Reg. No. : | | | | | | | | | | |

Question Paper Code: 47102

B.E./B.Tech. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Civil Engineering

14UCE702 -ADVANCED STRUCTURAL DESIGN

(Regulation 2014)

(Note: Use of IS 456:2000, SP 16:1980, IS 3370(Part –II):2009, IS 3370(Part –IV):1967, IS 800:2007, SP 6-1:1964 and IRC 21:2000 are permitted in the End Semester Examinations)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

(Answer all Questions)

1. High strength bolts are designed on the basis of

   (a) Friction (b) Tension (c) Compression (d) Shear

2. The maximum area of tension reinforcement in beams shall not exceed

   (a) 0.15 % (b) 1.5 % (c) 4 % (d) 1 %

3. The width of the flange of a T-beam should be less than

   (a) one-third of the effective span of the T-beam

   (b) distance between the centres of T-beam

   (c) breadth of the rib plus twelve times the thickness of the slab

   (d) least of the above

4. Cantilever retaining walls can safely be used for a height not more than

   (a) 3m (b) 4m (c) 5m (d) 6m

5. If the average bending stress is 6 kg/cm^2 for M 150 grade concrete, the length of embedment of a bar of diameter *d* according to I.S. 456 specifications, is

(a) 28 d (b) 38 d (c) 48 d (d) 58 d

6. Bottom bars under the columns are extended into the interior of the footing slab to a distance greater than

(a) 42 diameters from the centre of the column

(b) 42 diameters from the inner edge of the column

(c) 42 diameters from the outer edge of the column

(d) 24 diameter from the centre of the column

7. The method of design of steel framework for greatest rigidity and economy in weight, is known as

(a) simply design (b) semi-rigid design

(c) fully rigid design (d) none of the above

8. A fillet weld may be termed as

(a) mitre weld (b) concave weld (c) convex weld (d) all the above

9. The distance between, rivet line and the nearest edge of a joint not exposed to weather, is taken (where t is thickness in mm of the thinner outside plate).

(a) 10 t (b) 8 t (c) 6 t (d) 12 t

10. For the stability of a structural part, the weight or anchorage should be

(a) 1.4 times the minimum overturning moment due to dead load

(b) 1.2 times the minimum overturning moment due to dead load

(c) sum of (a) and (b)

(d) none of these

PART – B (5 x 2= 10Marks)

11. What are the advantages of welded joints?

12. Mention the reinforcement details that should be provided in a water tanks.

13. Give the names of various types of bridges.

14. What are the forces acting on a retaining wall?

15. Name the different types of of a roof truss.

PART – C (5 x 16= 80Marks)

16. (a) A tie member of a roof truss consists of two ISA 10075, 8mm. The angles are connected to either side of a 10 mm gusset plates and the member is subjected to a working pull of 300 kN. Design the welded connection. Assume the connections are made in workshop. (16)

Or

(b) (i) State types of bolted joints and types of failure in case of bolted joints. (8)

(ii) State two advantages of welded joints and two disadvantages of bolted joints. (8)

17. (a) Design a circular tank with a flexible base for capacity of 5 Lakh litres. The depth of water is to be 4m. Free board=200mm. Use M20 concrete and grade I steel. Permissible direct tensile stress in concrete =1.2 N/mm^2.Permissible stress in steel in direct tension=100N/mm^2.Sketch the details of reinforcements in tank walls. (16)

Or

(b) A reinforced concrete water tank resting on ground is 6m x 2m with a maximum depth 2.5m.Using M20 concrete and grade I steel design the tank walls. (16)

18. (a) Design a solid slab bridge superstructure having a clear span of 9.0 m and carriageway of 7.5 m with 1.5 m wide footway on either side for a National Highway. Loading: Single lane of IRC Class 70-R (both wheeled and tracked) or two lanes of IRC Class A whichever produces maximum effect. (16)

Or

(b) Explain the design principle of reinforced concrete solid slab bridge and in which condition this bridge is used? (16)

19. (a) Design a cantilever retaining wall to retain earth embankment 4m height above ground level the density of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. The safe bearing capacity of the soil may be taken as 200 kN/m^2 and the co-efficient of friction between soil and concrete is 0.5. Adopt M20 grade concrete and Fe415 HYSD bars. (16)

Or

(b) Design a counterfort type retaining wall to suit the following data: (16)
Height of wall above ground level = 6 m
S.B.C. of soil at site = 160 kN/m^2
Angle of internal friction = 33 degrees
Density of soils = 16 kN/m^3
Spacing of counterforts = 3 m c/c
Materials = M20 grade concrete
Fe415 HYSD bars
Sketch the details of reinforcements in the wall.

20. (a) Design an I section purlin for an industrial building to support a galvanized corrugated iron sheet roof. (16)
Spacing of the trusses = 5.0m
Spacing of purlins = 1.5m
Inclination of main rafter to horizontal = 30°
Weight of galvanized sheet taking into account laps and connecting bolts = 130 N/m^2
Imposed load = 1.5 kN/m^2
Wind load = 1.0 kN/m^2

Or

(b) Design the purlin for the following specification: (16)
Span of truss = 12 m c/c
Pitch = 1/5 of span
Spacing of truss = 5 m c/c
Spacing of purlin = 1.5 m c/c
Load from roofing materials etc., = 200 N/mm^2.
Wind load = 1200 N/m^2. Use angle section.