6E3033

B. Tech. VI Semester (Main/Back) Exam. May/June, 2014

CIVIL ENGINEERING # 6CE2

CONCRETE STRUCTURES-II

Time : 3 Hours | Min. Passing Marks : 24 | Maximum Marks

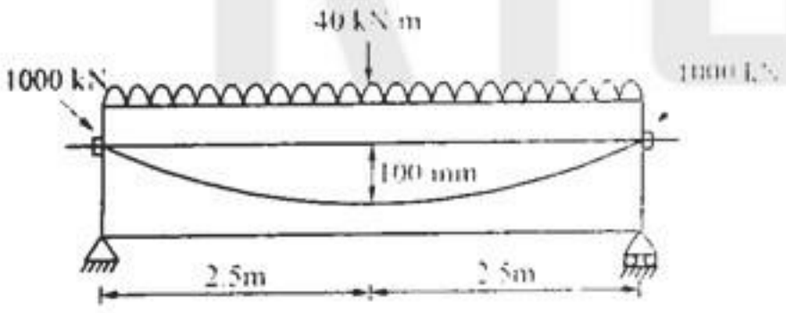
Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit–'I'

1. (*a*) What is the difference between pretensioning and post tensioning? Describe any six advantages of pre-stressed concrete members over reinforced concrete members. |8|

(*b*) Calculate the extreme fibre stresses at the mid span of simply supported beam is having parabolic profile with a prestressing force of 1000 kN. It is carrying a uniformly distributed load of 40 kN/m including its self weight over a span of 50m. The cross section of rectangular beam is 300 mm × 600 mm. |8|



OR

1. (*a*) Describe the freyssinet system of post tensioning. |4|

(*b*) A pre-stressed concrete pile is 300 × 300 mm in section and is provided with 28 wires of 5 mm diameter distributed uniformly over the section. The wires are tensioned with a pre-stressing force of 500 kN. Determine the percentage loss of stress in wires. Take modulus of elasticity of steel = 2.1×10^5 N/mm^2 modulus of elasticity in concrete = 3.2×10^4 N/mm^2 creep shortening = 3.1×10^{-5} mm per N/mm^2 shrinkage strain = 0.00025, relaxation loss of stress in steel wires = 4% of initial stress. |12|

Unit–'II'

2. (*a*) Find the reinforcement of a ring beam of rectangular section 450 mm wide and 800 mm deep with an effective cover of 50 mm. It is subjected to a bending moment of 70 kN-m torsional moment of 60 kN-m & shear force of 65 kN at working load. Assume grade of concrete M-25 & steel Fe-415. |10|

(*b*) Explain the concept of redistribution of moment. Also describe any two advantages of redistribution of moment in the design of statically indeterminate structure. |4+2=6|

OR

2. Design a continuous beam of a multistory building of three spans, each of 8m centre to centre. The characteristic superimposed dead load including self wt. is 15 kN/m and characteristic live load is 15 kN/m. Design the critical section of rectangular beam by limit state method of design by assuming M-20 and Fe-415. Adopt width of beam 300 mm. Also design shear reinforcement using 8 mm diameter, two legged vertical stirrups. Also apply check for deflection |10+4+2=16|

Unit–'III'

3. Design a circular dome over a circular room of diameter 9mm to carry a uniformly distributed live load of 1.5 kN/m^2. The dome has to support a lantern of 18 kN as point load from a circular opening of diameter 1.8m at its crown. The rise of circular dome is 1.8 m. Assume M-20 concrete and Fe-415 steel. Also design ring beams at opening and bottom of dome. |10+6=16|

OR

3. (*a*) Derive the expression for collapse load of a square slab fixed on all edges under yield line theory. |8|

(*b*) A R.C. Slab 5m × 5m is simply supported along the four edges and is reinforced with 10mm diameter of Fe-415 grade bars at 150mm c/c both ways. The average effective depth of the slab is 100 mm with overall depth of 130mm. The slab carries a flooring of 50mm thick with unit weight 22 kN/m^2. Determine the maximum permissible service load for the slab if M-20 grade concrete is used. |10|

Unit–'IV'

4. Design a rectangular water tank resting on ground having base area of 4m × 6 m. the height of water tank is 3.75 m and keep a free board of 0.15 m. Assume M-25 grade of concrete and Fe-415 steel. Assume appropriate data and clearly state the assumptions. |16|

OR

4. Design an insize water tank for a capacity of 900 m^3 by using M-25 and Fe-415. Assume density of water 9.8 kN/m^3 and keep diameter of cylindrical portion 14m. Take rise of top circular dome and bottom circular dome as 1.8 m and 1.6 m respectively. Design top circular dome, top ring beam and cylindrical wall of the tank. Take height of conical dome as 2 m with angle 45° with vertical |16|

Unit–'V'

5. Design a reinforced concrete deck slab culvert or two lane carriageway with the following data.
Effective span = 5.4 m, clear span = 5.0 m; Width of culvert = 12 m, width of bearing = 400 mm; Width of footpath = 1.5 m on both side, thickness of earing course = 75 mm, Asphaltic concrete with unit weight 22 kN/m^3. Material M–25 and Fe–415, Overall depth of deck slab = 470 mm, effective cover = 50 mm, carriageway width = 7.5 m, Consider IRC class A tracked loading. |16|

OR

5. Design the stem and heel slab of a R.C. cantilever retaining wall supporting an earth embankment of 3 m high. The top surface of embankment is horizontal. Also sketch the reinforcement with a neat sketch. Assume the following data.
Unit wt. of soil = 18 kN/m^3; Angle of internal friction = 30°; Safe bearing capacity of soil = 150 kN/m^3; Grade of concrete = M – 20; Grade of steel = –415; Assume all other data and state your assumptions.