| **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

00683 **June, 2018**

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.*

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

    (a) The resultant of two forces acting in opposite directions as shown in Figure 1 is

        (i)   5 N ↓

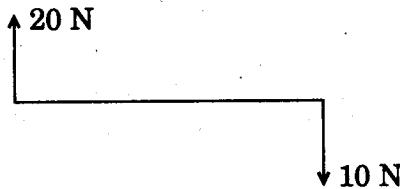   (ii)   10 N ↓

        (iii) 10 N ↑

        (iv)   20 N ↑

Figure 1

(b) The centre of gravity of a cone from the base lies at a height (h) at

(i) h/4

(ii) h/3

(iii) h/2

(iv) 2h/3

(c) The outer diameter of a hollow circular section is D. Its inner diameter is d. Its moment of inertia about centroidal axis XX is

(i) $\frac{\pi}{32} (D^2 - d^2)$

(ii) $\frac{\pi}{64} (D^4 - d^4)$

(iii) $\frac{\pi}{16} (D^2 - d^2)$

(iv) $\frac{\pi}{8} (D^2 - d^2)$

(d) The maximum angle which an inclined surface makes with the horizontal when a body, placed on it, is just on the point of moving downward, is called as

(i) Angle of friction

(ii) Angle of inclination

(iii) Angle of repose

(iv) Coefficient of friction

(e) The product of mass and velocity is known as

    (i)   momentum

    (ii) power

    (iii) impulse

    (iv) work

(f) A member subjected to tension in a truss is called

    (i)   tie

    (ii) strut

    (iii) node

    (iv) column

(g) When a body moves in simple harmonic motion

    (i)   the particular fixed point must be situated on the path of the motion.

    (ii) the acceleration of the body, at any instant, is always proportional to the distance of the body from the fixed point.

    (iii) the motion of the body is periodic.

    (iv) All the above

2. The resultant of two concurrent forces is perpendicular to the smaller force and the angle between the forces is 120°. If the bigger force is 60 N, find the smaller force. *14*

3. (a) State Varignon's theorem. 7

(b) A horizontal beam 12 m long is supported at the ends A and B as shown in Figure 2. It carries two loads, one of 250 N, 3 m from the left end and another of 600 N, 7·50 m from the left end. Neglecting the weight of the beam, calculate the reactions at the supports. 7
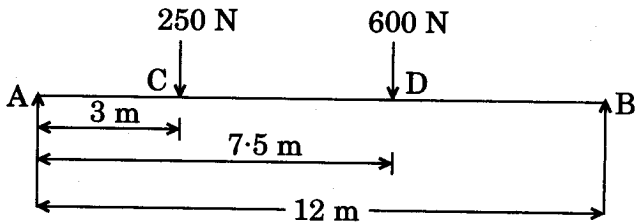

Figure 2

4. (a) State the laws of static friction. 7

(b) A force of 210 N inclined at 60° to the horizontal is applied to a block weighing 450 N which is put on a plane. Determine whether the block would move due to application of the force. The coefficient of friction between the block and the plane is 0·5. 7

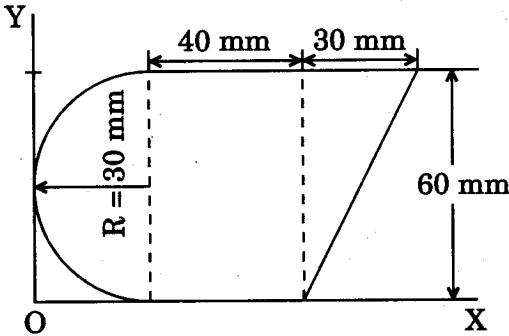5. Locate the centroid of the piece of sheet metal as shown in Figure 3. *14*

Figure 3

6. (a) State law of conservation of momentum. 7

   (b) A pile hammer of 400 kg falls through a height of 3·0 m on a pile of mass 1500 kg. If it drives the pile 0·8 m into the ground, find the average resistance of the ground to penetration of the pile. Take $g = 9·8$ m/s^2. 7

7. (a) State law of polygon of forces in brief. 7

   (b) A wheel is rotating with a constant acceleration of 1 radian/s^2 about its axis. If the initial and final angular velocities are 5·2 radian/s and 10·5 radian/s respectively, determine the total angle turned through during the time interval this change of angular velocity took place. 7