KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B. E.
Year : IV

Course : CIEG 402
Semester: I

Exam Roll No.:

Time: 30 mins.

F. M. : 10

Registration No.:

Date : MAR 0 4 2018

SECTION "A"
[20 Q.×0.5=10 marks]

Select the most appropriate answer.

1. If the diameter of bolt is 20mm then the maximum number of bolts that can be accommodated in one row in a 200 mm wide flat is:
   a) 2 b) 3 c) 4 d) 6

2. The maximum pitch of the bolts for a compression member should not exceed:
   a) 2.5 times the dia. of bolt
   b) 12 *t* or 200 mm whichever is less
   c) 2.5 times the dia. of holes
   d) 16 *t* or 200 mm whichever is less

3. The effective throat thickness of a fillet welds is K times the size of weld. For 70 degree angle between fusion faces, the value of K is
   a) 0.7 b) 0.65 c) 0.6 d) 1.0

4. Which one of the followings is prominent mode of failure in fillet bolt?
   a) Tension b) Shear c) Bearing d) Crushing

5. The net sectional area of a tension member is the gross sectional area of the member minus _____
   a) The sectional area of one bolt
   b) The sectional area of maximum no. of holes
   c) The sectional area of one hole
   d) The sectional area neglecting the hole

6. The best tension member shall be
   a) Bolted single angle section
   b) Welded single angle section
   c) Double angle section on opposite side of gusset plates
   d) Channel section

7. In case of angle section with lug angles, their attachment to the member should be capable of developing *x*% in excess of the force in outstanding leg of angle, where *x* is
   a) 20 b) 10 c) 40 d) 30

8. Minimum number of battens required in a built up column are:
   a) 2 b) 3 c) 4 d) 5

9. Lacing bar of built up steel column should be designed to resist_____.
   a) Bending moment due to 2.5% column load
   b) Shear force due to 2.5% column load
   c) 2.5% column load
   d) To connect steel sections.

10. For same load, unsupported length and end conditions, a laced column is compared to the batten column is _____.
a) Stronger b) Weaker c) Equal d) cannot be compared

11. Which of the following sections are preferred in column sections?
a) ISLB b) ISMB c) ISWB d) ISHB

12. The deflection of steel beam in buildings other than industrial buildings is limited to a span divided by
a) 200 b) 250 c) 300 d) 350

13. A beam is classified as low shear beam if factored shear force is less than_____.
a) $0.4V_d$ b) $0.6V_d$ c) $0.8V_d$ d) $1.0V_d$

14. The live load for sloping roof with slope 15° where access is not provided to roof is taken as
a) 0.65 kN/m^2 b) 0.75 kN/m^2 c) 1.35 kN/m^2 d) 1.5 kN/m^2

15. Area of opening for building of large permeability is more than__ wall area
a) 10% b) 20% c) 30% d) 50%

16. Generally purlins are placed at the panel points so as to avoid:
a) Axial force in rafter b) Deflection of rafter
c) Shear force in rafter d) Bending moment in rafter

17. Snow load in roof is assigned as_____ per mm depth of snow
a) 2 kN/m^2 b) 2.5 kN/m^2 c) 3 kN/m^2 d) 3.5 kN/m^2

18. For a simply supported beam with UDL of intensity "w" throughout its span, its maximum deflection is :
a) $wl^3/(48\ EI)$ b) $wl^3/(12\ EI)$ c) $5wl^4/(384\ EI)$ d) $wl^3/(8\ EI)$

19. The value of s/d of a solid teak wood column is 9.76. The column is classified as
a) Short b) Long c) intermediate d) not enough data

20. Bending moment of timber beam should be multiplied by form factor if its depth is greater than
a) 250 mm b) 300 mm c) 350 mm d) 400 mm

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SECTION "B"

Use of IS 800:2007, IS 875 : 1994 part III, IS 883 and steel tables is allowed. Attempt ALL questions and assume suitable data if necessary.

1. Design a bolted connection of a truss joint shown in figure 1 using M 16 bolts of grade 4.6 and steel of Fe 410. Use 10 mm gusset plate. Draw a necessary sketch. [7]

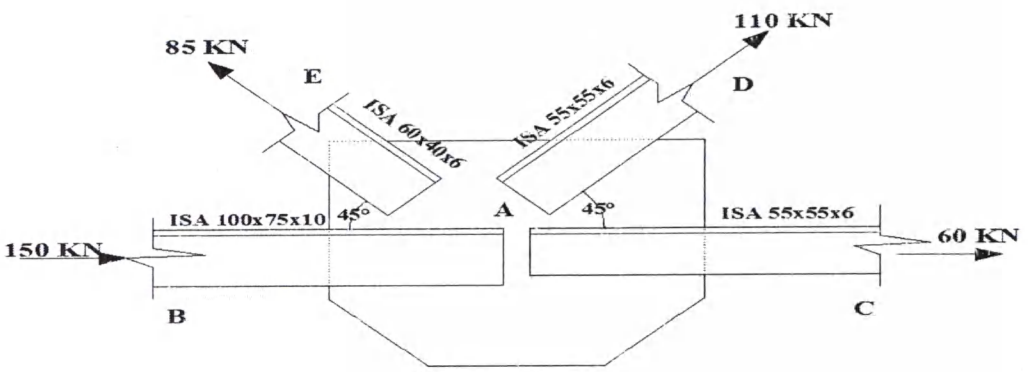

Fig: 1

2. A hall measuring 15 × 6 m consists of beams of clear span 6 m spaced 3 m c/c. RCC slab of 110 mm thickness (ρ=25 kN/m^3) is cast over the beam. The imposed load is 4 kN/m^2. The beam is supported on 250 mm wall. Design an intermediate beam and perform necessary check. [9]

3. Design a build up column of length 5.5 m to carry an axial service load of 750 kN using two channels and single lacing. The column is Fe 410 and is effectively held in position at both ends but not restrained against rotation. [9]

4. (a) Design a 4m long Sal column to carry an axial load of 325 kN. Take outside location. [4]

   (b) Find the design wind pressure for the design of sloping roof located in Delhi. The building has following data; [4]

Angle of slope of roof (α) = 28°
Building height ratio, h/w = 0.75
Factors $K_1 \times K_2 \times K_3$ = 0.79

5. A single unequal angle ISA 100 x 75 x 10 is connected to a 10 mm thick gusset plate with six 16 mm dia. Bolts to transfer tension as shown in figure 2. Determine the design tensile strength of the angle of Fe 410. Gusset is connected to longer leg. [7]

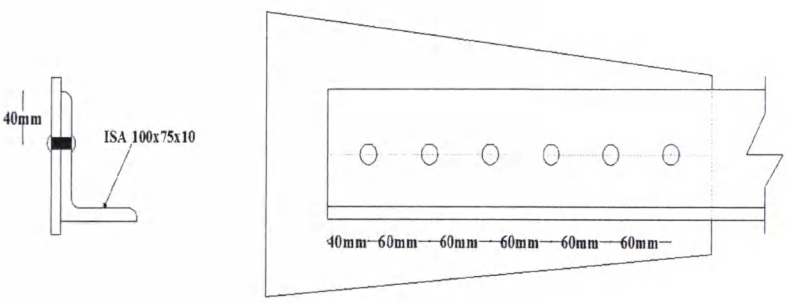

Fig: 2