MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester : VI (New) Term : II Academic Year : 2014-15
Course No. : FS 365 Title : Design of Structures
Credits : 3 (2+1)
Day & Date : Saturday, 16.05.2015 Time : 09.00 to 12.00 Total Marks : 80

Note : 1. Solve ANY EIGHT questions from SECTION "A".
2. All questions from SECTION "B" are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

1. a) A simply supported beam of 4.5 m span carries a uniformly distributed load of 30 KN/m inclusive of self-weight. The width of the beam is 230 mm and is reinforced on tension side only. Design the smallest concrete section. The material used are M 20 grade of Concrete and mild steel reinforcement. Assume load factor (L.F) equal to 1.5 $f_{ck} = 20 N/mm^2$, $f_y = 250 N/mm^2$.

   b) What are the different types of loads acting on roof trusses?

2. a) Enlist the various types of roof trusses and show with neat sketches the major components of roof truss.

   b) Write down the design steps for axially loaded compression member.

3. A R.C. beam of rectangular section 230 mm wide and 400 mm deep is reinforced with 4 bars of 12 mm diameter provided with an effective cover of 31 mm. Calculate the ultimate moment of resistance of the section and the maximum uniformly distributed super-imposed load this beam can carry if it is simply supported over a span of 3.5 m. The materials used are concrete grade M 20 and steel grade Fe 415.

   OR

   Calculate the moment of resistance of a doubly reinforced R.C beam of rectangular section of size 300mm x 450 mm deep reinforced with 6-dia 20 mm bars on tension side. Use concrete grade M 20 and steel Fe 250. Assume effective cover of 35 mm on both sides $f_{ck} = 20 N/mm^2$ $f_y = 250 N/mm^2$ $d_c = 35$ mm,

   (a) 4-dia 20 mm bars on compression side.

4. a) Discuss in brief the properties of concrete.

   b) What are the various types of footing?

5. a) Describe the classification of retaining wall.

   b) What do you mean by bond? What are the different types of bonds?

6. a) Calculate the area of steel required for a short R.C. column 400 x 450 mm in cross section to carry an axial load of 1160 KN. assume concrete grade M 20 and steel grade Fe 250.

   b) What do you mean by one way and two way slabs.

(P.T.O.)

Q.8 a) Show the arrangement of transverse reinforcement in designing of column.

b) Show the pressure distribution under the footing.

Q.9 a) What do you mean by development length? State factors affecting development length.

b) What are the reasons for providing minimum shear reinforcement?

Q.10 Calculate the design constant for the following materials considering the balanced design for singly reinforced section. The materials are grade M 15conrete and mild steel reinforcement. $6_{cbc} = 5\ N/mm^2$, $6_{st}=140\ N/mm^2$.

SECTION "B"

Q.11 Fill in the blanks.

1) A strap footing or cantilever footing is one of the types of _____.

2) _____ is defined as plastic deformation under constant load or stress.

3) Concrete possesses high compressive strength but is week in _____.

4) When the main reinforcement is in one direction it is a _____slab.

5) Gypsum is added to the cement for controlling_____.

6) In a singly reinforced beams, steel reinforcement is provided in _____.

7) Shear reinforcement is provided in the from of _____.

8) The neutral axis of a balanced section is called_____.

Q.12 Define the following terms.

1) Durability
2) Modular ratio
3) Effective length
4) Reinforced Cement Concrete
5) Column
6) Bond stress
7) Concrete
8) Over reinforced section

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