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 in a single plane (5marks)

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

c) Determine the magnitude and directions of all the forces. Let *OA =10 cm, AB = 45cm,* angle *BOA = 45 º* and torque on link 2 to be taken as *5000 Ncm*. (10 marks).

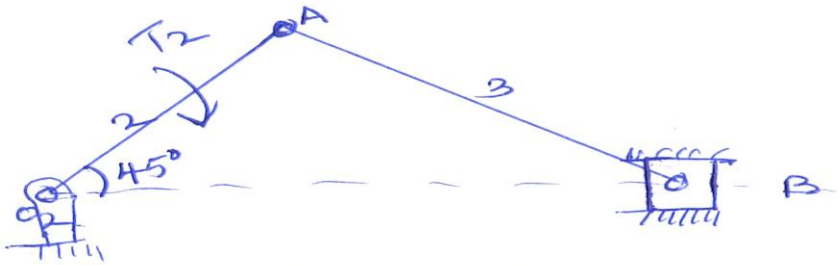

FIGURE 1

Question TWO

The driver a simple spur gear is shown in figure 2. Pinion 2 runs at a speed of *1750 r.p.m* and transmit a power of *2.5* Kw to idler gear 3. The teeth have a pressure angle of 20^o and module of *2.5 mm*.

a) Draw the free body diagram of gear 3 (10 marks)
b) Determine all forces that act on it (10 marks)

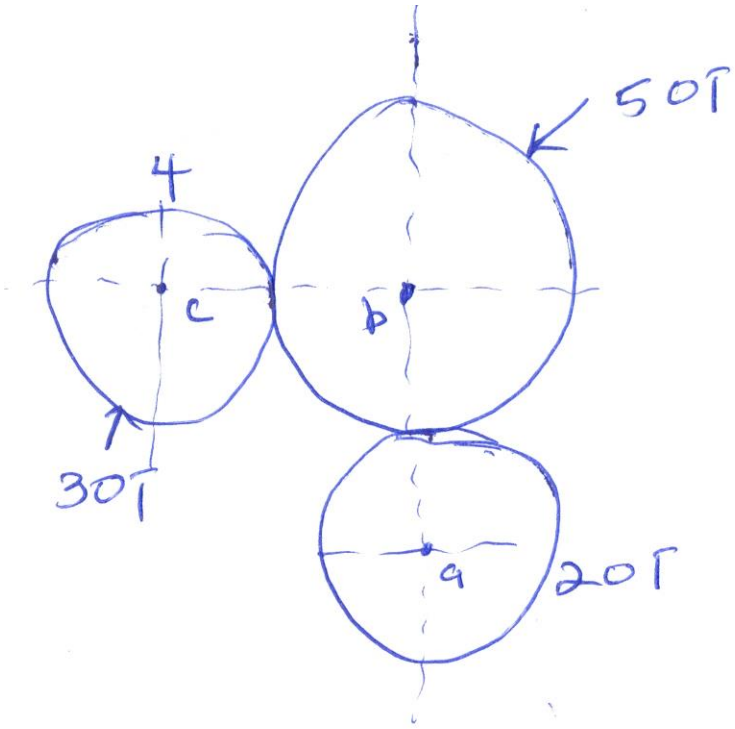

Figure 2

Question THREE

The driver of a simple helical train is shown in figure 3 is right handed helical gear having a pitch radius of *4 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. If the input torque is 15 KNcm determine the shaft forces. (20 marks)

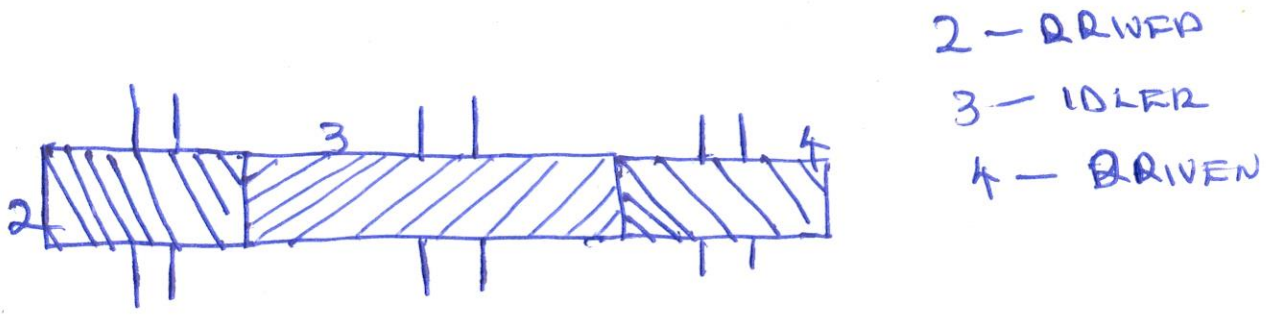

FIGURE 3

Question FOUR

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

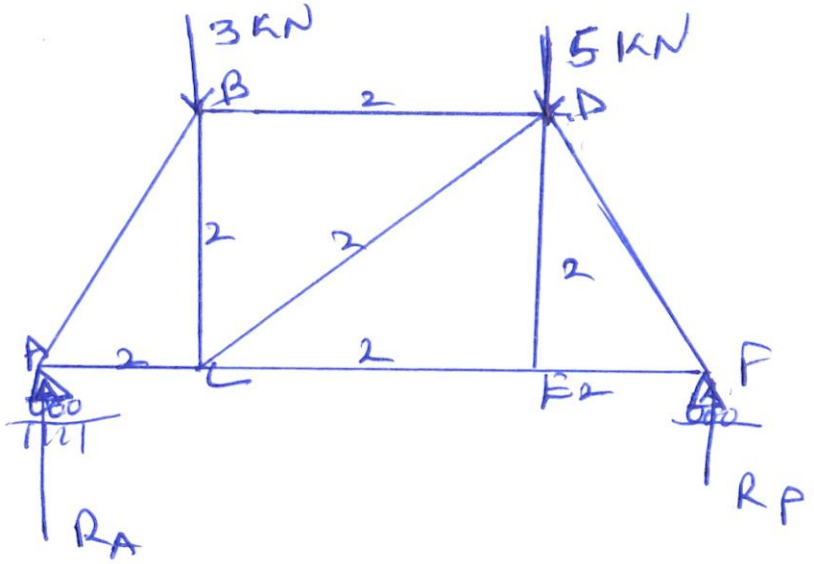

FIGURE 4

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)

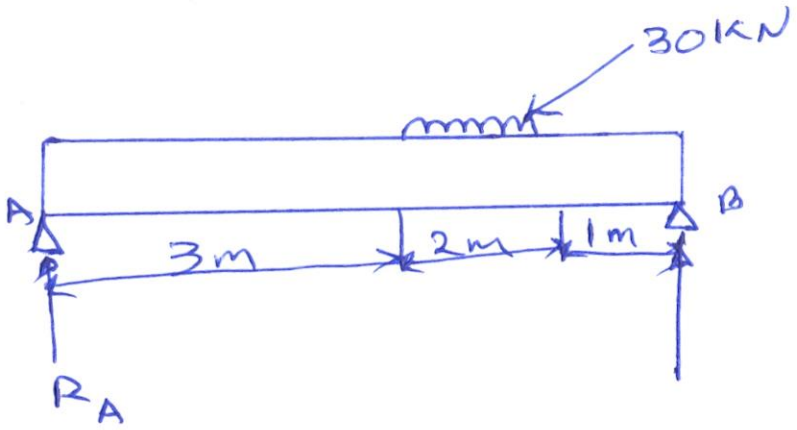

FIGURE 5