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

Question Paper Code: 37102

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

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. What are the types of loading?
2. Why the partial safety factors are used in the design steps of bolted connection?
3. Define hoop stress.
4. In which circumstances the circular water tank are designed and checked.
5. Name the component parts of the slab culvert.
6. Enumerate about foot-over bridge.
7. What is the function of shear key in retaining wall?
8. State the purpose of providing shear key.
9. What are the industrial structures?
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) Compare allowable stress design and limit state design with their merits and demerits. (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 reinforced concrete slab culvert for a slate highway to suit the following data:

Carriage way: two lane 7.5m wide

Materials:M-25 grade concrete and Fe-415 HYSD bars kerbs:600mm wide

clear span=6m, wearing coat=80mm,

width of bearing =400mm,

Loading: I.R.C class A or AA, whichever gives the worst effect. Design the reinforced concrete dock slab and stated the details of reinforcement in the longitudinal and cross section of the slab. The design should conform to the specifications of the bridge code IRC: 21-2000. (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, $\phi = 30^o$, (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 retaining wall to retain an earth embankment 4m high above ground level. The density of earth is 18kN/m^2 and its angle of repose is 30°.The embankment is horizontal at top. The safe bearing capacity of the soil may be taken as200kN/m^2 and

the coefficient of friction between soil and concrete is0.5. adopt M-20 grade concrete and fe-415 HYSD bars. (16)

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)

37102