B.TECH CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2013

BICE-013: STRUCTURAL DESIGN AND DRAWING - I

Time : 3 hours   *Maximum Marks : 70*

Note :   Answer any five questions. IS - 456 - 2000 and IS - 800 - 2007 are allowed use of calculator is permitted.

1.   A rectangular beam section of 300 mm width and **14** 500 mm effective depth is reinforced with the tension steel of 4 - 22 mm φ and the compression steel of 4 - 16 mm φ. Consider the clear cover to be 25 mm and grade of concrete as M20 and grade of steel as Fe 415. Determine the ultimate moment of resistance.

2.   Design a R.C.C. slab for a room having inner **14** dimensions 3 m × 7 m. The thickness of support wall is 300 mm. The live load on the slab may be taken as 2 kN/m². Assume the slab to be simply supported at ends. Consider the grade of concrete as M20 and the grade of steel as Fe 415.

3. Design a flight of stairs for a commercial building, **14** with the following data for the span between landing :
   (a) No. of steps   = 12
   (b) Tread   = 300 mm
   (c) Rise   = 160 mm
   (d) Width of landing   = 400 mm
   (e) Grade of concrete   = M20
   (f) Grade of steel   = Fe 415
       Also draw the longitudinal section of the flight with the reinforcement details.

4. (a) Explain the procedure to be adopted for the **7** design of isolated column footing.
   (b) What is meant by critical sections, in the **7** design of footing ? Explain critical sections with respect to flexure and shear.
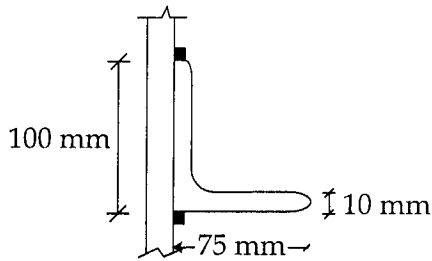
5. Determine the tensile strength of a root truss **14** diagonal $100 \times 75 \times 10$ mm $(fy = 260N/mm^2)$ connected to Gusset plate by
   (a) 20 mm diameter power driven rivets in one row along the length of the member. The short leg is kept outstanding.
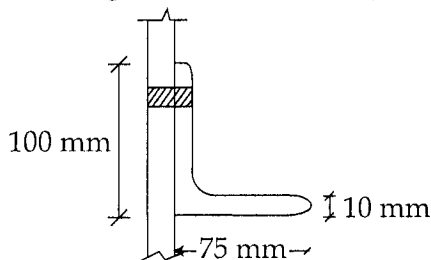
100 mm
$\updownarrow$ 10 mm
←75 mm→
(a)

(b)   5 mm fillet weld

(b)

6.   A simply supported steel joist with a 4 m effective   **14**
      span carries a U.D.L of 40 kN/m over its span,
      inclusive of self weight. Consider the beam to be
      supported laterally throughout. Select a suitable
      section and check its safety.

7.   (a)   Give an account of advantages and   **7**
             disadvantages of Tubular sections.

      (b)   Explain the behaviour of tubular sections   **7**
             when it is used as compression member,
             tension member and beam.

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