KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Marks Scored:

Level : B.E.
Year : III

Course : CIEG 305
Semester :I

Exam Roll No. :

Time: 30 mins.

F.M. :10

Registration No. :

Date 07 JUN 2019

SECTION "A"
[20Q. × 0.5 = 10 marks]

Encircle the most appropriate answer among the given choices.

1. The influence line diagram (ILD) shown in Fig: 1 is for the member
   a) PQ
   b) RS
   c) PS
   d) QS

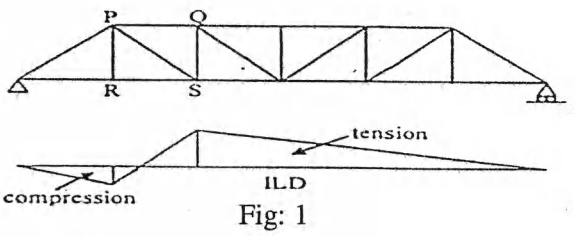

Fig: 1

2. A simply supported beam of length "L" carries a point load "P" as shown in Fig: 2 where b>a. The maximum deflection lies at
   a) Point A
   b) Point B
   c) Point C
   d) Between Point B & C

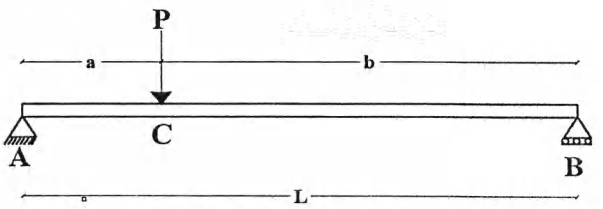

Fig: 2

3. A simply supported beam "X" of length "L" carries a central point load "W". Another beam "Y" of same length and boundary condition carries a UDL such that total load on the beam is of intensity "W". The ratio of maximum deflection between beam X & Y is
   a) 5/8 b) 8/5 c) 5/4 d) 4/5

4. The maximum deflection of cantilever beam of length "L" with point load "P" at free end is
   a) $PL^3/(3EI)$ b) $PL^3/(8EI)$ c) $PL^3/(16EI)$ d) $PL^3/(48EI)$

5. The product of modulus of Elasticity (E) and moment of inertia (I) is known as
   a) Modulus of rigidity b) Bulk modulus
   c) Flexural Rigidity d) Torsional Rigidity

6. The principle of virtual work can be applied to elastic system by considering the virtual work of
   a) Internal force only b) External Force only
   c) Both internal and external forces d) Virtual Force only

7. When UDL, longer then span of beam moves from left to right, the maximum BM at mid span occurs when the UDL occupies
   a) Less than half span b) More than half span
   c) Half span d) Whole Span

8. For a single point load "P" in a symmetrical three hinged arch of span "L". The maximum sagging moment occurs at distance X from ends. The value of X is
   a) 0.211 L b) 0.25L c) 0.5L d) 0.235L

9. The bending moment at any section of conjugate beam gives _____ in real beam.
a) slope b) curvature c) deflection d) bending moment

10. The maximum bending moment due to train of concentrated load in a simply supported beam occurs
a) Center of Span
b) Under the load
c) at support
d) Can't say from the given data

11. A single point rolling load of 16 kN moves along a simply supported beam of 30 m. The absolute maximum Bending moment is _____ kN-m
a) 15 b) 30 c) 45 d) 60

12. A three hinged parabolic arch having a span of 20 m and a rise of 5 m carries a point load of 10 kN at quarter span from the left end. The resultant reaction at the left support and its inclination with the horizontal are respectively.
a) 9.01 kN & 56.31°
b) 9.01 kN & 33.69°
c) 7.50 kN & 56.31°
d) 2.50 & 33.69°

13. Cables supporting roadway of a suspension bridge is considered to carry
a) Point load
b) UDL
c) UVL
d) Depends on external load

14. Suspension cable loaded with UDL "w" with the distance between support as "L" and central deflection as Yc. Horizontal Thrust "H" is given as
a) $wL^2/(8Yc)$ b) $2wL^2/(5Yc)$ c) $wL^2/(16Yc)$ d) $wL^2/(12Yc)$

15. When a cable is stretched by point loads the geometry of the cable will be
a) Parabolic b) Straight line c) circular d) hyperbolic

16. The fixed support in a real beam becomes is the conjugate beam
a) roller support b) hinged support c) fixed support d) free end

17. Principle of superposition is applicable when
a) Deflections are linear functions of applied forces
b) Material obeys Hooke's law
c) The action of applied forces will be affected by small deformations of the structure
d) None of the above

18. A three hinged parabolic arch having a span L and a rise of H carries a UDL of w unit length over entire span. Which of these statement is correct
a) H = wL^2/8H
b) SF = 0 throughout
c) BM =0 Throughout
c) All of the above

19. When a uniformly distributed load, shorter than the span of the girder, moves from left to right, then the conditions for maximum bending moment at a section is that
a) The head of the load reaches the section
b) The tail of the load reaches the section
c) The load position should be such that the section divides it equally on both side
d) The load position should be such that the section divides the load in the same ratio as it divides the span

20. A simply supported beam carries a varying load from zero at one end and w at the other end. If the length of the beam is a, the shear force will be zero at a distance x from least loaded point where x is
a) $a/2$ b) $a/3$ c) $a/\sqrt{2}$ d) $a/\sqrt{3}$

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SECTION "B"

Attempt *ALL* questions. Assume the suitable data wherever necessary.

1. For the overhanging beam shown in Figure 1, determine the maximum positive and negative shear force and maximum moments at point C. Due to
   a) distributed dead load 20 kN/m of span 3 m
   b) distributed live load 40 kN/m of span 20 m and
   c) Concentrated live load 90 kN. [8]

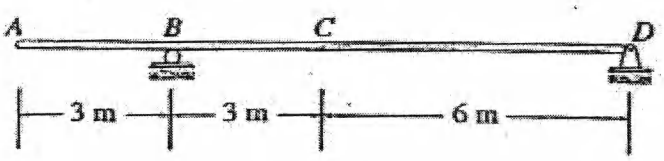

Figure 1

2. Find the Reaction and Normal Thrust & Shear force and BM at 15 m from left support of a 3 hinged unsymmetrical arch shown in Figure 2. [8]

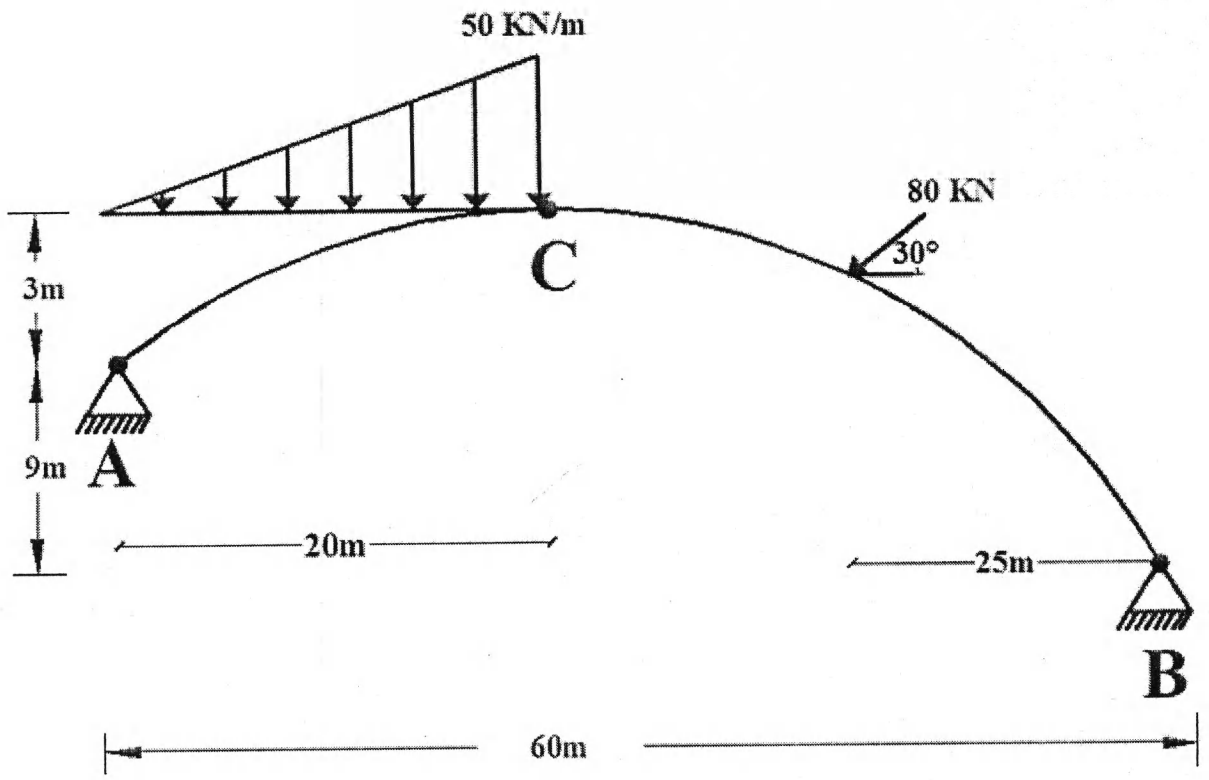

Figure 2

3. Determine the vertical displacement at point D of a truss shown in Figure 3 by Virtual Work method. Diameter of member AB = 100mm, BC = 110mm, CD = 80mm and BD = 125 mm. The material is steel. [10]

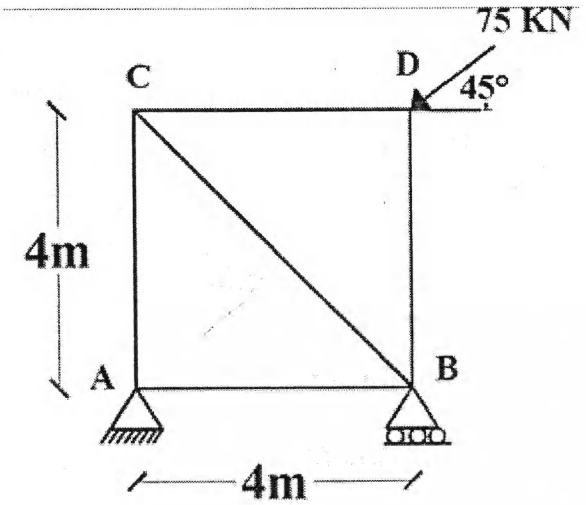

Figure 3

4. A Bridge of width 3.5 m and span 100 m is carried by two cables of uniform section having central dip 10 m. If the load due to pedestrian in the platform is 4 kN/m^2, dead load due to floor materials and self weight of platform is 6 kN/m^2, calculate maximum Tension in the cable. Also find the diameter of cable required if its allowable stress is 125 N/mm^2. [6]

5. Find the central deflection and slope at supports using Conjugate Beam method of the beam shown in Figure 4. Take EI constant throughout. [8]

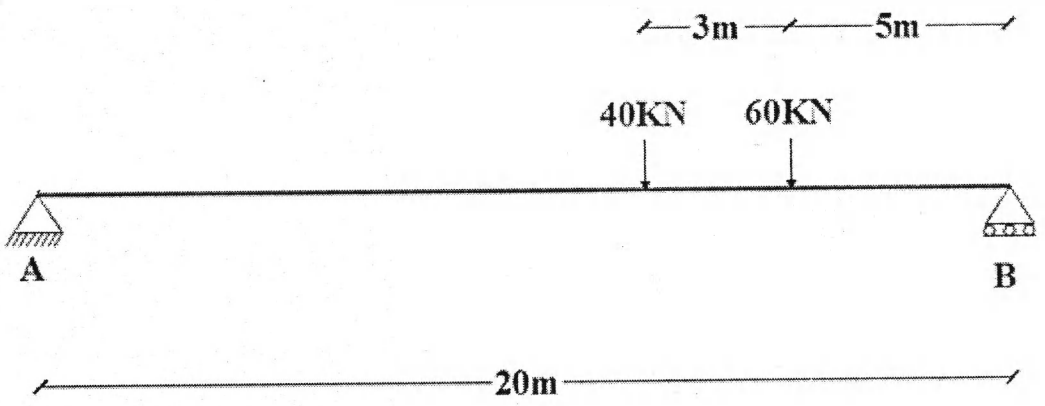

Figure 4