TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2203: ENGINEERING MECHANICS - STATICS

END OF SEMESTER EXAMINATION

SERIES:DECEMBER2016

TIME:2HOURS

DATE: Pick DateDECEMBER 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt **any THREE questions**.

Do not write on the question paper.

Question ONE

a) State the condition for a body to be deemed to be in equilibrium (5marks)

b) Draw the free body diagram of figure 1 (5 Marks)

c) Determine the magnitude and directions of all the forces. Let *OA =15 cm, AB = 48cm,* angle *BOA = 30 º* and torque on link 2 to be taken as *7000 Ncm*. (10 marks).

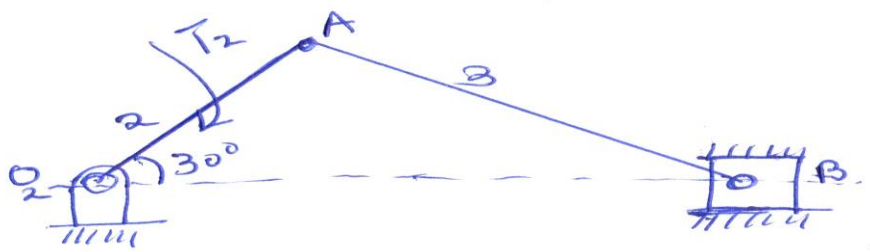

FIGURE 1

Question TWO

The four bar linkage shown in figure 2 has a crank 2 driven by an input torque T_2 and an external load $P = 2000\ N < 200^o$ acting on point Q on link 4.

a) Draw the free body diagram (5 marks)
b) Determine force F_{34} (15 marks)

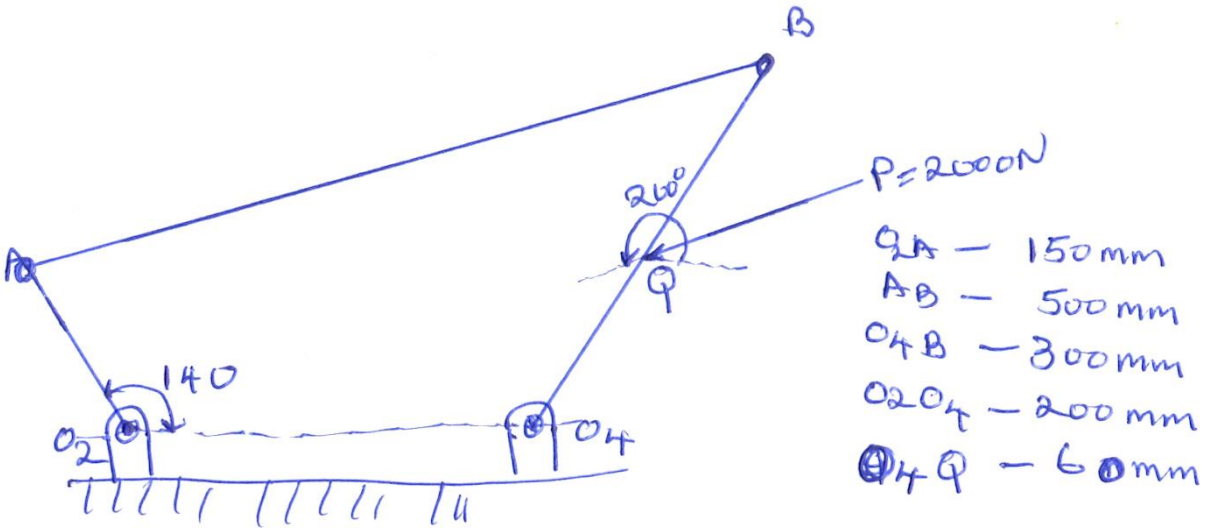

FIGURE 2

Question THREE

The driver of a simple helical train is shown in figure 3 is right handed helical gear having a pitch radius of *5 cm* , a traverse pressure angle 20^o and a helix angle 30^o.The pitch radii of the idler wheel and the driven gear are *8* and *6 cm* respectively. Let the input torque be taken as *20 KNcm* .

a) Draw the free body diagram (10 marks)
b) Determine the shaft forces (10 marks)

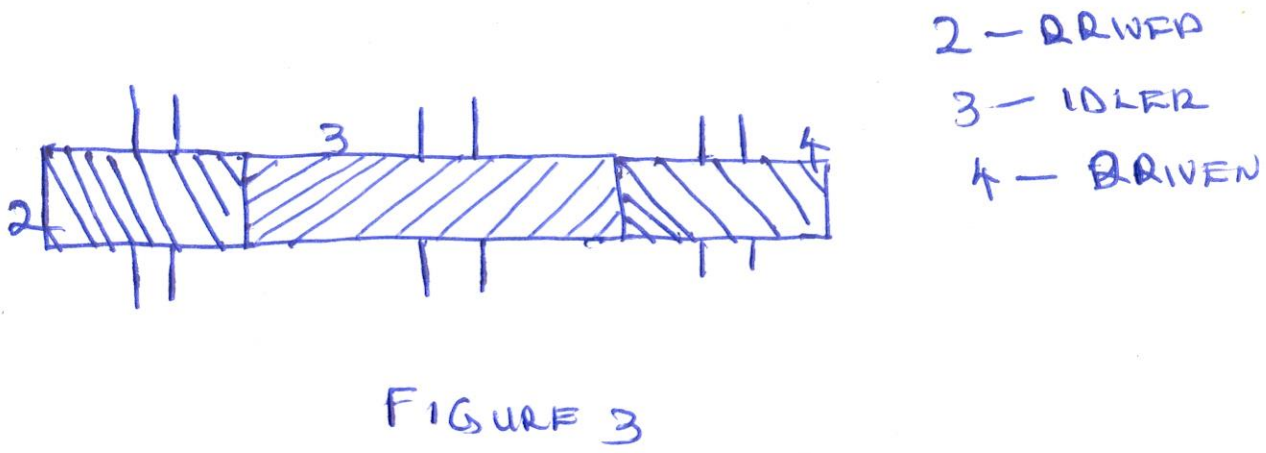

FIGURE 3

Question FOUR

Determine the reactions at the supports and the magnitude forces in each member of the frame shown in figure 4. (20 marks)

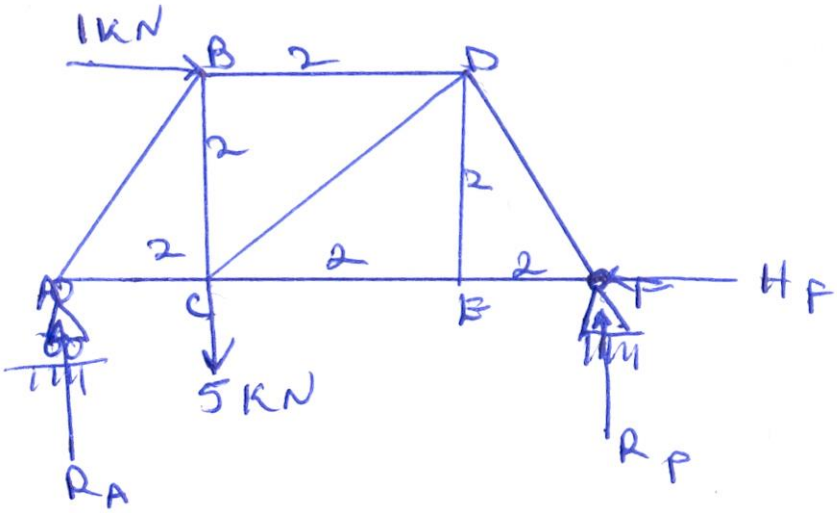

FIGURE 4

Question FIVE

a) A beam is loaded as shown in figure 5. Determine and draw the shear force diagram (10 marks)
b) Determine and draw the bending moment diagram (10 marks)

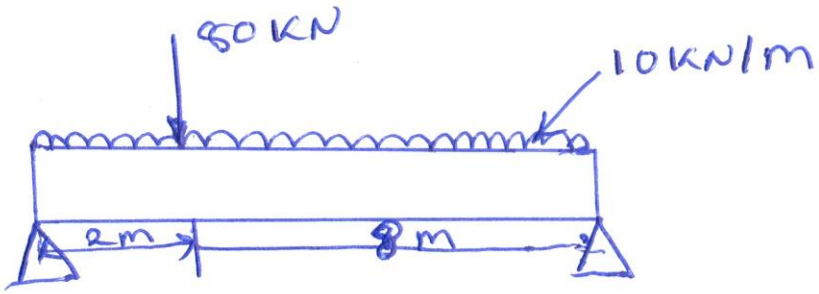

FIGURE 5