BOARD DIPLOMA SUPPLEMENTARY (INSTANT) EXAMINATION, (C-16)

JUNE - 2019

DME - FIRST YEAR EXAMINATION
ENGINEERING MECHANICS

Time : **3** Hours]   [Total Marks : **80**

PART - A   **2×15=30**

Instructions :   (1) *Answer any **15** questions.*

(2) *Each question carries **2** marks.*

(3) *Answer should be brief and straight to the point and shall not exceed five simple sentences.*

1   Define the term statics.

2   Define coplanar and Non-coplanar system of forces.

3   State Triangle Law of forces.

4   State Law of Moments.

5   Define the term Limiting Friction.

6   Define Angle of friction.

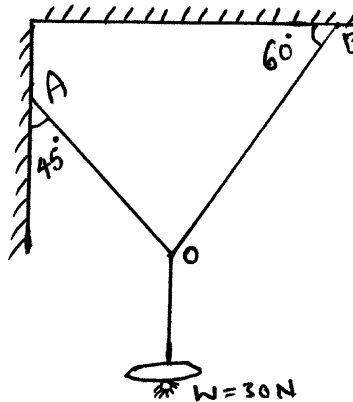7   Define Co-efficient of friction.

8   What is Fluid friction?

9   State Perpendicular axis theorem.

10   Define the term Centriod.

11   Define the terms Velocity and Acceleration.

12   A particle starts from rest and covers a distance of 75m. Find acceleration, if the final velocity is 60m/s.

13   State Law of conservation of Momentum.

14   Define centrifugal force. Give two examples.

15   Define Simple Machine. Give two examples.

16   Write the expressions for velocity ratio for first and second system of pulleys.

17   Define the terms Ideal effort and Ideal load.

18   What is Screw jack? Write its principle.

19   Give two examples for second order lever.

20   Write expression for Velocity ratio of Rack and Pinion.

PART - B   10×5=50

Instructions :   (1) Answer any **FIVE** questions.
                     (2) Each question carries **TEN** marks.
                     (3) Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

21 (a) The Resultant of two forces acting at an angle of 60° is $\sqrt{49}$. If they act at right angle their resultant would be $\sqrt{34}$. Find the magnitude of forces.

    (b) An Electric Light fixture weight 30 N hangs from a point "O" by two strings OA and OB as shown given below. Determine the forces in the strings.

22 (a) A Mass of 50kg is pulled up a rough inclined plane whose inclination to the horizontal is 30° by a force of 354 N acting parallel to the plane. Find the Co-efficient of friction. Solve by resolution of forces; Take $g = 9.81\,m/s^2$.

    (b) A body of weighting 250 N is lying on a rough horizontal plane. A horizontal effort of 50 N is required to cause the body to slide. Determine the limiting force of friction and the Co-efficient of friction.

23 (a) State parallel axis theorem.

    (b) Find the Moment of inertia of a I-section about centroidal axes with top flange 20 × 5mm, web 50 × 5mm and bottom flange 40 × 5mm.

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24 (a) A point is moving with uniform acceleration. In the eleventh and fifteenth seconds from the commencement it moves through 7.2m and 9.6m respectively. Find its initial velocity and the acceleration with which it moves.

   (b) Derive an expression for maximum height reached by a projectile.

25 A Wheel rotating about a fixed axis at 20 r.p.m. is uniformly accelerated for 70 seconds during which it makes 50 revolutions. Find

   (a) Angular velocity at the end of this interval

   (b) Time required for the speed to reach 100 rev/min.

26 (a) In a simple wheel and axle, the radius of the effort wheel is 240 mm and that of the axle is 40 mm. Determine the efficiency if a load of 2940 N can be lifted by an effort of 588 N.

   (b) The pitch of the screw of a screw jack is 6.5 mm. The length of the lever rod at the end of which effort applied is 550 mm. Find the effort required to raise a load of 660 N , if the efficiency is 55%.

27 Single Purchase crab winch, has following data :

   Length of lever = 700mm

   Number of pinion teeth = 12

   Number of spur gear teeth = 96

   Diameter of load axle = 200mm

   It is observed that an effort of 60N can lift a load of 1800N and an effort of 120N can lift a load of 3960N. What is the Law of machine? Also calculate probable effort to lift a load of 5000N.

28 (a) Two forces 80 N and 70 N act simultaneously at a point. Find the magnitude and direction of resultant force if the angle between them is 150°.

   (b) A rectangle has a base of 100mm and height of 60mm. Determine the Moment of inertia and radius of gyration about its base.

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