TERTIARY AND VOCATIONAL EDUCATION COMMISSION

NVQ LEVEL 05 –SEMESTER I

CONSTRUCTION TECHNOLOGY

| STRUCTURAL MECHANICS | F45C001M03 | THREE HOURS |

Answer any five (05) questions.

Question No. 01

i). Explain about three (03) types of supports (03 marks)

ii). Briefly describe about statically determinate structures and statically indeterminate structures (04 marks)

iii). If the resultant of two forces 7P and 8P are equal to 13P, find the angle between the above two forces (04 marks)

iv). The following forces act at a point A;
   a) 20N inclined at 30° towards North to East
   b) 25N towards North
   c) 30N towards North West
   d) 35N inclined at 40° towards South to West

   Find the magnitude and direction of the resultant force. (09 marks)

Question No. 02

i). State Hook's law (03 marks)

ii). Draw stress – strain curve for mild steel and derive the formula for Young's modules (E) (05 marks)

iii). Figure (1.0) below shows a section through a balcony. The total uniform load of 600kN is supported by three (03) rods with same cross-sectional areas and same materials. Calculate the load in each rod. Assume that the floor is rigid, but note that it does not necessarily remain horizontal. (12 marks)
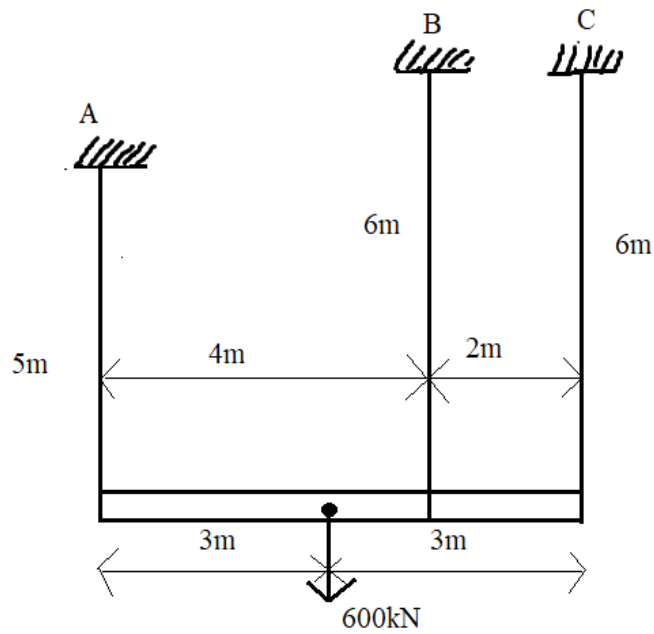
Figure (1.0)

Question No. 03

i).   Explain   (a) Shear Force   (02 marks)

(b) Bending moment   (02 marks)

ii).   Refer the beam shown in the figure (2.0) and,

a)   Calculate the support reactions at A and B;   (05 marks)

b)   Plot the shear force diagram (SFD) and bending moment diagram (BMD).

(08 marks)

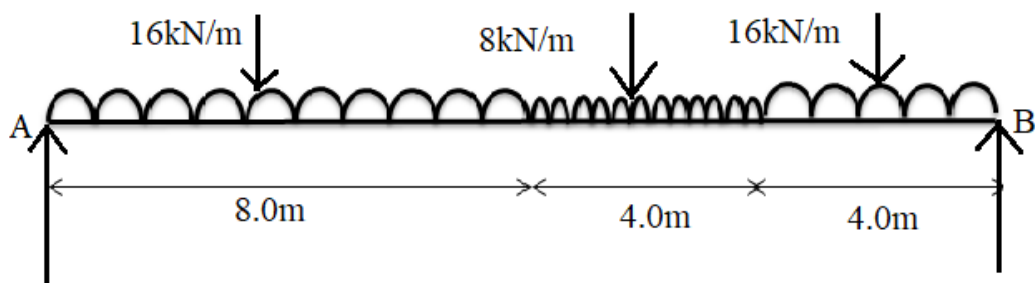iii).   Determine the magnitude of the maximum bending moment for the following.

(05 marks)

Fig. 2.0

Question No. 04

i).   Explain about section modulus (z)   (05 marks)

ii).   Refer the Fig. 3.0 below and answer the questions.

a)   Find Neutral Axis from CD.   (07 marks)

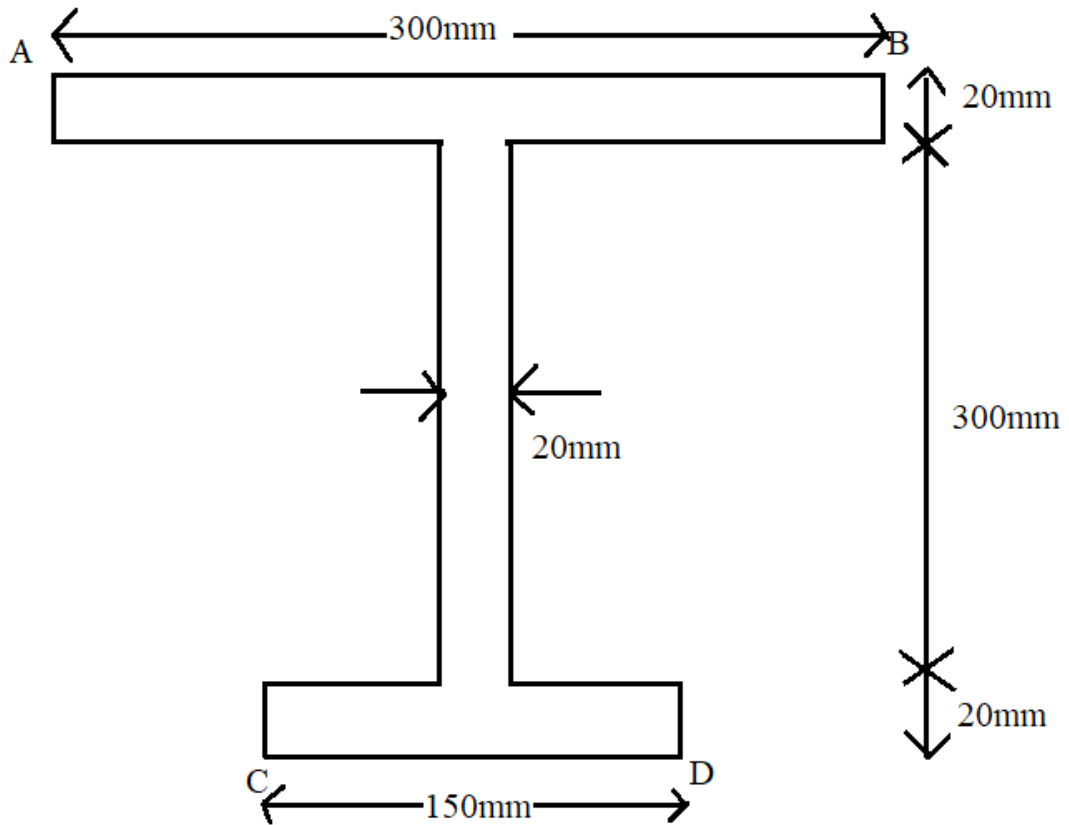b) Find Moment of Inertia of the cross section about the neutral axis.

(08 marks)

Fig. 3.0

Question No. 05

    i).   Prove the simple Bending Theory   (10 marks)

    ii).   A rectangular steel bar with a cross section of 15mm width and 30mm height, is 6.0m long. It is simply supported at its' ends, and the density of steel is 7850kg/m^3.Determine the maximum bending stress caused by the weight of the bar.   (10 marks)

Question No. 06

    i).   State clearly the difference between a perfect frame and an imperfect frame.   (04 marks)

    ii).   The pin jointed truss is shown in the figure (4.0) and its members AB, BC, CD, DE have equal lengths. Find the forces in the members of the truss and tabulate the results whether they have strength as "Tension" or "Compression".   (16 marks)
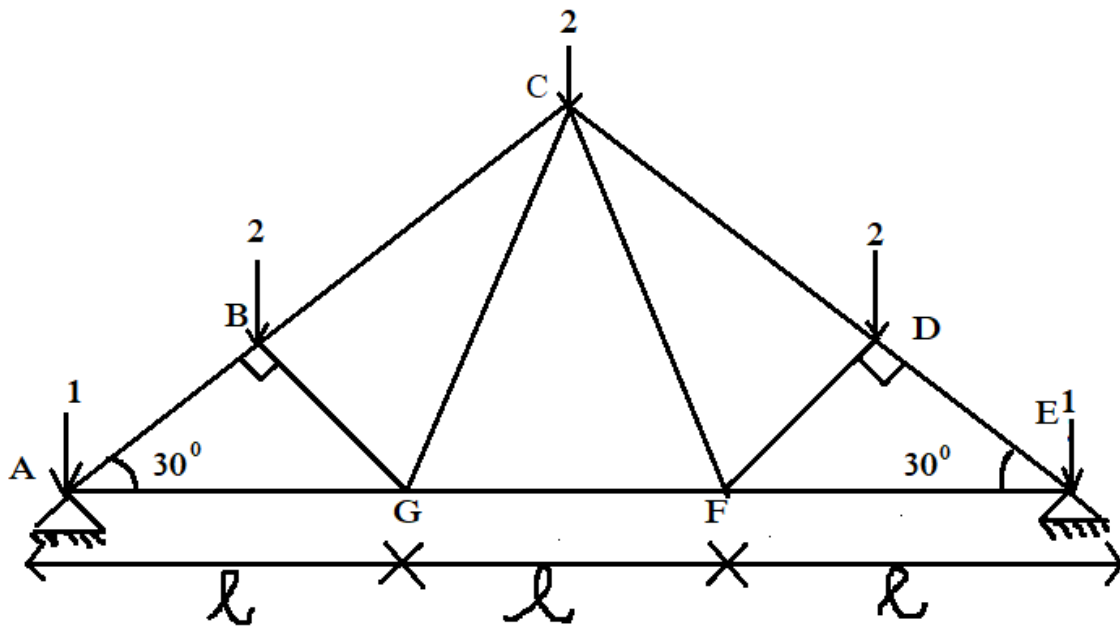
Fig.4.0