

OCT/FE/Insem-8
F.E.
ENGINEERING MECHANICS
(2019 Pattern)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Use of electronic pocket calculator is allowed in the examination.
- 5) Use of cell phone is prohibited in the examination hall.

- Q1)** a) Determine resultant of the force system as shown below w.r.to A.
 [Forces acting are 50, 20, 30 N] [6]

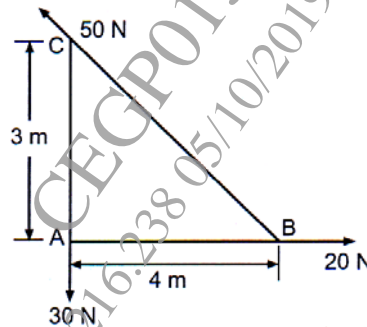


Fig.1a

- b) Resultant force $R = 400$ N has two component forces $P = 240$ N and $Q = 200$ N as shown. Determine direction of component forces P and Q w.r.t. resultant force R. [4]

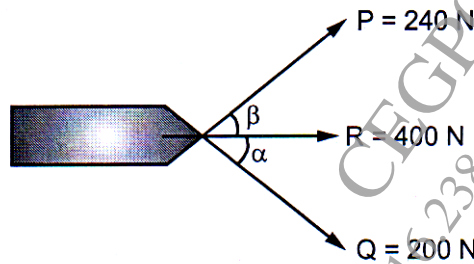


Fig.1b

- c) State and explain Law of Parallelogram of forces with sketch. [5]

OR

- Q2) a) If the resultant moment about point A is 4800 Nm clockwise, determine the magnitude of F_3 , if $F_1 = 300$ N and $F_2 = 400$ N. [5]

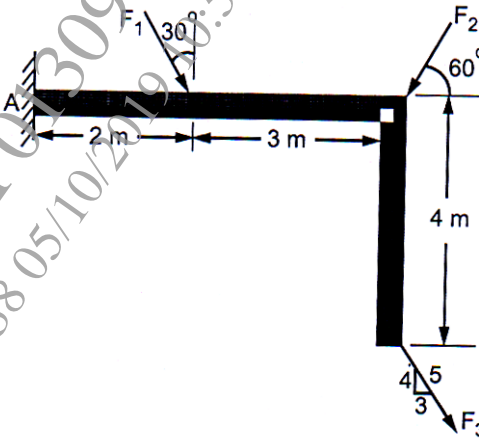


Fig.2a

- b) Find value of ' α ' if resultant of given three forces is parallel to the inclined plane. Also find corresponding magnitude of the resultant. [5]

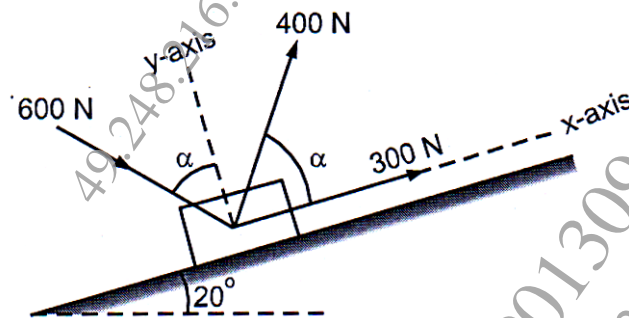


Fig.2b

- c) What is Couple? Give its any three characteristics with sketch. [5]

- Q3) a)** Analyze and locate the position of centroid for the plane lamina as shown in Fig. 3a, w.r.to 'A'. [6]

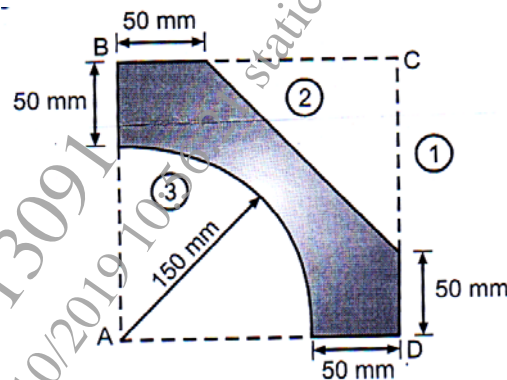


Fig.3a

- b) The uniform ladder AB has a length of 8 m and a mass of 24 kg. End A is on rough horizontal floor and end B rests against a smooth vertical wall. A man of mass 60 kg has to climb this ladder. At what position from the base will he induce slipping? $\mu_s = 0.34$ at floor. [5]

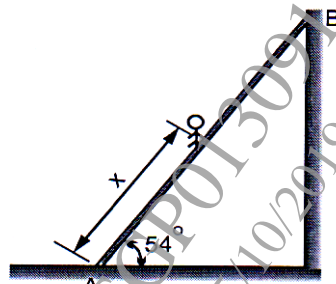


Fig.3b

- c) What is Friction? Explain with a neat sketch any two properties of Friction. [4]

OR

- Q4) a)** Define Moment of Inertia. Determine the M.I. of the composite shape as shown below with respect to X axis. [1+7 = 8]

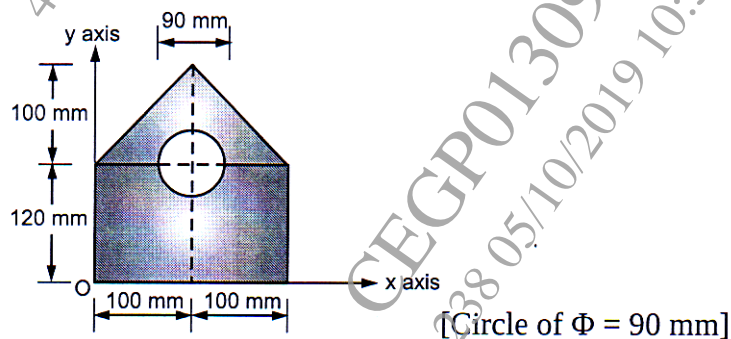


Fig.4a

- b) Two cylinders are connected by a rope that passes over two fixed circular rods as shown. Knowing that the coefficient of static friction between the rope and the rods is 0.40, determine the maximum value of 'm' for equilibrium. [7]

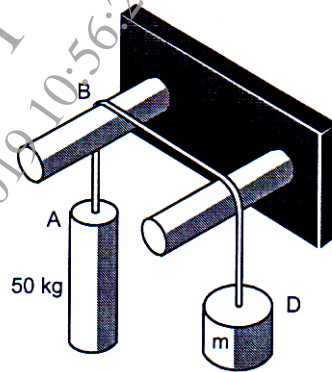


Fig.4b

