PB-409

[6267]-7

F.E. (Insem)

ENGINEERING MECHANICS

(2019 Pattern) (Semester - II) (101011) (Credit System)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q1 or Q2 and Q3 or Q4.*
2) *Neat sketches must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *Use of electronic pocket calculator is allowed.*
6) *Use of cell phone is prohibited in the examination hall.*

Q1) a) State and explain law of parallelogram of forces. **[4]**

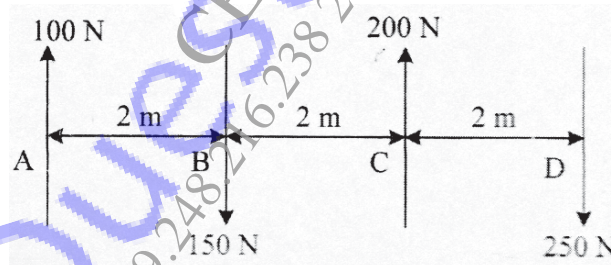b) Find the magnitude and point of application of the resultant force for parallel force system as shown in Fig. 1 b. **[5]**

Fig. 1 b.

c) Determine the magnitude and direction of resultant with reference to point A for the force system as shown in Fig. 1c. **[6]**
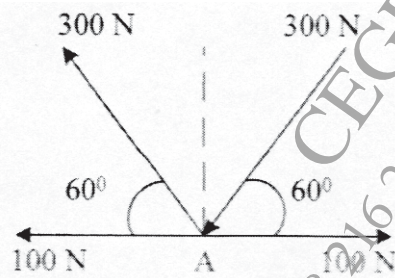

Fig. 1c

OR

Q2) a) Explain in brief coplanar and non-coplanar force system with suitable sketches. **[4]**

b) Two forces of magnitude 300 kN and 400 kN are acting at a point at an angle of 90º, find the magnitude and direction of resultant force. **[5]**

c) Determine the magnitude, direction and point of application of resultant force with respect to point A for a force system as shown in Fig. 2c. **[6]**
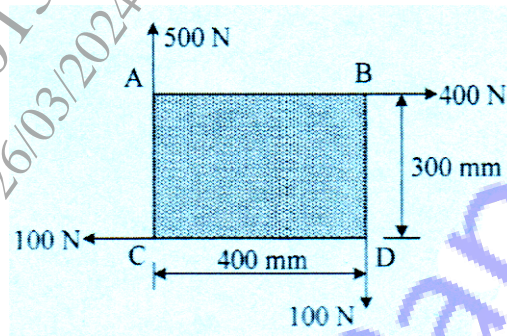

Fig. 2c

Q3) a) State and explain ladder friction with free body diagram. **[4]**

b) Locate the centroid of the shaded area as shown in Fig. 3b with respect to origin O. **[5]**

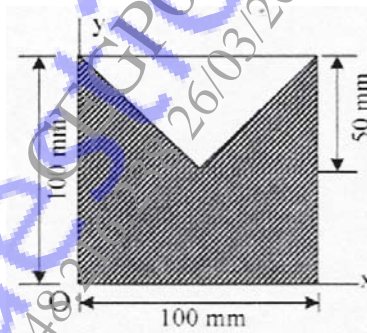
Fig. 3b

c) A 45 kg block is resting on a rough incline surface as shown in Fig. 3c. If the coefficient of static friction, $\mu_s = 0.20$, determine the range of force P required to cause motion. **[6]**
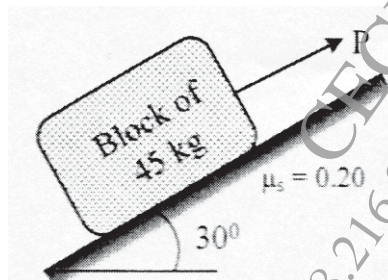

Fig. 3c

Q4) a) State and explain centroidal axis. **[4]**

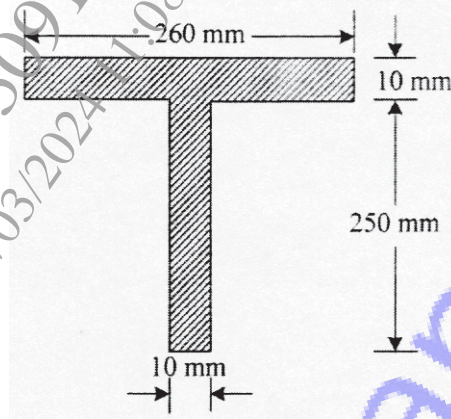b) Determine the moment of inertia of T-section about centroidal y-y axis as shown in Fig. 4b. **[5]**

Fig. 4b

c) A 4 m ladder is rest against smooth wall and on a horizontal floor as shown in Fig. 4c. If coefficient of statics friction. $\mu_s = 0.2$ and the mass of the ladder is 25kg, determine the normal reaction to maintain the equilibrium. **[6]**
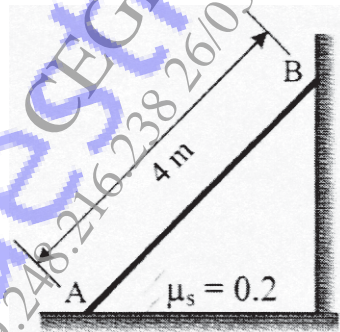

Fig. 4c

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