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BET-014

**DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) /
DIPLOMA IN ELECTRICAL AND MECHANICAL
ENGINEERING (DEME) / DCLEVI / DMEVI /
DELVI / DECVI / DCSVI / ACCLEVI / ACMEVI /
ACELVI / ACECVI / ACCSVI**

Term-End Examination

December, 2015

BET-014 : APPLIED MECHANICS

Time : 2 hours

Maximum Marks : 70

Note : *Question no. 1 is compulsory. Attempt any four from the remaining questions. Assume suitable data wherever necessary.*

1. Choose the correct answer from the given alternatives. $7 \times 2 = 14$
- (a) If the resultant of two forces has the same magnitude as either of the forces, then the angle between the two forces is
- (i) 30°
 - (ii) 45°
 - (iii) 60°
 - (iv) 120°

(b) The moment of inertia of a spherical shell of mass m and radius r about a diameter is

(i) $\frac{1}{3} mr^2$

(ii) $\frac{2}{3} mr^2$

(iii) $\frac{2}{5} mr^2$

(iv) $\frac{3}{5} mr^2$

(c) Power is defined as

(i) Total work done

(ii) Capacity to do the work

(iii) Rate of doing the work

(iv) Rate of change of momentum

(d) Force in $U_2 L_2$ member of the truss shown in Figure 1 is

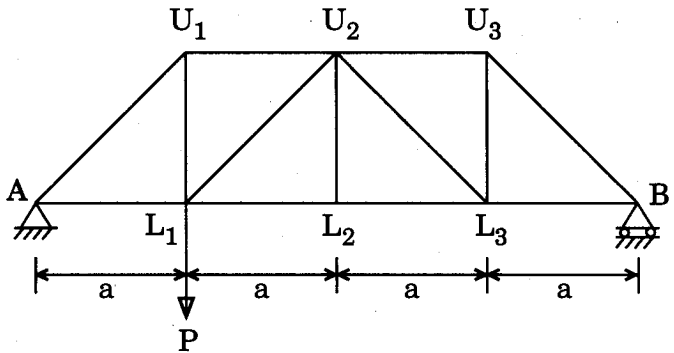


Figure 1

(i) P

(ii) $P/2$

(iii) $P/4$

(iv) Zero

- (e) Frictional resistance does not depend upon
- (i) Normal reaction
 - (ii) Coefficient of friction
 - (iii) Contact area
 - (iv) All of the above
- (f) The maximum displacement of a particle executing S.H.M. corresponds to
- (i) zero potential energy and maximum kinetic energy
 - (ii) zero kinetic energy and maximum potential energy
 - (iii) maximum kinetic energy and maximum potential energy
 - (iv) minimum kinetic energy and minimum potential energy
- (g) A ball moving on a smooth horizontal table hits a rough vertical wall, the coefficient of restitution between ball and wall being $1/3$. The ball rebounds at the same angle. The fraction of its kinetic energy lost is
- (i) $1/3$
 - (ii) $2/3$
 - (iii) $1/9$
 - (iv) $8/9$

2. (a) State the parallelogram law of forces. 6

(b) A rod AB carries three loads of 30 N, 90 N and 100 N at distances of 20 mm, 90 mm and 150 mm respectively from A. Neglecting the weight of the rod, determine the point at which the rod will balance. 8

3. A beam AB is hinged at A and is supported at C as shown in Figure 2. Find out the reaction at A and C. 14

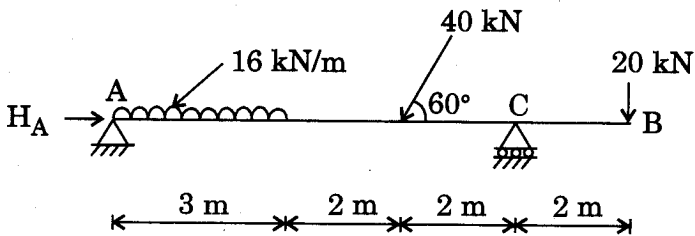


Figure 2

4. A crate weighing 5 kN is kept on an inclined plane making an angle of 30° with the horizontal. [Ref : Figure 3]

(a) Determine the P (the horizontal force) required to move the crate up the plane.

- (b) What is the minimum value of P required to prevent the crate from sliding down the plane? Assume $\mu = 0.25$.

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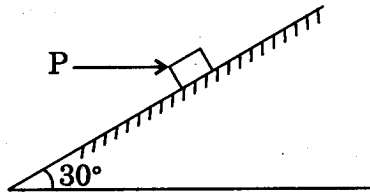


Figure 3

5. Determine the centroid of a plane with uniform mass per unit area having a shape given in Figure 4.

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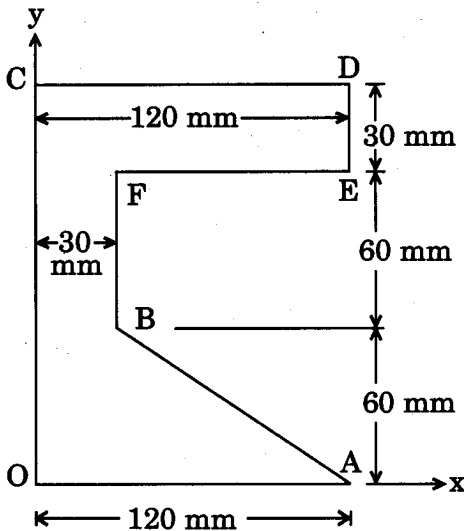


Figure 4

6. A pile of mass 1500 kg is driven 450 mm into the ground by a pile driver weighing 200 N falling from a height of 2.0 m. Find the average resistance of the ground to penetration of pile, assuming $g = 10 \text{ m/sec}^2$.

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7. A stone of mass 0.25 kg tied to the end of a string is whirled round in a circle of radius 1.5 m with a speed of 40 rev./min in a horizontal plane. What is the tension in the string? What is the maximum speed with which the stone can be whirled around, if the string can withstand a maximum tension of 200 N?

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