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06CV52

Fifth Semester B.E. Degree Examination, May/June 2010
Design of Structures – R.C.C.

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Use of IS:456-2000, SP-16, IS:875 permitted. Use SP-16 for question 6 only.
3. Assume suitable additional data, if necessary.

PART – A

1 a. Explain the stress block parameters, with neat sketches for a rectangular R.C. section. **(03 Marks)**

b. Obtain an expression for the limiting depth of neutral axis, limiting percentage of steel and M_{ulim} for a rectangular section with M25 grade concrete and Fe-500 steel. **(12 Marks)**

c. Explain, in brief, the principles of limit state method of R.C.C. design. **(05 Marks)**

2 a. Under what circumstances a doubly reinforced beam section is provided? Mention a few examples. **(05 Marks)**

b. A concrete beam has 350 mm breadth and 700 mm effective depth. Design the beam, if it is subjected to a factored B.M. of 600 kN-m. Use M20 concrete and Fe-415 steel. Take d′ = 50mm. Design stress – strain curve data, for Fe-415 steel are given below.

Strain	Stress (N/mm^2)
0.00276	351.8
0.00380	360.9

(15 Marks)

3 a. What is development length? Obtain an expression for development length in tension. Find the development length of 16 mm diameter HYSD bar of Fe-500, subjected to compression, if M25 grade concrete is used. **(08 Marks)**

b. Check the safety of a T-beam for deflection control using the empirical method suggested by I.S. code. The beam is continuous over a span of 8.5 m, having details as given below.
Width of flange = 900 mm
Web width = 300 mm
Effective depth = 400 mm
Area of tension steel = 1600 mm^2
Area of compression steel = 900 mm^2
Use M20 concrete and Fe-415 steel. **(12 Marks)**

4 A T-beam slab floor system has a slab of 125 mm thick spanning between T-beams which are spaced at 3.5 m apart. The beams have a clear span of 8.15 m and the end bearings are 300 mm walls. The live load on the floor is 3 kN/m^2 and take floor finish as 0.6 kN/m^2. Design one of the intermediate T-beam for bending and shear. Sketch the reinforcement details. Use M20 concrete and Fe 415 steel. **(20 Marks)**

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06CV54

Fifth Semester B.E. Degree Examination, Dec.08/Jan.09
Geotechnical Engineering - I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. With the help of phase diagram define the following terms: **(04 Marks)**
(i) Voids ratio (ii) Degree of saturation (iii) Dry density (iv) Saturated density.

b. Considering soil as a three phase system derive an expression for the dry density of soil in the form $\gamma_d = \frac{(1-n_a)G.\gamma_d}{1+wG}$ with usual notations. **(06 Marks)**

c. In an earth embankment under construction the bulk unit is 16.50 kN/m^3 at water content 11%. If the water content has to be increased to 15%, compute the quantity of water to be added per cubic meter of soil. Assuming no change in void ratio, determine the degree of saturation at this water content. Take $G_s = 2.70$. **(10 Marks)**

2 a. List and explain consistency limits 0.005mm diameter. **(04 Marks)**

b. Determine the time required for a soil particle to settle through a depth of 150 mm in a hydrometer test. Take $\mu = 0.008$poise, G=2.70. **(06 Marks)**

c. Following are the results of liquid limit test on a clay sample whose natural water content is 60% and plastic limit 22%.

Number of Blows	34	22	19	12
Water content %	44.6	49.4	51.4	55.6

Plot the flow curve and obtain (i) Liquid limit (ii) Plasticity index (iii) Flow index (iv) consistency index (v) Liquidity index. **(10 Marks)**

3 a. Describe any three methods of field identification of soils. **(06 Marks)**

b. With neat figures explain the structure of Kaolinite, Illite and Montmorillonite clay minerals. **(06 Marks)**

c. Following are the results obtained from the tests conducted on two soils. Show the positions of these soils on the plasticity chart. Classify the two soils as per I.S. system. **(08 Marks)**

Soil	Liquid Limit %	Plastic Limit %	% Retained on IS75μsieve
A	110	50	40
B	45	12	10

4 a. List the various factors affecting permeability of soils. **(04 Marks)**

b. Explain with neat sketch quick sand phenomena. **(04 Marks)**

c. The following data was recorded in a constant head permeability test.
Area of permeameter = 50 x 10^2 mm^2
Height of soil sample = 60mm.
If a quantity of 430cc of water is passed down in 10 minutes under an effective constant heat of 400mm, calculate coefficient of permeability and seepage velocity during the test. On oven drying, the specimen weighs 4.98N. Take G=2.65. **(06 Marks)**

d. A sand stratum is 10m thick. The water table is 2m below ground level. The unit weights of sand above and below water table are 17 kN/m^3 and 21 kN/m^3. The capillary rise above water table is 1 m. Draw up the effective, pore pressure and total stress diagrams for the sand stratum. **(06 Marks)**