KUMARAGURU
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M.E DEGREE EXAMINATIONS: JAN 2015

(Regulation 2014)

First Semester

STRUCTURAL ENGINEERING

P14SET103**:** Advanced Reinforced Concrete Structures

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The deflection in the member including all causes should not exceed ……… [K₁]

    a) Span/350   b) Span / 400

    c) Span/250   d) Span/450

2. Match the following: [K₁]

BEAM	M_c
A. Cantilever beam with point load at free end	1. wl/4
B. Simply supported beam with moment at ends	2. M
C. Fixed beam with point load at centre	3. wl
D. Simply supported beam with point load at centre	4. wl/8

    a) 2,3,1,4   b) 2,3,4,1

    c) 1,2,3,4   d) 3,2,4,1

3. Identify the correct sequence in determining the redistribution of moment [K₂]

    a) Free body diagram, Bending Moment Diagram by elastic analysis, BMD after redistribution, Bending moment envelope

    b) Free body diagram, Bending Moment Diagram by elastic analysis, Bending moment envelope, BMD after redistribution

    c) Bending Moment Diagram by elastic analysis, Bending moment envelope, Free body diagram, BMD after redistribution

    d) BMD after redistribution , Free body diagram, Bending Moment Diagram by elastic analysis, Bending moment envelope,

4. Structural design of beam and column should be such that redistribution of [K₂]

moments takes place in …………..

a) Beams only   b) Columns only

c) Both beams and columns   d) Either beam or column

5. Identify the correct sequence in analysis of Grid floors   [K$_2$]

    a) Central deflection ,Rigidity of ribs per unit width, torsional rigidity, moments

    b) Rigidity of ribs per unit width, torsional rigidity, central deflection, moments

    c) Torsional rigidity, Rigidity of ribs per unit width, , central deflection, moments

    d) Moments, Rigidity of ribs per unit width, torsional rigidity, central deflection

6. In deep beam the stress distribution along the depth of the beam is ……………   [K$_1$]

a) Elastic   b) Linear

c) Non linear   d) In elastic

7. Load due to imposed deformations is because of ……………..   [K$_1$]

a) Shrinkage only   b) Shrinkage and temperature only

c) Shrinkage, temperature and d) Shrinkage, temperature, prestress
     prestress   and creep

8. As per IS 875, the loads in beams can be reduced by ………… for every 5m^2 [K$_2$]

a) 2   b) 5

c) 10   d) 6

9. Sequence of analyzing the frame subjected to lateral load is ....   [K$_2$]

a) Left to right from bottom floor   b) Left to right from top floor

c) Right to left from bottom floor   d) Right to left from top floor

10. Portal method is suitable for …………………..   [K$_2$]

    a) High narrow buildings only

    b) Both high narrow buildings and moderate height to width ratio

    c) Moderate height to width ratio only

    d) Small buildings only

PART B (10 x 2 = 20 Marks)

11. Define Plastic hinge.   [K$_1$]

12. Discuss about redistribution of moment.   [K$_2$]

13. List the various factors affecting short term deflection.   [K$_1$]

14. Explain the adverse effects on cracking in RC member. [K₂]

15. Draw different types of Grid floors. [K₁]

16. Discuss the advantages of flat slab. [K₂]

17. Indicate the approaches to determine the effect of wind on structures. [K₂]

18. Define Gust factor. [K₁]

19. Discuss about drift limitation in very tall buildings. [K₂]

20. List the methods of analysis of frames subjected to lateral loads. [K₁]

PART C (6 x 5 = 30 Marks)

21. llustrate the various measures to reduce deflection. [K₃]

22. Discuss about the advantages and disadvantages of redistribution of moments. Also Explain about the moment curvature relation of reinforced concrete section. [K₂]

23. Draw bending moment diagram for a beam fixed at ends and carrying total uniformly distributed load W_u, after 15% redistribution. Compute the magnitude by which point of contra-flexure is shifted. [K₃]

24. Discuss about the analysis of rectangular grid floor by Timoshenko's plate theory. [K₂]

25. Discuss about the effect of wind on structures. [K₃]

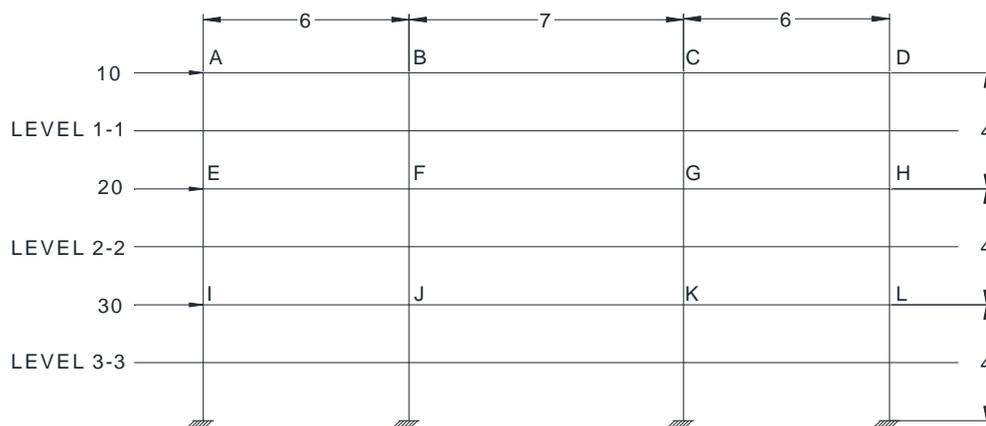26. Illustrate the assumptions made in portal method. [K₃]

PART D (4 x 10 = 40 Marks)

27. Compute the surface crack width for a rectangular beam at following locations: [K₃]

　　a)at a point A directly under a bar on tension face

　　b)at the bottom corner of the beam

　　c)at a point on tension face, midway between two bars

The beam is 300mm x 600mm, having an effective span of 5m and is

subjected to UDL of 15kN/m, inclusive of its own weight. The beam is reinforced with 4 bars of 16 mm Φ, at an effective cover of 50 mm, assuming M20 concrete and Fe 415 steel.

28. Design of waffle slab 3.6 x 3.9 m over two adjacent sides continuous and simply supported on the other two sides if it is made of precast funicular shells so that ribs are spaced at 1.2m x 1.2 m Assume factored UDL w = 12 kN/m^2 , f_{ck} = 25N/mm^2, f_y = 415N/mm^2 . [K$_5$]

29. Compute the pressure for which the walls and roof are to be designed for a single storey shed which is 20m wide and 30m in length it is situated in terrain category II and the basic wind speed for its location is 45m/s. The frames are spaced at 4m centres. [K$_3$]

30. Compute the bending moment and shear force and draw BMD and SFD at level 1-1 & 2-2 for the various beams and columns of the cross section building frame which is subjected to horizontal loads at the joints as shown by portal method. 10 K$_3$

(All dimensions are in meters)

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