

**FE/INSEM/APR-7**  
**F.E. (All) (Semester - II)**  
**101011 : ENGINEERING MECHANICS**  
**(2019 Pattern)**

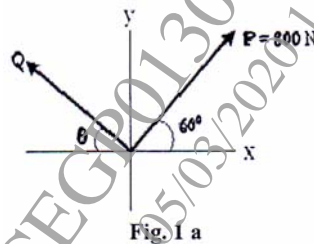
Time : 1 Hour]

[Max. Marks : 30

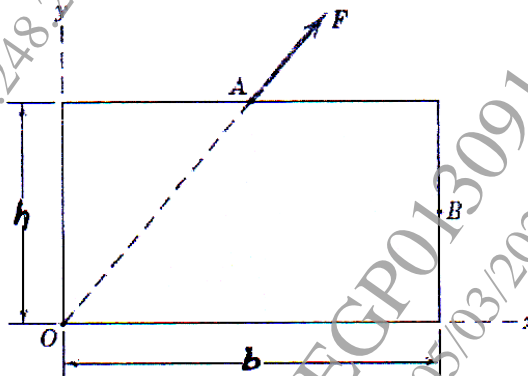
Instructions to the candidates :

- 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) The resultant of two forces P and Q is 1400 N vertical. Determine the force Q and the corresponding angle  $\theta$  for the system of forces as shown in Fig. 1 a. [6]



- b) Points A & B are mid points of sides of rectangle. Replace the given force F acting at A by equivalent force-couple system at point B as shown in Fig. 1 b. [6]



- c) State Varignon's theorem and principle of transmissibility. [3]

OR

P.T.O.

- Q2) a)** The eyebolt supports four forces as shown in Fig. 2 a. If the resultant of these forces is 3 kN directed along x - axis, determine the angle  $\theta$  and force T. (2 kN, T kN, 1.2 kN, 1.8 kN) [6]

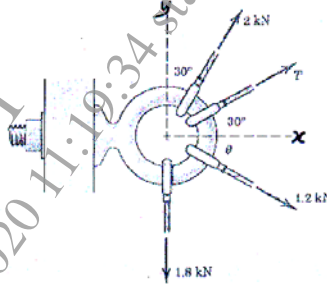


Fig. 2 a

- b) Determine moment of 200 N about point 'A' and about 'B' for the bracket as shown in Fig. 2 b. [6]

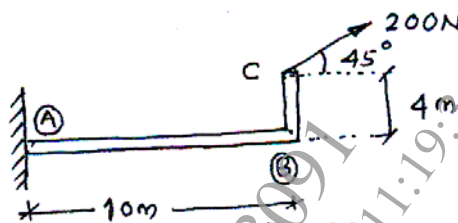


Fig. 2 b

- c) Differentiate moment and couple with a sketch. [3]

- Q3) a)** Locate the position of centroid for the shaded lamina as shown in Fig. 3 a, with respect to origin O. [6]

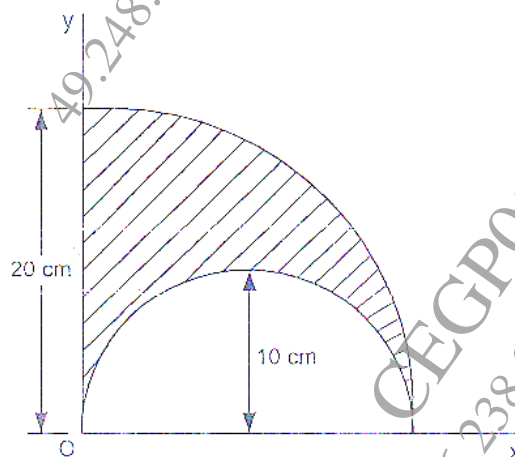


Fig. 3 a

- b) A cable is passing over the disc of belt friction apparatus as shown in Fig. 3 b. If coefficient of static friction is 0.25 and the weight of block is 500 N, determine the range of force  $P$  to maintain equilibrium. [5]

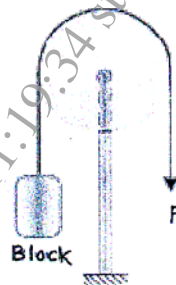


Fig. 3 b

- c) Explain angle of repose and angle of friction with sketch. [4]

OR

- Q4)** a) Define moment of inertia and determine the M. I. of the composite Figure, if  $a = 40$  mm with respect to  $x$  - axis as shown in Fig. 4 a. [8]

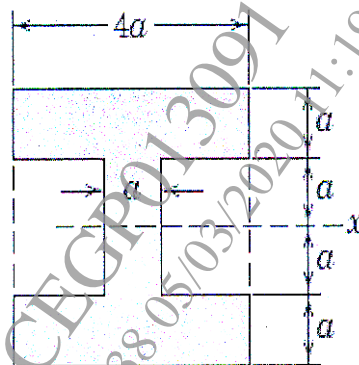


Fig. 4 a

- b) A block of mass 10 kg rest on an incline plane as shown in Fig. 4 b. If the coefficient of static friction between the block and plane is  $\mu_s = 0.25$ , determine the maximum force  $P$  required to maintain equilibrium. [7]

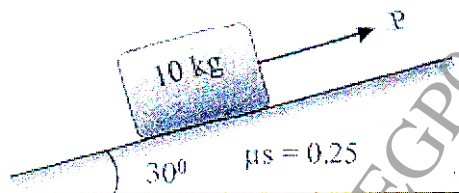


Fig. 4 b

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