Enrollment No: _____   Exam Seat No:_____

C. U. SHAH UNIVERSITY
Summer Examination-2022

Subject Name : Structure Design-I

Subject Code : 4TE07STD1   **Branch: B.Tech (Civil)**

Semester: 7   **Date: 21/04/2022**   **Time: 02:30 To 05:30**   **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.

Q-1   **Attempt the following questions:**   **(14)**

  a) What are the advantages of bolted connections over riveted or welded connections?   (1)
  b) Give the full form of HYSD   (1)
  c) Give the Definition of Floor beam.   (1)
  d) What is the difference between Mild steel and HYSD steel?   (1)
  e) What are the advantages of bolted connections over riveted or welded connections?   (1)
  f) Give the Definition : stringers   (1)
  g) State types of Limit State.   (1)
  h) Why rolled I-sections widely used as beam member ?   (1)
  i) Determine the shape factor for a circular section having radius R.   (1)
  j) Give the Definitions of girder.   (1)
  k) Give the full form RCC.   (1)
  l) Give the Definitions of purlins.   (1)
  m) Give the full forms of TMT.   (1)
  n) Determine the shape factor for a rectangular beam of width b and depth d.   (1)

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

Q-2   **Attempt all questions**   **(14)**
  (A) Determine the position of neutral axis of a reinforced concrete beam 230 mm wide and 460 mm effective depth, if the stresses developed in concrete and steel are 6.3 N/mm2 and 212 N/mm2respectively. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. Also state the type the beam.   **(7)**

(B) A rectangular cantilever beam of size 230 mm width X 500 mm effective depth is subjected to a bending moment of 80 KNm. Design the reinforcement for flexure. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415 **(7)**

Q-3 **Attempt all questions** **(14)**
(A) A simply supported T-beam of 4.5 m clear span is loaded with characteristic load of 40 KN/m. If is reinforced with 4 no. 20 mm diameter bars at support. The section of the beam is 230 mm wide X 560 mm effective depth. Design the shear reinforcement at the support. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. **(7)**

(B) A simply supported one-way slab of a corridor of an office building of a clear span 2.4 m is supported on beams of 230 mm width. Design the slab for a live load of $5KN/m^2$. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. **(7)**

Q-4 **Attempt all questions** **(14)**
(A) An equal angle section 80 x 80 x 6 mm is connected to gusset plate 8 mm tick using 4-20 diameter bolts to transfer tensile force. Determine tensile strength of the angle. Assume steel grade Fe410. **(7)**

(B) Determine tensile strength of 2 ISA 90 x 90 x 10 mm placed on same side of gusset plate 12 mm thick, and tack bolted. **(7)**

Q-5 **Attempt all questions** **(14)**
(A) An R.C.C. column of size 350 mm X 350 mm reinforced with 8 no.16 mm diameter bars carries a characteristic load of 800 KN. The allowable bearing pressure on soil is 200 KN/m^2. Design an isolated square pad footing. The materials are M 20 grade concrete and HYSD reinforcement of grade Fe 415 for both the column and the footing. **(7)**

(B) Design a rectangular isolated footing for a column of size 250 mmm X 750 mm carrying an axial characteristic loads of 2000 KN and reinforced with 10 no. 25 mm diameter bars in M 30 grade concrete. The allowable bearing pressure on soil is 220 KN/m^2 at 2.0 m depth. The materials are M 20 grade concrete and HYSD reinforcement of grade Fe 415. **(7)**

Q-6 **Attempt all questions** **(14)**
(A) Gives various steps for design of angle purlins. **(7)**

(B) Distinguish between plastic design method and elastic design method. **(7)**
Q-7 **Attempt all questions** **(14)**
(A) Discuss various cross sections of beam. **(7)**
(B) Explain the purpose of Binding wires, Spacers, Chairs and Dowels from detailing point of view. **(7)**

Q-8 **Attempt all questions** **(14)**
Design a simply supported beam of span 7m carrying R.C.C slab capable of providing lateral resistant to top compression flange. The beam is

subjected to total u.d.l of 100 kN dead load excluding self weight plus 150 kN imposed load. In addition, the beam carries a point load at mid span made up of 50 kN dead load and 50 kN imposed load.