Total No. of Questions : 6]

SEAT No. : ____

P1434

[Total No. of Pages : 3

TE/Insem/APR-104
T.E. (Civil)
STRUCTURAL DESIGN - II
(2015 Pattern) (Semester - II)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Figures to the right indicate full marks.***
3) ***Use of IS 456-2000 and non programmable calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Mere reproduction from IS Code as answer, will not be given full credit.***
6) ***Assume any other data, if necessary.***

Q1) a) Enlist various design philosophies/methods for design of RCC structures. Compare working stress method with limit state method. **[3]**

b) A reinforced concrete beam of rectangular cross section of size, b = 300 mm x D = 450 mm overall is reinforced with 4 no 16 mm diameter bars. The effective simply supported span of beam is 4.50 m. Using WSM approach, find the intensity of safe uniformly distributed load (excluding self weight) that beam can carry. The Concrete grade is M 20 and steel is Fe 250. Assume effective cover as 30 mm **[7]**

OR

Q2) a) What is purpose of partial safety factors used in LSM? Why partial safety factor meant for material strength of concrete is higher than that for steel. **[3]**

b) Calculate the moment of resistance of a doubly reinforced RC beam of rectangular cross section of size b = 230 mm x d = 450 mm effective depth reinforced with 3 numbers of 25 mm diameter bars on tension side and 2 numbers of 20 mm diameter bars on compression side. Grade of concrete is M20 and steel grade is Fe 415. Effective cover for compression reinforcement is 40 mm. Use WSM approach. **[7]**

P.T.O.

Q3) a) Draw strain and stress distribution diagrams with all parameters for the design of singly reinforced RCC section of flexural member using LSM. **[3]**

b) Determine the ultimate moment of resistance of a T-beam for following data: Effective width of flange = 1200 mm; Depth of slab = 100 mm; Total depth = 600 mm with effective cover of 40mm; Width of web = 300 mm; Area of tension reinforcement = 4 number of 25 mm diameter bars; Also find the working load that the beam can carry apart from its self weight if span of beam is 6m. Grade of concrete = M 20; Grade of steel = Fe 415. **[7]**

OR

Q4) a) What do you meant by flanged beam section? Enlist essential conditions to design beam section as flanged beam in floor beam system. **[3]**

b) The central line plan of building is as shown in Fig. 1. Design a cantilever slab S_8 only for flexure by LSM. Draw neat sketches showing details of reinforcement. Take live load = 4 kN/m^2; Floor finish = 1.5 kN/m^2; Materials: M25 grade of concrete; Fe500 grade of reinforcement. **[7]**

Q5) Referring to central line plan of building (Fig. 1), design the slab Sl only for flexure by L.S.M. Draw neat sketches showing details of reinforcement. Take: Live load = 4 kN/m^2; Floor finish = 1.5 kN/m^2; Materials: M25 grade of concrete; Fe 500 grade of reinforcement. **[10]**

OR

Q6) Design the first flight of a dog-legged staircase as shown in Fig. 1 **[10]**
Use following data

a) Floor to floor height = 3.2 m;
b) Rise = 160 mm, Tread = 250 mm;
c) Width of landing = 1.115m;
d) Width of stair = 1.2 m;
e) Gap between flights = 100 mm;
f) Live load = 4 kN/m^2
g) Floor finish = 1.5 kN/m^2
h) Materials: M30 grade of concrete; Fe500 grade of reinforcement. At ground floor, plinth beam is provided below 1st step.
Show details of reinforcement. Use LSM approach.

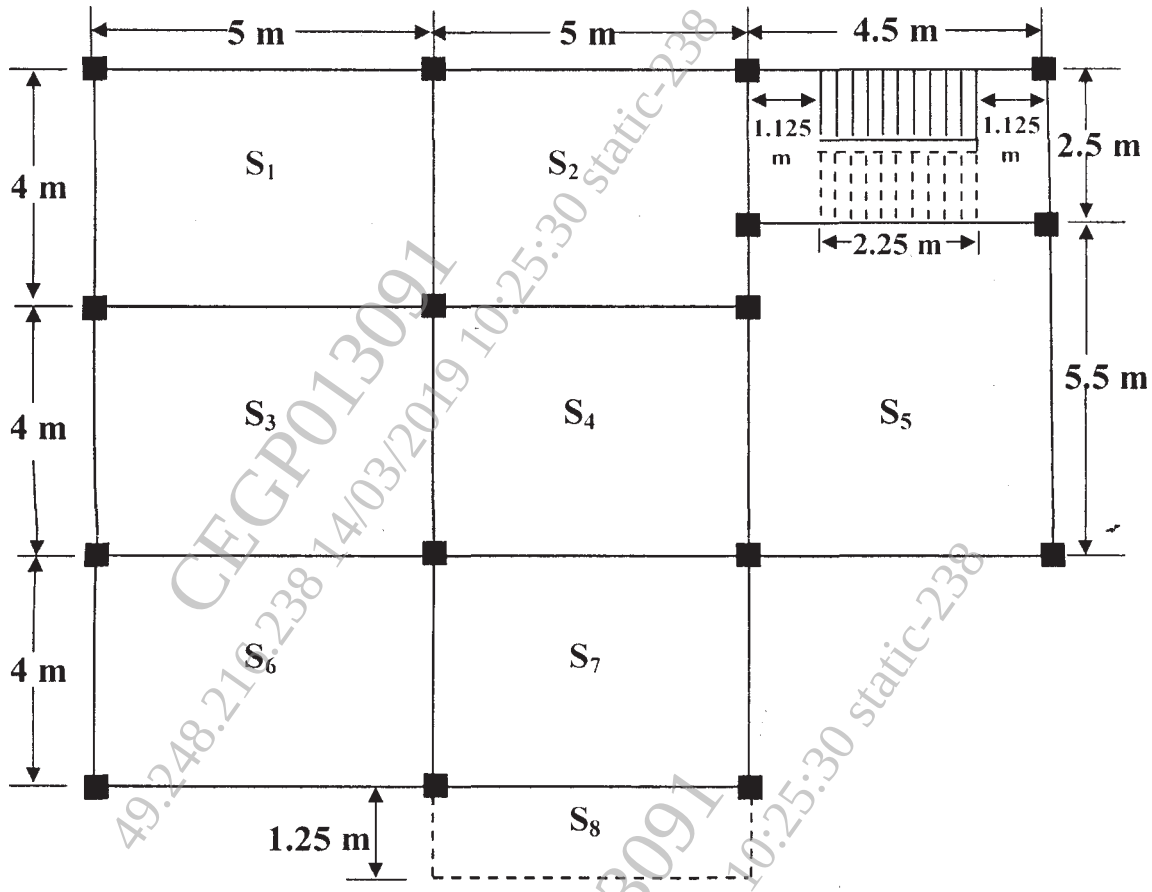

Figure 1: Centre line plan of G+2 Building