Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 37102

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Seventh Semester

Civil Engineering

01UCE702 - ADVANCED STRUCTURAL DESIGN

(Regulation 2013)

(IS 456:2000, IS 800:2007, SP 6-1:1964 and IRC 21:2000 are permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. List out the types of loading?

2. Why the partial safety factors are used in the design steps of bolted connection.

3. Define hoop stress.

4. Mention the purpose of providing ring beam in hemispherical bottomed steel water tank.

5. Name the component parts of the slab culvert.

6. Enumerate about foot-over bridge.

7. Write the difference between cantilever and counter fort retaining wall.

8. State the purpose of providing shear key.

9. Define the elements of north light roof truss with sketch.

10. What are the types of chimney?

PART - B (5 x 16 = 80 Marks)

11. (a) Explain the various design philosophies in detail. State their advantages and disadvantages. (16)

Or

(b) A 75*mm*x50*mm*x8*mm* angle is to be connected to a gusset plate by **6*mm*** fillet welds at the extremities of the longer leg. Design the weld connection corresponding to the full tensile strength of the angle. Assume shop welding. (16)

12. (a) Design side wall and floor slab only for a RC circular tank resting on the ground for a capacity of 500 m3. The depth of storage is to be 4m. Free board is 200 mm. Use M20 and Fe410 grade steel. (16)

Or

(b) Design a steel circular elevated water tank with hemispherical bottom for a capacity of 250 m^3. The height of the tank bottom above the ground level is 8.7 *m*. The tank is supported over eight columns and is situated at the Allahabad railway station. Height of cylindrical shell shall be 0.8 times the diameter of the tank. (16)

13. (a) Design a R.C. slab culvert for an NH to suit the following data: (i) Carriage way = 2 Lane, (ii) Footpath = 1*m* on either side, (iii) Clear span of bridge = 6 *m*, (iv) Thickness of wearing coat = 80 *mm*, (v) Width of the bearing = 400 *mm*. Use M20 and Fe415. Loading condition – IRC70R (Class AA) tracked vehicle. (16)

Or

(b) Describe about IRC specifications and loadings. (16)

14. (a) Design stem and toe for a cantilever retaining wall to retain earth embankment with a horizontal top above ground level: (i) Density of earth = 18 kN/m^3, (ii) Angle of internal friction, ϕ = 30°, (iii) SBC of soil = 200 kN/m^2, (iv) Coefficient of friction between soil and concrete = 0.6. Adopt M20 and Fe415. (16)

Or

(b) Design a counter fort type retaining wall to suit the following data.

 Safe bearing capacity of soil at site =160kN/m²,

Angle of internal friction=33°,

Density of soil=16kN/m³,

spacing of counter forts =3mc/c.

Materials:M-20 grad of concrete and Fe-415 HYSD bars

Sketch the details of reinforcement in the retaining wall. (16)

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15. (a) Write step by step procedure for the design of purlin. (16)

Or

(b) Design a self-supporting chimney of 30 m height. The diameter of the cylindrical shell is 2 m at the top. The chimney has a 100 mm thick brick lining supported on the shell. Take a uniform wind pressure intensity of 1.5 kN/m^2 throughout the height. Assume uniform values of permissible tensile and compressive stresses as 120 N/mm^2 and 90 N/mm^2. Design of base plate, lugs and anchor plates are not necessary. (16)

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