Code No: 155DD

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2021
STRUCTURAL ENGINEERING – I (RCC)
(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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Note: Use of only IS 456: 2000 is allowed

1.a) Derive Stress Block Parameters as per the Limit State Method.
b) Compare 'Working Stress Method' and Limit State Design of RCC Structures. Explain the answer with suitable examples.
c) What is meant by Limit State? Mention different limit states to be considered in R.C.C design. [5+5+5]

2. The cross-section of an RCC beam of rectangular section is to be designed to resist a bending moment of 65 kNm. Assuming the width of beam as half the effective depth, determine the dimensions of the beam and the area of tension reinforcement for the balanced section .Use M20 grade Concrete and Fe 500 grade HYSD bars. Adopt Limit State Method of design. [15]

3. Design an R.C.Slab for a Hall 4m wide and 5m long. The Slab is simply supported on all four edges with corners held down and carries a superimposed load of $3kN/m^2$. Use M20 Concrete and Fe 415 Steel. Assume mild exposure condition. Sketch the Reinforcement details. [15]

4. Design an axially loaded circular tied column with an unsupported length of 3 m. The column is pinned at both the ends. The column has to carry a factored load of 2000 kN. Use M 25 Grade Concrete and Fe 500 Grade Steel. Sketch the Reinforcement details. [15]

5. Design a RC footing for a square RC column of 500 mm × 500 mm size which carries an axial load of 1500 kN including its self-weight. Use M20 grade Concrete and Fe 500 steel. The safe bearing capacity of soil may be taken as $220 kN/m^2$. Sketch the reinforcement details. [15]

6.a) Draw the cross-section of singly reinforced rectangular beam and show the strain and stress diagrams.
b) Explain the critical sections for design shear as per IS 456 with requisite sketches.
c) Explain the approaches for control of deflection in bending members as per IS 456. What are the measures for reducing deflection? [5+5+5]

7.a) Sketch edge and middle strips of a two way slab.
b) Explain the difficulty in estimating the short term deflection as per IS code procedure when the applied moments at service loads is marginally less than the cracking moment calculated using the modulus of rupture of concrete. [5+10]

8.a) Explain the procedure for design of columns with biaxial bending
b) Enumerate the steps for design of combined rectangular footing. [8+7]

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