

Total No. of Questions : 4]

SEAT No. :

PE-527

[Total No. of Pages : 3

[6577]-8

F.E. (Insem.)

ENGINEERING MECHANICS

(2019 Pattern) (Semester - I) (101011)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4
- 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) Explain law of parallelogram of forces with suitable example. [4]

b) Find the magnitude and direction of the resultant force for concurrent force system as shown in Fig. 1 b. [5]

c) Determine the magnitude and direction of resultant with reference to point A for the force system as shown in Fig. 1 c if side of equilateral triangle is 1 m. [6]

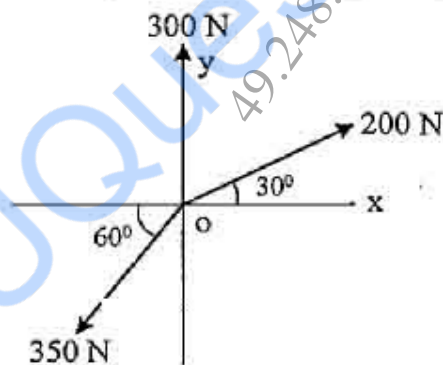


Fig. 1 b

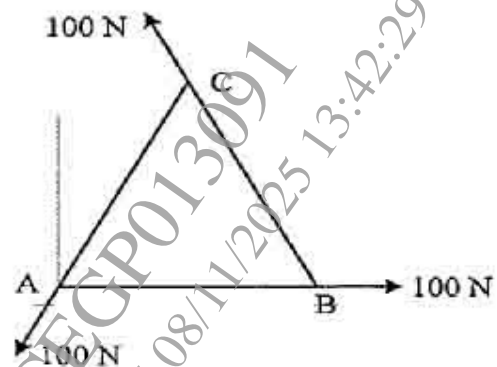


Fig. 1 c

OR

P.T.O.

- Q2) a) State the Varignon's theorem and its application with suitable Example. [4]
- b) The resultant of two forces P and Q is 1400 N vertical. Determine the force Q and the corresponding angle θ for the system of forces as shown in Fig. 2 b. [5]
- c) Determine the magnitude and direction of resultant with reference to point A for force systems as shown in Fig.2c if side of square is 1m. [6]

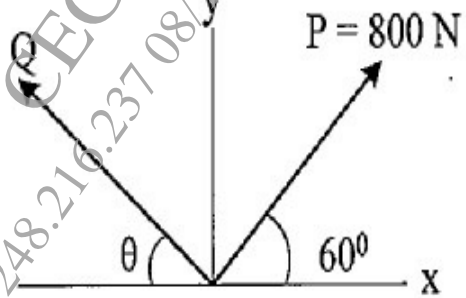


Fig. 2 b

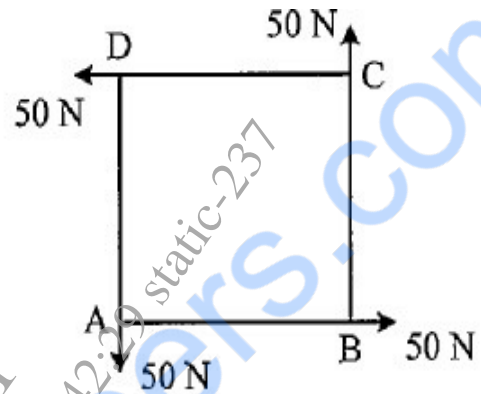


Fig. 2 c

- Q3) a) State the law of static friction. [4]
- b) Locate the centroid of the shaded area as shown in Fig. 3 b with respect to origin O. [5]
- c) A 45 kg block is resting on a rough horizontal surface as shown in Fig3c. If the coefficient of static friction $\mu_s = 0.25$, determine the force P required to cause motion. [6]

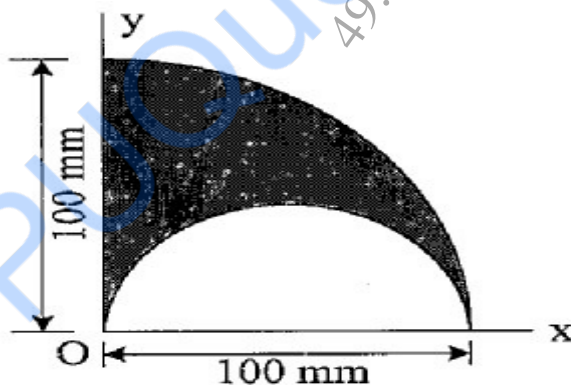


Fig. 3 b

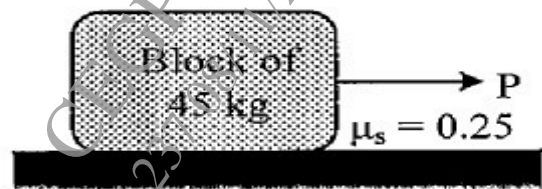


Fig. 3 c

OR

- Q4) a) Define centroid and center of gravity. [4]
- b) Determine the moment of inertia of I-section about centroidal x- axis as shown in Fig. 4 b if the thickness of flange and web is 10mm. [5]
- c) A cable is passing over the disc of belt friction apparatus at a lap angle 180° as shown in Fig. 4 c. If coefficient of statics friction is 0.25 and the mass of the block is 50 kg, determine the range of force P to maintain equilibrium. [6]

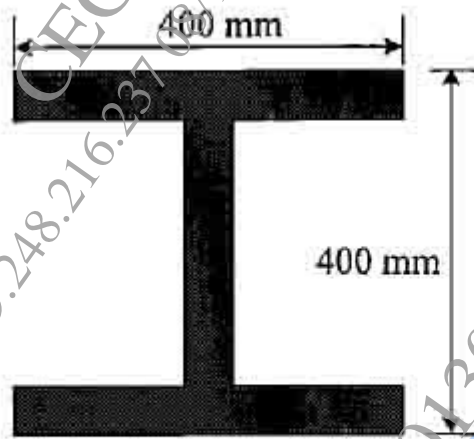


Fig. 4 b

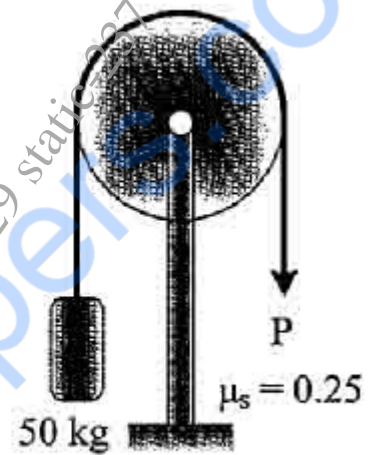


Fig. 4 c

