Scheme - G

Sample Test Paper-I

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17422**

Subject Title : Theory of Structures

Marks : 25 **Time: 1 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. Attempt any THREE **(9 Marks)**

a. Define core of section and sketch it for solid circular section.

b. State Middle third rule and explain its application.

c. Write two advantages and one disadvantage of fixed beam.

d. List the factors affecting slope and deflection.

e. A fixed beam of 6 m span has left end fixed moment 60 kNm due to a point load 'P' acting at 3 m from left support. Determine magnitude of 'P'.

Q2. Attempt any TWO **(8 Marks)**

a. A rectangular column of size 0.35 m x 0.25 m carries an eccentric load of 150 kN. The load acts at 0.15 m from CG of section on axis bisecting shorter side. Determine resultant stresses at base.

b. A cantilever beam, 2.8 m long carries 10 kN/m ud load over entire span. Beam has cross section 100 x 200 mm. Determine magnitude of maximum slope and deflection. Take E = 105 GPa.

c. Determine position of a point load acting on a fixed beam of span 5 m if fixed end moment at left end is half of that at right end.

Q3. Attempt any ONE **(8 Marks)**

a. A masonry chimney of uniform hollow circular section has external and internal diameters 3 m and 2 m respectively. It is subjected to uniform wind pressure of 1.5 kPa. Determine max height of chimney for no tension condition. Take unit weight of masonry 24 kN/m^3 and coefficient of wind pressure 0.65.

b. Determine position and magnitude of maximum deflection for a simply supported beam of span 7 m. It carries two point loads of 20 kN and 60 kN at 2 m and 5 m from left support. Take EI = 14400 kNm^2.

Scheme - G

Sample Test Paper-II

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17422**

Subject Title : Theory of Structures

Marks : 25 **Time: 1 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. Attempt any THREE **9 Marks**

a. State Clapeyron's theorem of three moments with neat sketch.

b. Define stiffness factor, distribution factor. State nature and magnitude of carryover moment developed at fixed end if 100 kNm clockwise moment is applied at other end.

c. Draw neat sketch of Perfect, Deficient and Redundant frame.

d. Explain effect of continuity in case of continuous beam with respect to deflected shape, sagging and hogging moments.

e. Write any three assumptions made in the analysis of simple frames.

Q2. Attempt any TWO **(8 Marks)**

a. A continuous beam ABCD is fixed at A and supported at B,C,D. AB =4 m, BC = 5 m, CD = 4m. MI of all spans is same. Determine distribution factors at continuity.

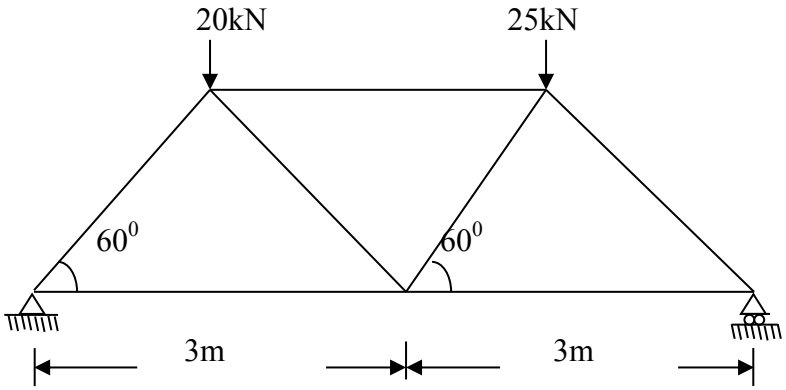
b. A two span continuous beam has equal spans of length 'L' and is subjected to ud load 'w' over both spans. Prove that moment at continuity is $wL^2/8$

c. Determine moment at fixed end of a propped cantilever of span 4 m carrying 30 kN/m over entire span. The prop is applied at free end. Use moment distribution method.

Q3. Attempt any ONE **(8 Marks)**

a. Determine nature and magnitude of forces in all members of a simple frame as shown in figure. Use method of joints or method of sections.

.



b. A continuous beam of uniform flexural rigidity is simply supported at A,B and C. Span AB = 6 m, BC = 4 m. The beam carries a central point load of 85 kN on span AB and u.d.load of 30 kN/m over the entire span BC. Calculate support moments by using theorem of three moments. Draw SFD and BMD.

Scheme - G

Sample Question Paper

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17422**

Subject Title : Theory of Structures

Marks : 100 **Time: 4 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. A) Attempt any SIX **(12 Marks)**

a) Define direct stress and bending stress.

b) Write the value of maximum slope and maximum deflection in case of a simply supported beam loaded with ud load over entire span.

c) Write the equation for slope and deflection at free end for a cantilever beam having point load at free end.

d) A cantilever of span 'L' carries a point load 'W' at L/2 from fixed end. State deflection at free end in terms of EI.

e) State any two advantages of fixed beam over simply supported beam.

f) Define stiffness factor.

g) Define carry-over factor.

h) List the types of simple frames.

Q1. B) Attempt any TWO **(08 Marks)**

a) Define core of section. Sketch it for rectangular section.

b) Sketch resultant stress distribution diagrams if -

i) Direct stress > bending stress

ii) Direct stress = bending stress

iii) Direct stress < bending stress

c) Explain method of joints to analyse simple frames.

Q2. Attempt any FOUR **(16 Marks)**

a) A rectangular section of 200 mm x 100 mm is subjected to an axial compressive force of 60 KN at an eccentricity of 30 mm in a plane bisecting the thickness. Calculate the resultant stresses at the base and draw stress distribution diagram.

b) A C.I. hollow circular column section has external diameter 250 mm and internal diameter 200 mm. It is subjected to vertical load of 25 kN at a distance of 100 mm from vertical axis of column. Calculate the resultant stresses at the base of the column.

c) A tie rod of rectangular section having 15 mm thickness is required to carry a maximum tensile load of 200 kN at an eccentricity of 10 mm along the plane bisecting thickness. Calculate the width of the section if the maximum tensile stress shall not exceed 100 MPa.

d) A simply supported beam of span 4 m carries a central point load of 19 kN and ud load of 8 kN/m over entire span. Find maximum slope and maximum deflection of the beam. Take $I_{xx} = 2 \times 10^8 mm^4$ and E=200GPa

e) A cantilever beam of span 1.8 m carries 30 kN/m u.d.load over full length. If deflection at the free end is limited to 25 mm, determine elastic modulus of material. Take $I= 1.3x10^8 mm^4$.

f) A beam ABC is supported at A, B and C such that AB = 6 m, BC = 5 m. AB carries a u.d.l. of 12 kN/m and BC has a central point load of 45 kN. Calculate the support moments using three moment theorem.

Q3. Attempt any FOUR **(16 Marks)**

a) A simply supported beam of span 5 m carries central point load of 60 kN. Determine constants of slope and deflection equations (in terms of EI) using method of double integration.

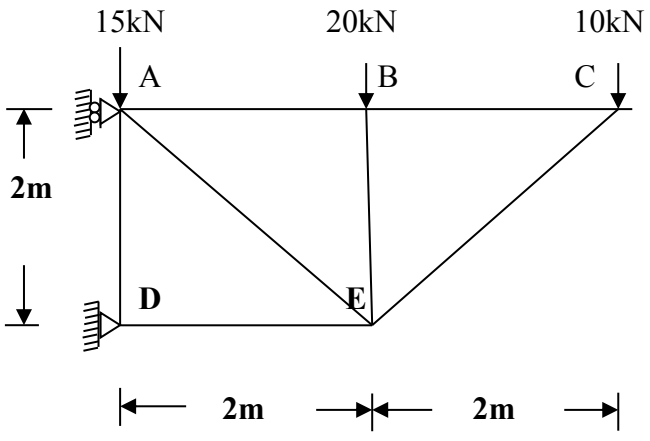
b) A simply supported beam of span 6 m carries a point load of 30 kN at a distance 2 m from left support. Find value of slope under the load. Take $EI = 7860 kNm^2$.

c) A fixed beam of span 9 m carries two point loads W_1 and W_2 at 3 m from both fixed ends. If $M_A = 0.8 M_B$ calculate the ratio W_1 to W_2.

d) Using first principle determine support moment for a fixed beam of span 4 m carrying ud load of 18 kN/m over full length.

e) Explain method of sections for finding forces in members of simple frame.

f) Using method of joints, find nature and magnitude of forces in AE, AD, DE in a frame as shown in figure.



Q4. Attempt any FOUR **(16 Marks)**

a) A continuous beam ABC is supported on three supports at same level. AB = BC = 4 m. Both spans carry central point loads of W kN each. Calculate moment at B using theorem of three moments.

b) State Clapeyron's theorem of three moments and state meaning of each term involved using neat sketch.

c) A beam ABC is simply supported at A, B and C. Spans AB and BC are of lengths 4 m and 5 m respectively. AB carries a point load of 20 kN at centre and BC carries u. d. load of 10 kN/m over entire span. Calculate support moment at B using theorem of three moments.

d) Determine distribution factors at continuity for a continuous beam A-B-C-D which is fixed at A and supported at B, C and D. Take AB = CD = 4 m, BC = 5 m. Assume same MI for all spans.

e) Using moment distribution method, determine the moment at fixed end of a propped cantilever of span 6m carrying uniformly distributed load 30kN/m over

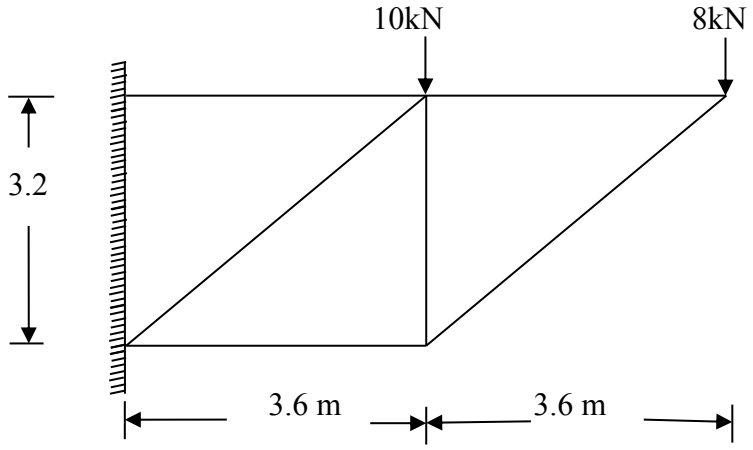
f) Interpret the significance of carry over factor and stiffness factor.

Q5. Attempt any TWO **(16 Marks)**

a) A masonry chimney of uniform hollow rectangular section has size 2 m x 1.4 m and has thickness 0.3 m. It is subjected to horizontal wind pressure of 1.5 kPa. Find maximum height of chimney if maximum compressive stress at the base is limited to 280 kN/m^2. Also state nature of minimum stress. Take density of masonry as 22 KN/m^3.

b) A continuous beam ABCD is supported at A and D and is continuous over B and C such that AB = 4 m, BC = 6 m, CD = 6 m. Central point loads of 90 kN and 100 kN act on AB and BC. CD carries a u.d. load of 10 kN/m. Determine support moments using three moments theorem. Draw BM diagram.

c) Determine nature and magnitude of forces in all the members of the frame as shown in figure. Also find support reactions.



Q6. Attempt any TWO **(16 Marks)**

a) A simply supported beam of span 8 m is subjected to point loads of 60 kN, 80 kN and 50 kN at 2 m, 4 m and 6 m from left support respectively. Determine slope at left end and deflection under 60 kN and 80 kN loads. Take EI = 2.668 x 10^9 kN-m^2.

b) A fixed beam AB of span 8 m carries u d load of 30 kN/m over entire span. In addition it carries a point load of 70 kN at 3 m from LHS. Find fixed end moments at A and B. Draw BMD and SFD.

c) A beam ABCD is supported at A, B and C, CD being Overhang. AB = 4 m, BC = 6 m and CD = 1.2 m. AB carries a point load of 20 kN at 1.5 m from A, BC carries u.d.load of 10 kN/m over entire span and a point load of 12 kN acts at free end D. Calculate the support moments using theorem of three moments and draw BMD. Sketch deflected shape with respect to BMD and show points of contra-flexure.

.....