# MACHAKOS UNIVERSITY

**University Examinations for 2021/2022 Academic Year**

## SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

## SECOND YEAR SPECIAL / SUPPLEMENTARY EXAMINATION FOR

## BACHELOR OF SCIENCE (CIVIL ENGINEERING)

## ECV 204: THEORY OF STRCUTURES I

**DATE: 26/8/2022**                                    **TIME: 2.00-4.00 PM**

**INSTRUCTIONS:**

- *This paper comprises of FIVE questions. Answer **THREE** questions*
- *Question one is **compulsory** and carry 30 marks*
- *Answer any other **TWO** questions*
- *All symbols have their usual meaning*

**QUESTION ONE (30 MARKS)**

a)    Using figures, describe three types of supports used to support structures.        (12 marks)

b)    The beam ABCDE shown in figure Q1(b) carries a UDL of 6 kN/m over BC, plus a point load of 20 kN at D. Draw the S.F.D and B.M.D for the beam, indicating all significant values.                                                                                           (18 marks)
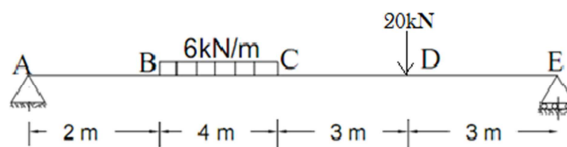


Figure Q1(b)

**QUESTION TWO (20 MARKS)**

a)  Calculate the support reactions in the simply supported beam ABCD shown in figure Q2(a).

(10 marks)
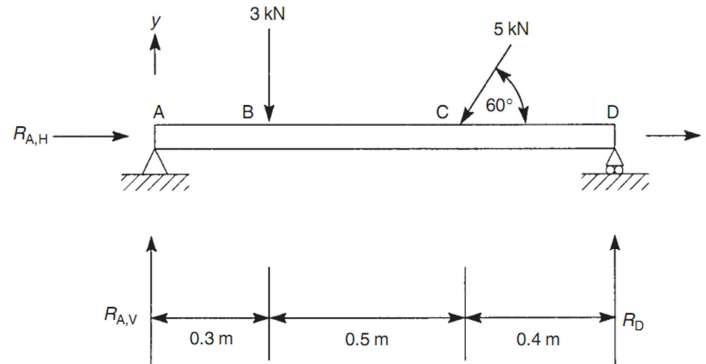


Figure Q2(a)

b)  Calculate the support reactions in the simply supported beam AB shown in figure Q2(b).
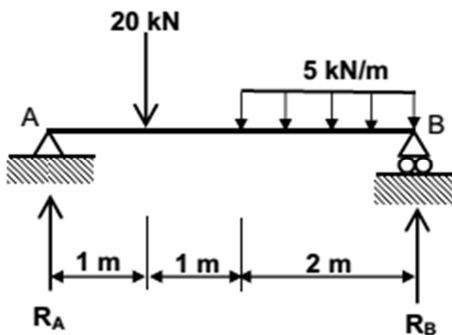
(10 marks)



Figure Q2(b)

**QUESTION THREE (20 MARKS)**

A light cable 18m long, is supported at two ends at the same level. The supports are 16m apart. The cable supports 120N load dividing the distance into two equal parts. Find the shape of the cable and tension in cable.

## QUESTION FOUR (20 MARKS)

A truss of span 5m is loaded as shown in Figure Q4. Find the reactions and forces in the members of the truss.
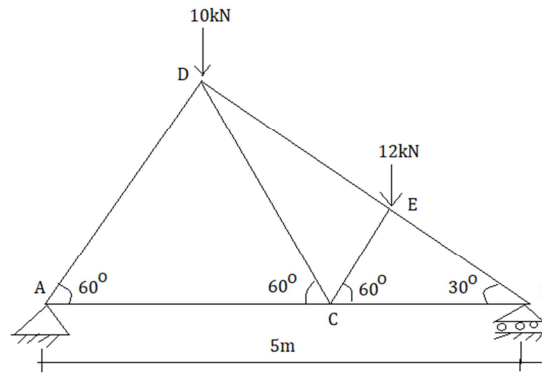


Figure Q4

## QUESTION FIVE (20 MARKS)

Figure Q5 shows an unsymmetrical parabolic arch of span 90m. The right-hand springing B is 9 m above the left-hand springing A. The crown C is at 50m from A and 25m above it. It is required to find the reactions under the given loads at D.
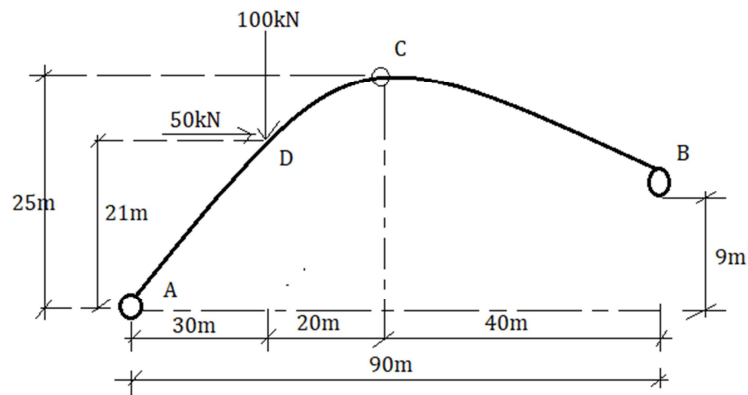


Figure Q5