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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, FEBRUARY 2016

Civil Engineering

(Structural Engineering and Construction Management)

04CE 6407 Advanced Design of Concrete Structures

Max. Marks : 60 Duration: 3 Hours

Answer all Questions
Use of IS-456-2000 and Interaction curves are permitted.
Assume suitable data wherever necessary

Part A

1. Why is it necessary to limit deflections in reinforced concrete flexural members?
2. Describe how load is carried by corbel-Sketch the equilibrium forces in a corbel.
3. Explain the classification of shear walls.
4. What are the assumptions made in the portal method of analysis of frames subjected to lateral loads?
5. Explain ductility factor with respect to displacement, rotation and curvature.
6. Explain moment curvature relation of a reinforced concrete section.
7. State the assumptions made in Baker's method of plastic design.
8. Briefly mention fire resistance of structural members.

(8x3=24)

Part –B

9(a) Design a simply supported deep beam with clear span of 5m and width of bearing=500mm at each ends. Depth of deep beam D=3500mm and thickness t=250mm.. assume concret M20 and steel grade Fe415

(6marks)

OR

9(b) Design a biaxially eccentrically loaded braced rectangular column deforming in single curvature for the following data.

Ultimate axial load Pu=2000KN
Ultimate biaxial moments at bottom Mux1=225kNm, Muy1=125kNm

Ultimate biaxial moments at top Mux2=175kNm, Muy2=75kNm
Unsupported length 9m
Effective length=lex=8m, ley=6m
Column section B (in x direction) = 400mm, D=600mm
Use concrete grade M25 and grade of steel Fe 415

(6marks)

10(a) Analyse the interior panel of flat slab 5.6 m x 6.6 m in size for a superimposed load of 7 kN/m^2.Find the design moments along the longer span.

OR

10(b) Design a circular slab of diameter 4m which is fixed at edges. Adopt service load as $4kN/m^2$ and use M20 grade concrete with Fe 415 grade steel. Use yield line theory.

(6marks)

11(a) RC grid floor is to be designed to cover a floor area of 12m x 18m. The spacing of ribs in mutually perpendicular direction is 1.5 m c/c. Live load on floor =$2kN/m^2$. Analyse the grid floor by IS 456 method. Design the suitable reinforcement (only for flexure).

(6 marks)

OR

11(b) Design a shear wall of length 4.15 m and thickness 250 mm is subjected to the following forces. Assume fck=$25N/mm^2$, fy=$415N/mm^2$. Design steel required for flexure only.

Loading	Axial Force kN	Moment KNm	Shear KN
1. DL + LL	1950	600	20
2. Seismic Load	250	4800	700

(6 marks)

12(a) Analyse the building frame subjected to horizontal forces shown in fig . Use cantilever method.

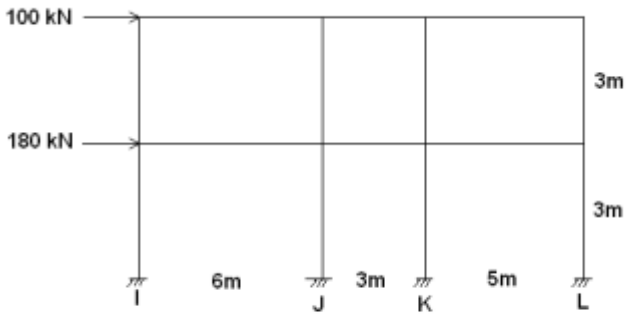


Fig. ii

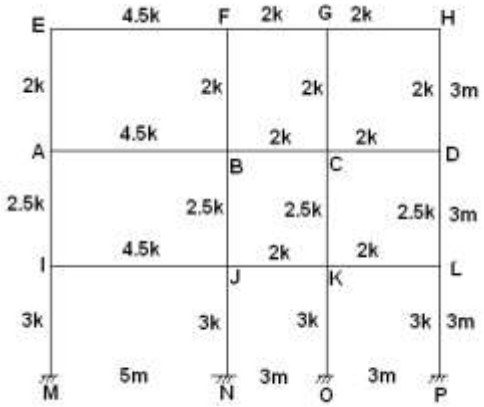
For the second storey calculate;

I. Moments at the end of columns
II. Axial forces in columns
III. Shear at the ends of beam.

(6marks)

OR

12(b) Fig (2) shows an intermediate frame of multistoried building. Frames are spaced at 3m c/c. Analyse the frame taking live load 4kN/m^2 and dead load as 3kN/m^2,3.25kN/m^2 and 2.0 kN/m^2 for panels AB,BC and CD respectively. The beam of 5m span(AB)= 5 kN/m. The beam of 3m span (BC)= 2.5kN/m. The beam of 3m span(CD) =2.5 kN/m.



(6marks)

13(a) Obtain the maximum elastic moment diagram(BM envelope) for ultimate limit state , for two span continuous span ABC, AB=6m,BC=6m freely supported at ends A and C ,D.L=10KN/m and L.L=15kN/m.

(6marks)

OR

13(b) A reinforced concrete slab is 105 mm thick with 20mm cover to the centre of steel. If the positive steel reinforcement is 450 mm^2/m. Determine moment curvature diagram. Determine ductility factor . Assuming fck=25N/mm^2 and fy= 415 N/mm^2.

(6 marks)

14(a) The following are the details of an internal beam-column of type (2) joint, subjected to reversals which are not due to earthquake,

1. Column 600mm x 600mm with 8nos 25 mm dia bars , Column factored load is 1400KN,Storey height =3m
2. Beams on either side are 400mm x 500 mm with 3 nos 28 mm dia (1846mm^2) at top and beam 400mm x 500 mm 3 nos 25 mm dia (at bottom) (1473mm^2).

Assume fck = 25 N/mm^2 fy= 415 N/mm^2. Design the joint with respect to ,

1. Strength of column
2. Stability condityion of column with capacity of beam
3. Check for shear in column.

(6 marks)

OR

14(b) Explain the various strengthening methods for masonry and foundation structures

(6x6=36 marks)