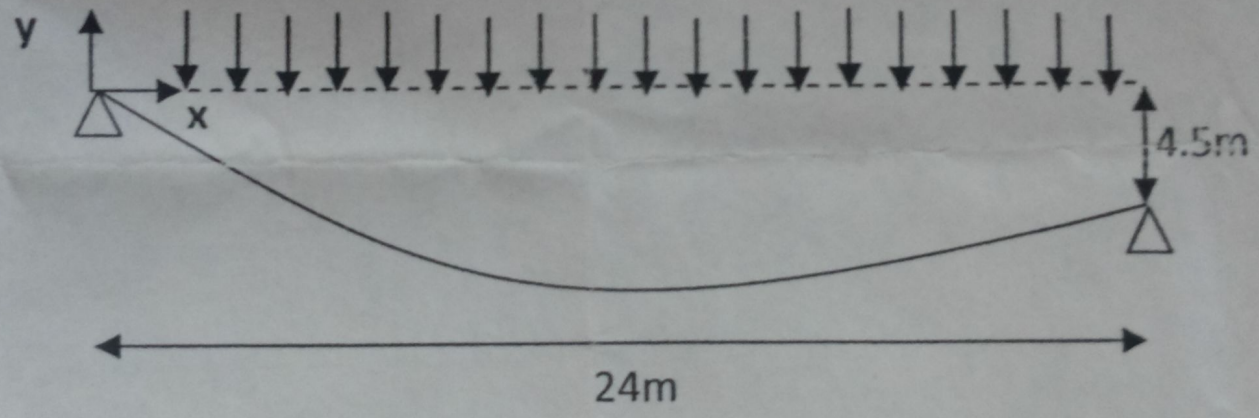
Major Exam, CEL 231, 2013-14

Dept. of Civil Engineering, IIT Delhi

Paper A

1.



Derive the equations governing the statics of a cable subjected to a u.d.l. Using the relationships derived, calculate the following quantities for the cable shown in the above figure: a) Length of the cable; b) the position and magnitude of the maximum tension in the cable. The maximum sag of the cable is 6m. Clearly state any basic assumptions involved in the derivation. (7.5+7.5=15 marks)

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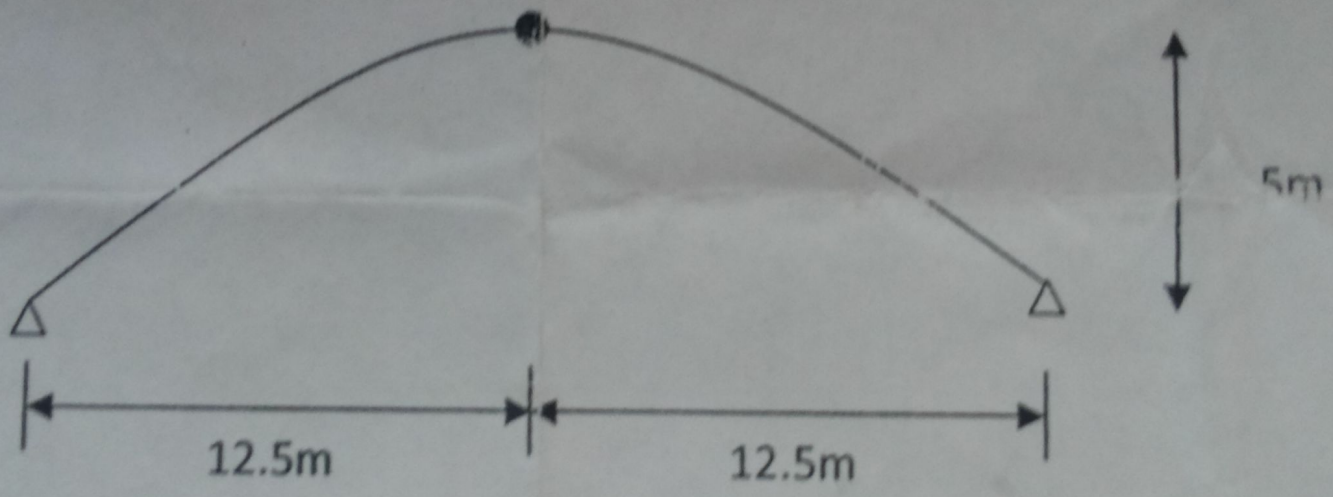
Paper A

2.



Derive expressions and draw the influence line diagram for the shear and the normal thrust for the parabolic arch with the given span and rise at a distance of 8m from the left support.

(15 marks)

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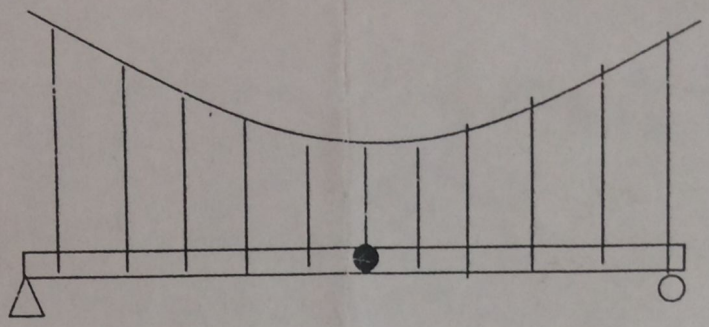
Paper B

1.



A symmetrically shaped cable of span **L** supports a bridge deck and a three hinged stiffening girder. The central dip of the cable is y_c.

a) Starting from the equilibrium equations, derive the relationship between the equivalent uniformly distributed load and a rolling load of magnitude **W** moving along the girder.

b) Derive expressions and draw the influence line diagram for the bending moment at any intermediate point on the girder.

(7.5 + 7.5 = 15 marks)

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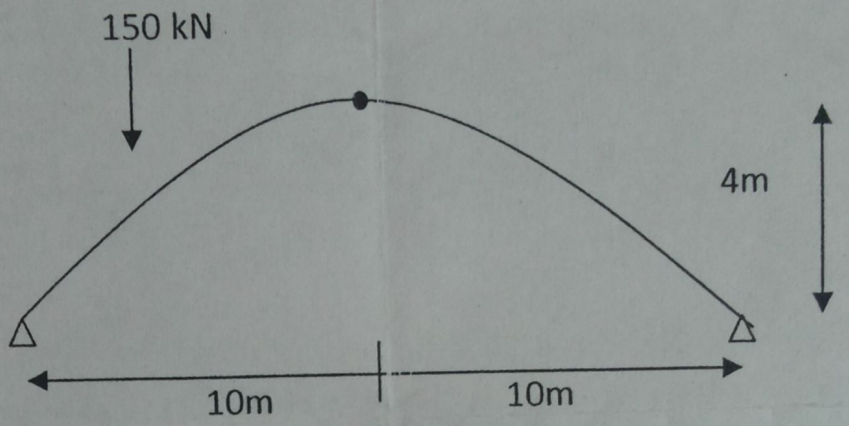
Paper B

2.



A load of 150 kN rolls from the left to the right of a three hinged parabolic arch having a span of 20m and rise of 4m. Determine the maximum and the minimum bending moments at a section which is 5m away from the left support. (15 marks)