C.U.SHAH UNIVERSITY
Summer Examination-2019

Subject Name : Structural Design - II

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

Semester : 8   **Date : 15/04/2019**   **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.

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

a) Name the various types of loads in a residential building.

b) Mention the IS code book for calculating the wind load on structures.

c) Define ductility.

d) List the popular methods for analysis of continuous beams and frames.

e) What are the merits of working stress method?

f) Mention the two most important considerations in design of R.C. tanks.

g) Write the different shapes of underground water tanks.

h) Enlist the main components of a retaining wall.

i) What is a plate girder?

j) Write the essential components of a crane system.

k) List the functions of Eaves girder.

l) Mention the available roof materials to cover the roof of a truss.

m) What is the other name of truss girder bridges?

n) Enlist the various loads acting on lattice towers.

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

Q-2   **Attempt all questions**

(a) Mention the advantages, disadvantages and applications of plate girder.   **(02)**

(b) Design a bolted Plate girder for effective span of 24 m to carry two concentrated **(12)** factored loads 150 kN each at 6m from ends along with factored u.d.l. of 32 kN/m. The girder is laterally supported.

Q-3 **Attempt all questions**

(a) Draw the various types of gantry girder. **(02)**

(b) Design a gantry Girder. **(12)**

Centre to centre distance between columns (i.e. Span of Gantry Girder) = 7 m.

Crane Capacity = 250 kN,

Self-weight of the crane girder excluding trolley = 200 kN,

Self-weight of the trolley, electric motor, hook etc. = 60 kN,

Minimum Hook Approach = 1.10 m,

Wheel base = 3.4 m,

c/c Distance between gantry rails (i.e Span of Crane)= 20 m,

Self-weight of the rail section = 250 N/m,

Yield stress of steel = 250 Mpa. Assume no lateral restraint along the span.

Q-4 **Attempt all questions**

(a) Enumerate the various types of retaining wall and explain any one in detail with **(02)** neat sketches.

(b) Design a cantilever retaining wall to retain earth embankment with a horizontal **(12)** top 4.0m above ground level with the following data:

Angle of Internal friction = 32°

Unit weight of soil = 17 kN/m^3

SBC of soil = 200 kN/m^2

Coefficient of friction between base and slab = 0.50

Use M20 concrete and Fe 415 grade of steel.

Q-5 **Attempt all questions**

(a) List the various steps involved in the design of angle purlin and channel/I section **(02)** purlin.

(b) Design a foot over bridge for the following data: **(12)**

Type of truss: warren type

Span of roof truss: 18 m

Width of walk way: 4 m

Panel length: 3 m

Live load: 5 kN/m^2

Floor finish : 1 kN/m^2

Rcc Slab thickness: 120 mm thick, Fy = 250

Assume Suitable Data if required.

Q-6   **Attempt all questions**

(a) Describe the different types of joints used in water tank. **(02)**

(b) Design an overhead circular water tank with flat bottom and supported on ring beam with the following data: **(12)**

Capacity of tank 4.5 lacs litre.

M-25 concrete and Fe 415 steel. (Assume required data.)

Deign the following components:

  (1) Top spherical dome

  (2) Top ring beam

  (3) Cylindrical wall

  (4) Base slab

Q-7   **Attempt all questions**

(a) Mention the major components of an Industrial building with neat sketches. **(02)**

(b) Design an Underground water tank of size 3m x 8m x 3m for the following data. Saturated unit weight of soil 16 kN/m^3, Angle of Internal friction 30°, and Water table can rises upto ground level. Use M25 Concrete for tank and Fe-415. **(12)**

Q-8

A typical floor plan of a building is shown below. The following data are, Type of structure: Multi-storey rigid jointed frame, Number of storeys : 4 (G+3) , Floor **(14)**

to floor height : 3.35m, Height of plinth : 1.0m above G.L., External wall : 230mm thick including plaster, Internal wall: 150mm thick including plaster, Bearing capacity of soil: 200 kN/m^2, Imposed load : Roof : Roof finish= 1.5 kN/m^2, Live load= 1.5 kN/m^2, Floor : Floor finish= 1.0 kN/m^2, Live load= 4.0 kN/m^2, Materials: concrete grade M20 and steel grade Fe 415, Unit weight of concrete= 25 kN/m^3, Unit weight of masonry= 20 kN/m^3. Design the slab S1 using limit state method.
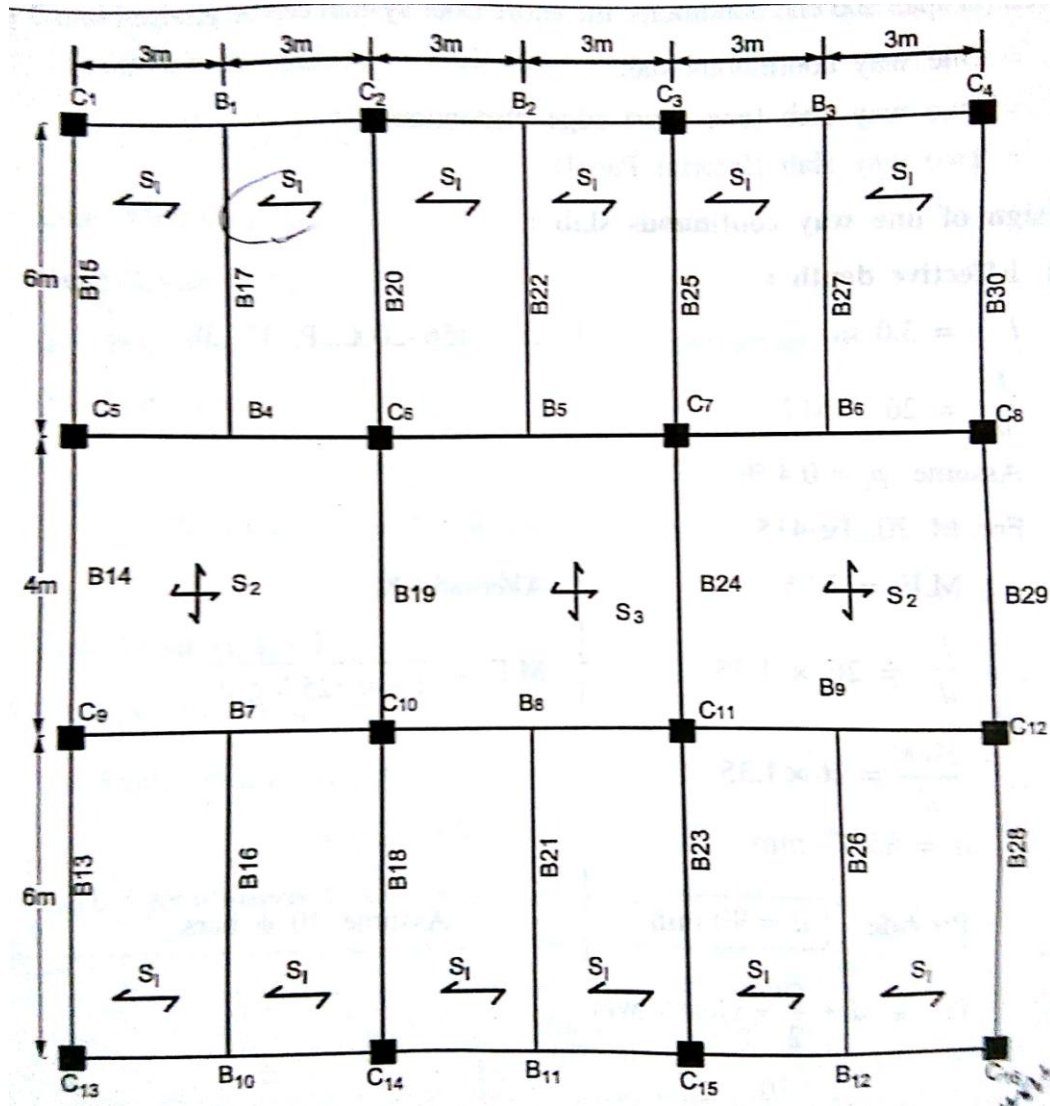

Fig. Floor Plan of a Building