NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

Bachelor of Engineering Honours Degree Industrial & Manufacturing Engineering

MAY 2011 EXAMINATIONS

APPLIED MECHANICS – TIE 2206

ANSWER ANY <u>FIVE (5)</u> QUESTIONS
TIME ALLOWED: 3 HRS

Question one
(a) State and explain Newton's laws of motion. [8]
(b) With the aid of diagrams determine:
    (i) Centre of gravity. [3]
    (ii) Center of mass. [3]
   (iii)Centroids of lines, areas and volume. [6]

Question Two
© Two forces, Force A and Force B are 20m apart and are in parallel. Force A is equal to 20kN and Force B is equal to 30kN. Find the resultant of these two forces using:
    (i) Graphical solution. [10]
    (ii) Trigonometric solution. [10]

Question Three
A beam is loaded and supported as shown if figure Q3.
(a) Write equations for the shear force *(V)* and the bending moment *(M)* for any section of the beam. [10]
(b)Draw a complete shear and bending moment diagram and show where the maximum bending moment and shear force takes place. [10]
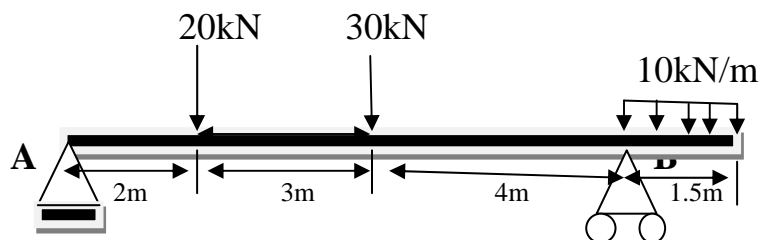
FigureQ3

Question Four
The structure shown in figure Q4 is a truss which is pinned to the floor at point A, and supported by a roller at point E. For this structure determine the value of all the support forces acting on the structure, and determine the force in member FC by method of joints.   [20]
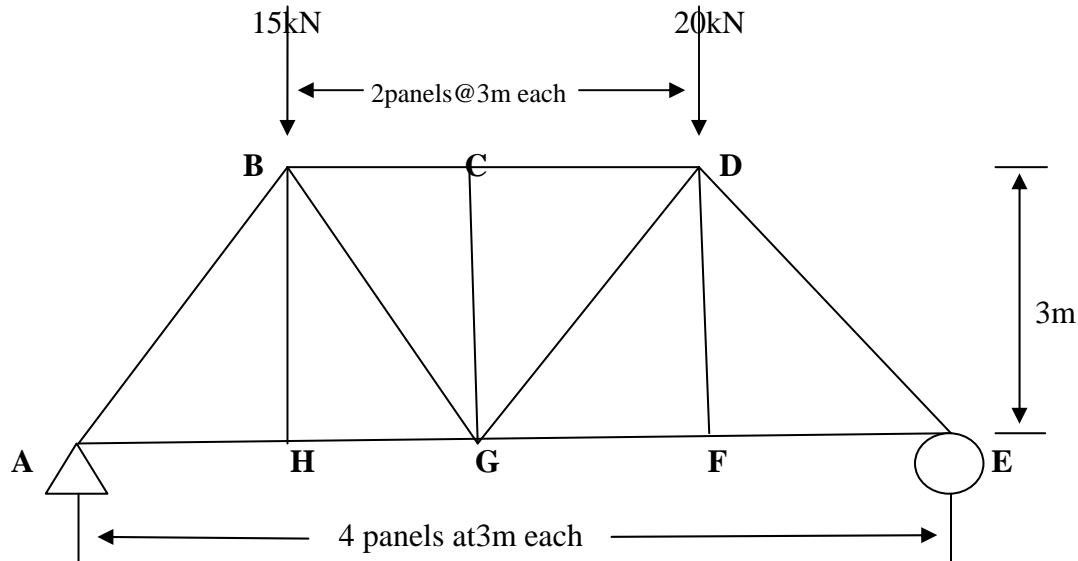
Figure Q4

Question Five
Refer to Figure Q4 determine forces in members BC, BG, HG, CD, GD and GF by method of sections.   [20]

Question Six
(a) Mention five advantages and disadvantages of friction   [10]
(b) Write short notes on:
    (i) Rolling friction   [2]
    (ii) Fluid friction   [2]
    (iii) Dry friction   [2]
(c) Mention the applications of friction, where there is need to minimize it and where these effects are essential.   [2]
(b) Distinguish between the coefficient of static friction and the coefficient of kinetic friction.   [2]

End of examination!!!