ME 162   Quiz1   Date:..........................

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1. ANSWER all questions.
2. <u>NOTE</u>: A correctly selected option **without accompanying supporting** document(s) earns a **tenth** of that question's mark. All supporting documents MUST be on the question sheet(s).
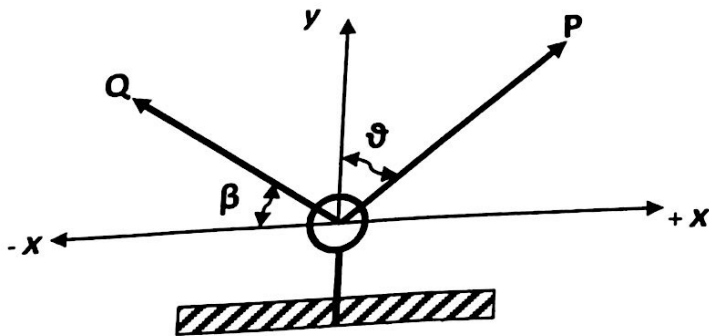

Figure 1

$21.$ In figure 1, if the angles $\beta = 60°$, $\vartheta = 45°$, and $Q = 8$ kN and $P = 10$ kN, determine the magnitude of the resultant force acting on the eyebolt and its direction measured clockwise from the positive y axis.

a. 14.32 kN   77.6°

b. 14.32 kN   12.4°

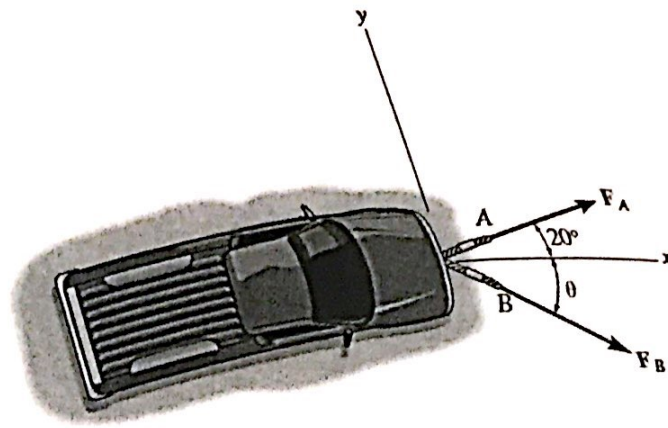c. 163.2 kN   50.6°

d. 16.32 kN   60.6°

e. 100.2 kN   102.4°

Figure 2

Q2. In figure 2, the truck is to be towed using two ropes. At the ends of ropes A, and B, Ama pulls with force F_A and Bomp pulls with force F_B respectively. If the resultant force of F_A and F_B is to be 8 kN and is directed along the positive x axis, determine the magnitudes of F_A and F_B as shown. Assume Bomp pulls perpendicularly to Ama.

- a. FA = 2.74 N   FB = 7.52 N
- b. FA = 27.4 N   FB = 75.2 N
- c. FA = 3.21 N   FB = 7.82 N
- d. FA = 32.1 N   FB = 78.2 N

Q3. What is the gravitational force exerted by the earth on a 70 kg man whose elevation above the surface of the earth equals the radius of the earth. The mass and radius of the earth are $M_e = 5.97423 \cdot 10^{24}$ kg and $R_e = 6378$ m, respectively. $G = 6.673 \cdot 10^{-11}$ m³/kg.s²

- a. 171.4 N
- b. 17.14 N
- c. 185.5 N
- d. 18.55 N

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Q4. Represent each of the following combination of units in the correct SI form using an appropriate prefix

$$8.2 \text{ mN}/(\text{kg}.\mu s)$$

a. 8.2 kN/(kg.s)

b. 8.2kN/(kg.s)

c. 8.2 N/(g.s)

d. 8.2N/(g.s)

e. 82N/(g.s)
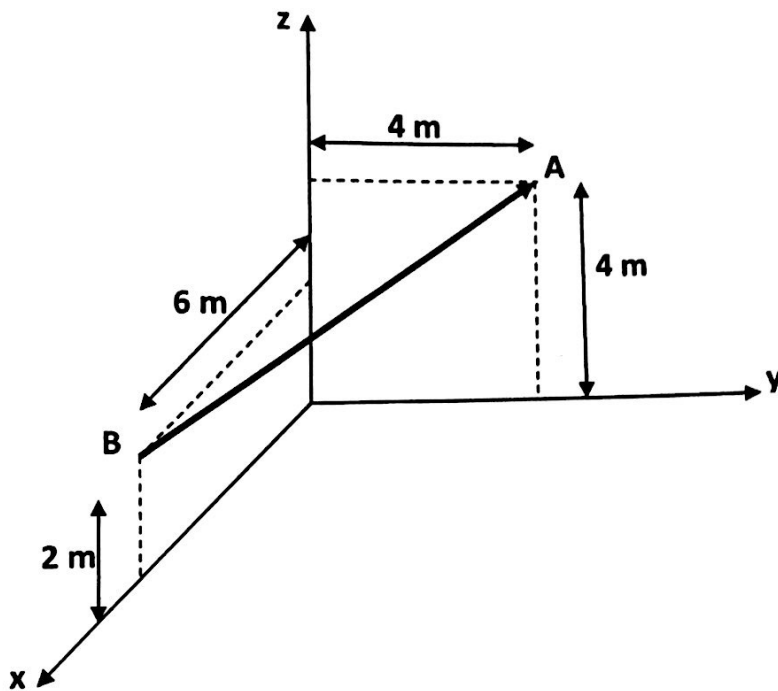
Figure 3

Q5. In figure 3, a 30 kN force acts along the line AB. Write the vector form of the force.

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Figure 6

Q10. Find the zero force members in the figure 6 above
   a. BF, CG, DH
   b. AB, AF, AI
   c. AI, BI, CG
   d. DH, DE, BF

Q11. Use the method of joints to find the force in member DE in figure 6 and indicate the type of force in it.
   a. 88 compressive
   b. 88 kN tensile
   c. 99 kN tensile
   d. 99 kN compressive

Q12. Determine the minimum horizontal force, pointing towards right, required to hold a crate of mass 50 kg resting on an inclined plane from sliding downward. The plane is inclined 30° to the horizontal. The static coefficient of friction between the plane and the crate is 0.25
   a. 14.03 N
   b. 140.3 N
   c. 495.0 N
   d. 49.50 N

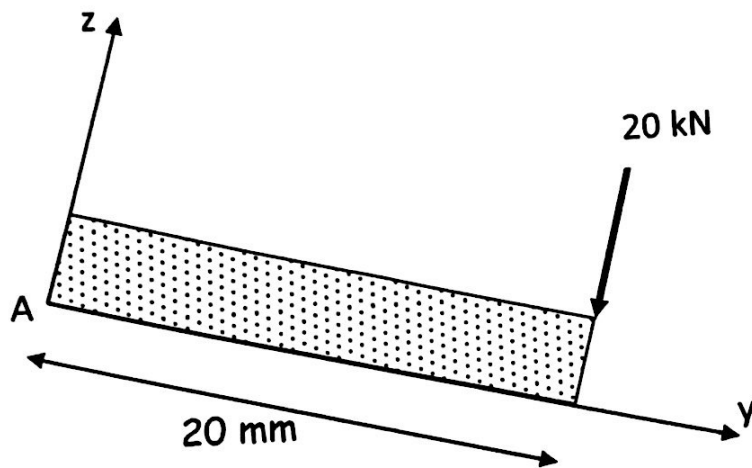**Q6.** In figure 3, calculate the turning effect of the 30 kN force about point D(1,1,0).

Figure 4

Q7. Calculate the moment about 'A' in figure 4.

a. 500 Nm

b. -100 Nm

c. -500 Nm

d. -400 Nm

e. 400 Nm

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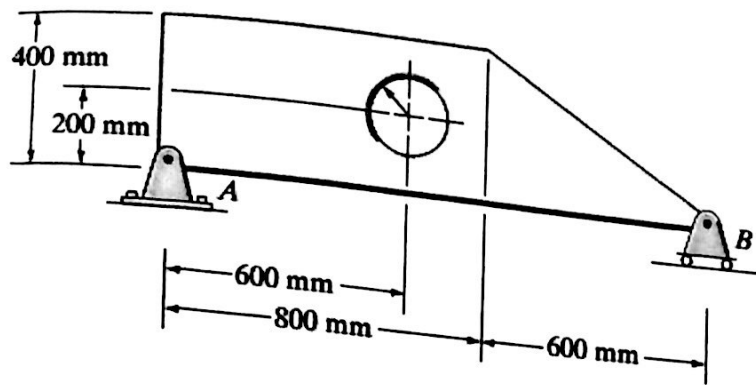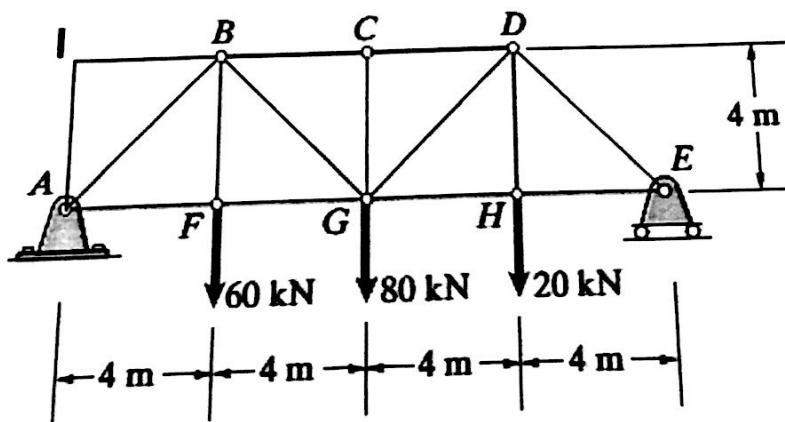
Figure 5

Q8. Find the x-component of the centroid of the above figure. Take the radius of the circle to be 63 mm.
   a. 632.2 mm
   b. 56.26 mm
   c. 562.6 mm
   d. 734.6 mm
   e. 73.46 mm

Q9. If the weight of the figure is 500 N, find the reaction at support B
   a. 300.9 N
   b. 200.9 N
   c. 400.9 N
   d. 500.9 N
   e. 100.9 N

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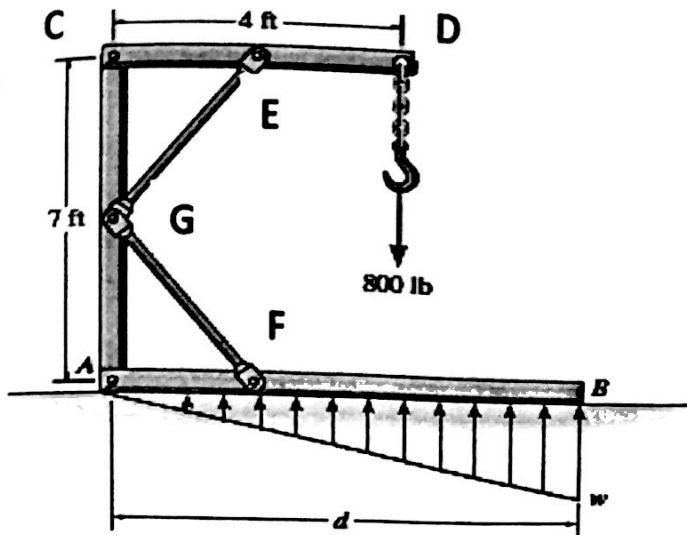
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Figure 7

Q13. Indentify, by circling, the truss members in the figure 7 above

    a. AB

    b. CA

    c. CD

    d. GE

    e. GF

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