BICE-013

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

☐☐☐1☐ **December, 2018**

BICE-013 : STRUCTURAL DESIGN AND DRAWING – I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions. Use of IS 456 and IS 800 codes is allowed. Use of scientific calculator is allowed.*

1. (a) Compare the limit state method and working stress method. *4*

   (b) Find the limiting moment carrying capacity of a reinforced concrete rectangular section of size 200×425 mm effective and the area of mild steel required. Use M 20 grade concrete and Fe 250 grade of steel. *10*

2. (a) Enlist different types of staircases and draw plans of any two types of staircases with details. *7*

   (b) Describe the design procedure of one-way slab. *7*

3. (a) Differentiate between cantilever and counterfort retaining walls. *4*

(b) An RCC column of unsupported length of 3 m is to be designed for a factored axial load of 2500 kN. Determine the cross-sectional dimensions of the column and the reinforcement required when there is no restriction on the cross-sectional dimension. Use M 25 grade of concrete and Fe 415 grade of steel. *10*

4. (a) Describe the types of welds. *5*

(b) Two plates 10 mm and 60 mm are connected in a lap joint with 5 M 16 bolts of grade 4·6 and 410 grade plates. Calculate the strength of joint as shown in Figure 1. *9*
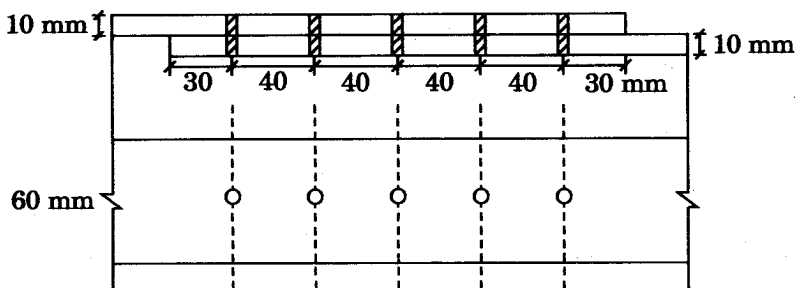

Figure 1

5. (a) What is shear lag ? What are the benefits of its use in the tension members ? 5

(b) Determine the design tensile strength of a plate 120 × 8 mm connected to 12 mm thick gusset plate with bolt holes as shown in Figure 2. The yield strength and ultimate strength of steel are 250 and 400 MPa. The diameter of the bolt is 16 mm. 9
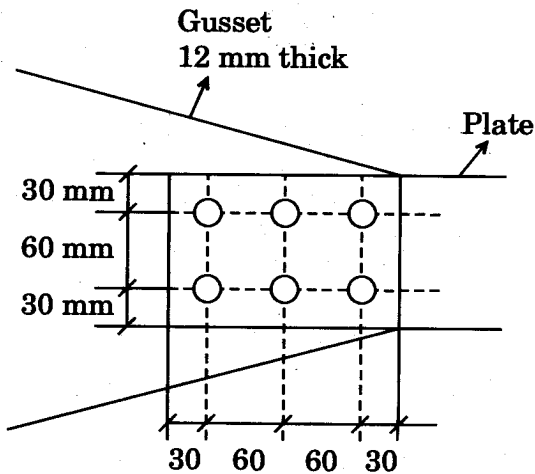

Gusset
12 mm thick

Plate

30 mm

60 mm

30 mm

30   60   60   30

Figure 2

6. (a) Elaborate the configuration of pitched roof trusses. 5

(b) Design a load carrying stiffener for a load
of 1200 kN for an ISMB 500 beam.   9

ISMB 500

h = 500 mm,

b_f = 180 mm,

t_f = 17·2 mm,

t_w = 10·2 mm,

μ_1 = 17 mm.

7. Write short notes on any **four** of the
following : $4 \times 3\frac{1}{2} = 14$

(a) Buckling in Columns

(b) Development Length

(c) Stress Strain Curve for Concrete

(d) Tie Member in Roof Truss

(e) Lug Angles

(f) Grillage Foundation