No. of Printed Pages : 7

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

01315 **Term-End Examination**

December, 2014

BET-014 : APPLIED MECHANICS

Time : 2 hours *Maximum Marks : 70*

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

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

(a) Forces acting in the same planes are called

(i) coplanar forces

(ii) non-coplanar forces

(iii) concurrent forces

(iv) non-concurrent forces

(b) A unit of M.I. is

(i) mm^3

(ii) mm^4

(iii) mm^5

(iv) mm^2

(c) M.I. of a rectangular section about an axis parallel to "b", passing through C.G. is given by

(i) $\frac{bd^3}{12}$

(ii) $\frac{bd^3}{3}$

(iii) $\frac{bd^3}{2}$

(iv) $\frac{bd^3}{6}$

(d) If a truss satisfies the equation $M = 2j - 3$, then the truss is known as

(i) statically determinate

(ii) reduntant

(iii) deficient

(iv) statically indeterminate

(e) The point at which the whole weight of a body acts, irrespective of its position is known as

(i) moment of inertia

(ii) centre of gravity

(iii) axis of reference

(iv) None of the above

(f) If machine is 100% efficient then it is called

(i) perfect/ideal machine

(ii) reversible machine

(iii) non-reversible machine

(iv) None of the above

(g) The Velocity Ratio of a simple wheel and axle is

(i) $\frac{D}{d}$

(ii) $\frac{2D}{d_1 - d_2}$

(iii) $\frac{l \,.\, T}{r}$

(iv) None of the above

2. (a) Four forces act on a body as shown in the Figure 1. Determine the resultant of the system of forces. *10*

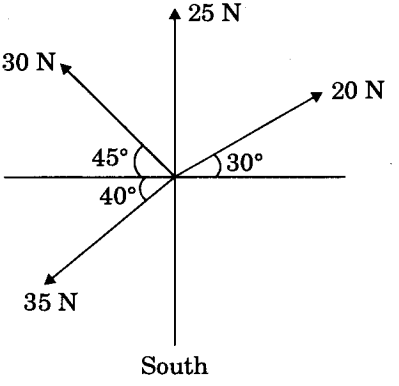

Figure 1

(b) State Law of parallelogram of forces. *4*

3. Find the moment of inertia of a T-section shown in Figure 2 about x – x axis and y – y axis through the C.G. of the section. *14*

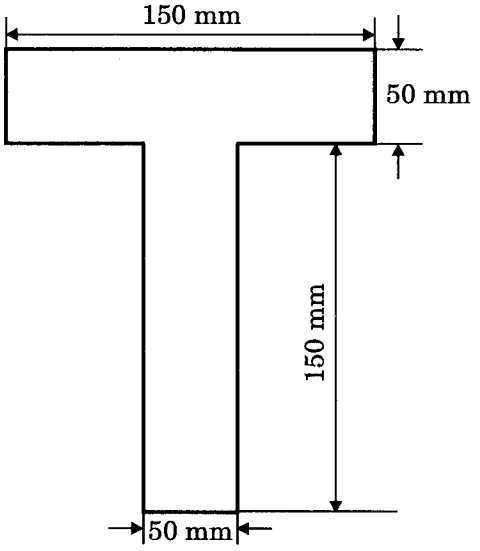

Figure 2

4. Analyse the truss as shown in Figure 3. Find the forces in all the members of the truss and tabulate the results. *14*

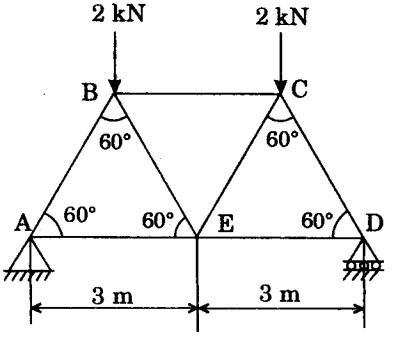

Figure 3

5. (a) A projectile is fired with a velocity of 500 m/sec at an elevation of 30°. Find the velocity and the direction of the projectile after 30 seconds of its firing. *10*

(b) Find the centre of gravity of the L section 90 mm × 120 mm × 12 mm shown in Figure 4. *4*

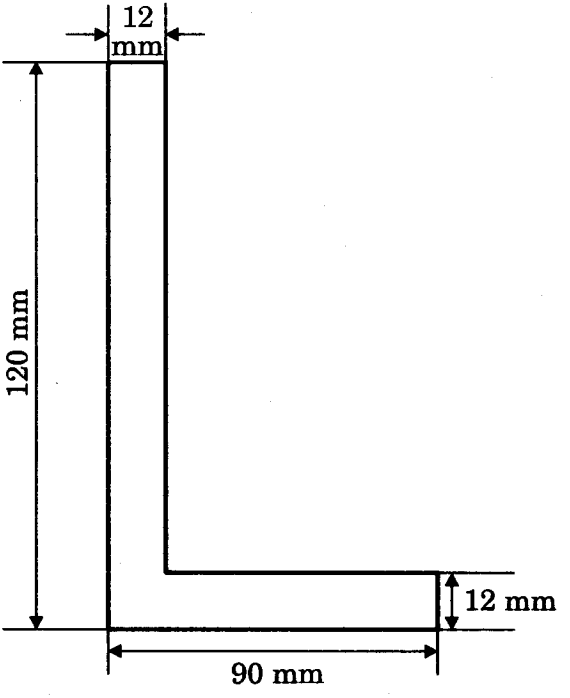

Figure 4

6. (a) A sphere of weight 350 N (Figure 5) is lying in between a triangular groove, one side of which is at an angle 75° and other side at angle of 35° to the horizontal. Find the Reaction at A and B. *10*

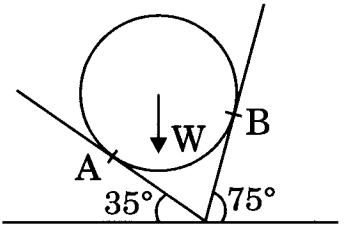

Figure 5

(b) State Lami's theorem. *4*

7. The pitch of a square threaded screw jack is 15 mm, and mean diameter 75 mm and the length of the lever 400 mm. If a load of 2 kN is to be lifted, what force at the end of the lever will be required ? Take $\mu = 0{\cdot}2$. State with reason whether the screw is self-locking or not. *14*

8. A wheel of 1 m diameter is mounted on a shaft between two bearings, and the wheel is subjected to constant moment of 100 N-m at the rim for 10 min to attain a speed of 120 r.p.m. Find the following : *14*

(a) The number of revolutions made during this period.

(b) The angular acceleration, the tangential acceleration and the centripetal acceleration.

(c) The work done in rotating the wheel during this time.