GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

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Registration No: | | | | | | | | | | |

Total Number of Pages : 3 **B.TECH**

4th Semester Regular Examination-April-May 2019

BCEPC4040 STRUCTURAL ANALYSIS-I

(Regulations 2017) CIVIL ENGG.

Time : 3 Hours Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark

Q.1. Answer *All* Questions.

a The principle of virtual work can be applied to elastic system by considering the virtual work of [CO2] [PO1]
   a) Internal forces only b) External forces only c) Internal as well as external forces
   b) None of the above

b The three moments equation is applicable only when [CO1] [PO2]
   a) The beam is prismatic c) There is no settlement of supports
   b) There is no discontinuity such as hinges within the span d)The spans are equal

c The fixed support in a real beam becomes in the conjugate beam a [CO1] [PO1]
   a) Roller support b) Hinged support c) Fixed support d) Free end

d In displacement method of structural analysis, the basic unknowns are [CO1] [PO2]
   a) Displacements b) Force c) Displacements and forces d) None of the above

e If L is length of conjugate beam and l is length of real beam then: [CO1] [PO1]
   a) L > l b) L < l c) L = l d) Can't say

f Free end is replaced by _____ in conjugate beam. [CO1] [PO1]
   a) Roller b) Pin c) Fixed support d) Link

g Top most part of an arch is called _____ [CO3] [PO1]
   a) Sofit b) Crown c) Center d) Abutment

h For drawing ILD, what value of test load is assumed? [CO4] [PO2]
   a) 1 unit b) Arbitrary c) Depends upon structure d) 0

i Shape of three hinged arch is always :- [CO3] [PO1]
   a) Hyperbolic b) Circular c) Parabolic d) Can be any arbitrary curve

j The maximum bending moment due to a train of wheel loads on a simply supported girder [CO4] [PO1]
   a) Always occurs at centre of span c) Always occurs under a wheel load
   b) Never occurs under a wheel load d)None of the above

PART – B: (Short Answer Questions) 10x2=20 Marks

Q.2. Answer *ALL* questions

a Write the difference between determine and indeterminate structures? [CO1] [PO1]

b State the principle of virtual work? [CO1] [PO1]

c Define strain energy? [CO2] [PO2]

d Define conjugate beam? [CO2] [PO1]

e What are the uses of influence line diagrams? [CO4] [PO2]

f What is meant by influence lines? [CO4] [PO2]

g What is an arch? Explain? [CO3] [PO2]

h Under what conditions will the bending moment in an arch be zero throughout? [CO3] [PO2]

i Distinguish between two hinged and three hinges arches? [CO3] [PO2]

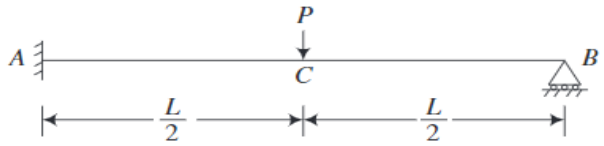
j Why stiffening girders are necessary in the suspension bridges? [CO3] [PO2]

PART – C: (Long Answer Questions) 4x15=60 Marks

Answer *ALL* questions

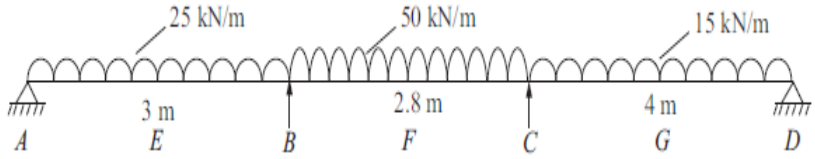
Q.3

a A propped cantilever of span L is fixed at A and is on roller at B as shown in the figure. Analyze it when it is subjected to a concentrated load P at mid span. Assume uniform cross-section throughout. **[CO1] [PO2]** 15 Marks



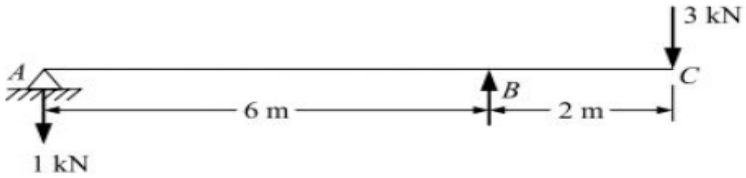
OR

b Analyse the continuous beam by three moment theorem. Also draw SFD and BMD. **[CO1] [PO2]** 15 Marks



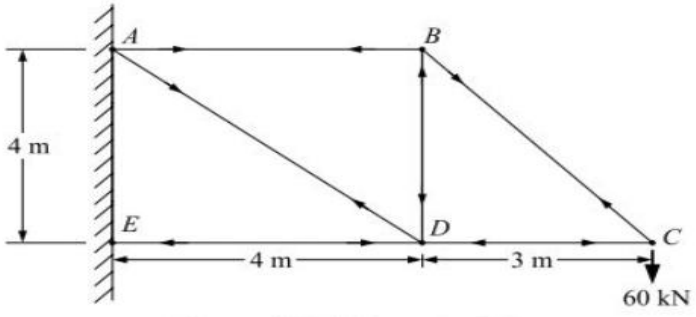
Q.4

a Determine the vertical deflection at the free end and rotation at A in the overhanging beam as shown in figure. Assume constant EI. Use Castigliano's method. **[CO2] [PO1]** 15 Marks



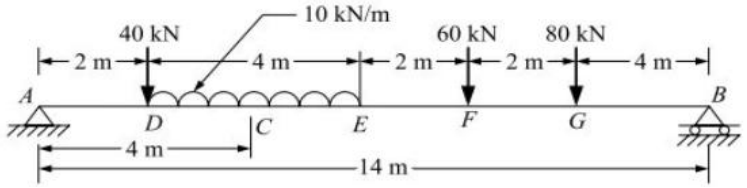
OR

b Determine the vertical deflection of point D in the truss shown in figure. The cross-sectional areas of members AD and DE are 1500 mm^2 while those of the other members are 1000 mm^2. Take E= 200 kN/mm^2. **[CO2] [PO2]** 15 Marks



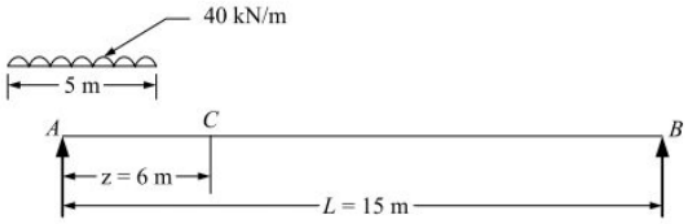
Q.5

a Using influence line diagrams determine the shear force and bending moment at section C in the simply supported beam as shown in the figure. 15 Marks **[CO4] [PO1]**



OR

b A simply supported beam has a span of 1 5 m. Uniformly distributed load of 40 kN/m and 5m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment ata a section 6 m from left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. **[CO4] [PO1]** 15 Marks



Q.6

a A three hinged parabolic arch hinged at the supports and at the crown has a span of 24m and a central rise of 4m. It carries a concentrated load of 50 kN at 18 m from left support and a uniformly distributed load of 30 kN/m over the left-half portion. Determine the moment, thrust and radial shear at a section 6 m from the left support. **[CO3] [PO2]** 15 Marks

OR

b A three hinged symmetric parabolic arch has a span of 20 m and a central rise of 4m. It is loaded with a uniformly distributed load of 30 kN/m for 8 m length from the left support. Draw influence line diagram for the bending moment at a section 6 m from the left support and then, determine the bending moment at that section. **[CO3] [PO2]** 15 Marks

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