University of Mumbai
Examination 2020

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: ___Civil Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: _CE-C502____ and Course Name: _Geotechnical Engineering-I___

Time: 2-hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	When the product of rock weathering is not transported but remain at the place of formation the soil is called:
Option A:	Alluvial soil
Option B:	Talus
Option C:	Residual soil
Option D:	Aeolian soil.
2.	Soils are formed by
Option A:	Physical disintegration.
Option B:	Chemical disintegration.
Option C:	Both A and B
Option D:	Neither A Nor B
3.	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
4.	In a wet soil mass air occupies one-sixth of its volume and water occupies one-third of its volume. The void ratio of soil will be
Option A:	0.25
Option B:	0.50
Option C:	1.5
Option D:	1
5.	A soil sample has a specific gravity of 2.60 and void ratio of 0.78. the water content required to fully saturated soil at that void ratio will be

Option A:	20%
Option B:	30%
Option C:	40%
Option D:	60%
6.	Pycnometer method for water content determination is more suitable for:
Option A:	Clay
Option B:	Loess
Option C:	Sand
Option D:	Silt
7.	The mass specific gravity of a fully saturate soil specimen of clay having water content of 36% is 1.86. on oven-drying the mass specific gravity drops to 1.72 calculate specific gravity of clay
Option A:	2.5
Option B:	2.69
Option C:	2.8
Option D:	2.9
8.	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%
9.	The plasticity index of a highly plastic soil is about
Option A:	10-20
Option B:	20-40
Option C:	Greater than 40
Option D:	Less than 10
10.	The maximum size of particle of clay is
Option A:	0.2mm
Option B:	0.02mm
Option C:	0.002mm
Option D:	0.0002mm
11.	For dense sand relative density is
Option A:	Between 35 and 65
Option B:	Between 65 and 85
Option C:	Between 85 and 100
Option D:	Greater than 100

12.	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
13.	The maximum size particle size for which Darcy's law is applicable is
Option A:	0.2mm
Option B:	0.5mm
Option C:	1mm
Option D:	2mm
14.	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
15.	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
16.	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
17.	Effective stress will be
Option A:	Total stress minus neutral stress
Option B:	Total stress plus neutral stress
Option C:	Product of total stress and neutral stress
Option D:	Total stress divide by neutral stress
18.	The line of optimums generally corresponds to percentage air void of about
Option A:	0%
Option B:	5%
Option C:	10%
Option D:	20%

19.	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
20.	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

Q2	Solve any Four out of Six 5 marks each
A	Define plasticity index, toughness index, activity of soil, sensitivity of soil and Shrinkage ratio?
B	Define D10, D30 and D60 and also explain their uses?
C	Write note on scope of geotechnical engineering?
D	Explain briefly effect of compaction on engineering properties of soil?
E	Write short note on application of flow net?
F	Derive an expression for coefficient of permeability for falling head permeability test?

Q3	Solve any Two Questions out of Three 10 marks each
A	In falling head permeability test length and cross-section area of specimen are 0.17m and 2.18 $*10^{-4}$ m^2. Calculate time required for the head drop from 0.25m to 0.10m. c/s area of stand pipe $2*10^{-4}$ m^2. Sample has three horizontal layers with permeabilities $3*10^{-5}$ m/sec for the 1st 0.06m, $4*10^{-5}$m/sec for 2nd 0.06m and $6*10^{-5}$ m/sec for 3rd 0.05m thickness. Flow take place perpendicular to bedding plane.
B	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 2Mg/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 200/100m^3 .and 220/100 m^3 for borrow pit B. state which borrow pit is economical.
C	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. |