EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF AGRICULTURAL ENGINEERING
FACULTY OF AGRICULTURE
FIRST YEAR SECOND SEMESTER EXAMINATION IN AGRICULTURE – 2017/2018
(Aug/Sept-2020)
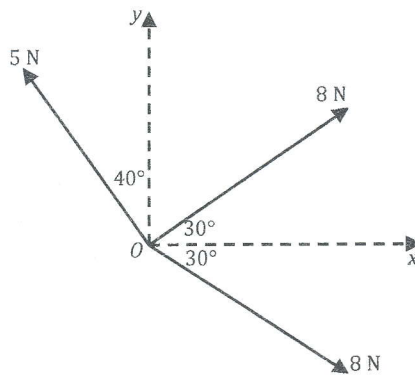
AE 1202: APPLIED MECHANICS

<u>Answer all questions</u>   <u>Time: One hour</u>

1. a. Three coplanar forces of magnitudes 5 N, 8 N and 8 N act at the origin O of rectangular coordinate axes. The directions of the forces are as shown in the diagram.
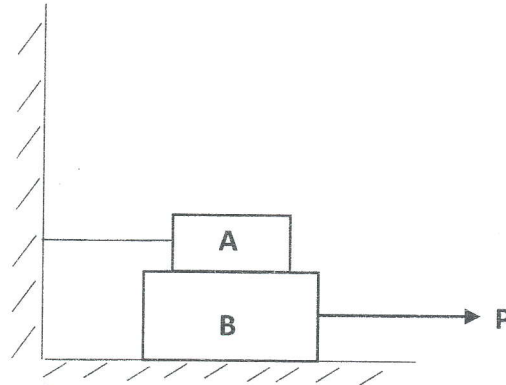

Find the following:

1) Component of the resultant of the three forces in the

    i. x – direction   05 marks

    ii. y – direction   05 marks

2) Magnitude and direction of the resultant force.   10 marks

b. All inclined members in the truss are at 60° to horizontal and length of each member is 2m as shown in the diagram.
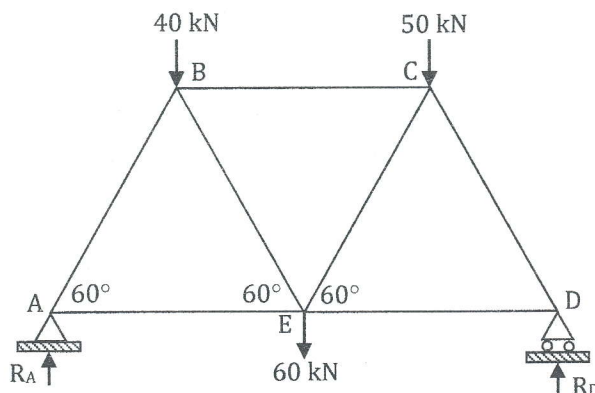
Determine the following:

1) Forces in all the members of the truss   07 marks

2) Indicate the nature of the forces on the members of the truss.   33 marks

c. Block A weighing 1000 N rests over block B which weighs 2000 N as shown in the figure. Block A is tied to wall with a horizontal string. The coefficient of friction between blocks A and B is 1/4 and between B and floor is 1/3.

1) Draw the free body diagram for block A and B in the following case (i) and (ii),
                                                 10 marks

     i. P is horizontal.

     ii. P acts at 30° upwards to horizontal.

2) What should be the value of P to move the block B in each case (i) and (ii). 30 marks

2. a. What do you understand by the terms;

1) Neutral surface   05 marks

2) Plane of bending   05 marks

3) Neutral axis   05 marks

4) Bending moment   05 marks

b. Derive an expression for the moment of the couple required to bend a uniform metallic bar into arc of a circle of small curvature.   30 marks

c. A horizontal cantilever of uniform cross-section, A, and length, L, carries a load, W, at the free end. Obtain an expression for the deflection at the free end.   50 marks

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