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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

00720

Term-End Examination

June, 2014

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. *7×2=14*

(a) Coplanar forces mean the forces acting in _____ plane.

(i) one

(ii) two

(iii) three

(iv) None of the above

(b) The resultant of two forces P and Q acting at an angle θ is equal to

(i) $\sqrt{P^2 + Q^2 + 2PQ \sin \theta}$

(ii) $\sqrt{P^2 + Q^2 + 2PQ \cos \theta}$

(iii) $\sqrt{P^2 + Q^2 - 2PQ \sin \theta}$

(iv) $\sqrt{P^2 + Q^2 - 2PQ \cos \theta}$

(c) Number of forces intersecting at a common point is called _____ .

(i) concurrent
(ii) parallel
(iii) like parallel
(iv) unlike parallel

(d) The moment of inertia of a circular section of diameter (d) is given by the relation (about its diameter)

(i) $\frac{\pi(d)^4}{16}$

(ii) $\frac{\pi(d)^4}{32}$

(iii) $\frac{\pi(d)^4}{64}$

(iv) $\frac{\pi(d)^4}{96}$

(e) In an ideal machine, the mechanical advantage is _____ velocity ratio.

(i) equal to
(ii) less than
(iii) greater than
(iv) None of the above

(f) The law of a lifting machine is

(i) $P = MW - C$

(ii) $P = MW + C$

(iii) $Q = MW - C$

(iv) $Q = MW + C$

(g) The horizontal range of a projectile is

(i) $\frac{u \sin 2\alpha}{g}$

(ii) $\frac{u^2 \sin 2\alpha}{g}$

(iii) $\frac{u \sin 2\alpha}{2g}$

(iv) $\frac{u^2 \sin 2\alpha}{2g}$

2. (a) Determine the resultant in magnitude and direction of two forces shown in Figure 1 using parallelogram law of forces. *10*

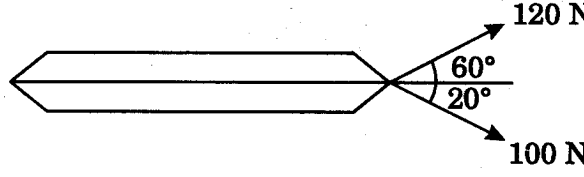

Figure 1

(b) Distinguish clearly between like parallel forces and unlike parallel forces. *4*

3. (a) State Lami's Theorem. *4*

(b) Determine the minimum value of force 'P' required just to start the wheel over the step 300 mm high (Figure 2). The diameter of wheel is 1·2 m and the weight is 800 N. Also find the direction of 'P'. *10*

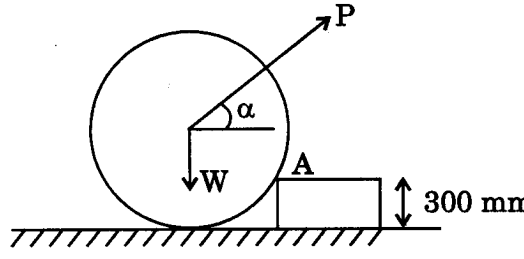

Figure 2

4. An effort of 1500 N is required to just move a certain body up a plane, inclined at angle 12°, to the horizontal, while the force is acting parallel to the plane. If the angle of inclination is made 15°, the effort required again applied parallel to the plane is found to be 1720 N. Find the weight of the body and the co-efficient of friction. *14*

5. Find the moment of inertia about the centroidal axes X-X and Y-Y, respectively, of the given angle section as shown in Figure 3. *14*

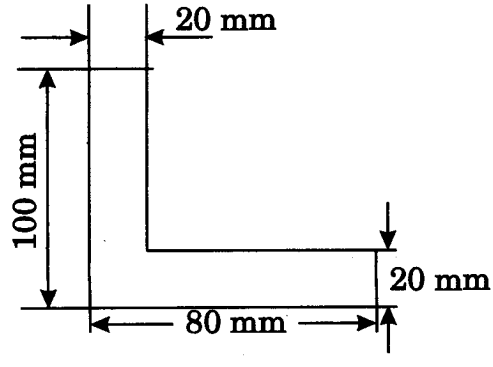

Figure 3

6. Body 'A' is thrown with a velocity of 10 m/s at an angle 60° to the horizontal. If another Body 'B' is thrown at angle of 45° to the horizontal, find its velocity if it has the same *14*

(a) horizontal range

(b) maximum height

(c) time of flight same as the Body 'A'

7. A truss shown in Figure 4 is subjected to two point loads. Find the forces in all the members of the truss and tabulate the results. *14*

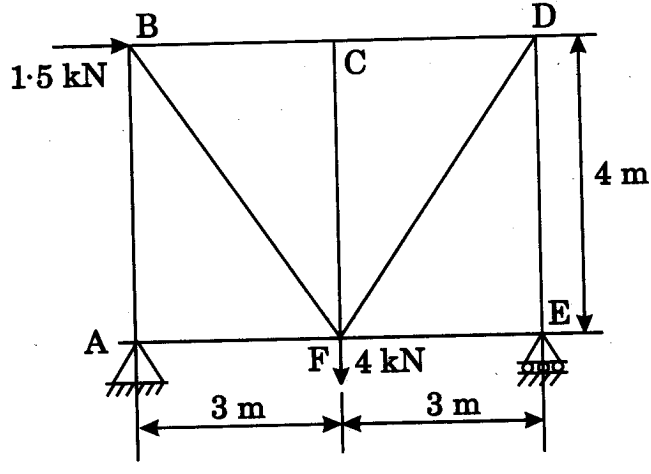

Figure 4

8. In a lifting machine, an effort of 40 N raised a load of 1 kN, if efficiency of the machine is 0·5. What is its velocity ratio ? If on this machine an effort of 74 N raised a load of 2 kN, what is the efficiency now ? What will be the effort required to raise a load of 5 kN ? *14*