

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination May 2019

B. Tech. in Civil Engineering, Semester IV

Roll No.....

CE405 : Structure Analysis

Time: 3 hours

Max. Marks: 60

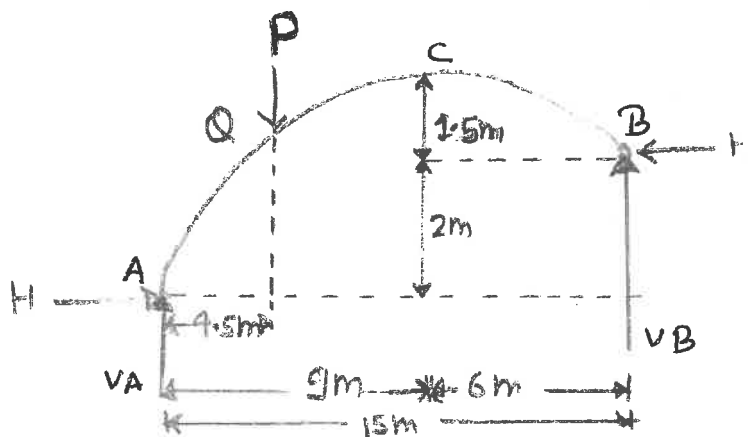
Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. In order to solve complex mathematical forms, Casio fx-991 MS or fx-991 ES or fx-991 ES Plus shall be permitted, however **programmable calculators** are strictly not entertained.
5. Take $P = 150 + \text{Last two digits of your roll number}$ and calculate the Answer.

- Q.1 A parabolic arch, hinged at its springings and crown has a span of 20 m and central rise of 8m. Determine the magnitude and maximum positive and negative bending moment at a section 8 m from left hand support, when a point load 90kN rolls over the beam. 05

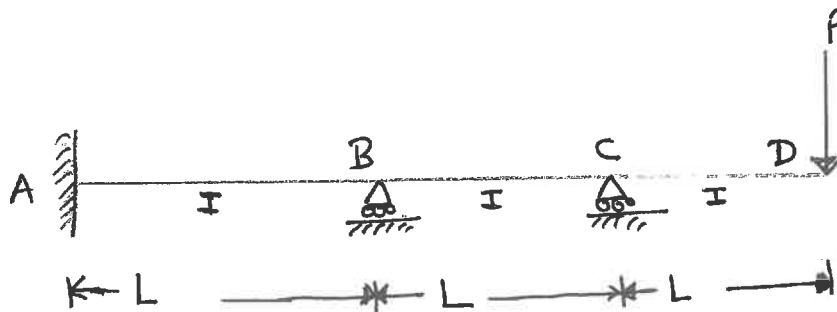
OR

- Q.1 A parabolic ARCH has a span of 15 meters and is supported at different levels such that the crown C is 9 meter from the left support A and 6 meters from the right support B, The right support is higher than left support by 2 meter and the crown is higher by 1.5 meter with respect to right support. The arch is hinged at the two supports and at the crown. Find the maximum bending moment in the arch at a section Q lying 4.5 meter from left support, when a point load P rolls over the span. 05



- Q.2A The continuous beam ABCD shown in the figure below is fixed at end A, simply supported at B and C and free at the end D. The beam carries a concentrated 05

load P at the free end. Analyses the beam by using moment distribution method. Also draw the Bending moment diagram.



Q.2B A mild steel T-section having a width of flange 150 mm and overall depth of section 180 mm has uniform thickness of web and flange equal to 10mm. when section is used as a compression member of 5m long with both end fixed. Using Rankine's Theory to calculate safe load which it can carry. Take $\sigma_c = 330 \text{ Mpa}$, $\alpha = \frac{1}{7500}$, and factor of safety = 3.5. 05

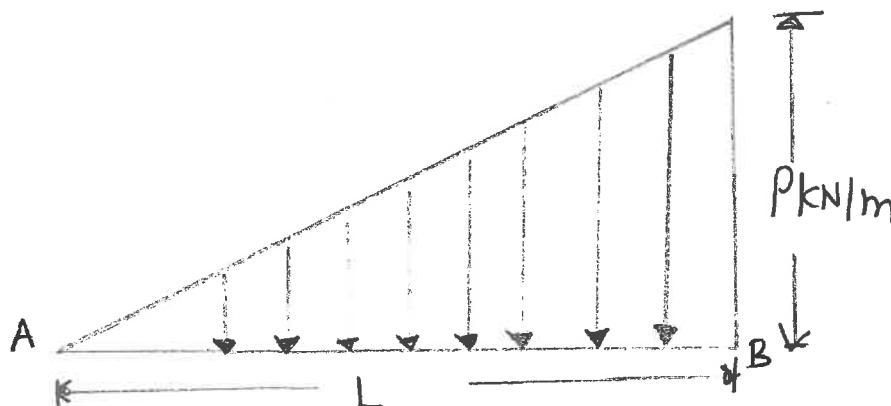
Q.3A A solid round bar 5 m long and 50 mm diameter was found to extend 4.2 mm under a tensile load of 75 kN. This bar is used as a strut with both ends fixed. Determine the buckling load for the bar and also find the safe load for factor of safety as 3. 7.5

Q.3B Compare the crippling loads given by Euler's and Rankine formula for a 2.25 m long tubular steel strut, having outer and inner diameter for 38 mm and 33 mm respectively, loaded through pin joints at both ends. Take the yield stress as 325 MN/m^2 , the Rankine's constant (for pinned ends) = $\frac{1}{7500}$ and $E = 200 \text{ GN/m}^2$. For what length of strut of this cross section does the Euler's formula cease to apply? 7.5

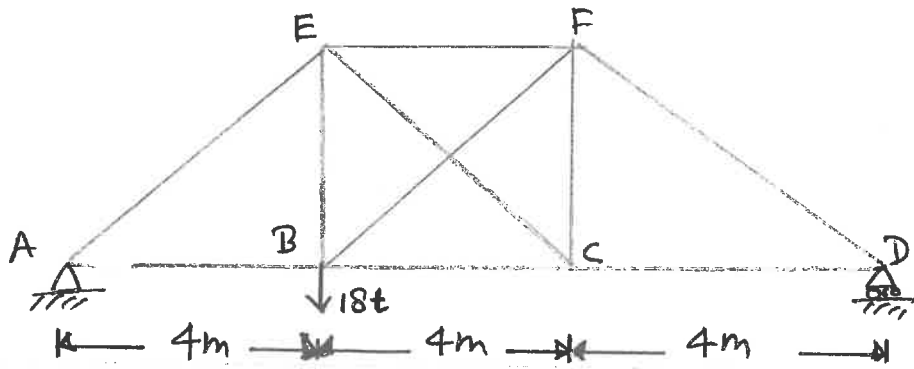
OR

Q.3B Using strain energy method, compute the deflection at mid span of the simply supported beam of span l carrying a uniformly distributed load of $W/\text{unit length}$. Assume flexural rigidity. 7.5

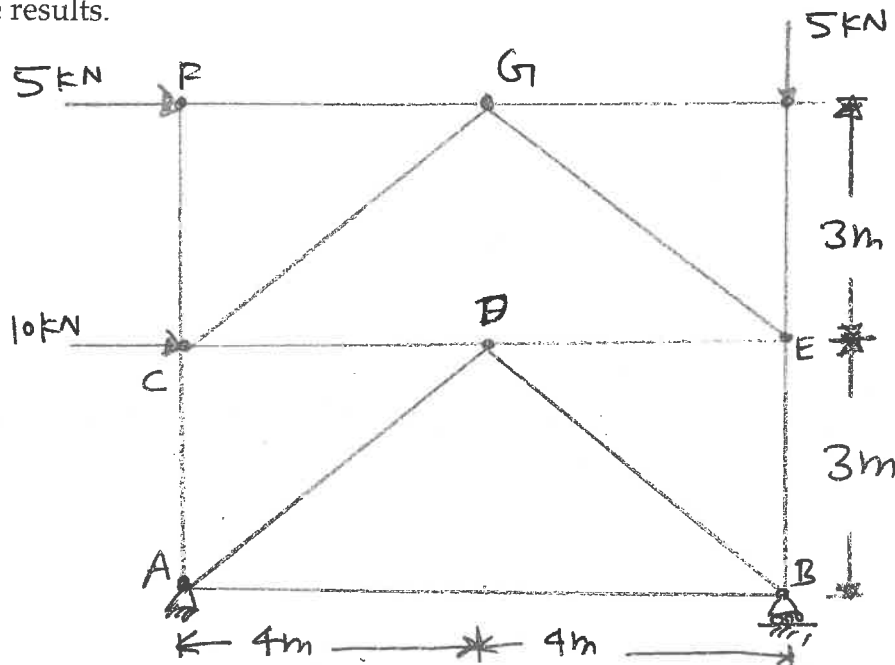
Q.4A Find slope and deflection at free end for beam shown in figure. 05



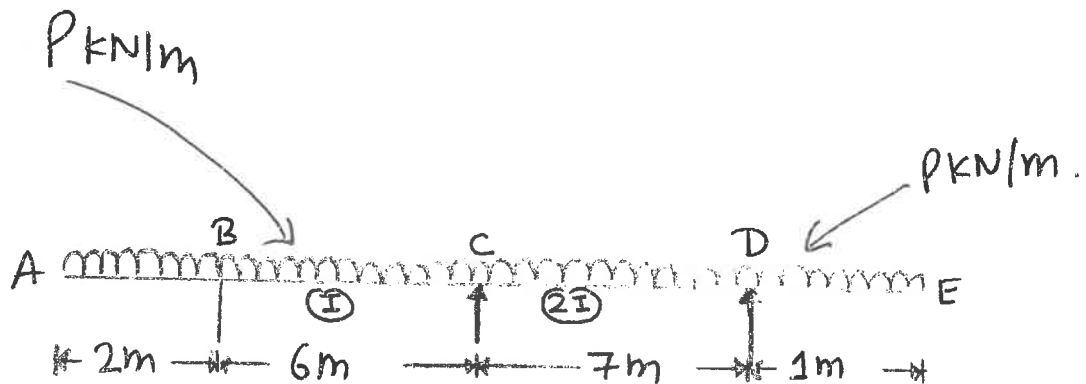
- Q.4B All the member of the steel truss shown in the figure below may be assumed pin jointed. Calculate forces in all the members. Area of cross section of all the members is same and equal to 30 cm^2 . 05



- Q.5 Find the magnitude and the nature of the forces in the members of the truss shown in the figure. Find also the reaction components at the supports. Tabulate the results. 10



- Q.6A Analysis the overhanging continuous beam given in figure by using Three moment theorem. 05



Q.6B Analysis the continuous beam given in figure by using clapeyron's Three moment theorem. 05

