B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

00273

December, 2016

BICE-013 : STRUCTURAL DESIGN AND DRAWING – I

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. IS 456, IS 800, steel tables and scientific calculator are permitted. Assume any missing data suitably.*

1. (a) Find the moment carrying capacity of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth. It is reinforced with 4 bars of 16 mm diameter. Take Fe 415 steel and M 20 concrete for the beam. *7*

(b) Write the advantages of using spiral shaped transverse reinforcement in RC columns. *7*

2. An RCC cantilever beam of 3 m span supports a distributed factored load of 120 kN/m. The beam has a uniform width of 300 mm, with overall depth varying from 650 mm at the support to 400 mm at the free end. The beam is reinforced with 2 bars of 20 mm diameter on the bottom side and 5 bars at 28 mm diameter on the top side with effective cover of 50 mm. Design shear reinforcement for the beam. Use M 20 grade concrete and Fe 415 grade steel reinforcement. *14*

3. Design a floor slab for an interior room, with clear dimension of 4·0 × 8·5 m for a building. The slab is assumed to be simply supported on 230 mm thick masonry walls. The floor loading consist of live load of 4·0 kN/m^2 and 1·5 kN/m^2 due to finish, partition, etc. Fe 415 steel and M 20 concrete are used for construction. *14*

4. (a) Explain why deflections in concrete structures are undesirable. What are the major factors that affect deflection ? Discuss briefly. *7*

   (b) Discuss the behaviour of under-reinforced and over-reinforced concrete beams. *7*

5. Calculate the design compressive load carrying capacity of a discontinuous strut having the centre-to-centre distance 2·5 m between the end connections. It consists of two ISA 70 × 70 × 6 mm angles connected to an 8 mm gusset plate. Consider the following cases : *14*

   (a) Connected to the same side of gusset plate.

   (b) Connected to both sides of gusset plate.

6. (a) Write the steps of design of built-up steel columns provided with lacing flats. *7*

   (b) Compare the merits and demerits of Reinforced concrete and steel construction. *7*

7. Write short notes on any ***two*** of the following topics : $2 \times 7 = 14$

(a) Limit States of Design

(b) Importance of Transverse Reinforcement in Beams

(c) Quality Control of Concrete