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BICE-013

B.TECH. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2014

00104

BICE-013 : STRUCTURAL DESIGN AND DRAWING - I

Time : 3 hours *Maximum Marks : 70*

*Note : (i) Answer **any five** questions.*

(ii) IS 456 and IS 800 codes are allowed.

*(iii) Use of calculator is **permitted.***

1. (a) Discuss the salient features of limit state method. 6

   (b) Find the ultimate moment of resistance of a beam 300 mm wide reinforced with 2-28 mm ϕ and 2-25 mm ϕ bars at an effective depth of 600 mm. Adopt M 25 grade concrete and Fe 500 steel. 8

2. (a) What is the necessity of providing shear reinforcement ? What are the various types of shear reinforcement used, explain briefly. 6

   (b) A reinforced concrete beam 400 mm $\times$ 700 mm is simply supported over a clear span of 6 m. It carries a u.d.l of 51.2 kN/m. (Including self weight). The section is reinforced with 6 bars of 20 mm ϕ using M 20 concrete and mild steel, calculate the shear reinforcement if : 8

   (i) only vertical stirrups are used,

   (ii) two bars are bent - up at 45° at the same cross - section.

3. A 4 m high column is effectively held in position at both ends and restrained against rotation at one end. Its diameter is restricted to 40 cm. Calculate the reinforcement if it is required to carry a factored axial load of 1400 kN, use M 20 mix and Fe 250 grade steel. 14

4. (a) Two flats (Fe 410 Grade Steel), each 210 mm × 8 mm, are to be jointed using 20 mm diameter, 4.6 grade bolts, to form a lap joint. The joint is supposed to transfer a factored load of 250 kN. Design the joint and determine suitable pitch for the bolts. 7

(b) A tie member consisting of an ISA 80 mm × 50 mm × 8 mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. 7

5. Determine the block shear strength of the welded tension member shown in Fig. (1) steel is of grade Fe 410. 14

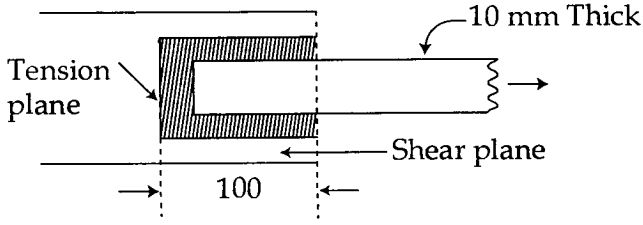

Fig. (1)

6. Design a laterally supported beam of effective span 6 m for the following data : 14

Grade of steel : Fe 410

Maximum bending moment M = 150 kNm

Maximum shear force : V = 210 kN

7. Design a welded plate girder 24 m in span and laterally restrained throughout. It has to support a uniform load of 100 kN/m throughout the span exclusive of self weight. Design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410. Design the cross-section, the end load bearing stiffener and connections. 14