Program: BE Civil Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: CEC502 and Course Name: Geotechnical Engineering - I

Time: 1 hour Max. Marks: 50

Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	A soil sample has porosity of 40%. The specific gravity of solids is 2.7, if soil is 50% saturated, what is unit weight of soil and void ratio of sample respectively?
Option A:	30 KN/m^3 and 40%
Option B:	15 KN/m^3 and 20%
Option C:	18 KN/m^3 and 68%
Option D:	28 KN/ m^3 and 37%
Q2.	An oven dried soil having a mass of 200 gm after filling it completely with water, total mass of Pycnometer + water + soil is 1605 gm. The Pycnometer filled with water alone has a mass of 1480 gm. What is specific gravity of soil?
Option A:	2.5
Option B:	2.67
Option C:	2.45
Option D:	2.6
Q3.	Specific gravity of solids of soil composed of pure quartz is 2.66. If the soil has void ratio is 0.63. What is saturated unit weight of soil?
Option A:	30 KN/m^3
Option B:	10 KN/m^3
Option C:	15 KN/m^3
Option D:	20 KN/m^3
Q4.	Specific gravity of soil is ratio of unit weight of soil solid to that of water at a temperature of
Option A:	4° C
Option B:	17° C
Option C:	27° C
Option D:	36° C
Q5.	The volumetric shrinkage (Vs) is defined as change in volume expressed as a percentage of dry volume when the water content is reduced from given volume to the shrinkage limit , thus VS is equal to
Option A:	VS=(V1- Vd)/Vd * 100
Option B:	VS=(Vd-V1)/Vd * 100
Option C:	VS=(V1- Vd)/V * 100

Option D:	VS=(Vd- V1)/V * 100
Q6.	A range of water content over which the soil remains in the plastic state is given by the expression
Option A:	Ip = Wp-Wl
Option B:	Ip = Wl-Wp
Option C:	Il = W-Wp/Ip *100
Option D:	Ic=Wl - W/Ip *100
Q7.	Liquidity index is defined as
Option A:	Ic = Wl - W/Ip * 100
Option B:	If= W1 - W2/ log(N2/N1)
Option C:	Il = W- Wp/Ip *100
Option D:	Ic = Wp-W/Ip *100
Q8.	The hydrometer method of sedimentation analysis differs from the pipette analysis mainly in which aspect?
Option A:	the principle of test
Option B:	the method of taking observations
Option C:	the method of preparation of soil suspension
Option D:	the method of conclusion
Q9.	Specific surface is termed as
Option A:	Total volume of soil particles
Option B:	Total area of soil particles
Option C:	Total surface area in a unit mass
Option D:	Ratio of total surface to the total volume
Q10.	A factor, which is important for the magnitude of specific surface of soil particles is
Option A:	Grain shape
Option B:	Grain size
Option C:	Both size and shape
Option D:	Grain molecular structure
Q11.	Microscopic soil particles have a very
Option A:	Large specific surface
Option B:	A large volume
Option C:	Small specific surface
Option D:	Large diameter
Q12.	In a Pumping out test, drawdown is 5m. If the k = 10^{-4}m/s, find the radius of influence. Choose closest answer.
Option A:	100 mm
Option B:	150 mm
Option C:	200 mm

Option D:	250 mm
Q13.	A flow met for earthen dam with 30m water depth consists of 25 potential drops and 5 flow channels. If the discharge per meter length of dam is 0.00018m^3/sec. Then what is the coefficient of permeability of dam materials?
Option A:	3 x 10^{-5} m/s
Option B:	3 x 10^{-3} m/s
Option C:	6 x 10^{-3} m/s
Option D:	9 x 10^{-3} m/s
Q14.	What is the saturation in capillary-permeability test assumed to be?
Option A:	0%
Option B:	50%
Option C:	75%
Option D:	100%
Q15.	The void ratio of sand is 0.4. The specific gravity of sand is 2.67. Calculate critical hydraulic gradient.
Option A:	9.11
Option B:	1.91
Option C:	1.19
Option D:	1.99
Q16.	Flow net drawn for weir the total head loss is 6m, number of potential drop is 10 and length of flow path for the last square is 1m. Find the exit gradient
Option A:	0.6m
Option B:	0.006 m
Option C:	0.06m
Option D:	1.6 m
Q17.	The soil has a discharge velocity of 6 x 10^{-7} m/s and void ratio 0.50. Find the seepage velocity.
Option A:	20.5 x10^{-5} m/s
Option B:	18 x10^{-5} m/s
Option C:	18 x10^{-7} m/s
Option D:	1.8 x10^{-7} m/s
Q18.	Calculate the K for sample of sand having the following data, Diameter of Permeameter = 75mm, Loss of head on 200mm length = 83.2mm, Water collected in 1 min = 66.8lit.
Option A:	6.057 x10^{-7} mm/sec
Option B:	5.067 x10^{-7} mm/sec
Option C:	7.065 x10^{-7} mm/sec
Option D:	0.657 x10^{-7} mm/sec
Q19.	If the soil is impervious, what is the tendency to compress the pore water which

	is incompressible would lead to development of internal pressure in water known as?
Option A:	Seepage pressure
Option B:	Effective pressure
Option C:	Pore water pressure
Option D:	Total stress
Q20.	If '*G*' is specific gravity of sand particles, '*e*' is porosity, what would be the critically hydraulic gradient?
Option A:	$i_c = (G + 1)/(1 - e)$
Option B:	$i_c = (G + 1)/(1 + e)$
Option C:	$i_c = (G - 1)/(1 + e)$
Option D:	$i_c = (G - 1)/(1 - e)$
Q21.	Compaction of an embankment is carried out in 500mm thick layer. The rammer used for has a foot area of $0.05m^2$ and energy imparted in every drop of rammer is 400N-m. Assuming 50% more energy in each pass over the compacted area due to overlap. What would be the number of pass required to develop compacted energy equivalent to Indian standard light compaction for each layer?
Option A:	10
Option B:	16
Option C:	20
Option D:	25
Q22.	A clayey soil has maximum dry density of $16kN/m^3$ & optimum moisture content of 12%.A contractor during the construction of core of earth dam obtained the dry density 15.2 kN/m^3 & water content 11%. Why is construction acceptable?
Option A:	The density is less than the maximum dry density & water content on dry side of maximum
Option B:	The compaction density is very low & water content is less than 12 %
Option C:	The compaction is done on dry side of optimum
Option D:	Both the dry density & water content of compacted soil are within the desirable limit
Q23.	In which soil the initial decrease of dry density at lower water content?
Option A:	Fine grained soil
Option B:	Black cotton soil
Option C:	Alluvial soil
Option D:	Cohesion soil
Q24.	A cohesive soil yields a maximum dry density of 1.8 g/cc at an OMC of 16 % during a standard proctor test. What will be its degree of saturation? Take G=2.65
Option A:	100%
Option B:	60.45%

Option C:	43.27%
Option D:	89.79%
Q25.	Which of the following is incorrect for compaction?
Option A:	Decrease in volume of soil is due to removal of air from voids
Option B:	The load is static
Option C:	Process is rapid
Option D:	It is an artificial process

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Question	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	B
Q3.	D
Q4	C
Q5	A
Q6	B
Q7	C
Q8.	B
Q9.	C
Q10.	A
Q11.	A
Q12.	B
Q13.	A
Q14.	D
Q15.	C
Q16.	A
Q17.	C
Q18.	A

Q19.	C
Q20.	D
Q21.	D
Q22.	D
Q23.	B
Q24.	D
Q25.	B