AQ – 2937

First Semester M. E. (Geotechnical Engineering) (Civil) Examination

ADVANCED FOUNDATION ENGINEERING

1 SFGE 3

P. Pages : 3

Time : Three Hours] [Max. Marks : 80

Note : (1) Solve any **five** questions.
(2) Due credit will be given to neatnes and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Diagrams and Chemical equations should be given wherever necessary.
(5) Retain the construction lines.
(6) Illustrate your answer wherever necessary with the help neat sketches.
(7) Use pen of Blue/Black ink/refill only for writing the answer book.

1. (a) Describe significant depth. Discuss significant depth for various Civil Engineering Projects. 6

(b) Discuss the suitability of vane shear test. A vane of 100 mm long and 80 mm in diameter was pressed into soft clay at the bottom of bore hole. Torque was applied and gradually increased to 45×10^3 N–mm when failure took place.
Subsquently vane rotated rapidly so as to completely remould the soil. The remoulded soil was sheared at a torque of 18×10^3 N–mm. Calculate the cohesion of the clay in natural and remoulded state and also the value of sensitivity. 10

2. (a) A plate load test was carried out on a ground having a uniform sand stratum upto sufficient depth. The size of plate used was 0.30 m x 0.3 m.

Load kN	4.5	9.0	18.0	27.0	36.0	45.0	54.0
Settlement mm	0.75	1.25	2.0	3.5	5.38	7.55	10.75

Plot a load settlement graph. Also determine the bearing capacity and load that can be taken by a column footing of size 1.20 m x 1.20 m in this soil for an allowable settlement of 20.0 mm. 8

(b) Draw a typical schematic diagram of split spoon sampler. Discuss step by step procedure of conduction of standard penetration test with all specifications as per BIS. Also discuss the corrections to be applied to observations. 8

3. (a) Discuss the BIS method for determination of net ultimate bearing capacity with suggested equations. Discuss the various factors with their suggested values also. 8

(b) Enlist various types of raft foundations with their suitability. Discuss bearing capacity of raft foundation on sands and clays. 8

4. (a) Compute the embeded length D for sheet file wall shown in fig. 4 (a).

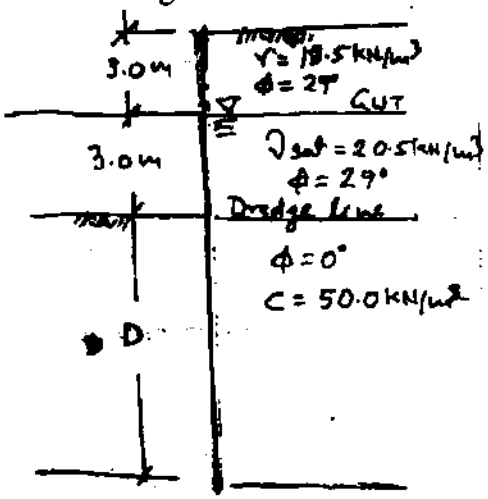

fig. 4 (a) 9

(b) Discuss the assemptions made for design of anchored sheet pile (Bulk head) in free earth support method and thus discuss this method to determine depth of embedement below dredge line for grannular soil. 7

5. (a) A concrete pile 350 mm square in section is driven 15.0 m into dense sand. The pile also extend 1.5 m above ground surface. Determine the deflection at the ground level if a lateral load of 5.0 kN is applied at the top of pile. Assume $\eta_h = 2 \times 10^4$ kN/m^3 for the soil and modululs of elasticity for concrete = 3×10^7 kN/m^2. Consider pile head is free. 10

(B) Discuss the determination of load carrying capacity of pile group in

(i) Sandy deposit

(ii) Cohesive deposits. 6

6. (a) Discuss the sinking operation of a well foundation. Also discuss various operations carried out to correct tilt and shits of well foundation during sinkining procedure. 8

(b) Draw a typical cross – section of well foundation showing all components. Discuss design criteria for any two components. 8