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Question Paper Code : X10255

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Civil Engineering
CE 8703 – STRUCTURAL DESIGN AND DRAWING
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Use of IS 456 – 2000, IS 800 – 2007, IS 875 (Part 3) – 2003, IS 3370 (part 2) – 2009, IS 3370 (Part 4) – 2008, IS 4998 – 2003, IS 6533 (Part 1) – 2010, IS 6533 (Part 2) – 2003.

IRC 6 – 2014, IRC 21 – 2000, and steel tables is permitted.

Relevant data may be suitably assumed if found necessary.

Answer ALL questions

(5×20=100 Marks)

1. a) Design the stem for a cantilever retaining wall to retain earth of 4m height. The backfill is horizontal. The unit weight of soil is 17kN/m^3 . Coefficient of friction between soil and concrete is 0.5. Safe bearing capacity of soil is 200kN/m^2 . The angle of repose is 30° . Use M35 grade concrete and Fe415 grade steel.

(OR)

- b) Find the dimensions of a counterfort retaining wall to retain earth of 8 m height. The unit weight of soil to be retained is 16 kN/m^3 . Coefficient of friction between soil and concrete is 0.6. Safe bearing capacity of soil is 200kN/m^2 . The angle of repose is 30° . Use M40 grade concrete and Fe415 grade steel. Check the stability of the wall.

2. a) Design a slab bridge using M35 grade concrete and Fe415 steel for IRC 70 loading. Consider the following data

Clear span - 7m

Carriage way - 12m

Thickness of wearing coat - 80 mm

Draw to a suitable scale the cross-section showing the reinforcement details.

(OR)

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- b) Design an interior panel of a flat slab of panel size $5\text{m} \times 5\text{m}$ supported by columns of size $450\text{ mm} \times 450\text{ mm}$. Provide suitable drop. Take live load as 3kN/m^2 . Use M30 grade concrete and Fe 415 grade steel.
3. a) Design a circular tank 10 m diameter and 3 m height of wall Free board = 0.3 m. The tank rests on a firm ground. The walls are fixed at the base and free at the top. Use M30 and Fe415 rebars.

(OR)

- b) Design a rectangular underground tank for a capacity of 30 kilo litres. Use M30 and Fe415 rebars.
4. a) Design a i-section purlin for a steel roof truss for the following data
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|--|------------------------------|
| Span of roof | = 9m |
| Spacing of purlins along slope or truss | = 2m |
| Spacing of truss | = 3m |
| Slope of roof truss | = 1 vertical to 2 horizontal |
| Wind load normal to roof on the roof surface | = 1.5 kN/m^2 |
| Vertical load from roof sheet | = 0.2 kN/m^2 |
- Sketch the details of the roof.

(OR)

- b) Design a bolted connection to transfer a factored end reaction of 120 kN from the beam (ISMB250) to the flange of a column (ISHB200). Use Fe410 grade steel and bolts of grade 4.6.
5. a) Design a welded plate girder of span 30 m to carry a live load of 40 kN/m . Use steel of grade Fe410. Avoid use of bearing and intermediate stiffeners. Draw the cross-section and longitudinal elevation of the girder.

(OR)

- b) An ISMB500 frames into an ISHB300. The factored end shear force is 300kN and the factored end moment is 90 kNm. Design a suitable moment resistant connection assuming site welding.
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