

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – MATHEMATICS

MECHANICS-I (STATICS)

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 The parallelogram drawn to obtain the two components is a rectangle, and F_x and F_y are called
 - (i) Components
 - (ii) Rectangular components
 - (iii) Angular
 - (iv) Law
- 2 The scalar product of two vectors p and Q is defined as
 - (i) Sum
 - (ii) Product
 - (iii) Sum of the magnitude
 - (iv) Product of the magnitudes
- 3 The first moment of the area A with respect to the Y axis is
 - (i) $Q_y = \int x dA$
 - (ii) $Q_y = \int y dA$
 - (iii) $Q_y = \int x dx$
 - (iv) $Q_x = \int x dA$
- 4 What is the second moment of inertia
 - (i) $k \int y^2 dx$
 - (ii) $k \int y^3 dy$
 - (iii) $k \int y^2 dA$
 - (iv) $k \int y^3 dx$
- 5 The mechanical efficiency of a machine is defined as
 - (i) Sum
 - (ii) Ratio
 - (iii) Product
 - (iv) Proposition

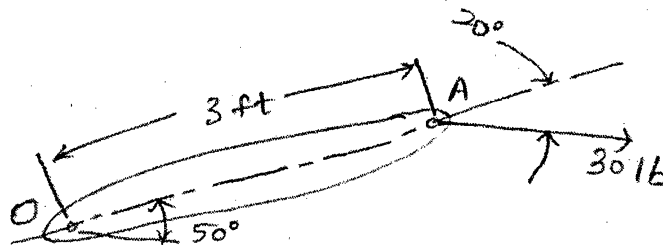
SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Describe vector addition.
OR
b Explain Newton's first law of motion.
- 7 a State the external and internal forces.
OR
b A 30-lb force acts on the end of the 3-ft lever as shown. Determine the moment of the force about O.

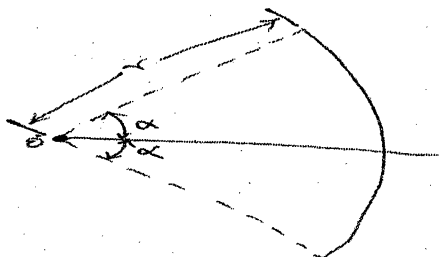


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- 8 a Explain the centroids of areas.

OR

- b Determine the location of the centroid of the arc of circle shown.

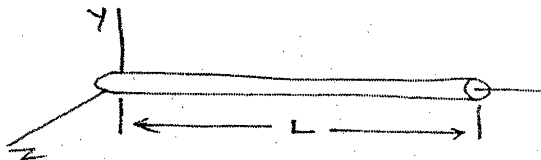


- 9 a Find the co-efficient of static friction and co-efficient of kinetic friction.

OR

- b Explain moment of inertia of a rectangular area.

- 10 a Determine the moment of inertia of a slender rod of length L and mass m with respect to an axis which is perpendicular to the rod and passes through one end of the rod.



OR

- b Describe work of a force.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Explain resolution of a force into components.

OR

- b Explain Addition of concurrent forces in space.

- 12 a Prove Varignon's theorem.

OR

- b Explain moment of a couple.

- 13 a The area of a surface of revolution is equal to the length of the generating curve times the distance traveled by the centroid of the curve while the surface is being generated.

OR

- b Describe the centroids of volumes by integration.

- 14 a Explain the angle of static friction and angle of kinetic friction.

OR

- b Prove the Parallel-Axis theorem.

- 15 a Describe the rectangular plate and circular plate.

OR

- b Explain the principle of virtual work.

Z-Z-Z

END