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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

V SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE305

Course Name: GEOTECHNICAL ENGINEERING – II

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Differentiate between isobar and pressure bulb. Give one practical example to highlight the significance of pressure bulb. (7½)

b) What is meant by passive state of plastic equilibrium of soils? Give two field situations [with sketches] where passive mechanism develops. (7½)

2 a) Critically differentiate between Boussinesq's theory and Westergaard's theory. (7½)

b) A retaining wall supports a backfill with the following properties: Upper layer: angle of internal friction=30^0; unit weight=17KN/m^3; thickness=2m. Lower layer: angle of internal friction=35^0; unit weight=19KN/m^3; thickness=4m. Find the total lateral earth pressure, if the retaining wall tends to move towards the backfill. (7½)

3 a) Compute the vertical stress at a depth of 1.5m vertically beneath the centre of a circular ring type of footing (width of ring=2m; internal diameter=5m) subjected to a uniform pressure of 175KPa. (7½)

b) An excavation is to be carried out in a soil with angle of internal friction=30^0; cohesion=10KPa. unit weight =20 KN/m^3. Find the maximum stable depth up to which excavation can be carried out without failure. (7½)

PART B

Answer any two full questions, each carries 15 marks.

4 a) State the assumptions of Terzaghi's bearing capacity theory. (7½)

b) State the functions of any 5 elements of a well foundation. (7½)

5 a) Estimate the net ultimate bearing capacity of a circular footing of 2.5m diameter placed at 1.5m depth, in a lateritic soil (cohesion=48KPa; unit weight =18KN/m^3). Bearing capacity factors are Nc=10, Nq=3, N_Υ=1.5. (7½)

b) How can the allowable bearing capacity of rafts on clay be estimated? (7½)

6 a) Mention any three causes of differential settlement. Suggest any three measures for reducing the same. (7½)

b) Design a combined footing for 2 columns, if size of both columns are: 350mmX350mm; Column loads=1800kN and 1200kN; C/c distance between columns=4m. Clear spacing beyond the outer face of the 1200kN column= 0.175m. Safe bearing capacity of soil=219kPa. (7½)

PART C

Answer any two full questions, each carries20 marks.

7 a) A circular concrete pile of diameter 500mm is installed in a clay stratum having (10)

undrained shear strength of 99kPa. Determine the length of pile needed, if pile has to carry a load of 370kN with factor of safety of 3 against shear failure. Take adhesion factor as 0.5.

b) State the I.S. guideline for minimum number of boreholes to be taken for a rectangular area. Determine the minimum number of bore holes needed for a rectangular plot of size (i) 80mX100m and (ii) 300mX80 m? (10)

8 a) A 0.3m×0.3m precaste concrete pile, 10m long is driven into a ground. The total penetration for the last five blows is observed as 12mm. Determine the ultimate load on pile (Q_u) for the following data: weight of hammer=30kN; Height of fall of hammer=90cm; efficiency of hammer=0.85; sum of the temporary elastic compressions [in mm] of the dolly, packing, pile and ground=$(0.005)Q_u$. where Q_u is in kN. Efficiency of blow may be assumed as 0.5. (10)

b) Mention any five objectives of site investigation. Also point out any 5 information that can be collected during reconnaissance. (10)

9 a) Results of load test on a pile [diameter=450mm] are given below: Estimate the safe load as per I.S. (10)

Load (kN)	225	300	375	450	600	750	900
Settlement (mm)	2.9	4.2	5.5	7.2	11.8	21.5	45

b) Choose the correct answer from among the following: (10)

[i] The type of vibration isolation wherein the machine foundation is located away from the adjoining structures is called :

[A] Passive isolation [B] Damping

[C] Amplification [D] Geometric isolation

[ii] Which of the following parameter can be computed, if the values of coefficient of elastic uniform compression, contact area of footing with soil and mass of machine, foundation and mass of participating soil mass are known?

[A] Maximum amplitude [B] Damping factor

[C] Magnification factor [D] Natural frequency

[iii] Dilatancy correction for N value is applied, only when

[A] soil is coarse sand below water table and N>15

[B] soil is clay below water table and N>15

[C] soil is fine sand below water table and N>15

[D] soil is fine sand above water table and N>15

[iv] Which of the following statement is NOT TRUE?

[A] N value (of SPT) depends upon the relative density of cohesionless soils.

[B] N value is underestimated at shallow depth.

[C] Soil samples collected in wash boring are not representative samples.

[D] Free vibrations occur under the influence of a continuous external force.

[v] As per I.S., even if there is no change in soil strata, SPT shall be made at intervals of :

[A] 1.0m [B] 1.5m [C] 2.0m [D] 3.0m

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