Scheme - I

Sample Question Paper

Program Name : **Civil Engineering Program Group**
Program Code : **CE/CR/CS**
Semester : **Fourth**
Course Title : **Theory of Structures**
Max. Marks : **70**

22402

Time : 4 Hours

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.
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.

Q.1 Attempt Five of the following. (10 Marks)

a) State middle third rule.
b) Give the relationship between slope, deflection and radius of curvature.
c) Draw the sketch of deflected shape of continuous beam state the nature of bending moment.
d) State sign convention for moment distribution method as per Hardy Cross.
e) Draw the sketch of symmetrical and unsymmetrical portal frame each.
f) Draw stress distribution diagram when $\sigma_o > \sigma_b$ and $\sigma_o < \sigma_b$.
g) Identify the nature of support, if i) $\theta = 0, y = 0$ ii) $\theta \neq 0, y = 0$.

Q.2 Attempt Three of the following. (12 Marks)

a) Explain with expression four conditions of stability of dam.
b) Calculate maximum and minimum stresses at the base of a hollow circular column having external diameter as 300 mm and internal diameter as 200 mm, subjected to a vertical load of 100kN with an eccentricity of 100 mm from the geometric axis of the column.
c) Calculate the maximum and minimum stresses at the base of a masonry chimney having outer dimension as 3m x 3m and inner dimension as 1m x 1m. Height of the chimney is 15m and subjected to a wind pressure of is $1.2kN/m^2$. Use weight of masonry as $20kN/m^3$.
d) Draw the sketch of core of section i) Rectangular section having dimensions B x D.
ii) Circular section having D as diameter.

Q.3 Attempt Three of the following. (12 Marks)

a) Using Macaulay's method calculate the slope under point load in terms of EI for a simply supported beam as shown in Figure No.1.

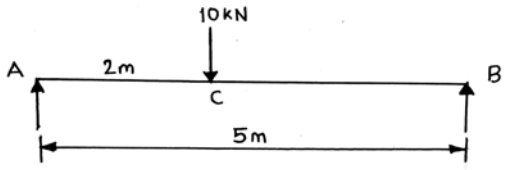

Figure No. 01

b) Calculate fixed end moments and draw BMD for a fixed beam as shown in Figure No.2.

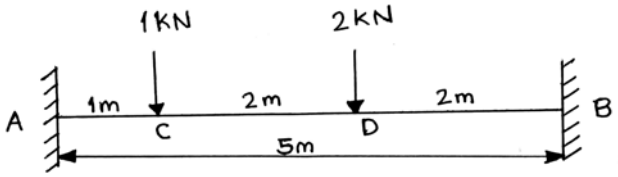

Figure No. 02

c) Calculate the value of load 'W' for a fixed beam as shown in Figure No.3, if $M_A = M_B$.

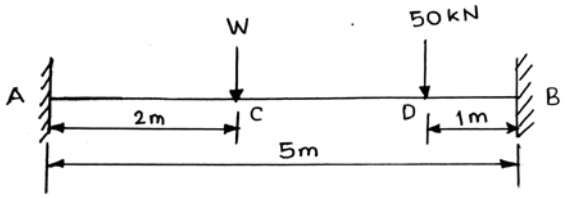

Figure No. 03

d) Explain the principle of superposition with example.

Q.4 Attempt Three of the following. (12 Marks)

a) State Clapeyron's theorem of three moments giving sketch, equation and relation with meaning of terms used in it.

b) Calculate distribution factors for the members OA, OB, and OC for the joint as shown in Figure No. 4. Use EI = constant.

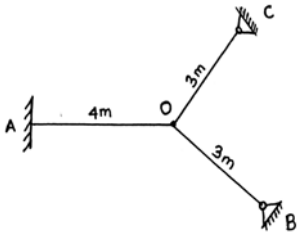

Figure No. 04

c) Make the following trusses perfect by adding or removing the members if required as shown in Figure No. 5.

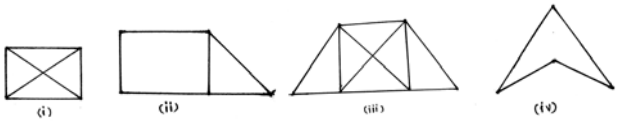

Figure No. 05

d) Draw SFD for a continuous beam as shown in Figure No. 6 having negative bending moment at support B as 66.14 kN-m.

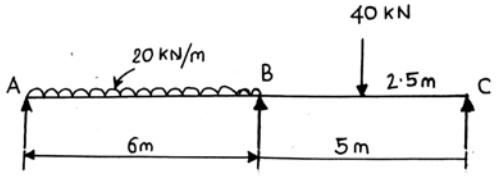

Figure No. 06

e) Using moment distribution method, calculate support moments and draw BMD of a beam as shown in Figure No. 7.

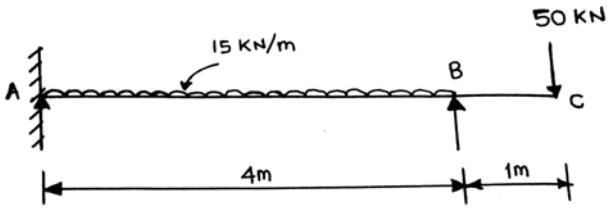

Figure No. 07

Q.5 Attempt Two of the following. (12 Marks)

a) Using standard formulae calculate slope and deflection at free end of a cantilever beam as shown in Figure No.8, having cross section of beam as 100mm width and 200mm depth. Use E = 200GPa.

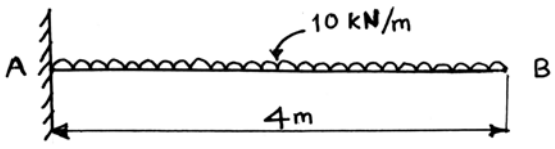

Figure No. 08

b) Using three moment theorem, calculate support moments for a beam as shown in Figure No. 9.

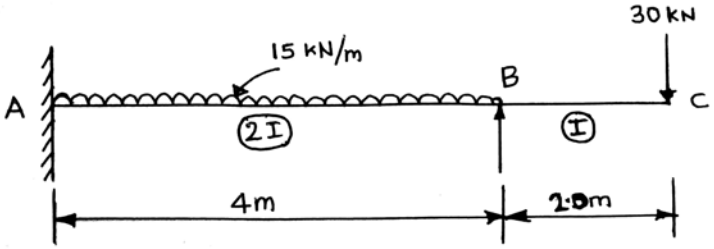

Figure No. 09

c) Using Macaulay's method, calculate slope at B and deflection at C of a cantilever beam in terms of EI as shown in Figure No.10.

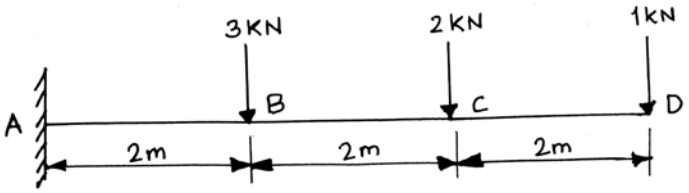

Figure No. 10

Q.6 Attempt Two of the following. (12 Marks)

a) Using moment distribution method, calculate the support moments of a beam as shown in Figure No.11.

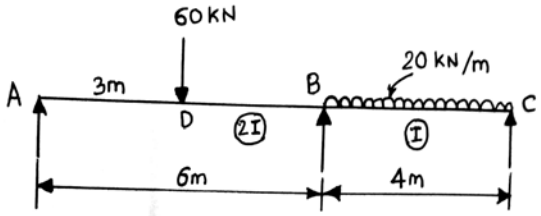

Figure No. 11

b) Using method of joints calculate magnitude and state the nature of the forces in the members AB, BD and DC of truss as shown in Figure No. 12.

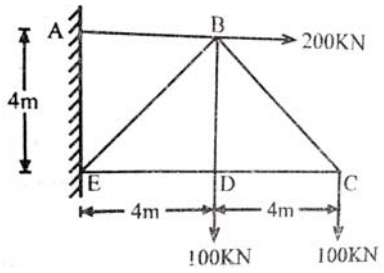

Figure No. 12

c) Using method of sections calculate magnitude and state the nature of the forces in the members BC and FE of a truss as shown in Figure No. 13.

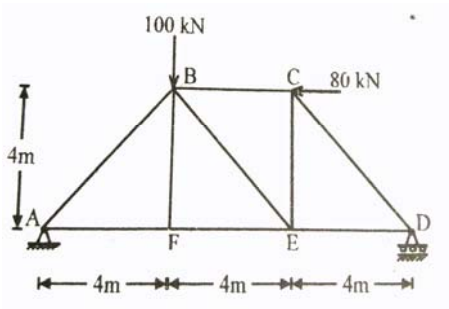

Figure No.13

***Note*: All the questions MUST BE accompanied with diagram instead of asking the questions in sentence form to avoid the ambiguity about type of beam,** *type or number of support, position of load etc.*

Scheme - I

Sample Test Paper - I

Program Name : **Civil Engineering Program Group**

Program Code : **CE/CR/CS**

Semester : **Fourth**

22402

Course Title : **Theory of Structures**

Max. Marks : **20** **Time : 1.15 Hour**

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.
6. Use of non-programmable electronic pocket calculator is permissible.
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Q.1 Attempt Four of the following. **(08 Marks)**

a) State the type of stresses developed due to eccentric load.
b) Draw stress distribution diagram when direct stress is equal to bending stress.
c) Write dimensions for core of section of a square cross section B x B.
d) State boundary conditions for fixed support and simple support with respect to slope and deflection.
e) Write the two disadvantages of a fixed beam over simply supported beam.
f) State the principle of superposition.

Q.2 Attempt Three of the following. **(12 Marks)**

a) Calculate the resultant stress in the section of a rectangular column as shown in Figure No.1

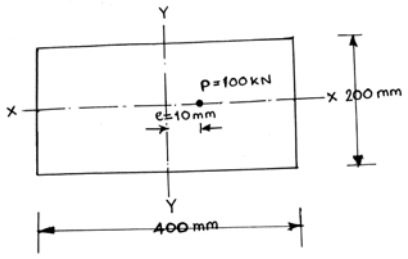


Figure No. 01

b) Calculate maximum and minimum stresses at the base of chimney of 22m height having outer diameter 5m and inner diameter 4m is subjected to wind pressure 1.4kN/m^2. Use coefficient of wind resistance 0.67 and weight of masonry 21kN/m^3.

c) Using standard formulae calculate maximum slope and deflection in terms of EI of a simply supported beam as shown in Figure No.2

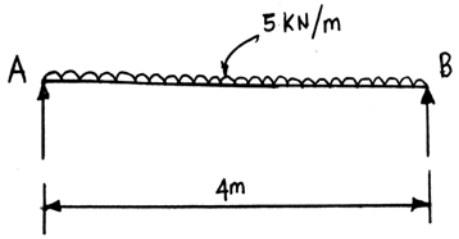


Figure No. 02

d) Using Macaulay's method calculate maximum slope in terms of EI for a cantilever beam as shown in Figure No.3

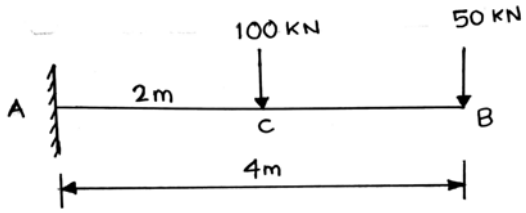


Figure No. 03

e) Using first principle calculate fixed end moments and net positive maximum bending moment for a beam as shown in Figure No.4

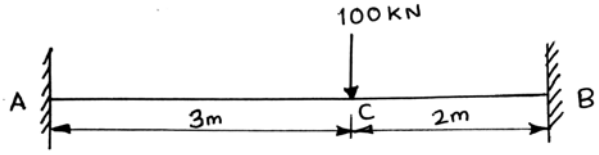


Figure No. 04

Signature

Name of Course Teacher:

<u>Note</u>: All the questions MUST BE accompanied with diagram instead of asking the questions in sentence form to avoid the ambiguity about type of beam, type or number of support, position of load etc.

Scheme - I

Sample Test Paper - II

Program Name : **Civil Engineering Program Group**

Program Code : **CE/CR/CS**

Semester : **Fourth**

22402

Course Title : **Theory of Structures**

Max. Marks : **20** **Time : 1.15 Hour**

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.
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.

Q.1 Attempt Four of the following. **(08 Marks)**

a) State the equation of Clapeyron's theorem of three moments for beam with different moment of inertia and modulus of elasticity.

b) State the value of stiffness factors for joints B and C for a frame as shown in Figure No.1

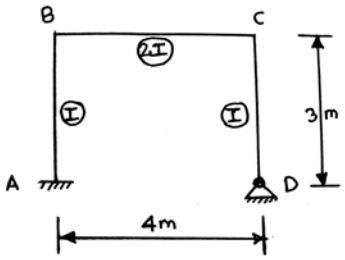


Figure No. 01

c) Draw sketch of perfect and imperfect truss each.

d) State four assumptions in the analysis of plan truss.

e) Define redundant and deficient truss.

f) State the relation between number of members and number of joints of a plane truss.

Q.2 Attempt Three of the following. **(12 Marks)**

a) Using three moment theorem calculate support moments for a beam as shown in Figure No.2

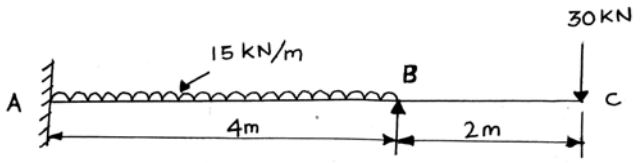
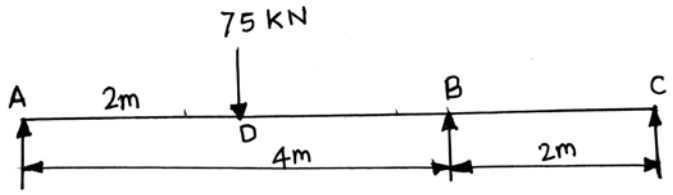


Figure No. 02

b) Using Clapeyron's theorem of three moments calculate the support moments of a beam as shown in Figure No.3



c) Distribute the moment 100 kN-m among the members OA, OB, OC and OD for a Figure No.4

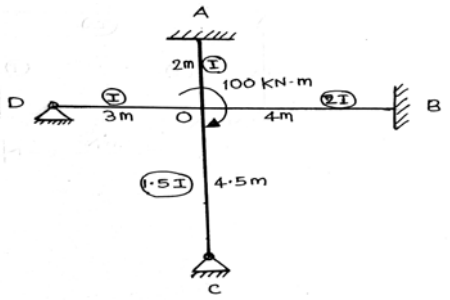


Figure No. 04

d) Using moment distribution method calculate the support moment of a beam as shown in Figure No.5

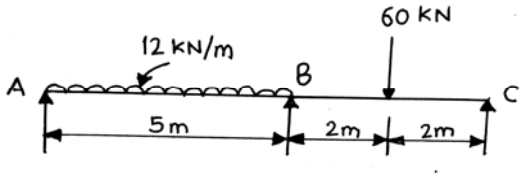


Figure No. 05

e) Using method of joints calculate magnitude and state the nature of forces in the members AB and AD of pin jointed truss as shown in Figure No.6

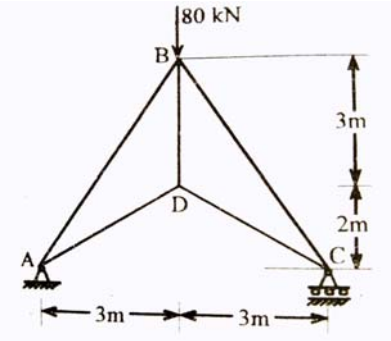


Figure No. 06

***Note**: All the questions MUST BE accompanied with diagram instead of asking the questions in sentence form to avoid the ambiguity about type of beam, type or number of support, position of load etc.*