5045-A

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   State triangle law of forces.

2   State the Lami's theorem and write relevant formula.

3   State the parallelogram law of forces.

4   State the coplanar and non coplanar systems of forces.

5   What horizontal force is required to move a body of weight 90N along horizontal plane, it is gradually raised upto 15° the body will slide down.

6   State the term angle of friction.

7   State coefficient of friction.

8   State any two laws of static friction.

9   State parallel axis theorem.

10   Illustrate the moment of inertia of semi-circular lamina.

11   Explain the term super-elevation or banking.

12   Define the terms horizontal range and time of flight.

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13 A point describes simple harmonic motion with an amplitude of 0.2m. find the maximum velocity if the time period is 0.3 seconds.

14 State angular displacement.

15 Define simple machine. List out any one simple machine.

16 Express graphically the law of machine for ideal machine and practical machine.

17 Define the terms ideal machine and ideal load.

18 Write the formula for velocity ratio of second system of pulley.

19 Write velocity ratios of inclined plane.

20 In a simple machine an effort of 500N raised a load of 12.5 kN. What is mechanical advantage ?

<center>PART - B   10×5=50</center>

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 particle is acted up on the forces equal to P, 2P, $3\sqrt{3P}$ and 4P. The angle between the first and second, second and third and third and fourth are 60º, 90º and 150º respectively. Find the magnitude and direction of the resultant force.

22 A body of weight 490.5N rests on a plane, inclined at 20º to the horizontal. A horizontal force of 250N just move the body up the plane. Find the coefficient of friction.

23 Find the moment of inertia about centroidal axes for given I-beam the dimensions are follows :

TOP FLANGE : 80 mm × 20 mm

WEB : 20mm × 120 mm

BOTTOM FLANGE : 180mm × 20 mm

24 Find the amplitude and time period of a particle moving with simple harmonic motion, which has a velocity of 9 m/s and 4 m/s at the distance of 2m and 3m respectively from the center.

25 A wheel rotating about a fixed axis at 30 r.p.m. is uniformly accelerated for 50 seconds during which it makes 40 revolutions; find:

   (a) Angular velocity at the end of this interval and

   (b) Time required for the speed to reach 80 r.p.m.

26 A simple screw jack has threads of pitch 5mm the effort applied at the end of a lever 500mm long. What effort will be required to lift a load of 10kN, if efficiency at this load is 40% ?

27 (a) Draw the line diagram of first system of pulley.

   (b) In a system of pulley of first type there are three movable pulleys and a weight 350N can just be supported by an effort of 50N. Find the efficiency of the machine and amount of friction.

28 (a) A lamp weighing 20N is suspended from the roof by means of a wire. It is pulled on to one chord by a horizontal chord until the wire makes an angle of 60º with the roof. Find the tension in the wire and the chord.

   (b) An angle section is specified as 125mm × 75mm ×10 mm. Determine the centroid.

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