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BET-014

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

Term-End Examination

00657

December, 2017

BET-014 : APPLIED MECHANICS

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *questions from the remaining questions. Assume suitable data wherever necessary. Use of scientific calculator is permitted. All questions carry equal marks.*

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1. Choose the correct answer from the given four alternatives. *7×2=14*

(a) The resolved part along X of the 20 N force as shown in Figure 1 is

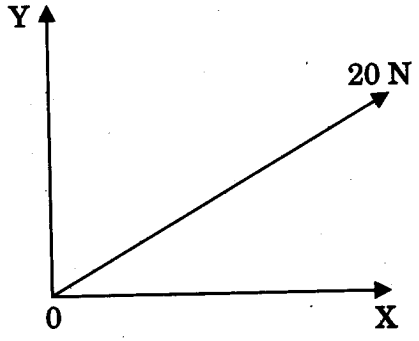

Figure 1

(i) 10 N

(ii) 15 N

(iii) 14·14 N

(iv) 17·32 N

(b) If b is the base and h is the height of a triangle, then its centroid lies at a height of _____ from the base.

(i) h/4

(ii) h/3

(iii) h/2

(iv) 2h/3

(c) The M.I. of a square of side d about the centroidal XX-axis, as shown in Figure 2 is

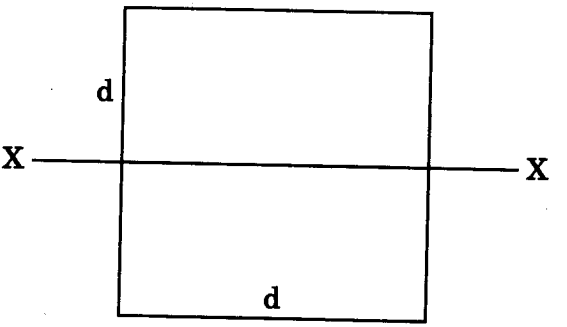

Figure 2

(i) $\frac{d^2}{12}$

(ii) $\frac{d^4}{12}$

(iii) $\frac{d^2}{24}$

(iv) $\frac{d^3}{24}$

(d) The opposing force which acts at the point of contact of two bodies which slide over one another is called

(i) Rolling friction

(ii) Sliding friction

(iii) Static friction

(iv) None of the above

(e) Newton's second law of motion gives a relation between force, mass and

(i) acceleration

(ii) velocity

(iii) momentum

(iv) moment

(f) When a lift of mass 'm' moves downwards with acceleration 'a', then tension in the string is

(i) $T = m(g - a)$

(ii) $T = m(g + a)$

(iii) $T = m(a - g)$

(iv) $T = m(a + g)$

(g) In S.H.M. a particle is moving with a uniform speed ω rad/sec round a circular path of radius r. Then displacement x of the projection after time t is equal to

(i) $\frac{\sin \omega t}{r}$

(ii) $\frac{\cos \omega t}{r}$

(iii) $r \cos \omega t$

(iv) $r \sin \omega t$

2. (a) What is a couple of a force system ? Explain briefly. 7

(b) Two forces P and $\sqrt{2}P$ act on a particle in directions inclined at an angle of 135° to each other. Find the magnitude and direction of the resultant. 7

3. (a) What do you understand by a Free Body Diagram ? Explain briefly. 7

(b) Four forces, 2N, 3N, 6N and 5N act along the sides AB, CB, CD and DA respectively, of a square ABCD of side 0·5 m. Find the sum of their moments about

(i) Centre of the square,

(ii) Point A. 7

4. (a) Explain Angle of Friction with a neat sketch. 7

(b) A body, resting on a rough horizontal plane required a pull of 18 N inclined at an angle of 30° to the horizontal just to move it. It required a push of 22 N inclined at 30° to the plane to move it. Determine the weight of the body and coefficient of friction. 7

5. Figure 3 shows an unsymmetrical I-section, the size of upper flange is 60 mm × 7·5 mm and that of the lower flange is 120 mm × 10 mm. The overall depth is 160 mm. The thickness of metal web is 5 mm. Find the C.G. of the section. 14

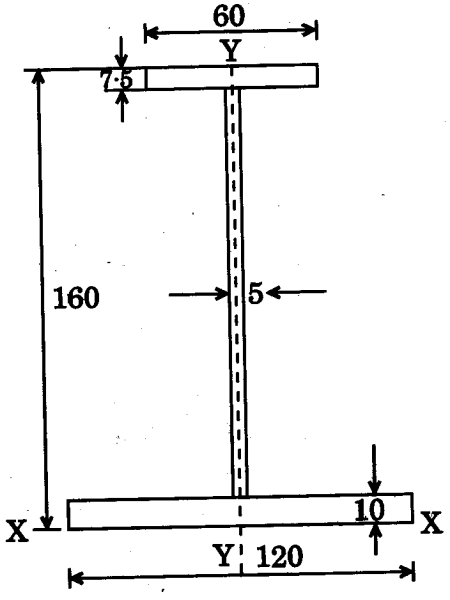

Figure 3

6. (a) Explain the working of a simple pulley in brief. 7

(b) A body of mass 10 kg falls from a height of 8 m and penetrates into the ground. If the resistance to penetration is constant and equal to 4905 N, find the distance through which it penetrates. 7

7. (a) Discuss the concept of Relative Motion in brief. 7

(b) A wheel rotating about a fixed axis at 20 rpm is uniformly accelerated for 70 secs. During this time it makes 50 revolutions. Determine angular velocity at the end of this interval. 7