FACULTY OF ENGINEERING & INFORMATICS
B.E. I Year (Common to all Branches) Examination January 2012
ENGINEERING MECHANICS (Old)

Time: 3 Hours]

[Max. Marks:75

**Note** : *Answer all questions of Part A. Answer five questions from Part B.*

PART – A   (25 Marks)

1. State Lamis Theorem ?   **2**

2. A uniform rod 1.5 m long and weighing 16 kg has weights 20N, 30N, 40N and 50 N suspended at points distance 10 cm, 15 cm, 20 cm and 25 cm respectively from one end. It is supported in a horizontal position by means of vertical strings attached to its ends. Find the tension in the strings.   **3**

3. Differentiate centroid and center of gravity ?   **2**

4. State the laws of friction ?   **2**

5. Determine the radius of gyration for a square of side 150 mm about one of its sides.   **3**

6. Mass moment of inertia of a solid sphere is given by I = _____   **2**

7. Define rectilinear translation and curvilinear translation of motion of a particle ?   **3**

8. A block of mass 70N rests on a horizontal plane as shown. Find the magnitude of foxe 'p' required to give the block an acceleration of a = 3m/Sec^2 to the right. The co-efficient of friction between the block and plane is 0.30.   **3**
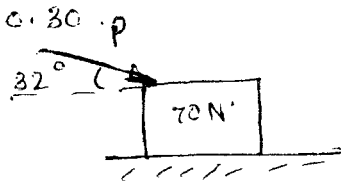

9. Derive the work energy equation for a particle in translation ?   **3**

10. When there is reduced in amplitude over every cycle of vibration, then the type of vibration is _____   **2**

PART – B   (50 Marks)

11. a) A body of 80 kN weight is suspended by two strings whose lengths are 6 cm and 7 cm from points in the same horizontal level as shown in the fig. The horizontal distance between the two points is 10 cm. Determine the tension in the strings.   **5**
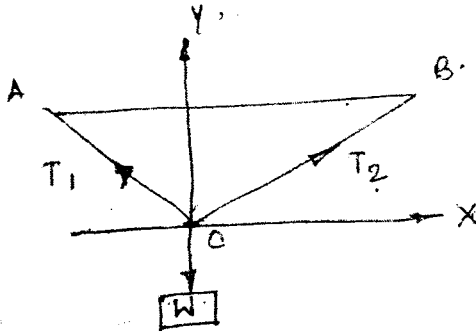
b) Forces 35 KN, 25 KN, 28 KN and 113 KN are concurrent at origin and are respectively directed through the points whose coordinates are A(2, 1, 6), B (4, –4, 6). C (–3, –3, 1) and D (6, 1, –3). Determine the resultant of the system.   **5**

12. A cylinder with a hemiepherical cavity and a conical cap is shown in the fig. find the centroid of composite volume.   **10**
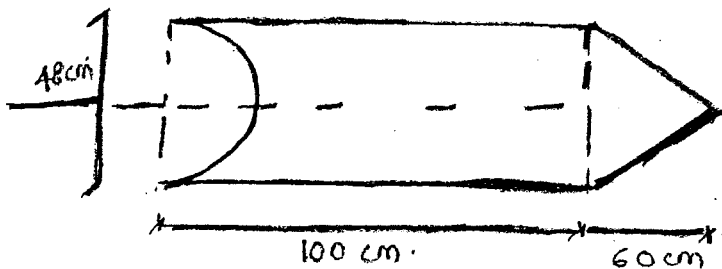

13. a) Differentiate static and dynamic friction ?   **3**

b) A weight of 80 KN is on the point of motion down a sough inclined plane when supported by a force of 25 kN acting parallel to inclined plane. The same weight is also on the point of motion up the same plane under the action of a force of 36 kN applied parallel to the plane. Find the co-efficient of friction of the plane.

   7

14. Find the Moment of Inertia of the section about horizontal and vertical axis through the centroid as shown below : **10**
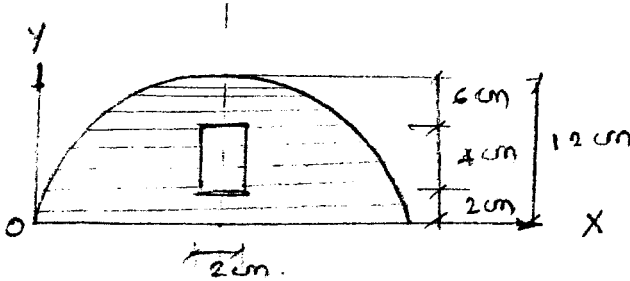
15. The equation of motion of a moving body along a straight line is given by $s = 4t^3 - 8t + 20$. Where S is in meters and t is in seconds. Find :

a) Time taken by the body to reach a velocity of 120 m/s.

b) Acceleration of the body when velocity is 60 m/s.

c) Distance travelled by the body in 4 sec. **10**

16. A pile of mass 100 N is driven 12 cm in to the ground by every blow of the pile driver of 20 N mass which is dropped through 2 m before reaching the pile find out

a) K.E. lost in each blow of the pile driver

b) Resistance offered by the ground to the pile. **10**

17. a) Differentiate free vibrations and forced vibrations ? **3**

b) A particle is executing SHM between A and B. It passes through a certain point P at intervals of 0.5 and 1.5 sec. with a speed of 2m/sec. find out the maximum

speed of the particle performing SHM and the ratio $\dfrac{AP}{PB}$. **7**

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