

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Structural Design - I

Subject Code : 4TE07STD1

Branch: B.Tech (Civil)

Semester : 7

Date :27/11/2018

Time : 10:30 To 01:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.
- (5) IS 456 -2000, IS 800 -2009, SP-16, Steel table permitted during examination.

- Q-1 Attempt the following questions: (14)**
- a) Concrete is very weak in..... (1)
 - b) What is R.C.C ? (1)
 - c) Enlist Various Method of Design R.C.C Structure. (1)
 - d) What is minimum diameter of bar used in Beam? (1)
 - e) Write any two difference between singly beam and doubly beam. (1)
 - f) What is balance section? (1)
 - g) How many directions bending take place in two way slab? (1)
 - h) Due to which reason bent up bar Provide in slab? (1)
 - i) Define Short Column. (1)
 - j) Write any two advantages of steel structure. (1)
 - k) What is edge distance? (1)
 - l) Enlist different mode of failure in tension member. (1)
 - m) The Slender ratio of lacing bar should not exceed..... (1)
 - n) Enlist various type of tension member. (1)

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- (A) An R.C.C beam is required to resist a bending moment of 70 KNm . Design the beam for Flexure taking $b/d=0.5$. Use M20 Concrete and $f_e 415$ steel. (7)
 - (B) Find the factored moment of resistance of an R.C.C Beam 300mm x 450mm. The beam is reinforced with 4-25 mm diameter bars in the tension zone. 2-20 mm diameter bars are placed at a distance of 50mm from top in the compression zone. Use M-20 grade concrete and Fe415 Grade steel. (7)
 - (A) Find the moment of resistance of a T- beam having a web width of 240mm, effective depth of 400mm flange width of 740mm and flange thickness equal to 100mm . the beam is reinforced with 5-16mm diameter Fe 415 bars Use M 20 (8)



- grade concrete and steel fe 415.
- (B) Write design steps of two way slab. (6)
- Q-4 Attempt all questions (14)**
- (A) Write difference between one way slab and two way slab. (6)
- (B) Design a simply supported slab for a room 7.5m x 3.5m clear size. The slab is carry an imposed load of 5 Kn/m² Use M20 mix and Fe 415 steel. (8)
- Q-5 Attempt all questions (14)**
- (A) A reinforced concrete short column is 400 mm x 400 mm and has 4 bars of 20mm diameter. Determine the ultimate load carrying capacity of column if M20 concrete and Fe 415 steel is used. Assume $e_{min} < 0.05D$. (7)
- (B) Design a short circular column 6 m long to carry an axial load of 250 kN, if both ends of the column are fully restrained. Use helical reinforcement. (7)
- Q-6 Attempt all questions (14)**
- (A) Design a square footing of uniform thickness for an axially loaded column of 450mmx450mm size. The safe bearing capacity of soil is 190kN/m². Load on column is 850 KN. Use M-20 Concrete and Fe 415 steel. (7)
- (B) Design lap joint connecting two plates 120mm x 6mm to transmit a factored load of 150kN. Use 16 mm diameter black bolt of grade 4.6 and steel having $f_u=410N/mm^2$ (7)
- Q-7 Attempt all questions (14)**
- (A) A tie member of a truss consisting of an angle section ISA 70x70x6 mm of Fe 410 grade is welded to a 8mm- gusset plate. Design a weld to transmit a load equal to the full strength of member. Assume Shop welding (8)
- (B) Write Design step of Tension Member (6)
- Q-8 Attempt all questions (14)**
- (A) Determine the design axial load on the column section ISMB450 @ 710.3 N/m Height of column is 4 m and it is pin –ended Assume that $f_y= 250N/mm^2$ $F_u=410N/mm^2$, $E=2 \times 10^5$ (7)
- (B) Design a built-up column consisting of two channels placed toe to toe. The column carries an axial factored load of 1500kN. The effective height of the column is 10m. Design the lacing also. Assume Fe 415 grade steel. (7)

