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BICEE-009

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

00872

December, 2017

BICEE-009 : ADVANCED STEEL DESIGN

Time : 3 hours *Maximum Marks : 70*

Note : *Use of IS 80 code and SP 6 are permitted. Assume suitable data, if any. Use of scientific calculator is permitted. Attempt any* ***four*** *questions.*

1. Design a gantry girder, without lateral restraint along its span, to be used in an industrial building carrying an overhead travelling crane for the following data : $17\frac{1}{2}$

   Centre-to-centre distance between columns (i.e., span of gantry girder) = 7·5 m

   Crane capacity = 200 kN

   Self-weight of trolley, electric motor, hook, etc. = 40 kN

   Minimum hook approach = 1·2 m

Distance between wheel centres = 3·5 m
c/c distance between gantry rails (i.e., span of the crane) = 15 m
Self-weight of the rail section = 300 N/m
Yield stress of steel = 250 MPa

2. Design a steel water tank with the following data :
Capacity of the tank = 1,25,000 liters
Diameter of the tank = 5·5 metres
Height of the columns = 12 metres
Adopt suitable working stress. $17\frac{1}{2}$

3. A self-supporting steel stack is 77 m in height and its diameter is 2·2 m. Design the thickness of chimney at equal part of 7 intervals. Take initial wind pressure at the bottom as 1·65 kN/m^2. Assume 3 breech openings that are located at a height of 4 m from base. The size of opening is 1·5 m × 1·5 m. Use Fe 415 grade steel. $17\frac{1}{2}$

4. A welded plate girder of span 25 m carries a load of 80 kN/m over the whole span besides its weight. Design the girder with intermediate stiffeners using post critical method. $17\frac{1}{2}$

5. Design a built-up laced column with 4 angles to support an axial load of 900 kN. The column is 12 m long and both the ends are held in position and restrained against rotation. Assume 410 grade steel. $17\frac{1}{2}$

6. A light gauge steel rectangular box section 200 mm × 100 mm × 2 mm is used for a column. The effective length of the column is 3·6 m. Determine the safe load carrying capacity of the section. Assume basic design stress (σ_b) suitably. $17\frac{1}{2}$
