Reg. No. :

Question Paper Code: 31172

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Seventh Semester

Civil Engineering

01UCE702 - ADVANCED STRUCTURAL DESIGN

(Regulation 2013)

(IS 456:2000, SP 16:1980, IS3370(Part-II):2009, IS 3370 (PART-IV):1967, 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. Describe the philosophy of structural design.

2. List out the types of bolts used in bolted connection.

3. Why neoprene pad is provided at the joints of base slab and wall in a water tank?

4. In what circumstances the circular water tank are designed and checked.

5. Mention the IRC loading for road bridge.

6. What are the components in the slab culvert?

7. Differentiate between cantilever and counter fort retaining wall.

8. What is the function of shear key in retaining wall?

9. What is the use of push in an industrial structures?

10. List out the various load acting on self-supported steel chimney.

PART - B (5 x 16 = 80 Marks)

11. (a) Compare allowable stress design and limit state design with their merits and demerits. (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 the side walls of a rectangular reinforced concrete water tank of dimensions 6*m* by 2*m* and having a maximum depth of 25*m* using M-20 grade concrete and Fe-4 15 HYSD bars. (16)

Or

(b) Design a circular hemispherical bottomed steel water tank to the following requirements.

Capacity of the tank =12,500 *liters*

Diameter of the tanks=5.5*metres*

Height of the tanks=12 *metres*

Adopt suitable working stresses method. (16)

13. (a) Design a reinforced concrete slab culvert for a slate highway to suit the following data:

Carriage way: two lane 7.5*m* wide

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

clear span=6*m*, wearing coat=80*mm*, width of bearing =400*mm*.

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

31172

(b) Design the foot bridge for the following data:

Type of girders =Lattice type (say)

span of girders =16m c/c of bearings

cross girder spacing =2m

walking width=2.50m(clear width)

Pedestrian load = 400N/m^2

Flooring to be made of timber planks supported on cross girders. (16)

14. (a) 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 is 0.5. adopt M-20 grade concrete and Fe-415 HYSD bars. (16)

Or

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

Safe bearing capacity of soil at site =160kN/m^2, Angle of internal friction=33°,

Density of soil=16kN/m^3, 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)

15. (a) Design an I-section purlin for the following data:

Span of trusses=5m

Spacing f trusses =10m

Spacing of purlin=1.25m

D.L of roof sheets = 125kN/m^2

wind load=1800N/m^2 normal to roof

Slope of roof=30º. (16)

Or

31172

(b) Design a self supporting steel chimney to the following particulars

   Height of the chimney=80*m*

   Diameter or the chimney =4*m*

   Thickness of the lining =100*mm*

   Wind pressure =1500*N/mm²* of flat vertical surface.   (16)

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