B.E. Civil Engineering (Model Curriculum) Semester-V
PCCCE506 - Design of RCC Structure-I

P. Pages : 2

Time : Four Hours

*7 3 1 5 *

Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Retain the construction lines.
6. Illustrate your answers wherever necessary with the help of neat sketches.
7. I.S.I. Hand Book for structural steel section, I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 may be consulted.

1. a) What are the assumptions & limitations of WSM. **6**

b) Determine the moment of resistance of a singly reinforced beam by WSM. The width and Effective depths are 230 mm and 410 mm. It is reinforced with 4 bars of Fe415 steel of 12mm dia. Assume M25 grade of concrete (WSM) **7**

OR

2. a) Derive design constants (k,j,R) for neutral axis, lever arm and moment of resistance for a single reinforced beam. Use M20 grade and Fe415 grade of steel and calculate the values of k, j and R for M20 & Fe415. **6**

b) Determine the moment of resistance of singly reinforced beam 200 mm wide and 410 mm deep (effective), if the stresses in steel and concrete are not to be exceed 140 N/mm^2 and 5 N/mm^2. $\left(\text{i.e } \sigma_{st} = 140 \text{ N / mm}^2 \text{ and } \sigma_{cbc} = 5 \text{ N / mm}^2\right)$. It consist of 6 bars of 16 mm dia. Take M = 18 & effective span 5.2m (WSM) **7**

3. Design a simply supported RCC beam for span of 4.8m, the beam is subjected to superimposed load of 22 kN/m. Use M20 grade of concrete with Fe415 steel (LSM). **13**

OR

4. a) Explain the various types of section by LSM approach- **6**
i) Under – rainforced section ii) Over – reinforced section

b) Determine the safe working udl which can be supported by a singly reinforced rectangular beam 230 mm x 420 mm reinforced with 4 bars of 20 mm placed at effective cover of 40 mm with M20 grade concrete and Fe500 steel.
Effective span = 4.0m **7**

5. Design a Tee – beam from the following data – Effective span = 4.8m **14**
Spacing of beam = 2.8m centre to centre
Thickness of slab = 120 mm
Width of web = 300 mm
Live load = 2.5 kN/m^2
Floor finish = 1 kN/m^2
Use M20 grade concrete with Fe415 steel.

OR

6. a) Calculate the moment of resistance of Tee-beam from the following data. **7**
Effective flange width = 750 mm
Depth of flage = 120 mm
Width of Rib = 230mm; Effective depth = 410mm
Steel = 6 bars of 12 mm ϕ
Concrete = M20 grade, steel = Fe415 grade

b) Design a short axially loaded RCC column having unsupported length of 3.2m subjected **7**
to 1200 kN compressive load. Use M20 & Fe415

7. Design a circular water tank of capacity 5,00,000 litres resting on ground having rigid **20**
joint at the base. Depth is taken as 5.2 m with free board of 0.5m.
Design the following components.-
i)   Top dome   ii)   ring Beam
iii) Circular wall
Use M20 grade of concrete & Fe415 steel
Give reinforcement details.

OR

8. a) Explain application of pre-stressed concrete and its advantages over RCC. **10**

b) Explain different types of losses in pre-stressing system. **10**

9. a) Design Dog-legged RCC staircase for a room of size 4.5mx2.2m. **20**
Floor height = 3.1m
Slab carries superimposed load of 3kN/m2
With a floor finish as 0.75 kN/m^2
Use M20 grade concrete with Fe500 steel Draw reinforcement details.

OR

10. Design a simply supported slab for hall 4.5mx10m clear supported on 300 mm thick wall **20**
all around to carry L.L of 3.0 kN/m^2 and floor finish of 0.75 kN/m^2. Use M20 grade of
concrete with Fe500 steel.
Draw Reinforcement details.

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