of structures.	8	L3	CO2
		OR			
4	a.	With a neat sketch list the characteristics of flow net.	6	L1	CO2
	b.	A permeameter of 82 mm diameter contains a soil simple of length 250 mm. In the constant head test, the loss of head was 1160 mm measured in time 10 sec. When the rate of flow was 2.73 ml, find the coefficient of permeability of soil.	6	L3	CO2
	c.	Explain the factors affecting on permeability.	8	L3	CO2

Layer	Thickness (m)	K(m/s)
1	3	2×10^{-6}
2	4	3×10^{-8}
3	3	3×10^{-5}

		Module – 3			
5	a.	Discuss the factors affecting compaction.	**6**	**L2**	**CO3**
	b.	The following data were obtained from standard proctor compaction test : Water content (%): 9, 11, 13, 15, 16, 17, 18 Bulk unit weight (KN/m^3): 18, 19, 19.9, 20.8, 21, 20.5, 20.1 Plot the compaction curve find out OMC and MDD.	**6**	**L3**	**CO3**
	c.	With a neat sketch explain mass-spring analogy.	**8**	**L3**	**CO3**
		OR			
6	a.	Explain how field compaction is controlled?	**6**	**L2**	**CO3**
	b.	In a laboratory compaction test, 20 mm thick soil sample under double drainage condition took 30 minutes for 50% consolidation. Calculate the time required for 90% consolidation of the same clay in the filed, the thickness of soil strata is 2 m and drains on one face only. Take $T_{50} = 0.196$ and $T_{90} = 0.848$.	**6**	**L3**	**CO3**
	c.	With a neat sketch explain the Terzaghi's One dimensional consolidation Theory.	**8**	**L3**	**CO3**
		Module – 4			
7	a.	Explain Mohr-Coulomb failure criterion.	**6**	**L2**	**CO4**
	b.	A specimen of clean, dry, cohesionless sand is tested in shear box the soil failed at a shear stress of 40 KN/m^2 when normal stress on the specimen was 50 KN/m^2. Determine : i) The angle of shearing resistance ii) Principal stress during failure iii) Direction of principal planes with respect to the direction of plan of shearing.	**8**	**L3**	**CO4**
	c.	Explain the factors affecting shear strength of soils.	**6**	**3**	**CO4**
		OR			
8	a.	Elaborate on total and effective shear strength parameters.	**6**	**L2**	**CO4**
	b.	A soil has an unconfined compression strength of 120 KN/m^2. In a triaxial compression test, a specimen of the same soil when subjected to a chamber pressure of 40 KN/m^2 failed at an additional stress of 160 KN/m^2. Determine : i) Shear strength parameters of soil ii) Angle made by the failure plane in the triaxial test.	**8**	**L3**	**CO4**
	c.	Explain the procedure for conducting laboratory direct shear test.	**6**	**L3**	**CO4**

		Module – 5			
9	a.	With a neat sketch explain different types of foundations shear failures.	8	L2	CO5
	b.	A square footing of size 2.8 m × 2.8 m is built on a homogeneous bed of sand with unit weight of 18 KN/m^3 and $\phi = 36°$, if the depth of foundation is 1.8 m, determine the safe load that can be applied on the footing. Take F = 2.5, $N_c = 27$, $N_q = 36$ and $N_r = 35$.	6	L3	CO5
	c.	Differentiate between uniform differential settlement and also state its effect.	6	L3	CO5
		OR			
10	a.	Explain the effect of water table and load eccentricity on bearing capacity of soil.	8	L2	CO5
	b.	What will be the net ultimate bearing capacity of sand having $\phi = 36°$, $r_d = 19$ KN/m^3 for : i) 1.5 m strip foundation ii) 1.5 m square foundation The footings are placed at a depth of 1.5 m below ground level. Assume F : 2.5. Take $N_c = 65.4$, $N_q = 49.4$ and $N_r = 54$.	6	L3	CO5
	c.	Elaborate on immediate primary, consolidation and secondary consolidation settlement.	6	L3	CO5

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