Total No. of Questions : 12]

SEAT No. :

P722

[Total No. of Pages : 4

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B.E. (Civil) (Semester - I)

ADVANCED GEOTECHNICAL ENGINEERING

(2008 Pattern) (Elective - I(e))

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Your answers will be valued as a whole.***
5) ***Use of electronic pocket calculator is allowed & IS codes are not allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Explain the following : **[4 × 4 = 16]**

a) USCS

b) ISCS

c) PRA classification

d) Diffuse Double layer

OR

Q2) a) Following data is obtained from a proposed foundation site : **[8]**

i) Total soil sieved = 250 gms

ii) Cum. mass retained on 4 mm sieve = 40 gms

iii) Cum. mass retained on 75 μ sieve = 200 gms

iv) D_{10} = 0.07 mm, D_{30} = 0.12 mm, D_{60} = 1.95 mm.

v) LL = 40% & PL = 30%

Classify the soil & comment, whether the soil is suitable for foundation?

b) Enlist different 'soil structures' & 'clay minerals' and explain the role of 'Montmorillonite'. **[8]**

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Q3) a) A vertical retaining wall 4m high, supported a backfill with $\beta = 0$, $\gamma = 18$ kN/m^3, $\phi = 30°$, $\delta = 10°$. A footing running parallel to the wall & carrying a load of 18 kN/m is to be constructed. Find the safe distance of the footing from the face of the wall, so that there is zero pressure increase, on the wall. **[10]**

b) Explain, Ka, Kp & Ko giving field examples. **[7]**

OR

Q4) a) Design a gravity retaining wall, 6m high, with, $\theta = 0$, $\gamma = 18$ kN/m^3, $\phi = 30°$, dry soil as backfill. Also find the Fos against sliding, assuming $\delta' = 30°$, the wall is made up of concrete with $\gamma = 24$ kN/m^3 & top width of 1m. Use Rankine's theory. **[8]**

b) Compute the embedment depth & pull in anchor rod for the sheet pile 6 m high backfill with anchor rod 1.5m below the top. The soil of backfill & below the dredge line are same, with following properties, $\phi = \phi' = 30°$, $C = 0$, $\gamma_{sat} = 22$ kN/m^3, $\gamma = 19$ kN/m^3, GWT = 3 m above D.L.

Use 'Free Earth Support' method. **[9]**

Q5) a) Explain the different types of Geosynthetics, with their functions. **[6]**

b) Explain the properties & functional requirements of geogrid. **[6]**

c) Discuss the 'Binquet & Lee' theory for reinf. foundationations. **[5]**

OR

Q6) a) Explain components of 'RE wall' with sketch. **[6]**

b) Explain 'Soil nailing' with situations applicable. **[5]**

c) Discuss the user of 'Geosynthetics in Geoenvironment. **[6]**

SECTION - II

Q7) Explain the following : **[4 × 4 = 16]**

a) Free & Forced vibrations.

b) Pressure Bulb concept of Balakrishna & Nagraj.

c) Barken's method

d) Pauw's Analysis

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OR

Q8) a) Resonance occurred at a frequency of 25 cycles/sec in a vertical block vibration test on a block of 1 m × 1 m × 1m. Determine Cu if the wt. of oscillator is 700 N & the force produced by it at 15 cycles/sec is 1200 N. Also compute the amplitude in vert. direction at 15 cycles/sec. **[8]**

b) Discuss the design criteria for impact type machines as per IS - 2974 (pt - II) - 1966. **[8]**

Q9) Explain the following :

a) Multi under-reamed pile. **[5]**

b) Bored compaction pile. **[4]**

c) Vibrofloatation. **[4]**

d) Sand drains. **[4]**

OR

Q10) a) Explain the stages of inserting reinforcement in Vibro-expanded pile. **[7]**

b) A clay layer 5m thick is consolidated with the help of sand drains of dia. 30cm & spaced at 2.7 m c/c. Determine the influence of the drain wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay without wells (Uz) would be 20%.

Arrange the sand drains in square pattern & compute the improvement in U, for the following cases. **[10]**

i) Kr = Kz

ii) Kr = 5 Kz. Use following data,

for Uz = 20%, Tv = 0.031,

Tr = 0.070, U = 30%

Tr = 0.085, U = 35%

Tr = 0.373, U = 85%

Tr = 0.455, U = 90%

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Q11) Explain the following :

a) Hookean & Newtonian model. **[5]**

b) Kelvin model. **[4]**

c) Burger's model. **[4]**

d) Bingham's model. **[4]**

OR

Q12) a) Explain 'Rheology' & simple Rheological models. **[7]**

b) Explain 'Saint - Venant's' model. **[5]**

c) Discuss 'secondary consolidation' & 'creep', with the help of Rheological models. **[5]**