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Question Paper Code : X10250

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Sixth Semester
Civil Engineering
CE 8602 – STRUCTURAL ANALYSIS – II
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Define the Muller-Breslau's principle.
2. What are the uses of influence lines ?
3. Draw the influence line diagram for the moment at the fixed end of a cantilever beam.
4. What is meant by panel loading ?
5. A three-hinged semi-circular arch of span L is subjected to a mid-span point load of W. Calculate the horizontal reaction at the supports.
6. What is a funicular arch ?
7. State Eddy's theorem.
8. What are the assumptions commonly made in the analysis of forces in cable systems ?
9. Determine the plastic section modulus of a square section with a size of 10 mm.
10. Briefly explain the length of plastic hinge in a beam with rectangular section.

PART – B **(5×13=65 Marks)**

11. a) A uniformly distributed load of 5 kN/m covering a length of 3 m crosses a girder of span 15 m. Find the maximum shear force and bending moment at a section 5 m from left support.

(OR)

b) Two point loads 50 kN and 100 kN spaced 5 m apart cross a girder of 15 m span with 50 kN load leading from left to right. Construct the maximum shear force and bending moment diagrams stating the absolute maximum values.

12. a) A propped cantilever beam has a span of 25 m. Two point loads of 10 kN each spaced 5 m apart is positioned symmetrically on the beam. Construct the influence lines for the support reactions, and determine the moment created at the fixed support.

(OR)

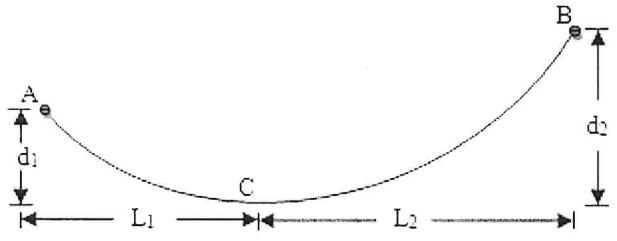
b) A two-span continuous beam of 10 m (each span) with simple supports carries a uniformly distributed load of 8 kN/m. The load can be located over all or a portion of each span. Compute the maximum value of shear at the middle of the first span.

13. a) A two-hinged parabolic arch of span (L) and rise (r) carries a uniformly distributed load of w/m run over the left half of the span. Obtain the expression for the horizontal thrust, and calculate the horizontal thrust and bending moment at quarter span point on the right half of the span with L = 20 m, r = 4 m and w = 20 kN/m.

(OR)

b) A three-hinged segmental arch has a span of 50 m and a rise of 8 m. A 100 kN load is acting at a point 15 m measured horizontally from the right support. Draw the bending moment diagram. Also determine the shear and normal forces under the load.

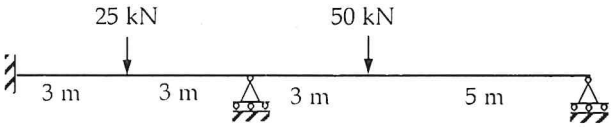
14. a) A light flexible cable shown below hangs between two points which are separated horizontally by distance L. The cable carries a udl w per unit horizontal length over entire span. If the dip of the lowest point of the cable is d_1 and d_2 from left and right support respectively, show that the horizontal component of tension in the cable is $H = \frac{wL^2}{2\left(\sqrt{d_1} + \sqrt{d_2}\right)^2}$. Also determine the length of the cable if L = 100 m d_1 = 2 m, d_2 = 6 m.



(OR)

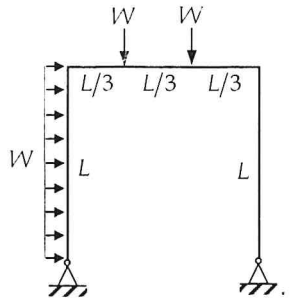
b) A foot bridge of width 3 m and span 50 m is carried by two cables of uniform section having a central dip of 5 m. If the platform load is 5 kN/m^2 , calculate the maximum pull in the cables. Find the necessary section area required if the allowable stress is 120 N/mm^2.

15. a) A two-span continuous beam of uniform cross-section is loaded as shown below. Determine the plastic moment.



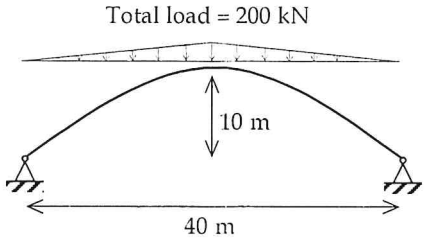
(OR)

b) For the portal frame shown below, find the value of W at collapse. Assume that the plastic moment of resistance M_p is the same for all the members



PART – C **(1×15=15 Marks)**

16. a) Analyze the two-hinged parabolic arch shown in figure below, and draw the bending moment diagram.



(OR)

b) Determine the collapse moment for the frame shown in figure below.