Total No. of Questions : 4]

SEAT No. :

PF6

[Total No. of Pages : 2

APR-26/FE/Insem-6

F.E. (Insem)

ENGINEERING MECHANICS

(2019 Pattern) (Semester-II) (Credit System) (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) State and explain resolution and composition of force with suitable sketch. **[4]**

b) Find the magnitude of the resultant and its direction of the following forces acting at a point O as shown in Fig. 1b. **[5]**

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

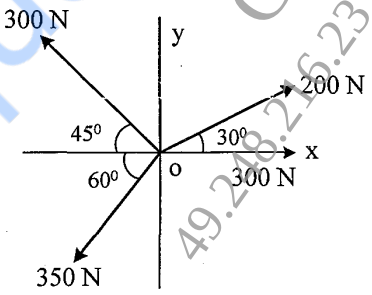

Fig. 1 b

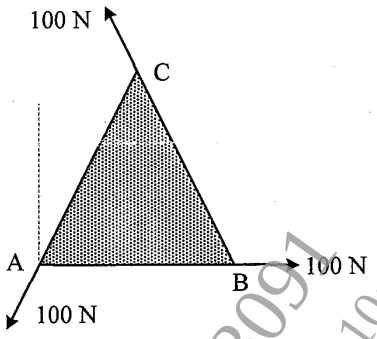

Fig. 1 c

OR

Q2) a) If two forces P and Q of magnitude 300 N and 400 N respectively acting at an angle 60º as shown in Fig. 2a, determine the magnitude and position of the resultant force. **[5]**

b) Determine the magnitude and direction of resultant with reference to point A for the force system as shown in Fig. 2b. **[6]**

c) State and explain principle of transmissibility with sketch. **[4]**

P.T.O.

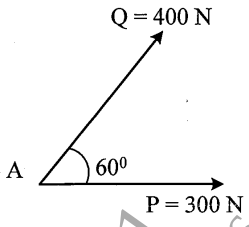

Fig. 2 a

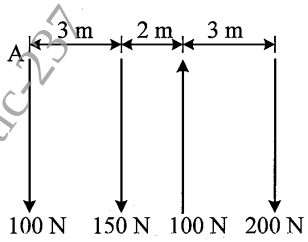

Fig. 2 b

Q3) a) State angle of repose, angle of friction, coefficient of friction and cone of friction with suitable sketch. **[5]**

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

c) A 200 N block is resting on a rough horizontal surface as shown in Fig. 3c for which the coefficient of friction, $\mu_s = 0.25$. Determine the force P required to cause motion. **[5]**

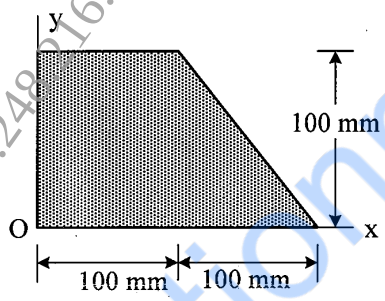

Fig. 3 b

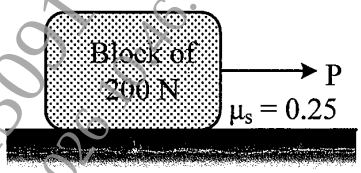

Fig. 3 c

OR

Q4) a) State and explain parallel and perpendicular axis theorem. **[4]**

b) Determine the moment of inertia of the section about centroidal axis as shown in Fig. 4b. **[6]**

c) A cable is passing over the disc of belt friction apparatus at a lap angle 540º as shown in Fig. 4c. If coefficient of statics friction is 0.25 and the weight of the block is 500 N, determine the range of force P to maintain equilibrium. **[5]**

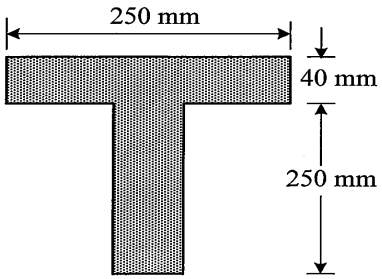

Fig. 4 b

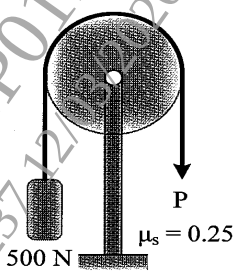

Fig. 4 c