Ex/BESUS/CE-501A/09-10

B.Arch. Part-III 5th Semester Examination, 2009-10

Structural Engineering-III

(CE-501A)

Time : 3 hours **Full Marks : 70**

Use separate answerscript for each half.
Answer SIX questions, taking THREE from each half.
The questions are of equal value.
Two marks are reserved for neatness in each half.
Assume any data suitably if required.

FIRST HALF

1. An office floor is supported on beam which are supported on column spaced at 6.5 m and 4.8 m centre to centre is two perpendicular direction respectively. Design a corner panel of the floor slab taking live load as 4 kN/m^2 and using coefficients given below.

L_y/L_x	1.0	1.1	1.2	1.3	1.4	1.5
$-\alpha_x$	0.047	0.053	0.057	0.060	0.065	0.075
$+\alpha_x$	0.035	0.040	0.047	0.048	0.049	0.056

Take
$-\alpha_y = 0.047$
$+\alpha_y = 0.035$

Use Concrete and Steel grades of M20 & Fe415 respectively.

2. Design a rectangular beam simply supported over a clear span of 8.0 m. The superimposed load is 30 kN/m^2 and supported width is 250 mm each. Use M20 Concrete and Fe415 Steel grades. Assume $\tau_c = 0.42$ N/mm^2.

3. Design the reinforcement for a R.C.C. beam from the following data :

   Size of the beam = 500 x 700 mm
   Ultimate bending moment = 100 kNm
   Ultimate S.F. = 100 kN
   Torsional moment = 100 kNm

   Assume $\tau_c = 0.42$ N/mm^2.

4. a) Why corner reinforcement is provided in the slab? What is the code provision of corner reinforcement.

   b) Show by sketch, reinforcement of a 3-span continuous slab by assuming the reinforcement through sectional elevations.

   c) When you require a combined footing for a R.C. columns? Explain by Diagram.

5. Design a balanced T-beam section of 1500 mm width of flange, 100 mm depth of flange and 250 mm width of web, which is subjected to an ultimate moment of 250 kNm. Stress-strain relation of Fe415 steel may be taken from the following. Use M20 and Fe415 grade of material respectively.

Strain (10^{-5})	144	163	192	241	276	380
Stress (MPa)	286.7	306.7	324.8	342.8	351.8	380.9

SECOND HALF

6. Analyze the beam of Fig.-Q.6 and draw bending moment diagram. EI is same throughout.

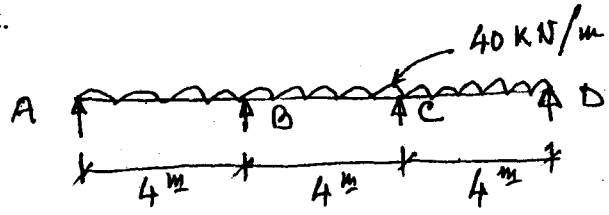

Fig.-Q.6

7. Analyze the beam of Fig.Q.6 and draw bending moment diagram, if support 'B' sinks by 2 mm. Take EI = 7000 kN-m^2. Use moment distribution method.

8. Analyze the beam of Fig.Q.8 by slope-deflection method and draw ending moment diagram if support 'B' sinks by 2 mm. Take EI = 7000 kN-m^2.

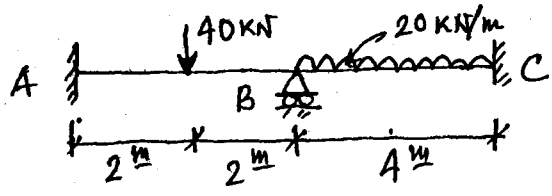

Fig.-Q.7

9. Analyze the frame of Fig.Q.9 and show bending moment diagram. The results of Non-sway analysis are indicated in the Fig.Q.9. All values are in (kN) and (m). EI = constant.

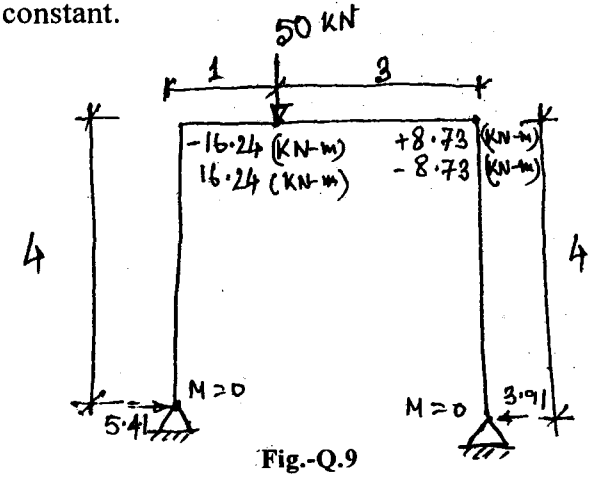

Fig.-Q.9

Sway force = 2.5 kN (towards right)

0. a) Write short notes on :
(i) Stiffness, (ii) Distribution factor, (iii) Relative stiffness.

b) Which of the following frames will require a sway analysis? Explain your answer.

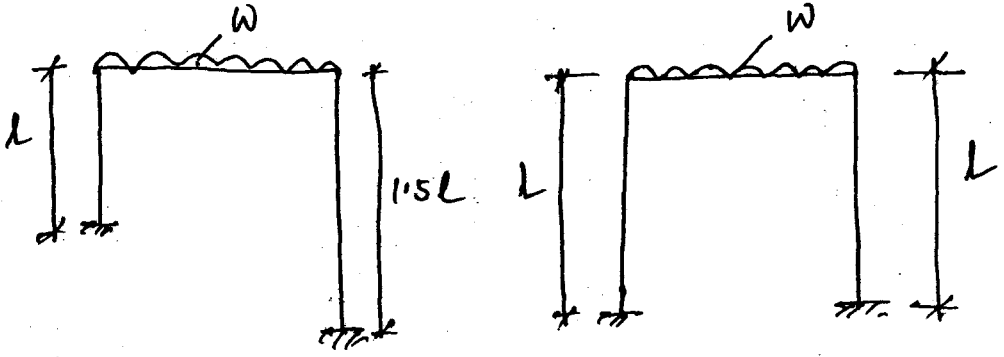

Fig.Q.10