17422

16172

4 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main question on a* ***new*** *page.*
(3) Illustrate your answers with neat sketches ***wherever*** *necessary.*
(4) Figures to the ***right*** *indicate* ***full*** *marks.*
(5) Assume suitable data, if ***necessary****.*
(6) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(7) Mobile Phone, Pager and any other Electronic Communication devices are ***not*** *permissible in Examination Hall.*

Marks

1. A) Attempt **any six** of the following : **(2×6=12)**

a) State the conditions of stability of Masonry dam.

b) Define slope and deflection of a beam.

c) What do you understand by boundary conditions of a beam ? State the boundary conditions for two different nature of beam supports.

d) State the values of maximum deflection for a cantilever beam of span L carrying a point load 'W' at a distance 'L' from the fixed end.

e) State the principle of super position.

f) Define :

i) Distribution factor

ii) Portal Frames.

g) What is the carry over factor for a beam fixed at one end and simply supported at the other ?

h) Define perfect and imperfect frame.

B) Attempt **any two** of the following : **(4×2=8)**

a) Explain the points to be considered to design 30 storey building with respect to wind pressure.

b) A short column of external diameter 250 mm and internal diameter 200 mm carries an eccentric load. Find the eccentricity which the load can have without producing tension in the section of a column.

c) State four assumptions made in the analysis of simple frame.

P.T.O.

Marks

2. Attempt **any four** of the following : **(4×4=16)**

a) A chimney having diameter 5 m and 50 m high. It is subjected to a horizontal wind pressure of 7 KPa normal to the chimney. Find the maximum bending stress in a chimney. (Use C = 0.70)

b) Calculate core of a section for following and draw neat sketches :

i) Circular section 300 mm in diameter

ii) Rectangular cross section 250 × 600 mm in size.

c) A square pillar 200 mm side is subjected to an eccentric load of 95 KN at an eccentricity of 50 mm in the plane bisecting thickness. Find the maximum and minimum intensities of stress at base section.

d) A cantilever of length 2 m carries a UDL of 10 KN/m over entire span. If the section is rectangle 100 mm wide and 300 mm deep. Find the slope at the free end and deflection at free end. Take $E = 100\ KN/mm^2$.

e) A simply supported beam of 6 m carries a UDL of 5KN/m find the breadth and depth of beam, if maximum bending stress is not to exceed $8\ N/mm^2$ and maximum deflection 20 mm. Take $E = 1 \times 10^4\ N/mm^2$.

f) Write Clapeyron's moment theorem for beam with different M.I. giving meaning of each term along with the diagram of beam.

3. Attempt **any four** : **(4×4=16)**

a) A simply supported beam of span 6 m, carries a point load of 60 KN at 2 m from left hand support. Calculate deflection under point load. Use Macaulay's method.

b) A simply supported beam having 3 m span carries a UDL 'W' per unit length. If slope at the end is not to exceed 1.5°. Find the maximum deflection.

c) State two advantages and two disadvantages of fixed beam over simply supported beam.

d) A fixed beam of span 8 m carries a point load 'W' at a distance 'x' from the left hand support. If the moment at the left end is twice that at the right end evaluate 'x'.

e) Using method of joints, find nature and magnitude of forces in member AB and member DE of truss shown in figure 1.

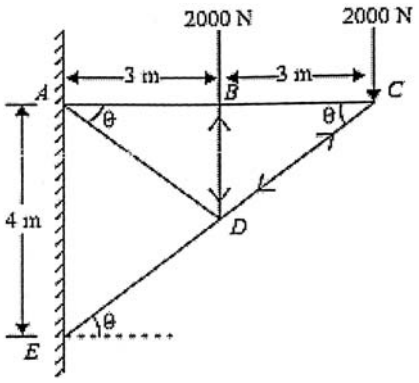

Figure 1

Marks

f) Using method of section calculate the magnitude of forces and its nature of member BC, BE and AE. Refer figure 2.

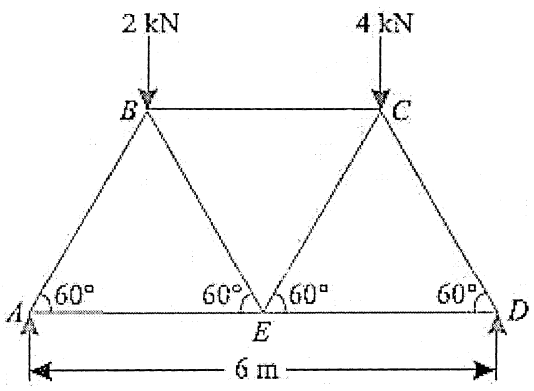

Figure 2

4. Attempt **any four** of the following : **(4×4=16)**

a) A continuous beam ABC is supported on three supports at same level. AB = BC = 5 m. Both spans carry udl of intensity '20' KN/m over entire span. Calculate moment at B using theorem of three moments.

b) Draw deflected shape of two span continuous beam ABC, fixed at 'A' and hinged at 'C', continuous over B. The beam AB is subjected to UDL over entire span.

c) A beam ABC is simply supported at A, B and C. Span AB and BC are of lengths 4 m and 6 m respectively. AB carries a central point load of 50 KN and BC carries a UDL of 15 KN/m over the entire span. Calculate support moment at B using three moment theorem.

d) Define carry over factor and stiffness factor with respect to moment distribution method.

e) A continuous beam of uniform flexural rigidity is fixed at A and supported over B and C such that AB = 8 m, BC = 6 m. A UDL of 12 KN/m acts on AB and a point load of 48 KN acts at the centre of BC. Calculate distribution factor using MDM.

f) Explain the procedure of moment distribution method.

5. Attempt **any two** : **(2×8=16)**

a) A masonry dam 8 m high, 1.5 m wide at the top and 3 m wide at the base has its water face vertical and retains the water to a depth of 7.0 m. Calculate the maximum and minimum stress intensities induced at the base, if the unit weight of water is 10 KN/m^3 and weight of masonry is 22 KN/m^3.

b) A continuous beam A B C D is fixed at A and supported at B, C and D such that AB = BC = 4 m and CD = 3 m. It carries a udl of 20 KN/m over the entire length. Using moment distribution method, calculate support moments and draw BMD. Showing all important values.

Marks

c) Determine the forces in all members of a plane frame shown in figure 3. Tabulate the results.

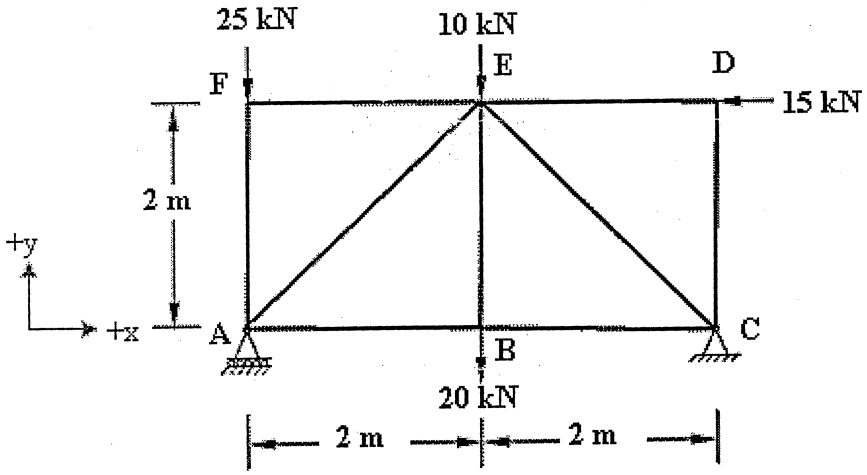

Figure 3

6. Attempt **any two**: **(2×8=16)**

a) A cantilever of 4 m span carries a UDL of 20 KN/m over 2 m portion from fixed end and a point load of 40 KN of free end. Calculate the maximum slope and deflection of the cantilever. Take $EI = 2 \times 10^7$ KN.mm^2.

b) A fixed beam of span 10 m carries a UDL of 25 KN/m and a point load of 60 KN at 4 m from left hand support. Calculate the fixed end moments and draw BMD. Also calculate the support reactions.

c) A continuous beam ABCD 15 m long rests on supports A, B, C and D all at same level. AB = 6 m, BC = 5 m and CD = 4 m. It carries two concentrated load 120 KN and 80 KN at 2 m and 8 m from A and UDL of 50 KN/m over CD. Find moments and reactions at the supports. Solve by three moment theorem only.