B.E. (Civil Engineering) Fifth Semester (C.B.S.)

Reinforced Cement Concrete (RCC) Structures

P. Pages : 3 **NRJ/KW/17/4459**

Time : Four Hours * 0 9 6 3 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. IS 456 : 2000; I.S. 875 may be consulted.

1. a) State the characteristics of under - reinforced and over - reinforced section in WSM. **6**

b) Define Neutral Axis, Moment of Resistance, Lever Arm, Balance section in WSM. **7**

OR

2. a) A singly reinforced concrete beam is of 300 mm width and 500 mm effective depth. It is reinforced with 6 Nos. of 16 mm HYSD bar. Assuming M 20 concrete, determine its moment of resistance according to the working stress Method. **8**

b) What are the limitation of WSM. **5**

3. a) Explain pre tensioning & post tensioning methods of prestressing. **6**

b) Explain different types of losses in prestressing system. **7**

OR

4. a) Explain Gifford Udall system of prestressing. **4**

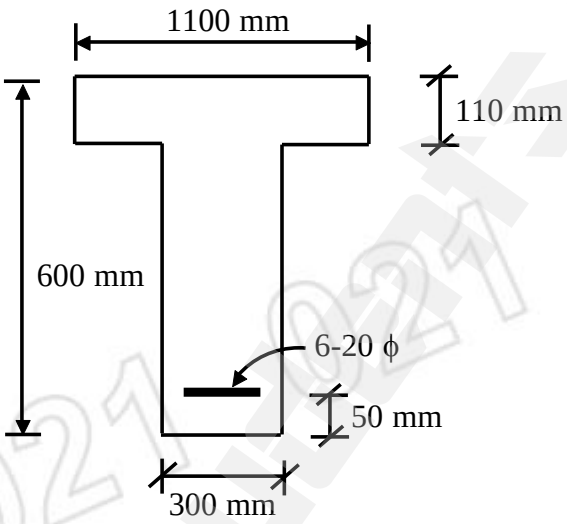
b) The prestressed concrete beam of rectangular section 350 mm wide & 550 mm deep has a span of 10 m. The effective prestressing force is 900 kN at an eccentricity of 125 mm. The dead load of beam is 4.5 kN/m & Live load of 7 kN/m. **9**
Find the extreme stresses.
i) at mid section without the action of live load.
ii) At mid section with the action of live load also draw the stress diagram.

5. Calculate moment of Resistance of a Singly Reinforced RCC beam 300 mm wide and 550 mm deep effective is reinforced with 4 x 20 mm ϕ bars M 20 concrete & Fe 415 Steel. Find a concentrated load which a beam can support at centre, if span of beam is 4.0 m (LSM). **13**

OR

6. Calculate the ultimate moment of Resistance of a Doubly Reinforced Rectangular Beam of size 230 mm x 450 mm reinforced with 5x20 mm ϕ on tension side and 3 x 20 mm ϕ on compression side at an effective cover of 50mm on either side. Use M20 concrete & Fe415 steel. **13**

7. a) Calculate the moment of Resistance of T - Beam as shown in fig. Assume M 20 Mix and Fe 415 grade steel. **7**



b) An R.C.C. column 3.6 m effective length is required to resist an axial ultimate load of 1600 kN. Design the column using M 20 and Fe 415 Steel. **6**

OR

8. Design a footing for the following data : Load on column 900 kN. Size of column 200 x 350 mm. S.B.C. of soil is $150\,kN/m^2$. Use M 20 concrete & Fe 415 Steel. **13**

9. a) Explain the following :

i) Long term & Short term deflection. **3**

ii) Shear Failure Mechanism. **2**

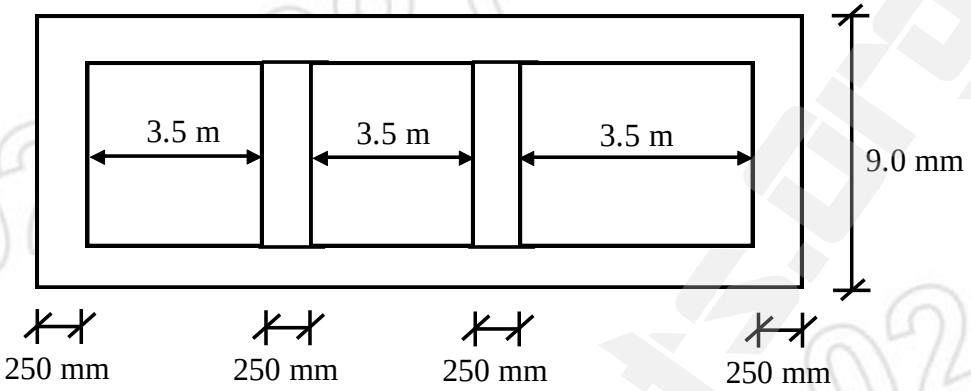
iii) Anchorage Bond & Flexure Bond. **3**

b) An R.C. Beam has an effective depth of 450 mm and a breadth of 300 mm. It contains 6 x 20 mm ϕ bars. If $f_{ck} = 25\,N/mm^2$ and $f_y = 415\,N/mm^2$, calculate the shear reinforcement needed for factored shear force of 400 kN. **6**

OR

10. A Rectangular beam section is 300 mm wide and is subjected to an ultimate moment of 80 kN - m and ultimate shear of 50 kN and an ultimate torsion of 35 kN-m. Design the section. Use M 20 concrete and Fe 415 Steel. **14**

11. Design a one way continuous slab for three - rooms of clear span 3.5 m each, supported on 230 mm thick brick walls. Take live load on slab $2.5\,kN/m^2$ and floor finish $1.0\,kN/m^2$. Use M 20 concrete and Fe 415 grade steel. Show Reinforcement Details. **14**



OR

12. Design a Two - way slab for panel size 4.5 m x 6.0 m (effective) carrying a live load of $4\,kN/m^2$ and cement concrete flooring of 20 mm thick. The slab is having one short edge discontinuous and all other edges are continuous. Use M 20 Mix & Fe 415 steel. Sketch the reinforcement details. **14**

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