C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name : Structural Design-II

Subject Code :4TE08STD1   **Branch : B.Tech (Civil)**

Semester : 8   **Date :12/04/2017**   **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.
    (5)   Use of IS:456, IS:3370, IS:800, IS:875, SP:16 and steel tables are permitted .
    (6)   Material is M20 grade concrete and Fe 415 Steel for RCC and fy=250 Mpa for steel if not specified.

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

    a)   Read the Drawing Carefully and Give the Answers of the Following Questions.   4
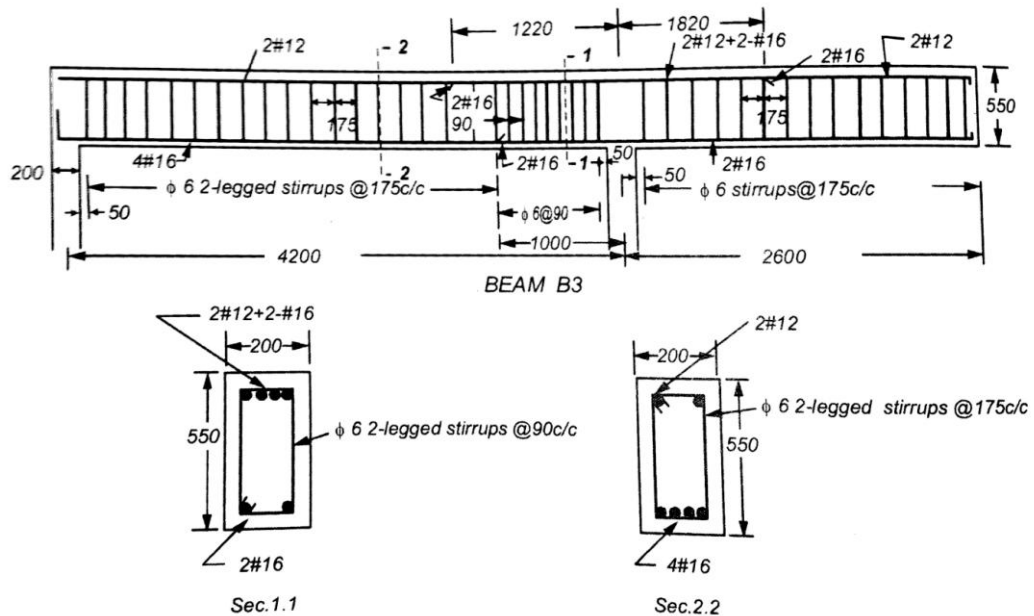
Fig.1 Details of Reinforcement of Beam

    1. Find the compression reinforcement in the Section 1.1
    2. Find the minimum diameter of shear reinforcement in section 1.1
    3. Find the maximum spacing in stirrups for section 2.2
    4. Find the effective spans for the Given beam.

b) What is the maximum size of bar for the two way slab? 1

c) Give the location of critical section for B.M, one way shear and two way shear in footing. 1

d) As per IS:3370, Minimum % of reinforcement in wall, Floors and roofs of water tank is taken as_____%. 1

e) Generally which process of welding is adopted for structural steel connections? 1

f) Which Section is most frequently used for the principal Rafter in roof truss? 1

g) Which type of load is carried by principal rafter in simply supported truss? 1

h) For gantry girder economic depth of girder is taken as _____ 1

i) In case of rolled steel beams, shear force is resisted by_____ 1

j) Sag rods are used in a roof truss for connecting 1
(a) Purlins (b) Main ties (c) Web and flanges together (d) None of these

k) In a plate girder, a web should be checked for shear buckling if 1
(a) $d/t_w > 67\epsilon$ (b) $d/t_w \le 67\epsilon$ (c) $d/t_w > 90\epsilon$ (d) $d/t_w > 200\epsilon$

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

Q-2 (14)

Design a gantry Girder, without lateral restraint along its span, to be used in an industrial building carrying an over head travelling crane for the following data.
c/c distance between columns =7.5m
Crane Capacity = 200 kN
Self Weight of the crane girder excluding trolley = 200 kN
Self weight of trolley, electrical motor, etc = 40 kN
Minimum hook Approach = 1.2 m
Distance between wheel centers = 3.5 m
c/c distance between gantry rail section = 15 m
Self weight of rail section = 300 kN/m
Yield stress of steel = 250 MPa

Q-3 (14)

A retaining wall is to be design to retain horizontal earth fill of 3.5 m height. Workout the dimension for various components, provide necessary stability checks and design either stem or heel slab. Furnish the reinforcement detailing. Consider following design data.
(i) Unit weight of soil :17 kN/m3
(ii) Angle of internal friction of soil : 30°.
(iii) Safe bearing capacity of soil strata: 175 kN/m2
(iv) Coefficient of friction between base and soil : 0.55
Use M20 concrete and Fe 415 steel

Q-4 (14)

Design a footover bridge for the following data:
Type of truss: N- type
Span of Bridge: 20m
Width of walk way: 2.5m
Hight of truss : 2m
Live load: $5kN/m^2$

Floor finish : 1kN/m^2
Rcc Slab thickness: 120 mm thick, F_y= 250
Assume Suitable Data if required.rakers are provided at alternate top chord joint

Q-5 (14)

Prepare a typical structural lay out for G+3 storey building having 3 bays 0f 4m in X – direction and 4 bays 0f 5 m in Y-direction. Design a two way slab with one short edge discontinuous. Floor height is 3 m. Draw neat sketch of reinforcement detailing.

Q-6 **Attempt all questions** (14)

a) Design a welded plate girder for a simply supported bridge deck beam with clear span of 20m, subjected to the following 10
Dead load including self weight = 20 kN/m
Imposed Load = 10 kN/m
Two moving loads = 150 kN each spaced 2m apart
Assume that top compression flange of the plate girder is restrained laterally and prevented from rotating. Use mild Steel with fy = 250 MPa. Design An unstiffened plate girder with thick webs.

b) Discuss Various bracing systems used in lattice tower. 04

Q-7 **Attempt all questions** (14)

a) Calculate wind pressure and design forces on wall and roof of rectangular building having plan dimensions 10m x 50m and height 5 m, as shown in fig-2. The building is situated in Ahmadabad in an upcoming industrial complex fairly leveled topography. The wall of building having 20 openings of 1.5m x 1.5m size. The building has flat roof supported on load bearing walls. 08
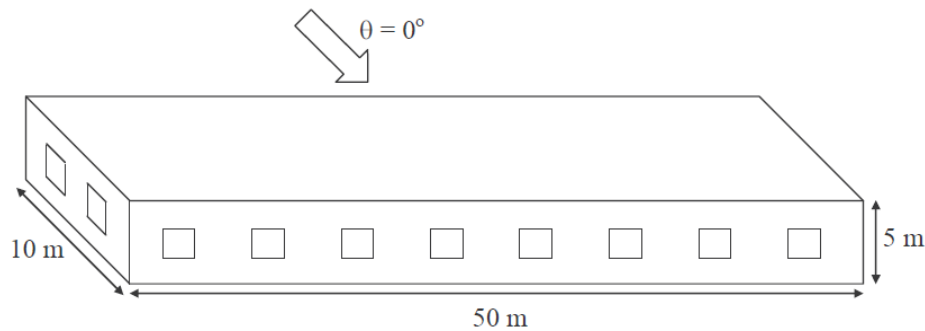

Figure-2

b) Design a circular water tank of capacity 85000 litre with a flexible joint at the junction of wall and base resting on ground. 06

Q-8 **Attempt all questions** (14)

a) What is Intze tank? Draw the neat sketch of Intze tank and locate its various structural components and IS Criteria. 12

b) What are the flexible and rigid diaphragms? 02