B.TECH SEM – V (2007 COURSE) (CIVIL ENGG.) : WINTER - 2017

SUBJECT: STRUCTURAL MECHANICS – II

Day: **Saturday** Time: **02.30 PM TO 05.30 PM**

Date: ***20/01/2018*** **W-2017-2453** Max. Marks: 80

N.B.:

1) **Q. No. 1 and Q. No. 5** are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer book.
4) Use of non programmable **CALCULATOR** is allowed.
5) Draw neat diagrams **WHEREVER** necessary.
6) Assume suitable data if necessary.

SECTION –I

Q.1 **a)** Explain Muller-Bresulau's principle and its application. **(04)**

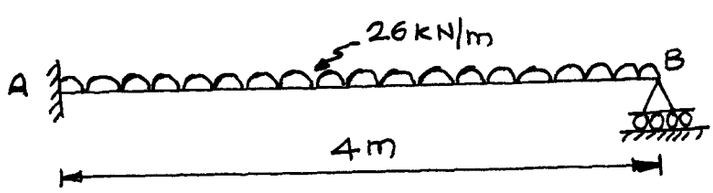
b) Three hinged parabolic arch 'L' and rise 'h' carrying UDL 'w' over whole span. Calculate horizontal thrust. Also show that Bending moment at any section is zero. **(05)**

c) State the procedure for analysis of structures using flexibility method. **(05)**

Q.2 A beam ACDB is of 19m. It is simply supported at C and D. Length between the supports is 10m. AC= 5m and DB= 4m. A load of 30kN is acting at A, 45kN at B. Two concentrated loads of 90kN and 65kN are acting at 3m and 6m respectively from support C. Find the reactions R_C and R_D, shear force and bending moment at 4m support C. Use ILD. **(13)**

Q.3 A three hinged parabolic arch has span 12m and central rise of 2.5m. It carries uniformly distributed load of 30kN/ m over left half of the span. Calculate, **(13)**
i) Reactions at the hinges
ii) Normal thrust, radial shear at 3m from left hinged.
iii) Maximum positive BM and maximum negative BM.

Q.4 Analyze the beam shown in fig. Q. 4 by flexibility matrix method. **(13)**



P. T. O.

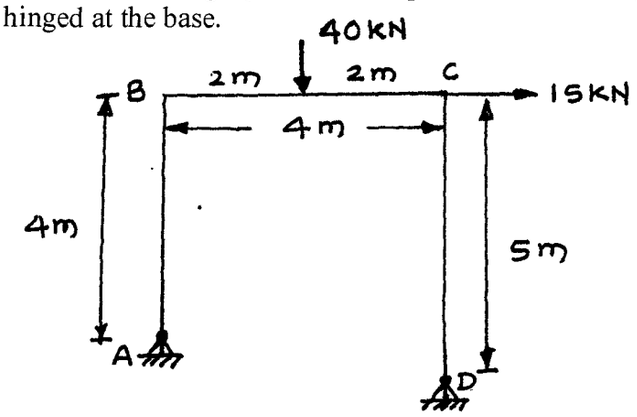
SECTION-II

Q.5 **a)** Define: **(04)**
i) Plastic hinge
ii) Shape factor

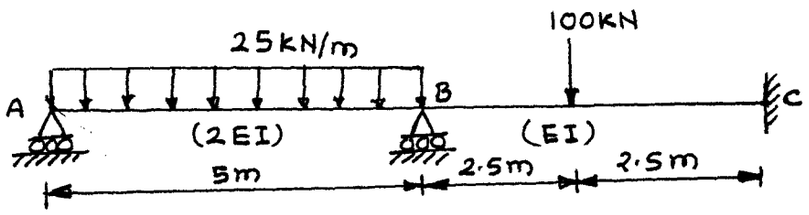
b) Explain difference between stiffness matrix and flexible matrix method. **(04)**

c) Explain the portal method. **(04)**

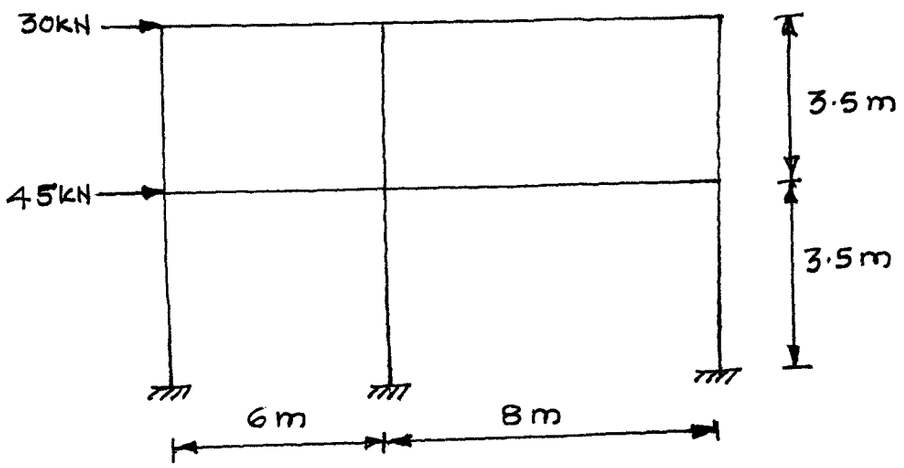
Q.6 A portal frame ABCD consists of columns AB and CD of heights 4m and 5m respectively while the beam BC is 4m long. All the members have the same fully plastic moment Mp. The frame is subjected to a vertical point load of 40kN at the middle point of BC and horizontal away of 15kN at C in the direction BC as shown in fig Q.6. Find the plastic moment required. The columns are hinged at the base. **(14)**



Q.7 Analyze the beam shown in figure using stiffness matrix method. **(14)**



Q.8 Analyze the frame shown in figure using cantilever method. **(14)**



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