MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DEGREE IN

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 209: THEORY OF STRUCTURES II

DATE: 16/6/2017 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

- ***This paper comprises five questions***
- ***Question one is compulsory and carries 30 marks***
- ***All other questions carry 20 marks each***
- ***Answer question one and any other two questions***

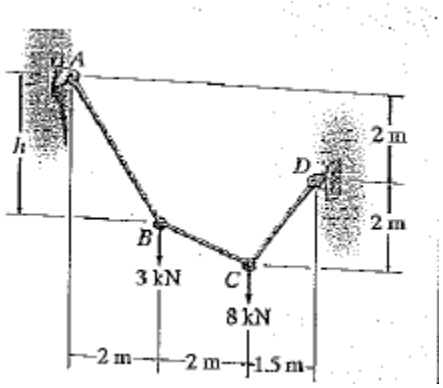
QUESTION ONE (COMPULSORY)(30 MARKS)

a) With the aid of diagrams explain three different types of trusses (15 marks)

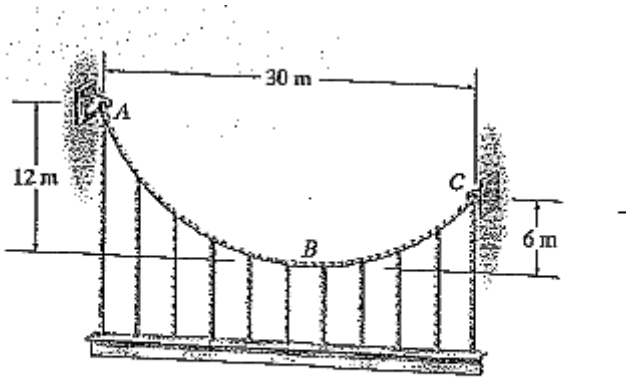
b) Derive the general expression for deflection with the aid of a diagram (15 marks)

QUESTION TWO (20 MARKS)

a) Determine the tension in each segment of the cable shown in the figure below and the dimension h. (12 marks)



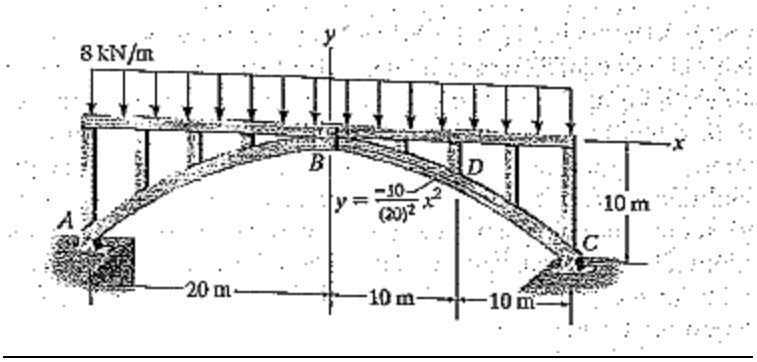
b) The cable in the figure below supports a girder which weighs 12 kN/m. Determine the tension in the cables at points A, B and C. (10 marks)



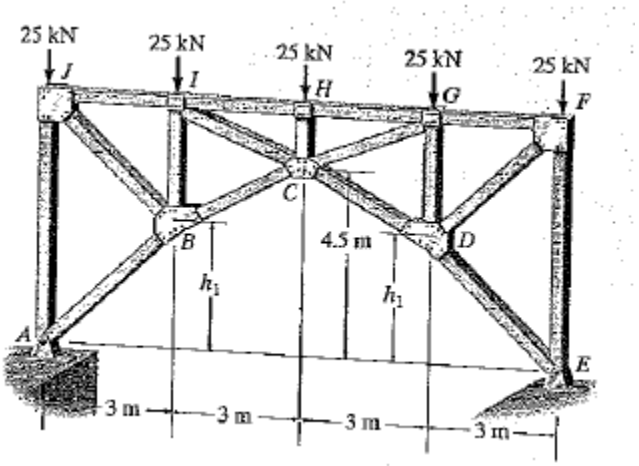
(a)

QUESTION THREE (20 MARKS)

a) The three-hinged open spandrel arch bridge shown in the figure below has a parabolic shape and supports the uniform load. Show that the parabolic arch is subjected only to axial compression at the intermediate point such as point D. Assume that the load is uniformly transmitted to the arch ribs. (10 marks)

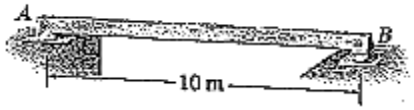


b) The three hinged truss shown in the figure below supports the symmetric loading. Determine the required heights h1 of the joints B and D, so that the arch takes a funicular shape. Member HG is intended to carry no force.

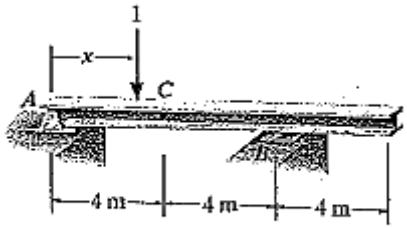


QUESTION FOUR (20 MARKS)

a) Construct the influence reactions for the vertical reaction at A of the beams in the figure below. (6 marks)



b) Construct the influence line for the shear at point C of the beam in the figure below. (14 marks)

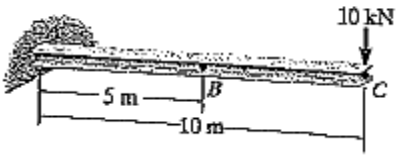


(a)

QUESTION FIVE (20 MARKS)

a) Determine the slope at points B and C of the beams shown in the figure below

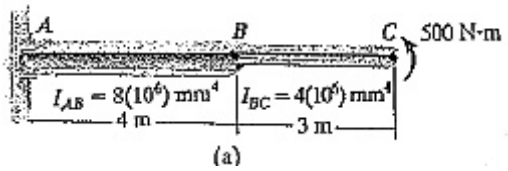
Take E= 300 GPa and I= 500(10^6) mm^4 (10 marks)



b) Determine the deflections at points B and C of the beam shown in the figure below.

Values for the moment of inertia in each segment are indicated. Take E= 200GPa.

(10 marks)



(a)