Total No. of Questions : 4]

SEAT No. :

P7

[Total No. of Pages : 3

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 0 for the system of forces as shown in Fig. 1 a. **[6]**

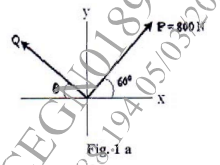

Fig. 1 a

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]**

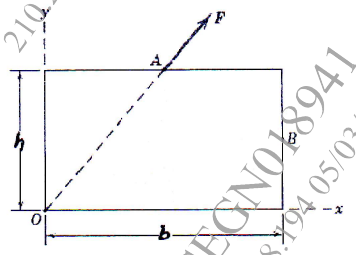

Fig. 1 b

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 0 and force T. (2 kN, T kN, 1.2 kN, 1.8 kN) **[6]**

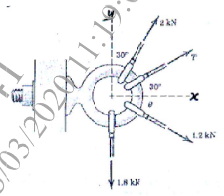

Fig. 2 a

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

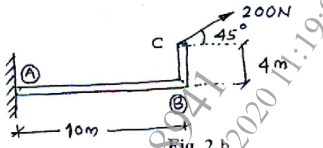

Fig. 2 b

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]**

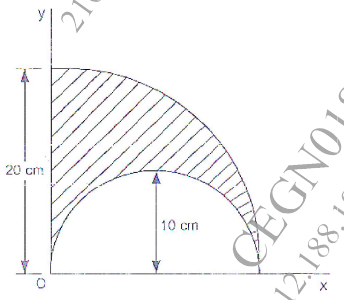

Fig. 3 a

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]**

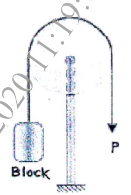

Fig. 3 b

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]**

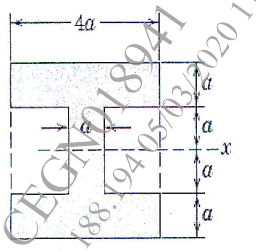

Fig. 4 a

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]**

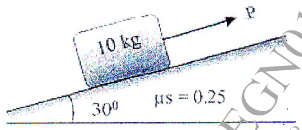

Fig. 4 b

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