6056

BOARD DIPLOMA EXAMINATION, (C-16)
MARCH/APRIL—2021
DME - FIRST YEAR EXAMINATION
ENGINEERING MECHANICS

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

PART—A

Instructions :   (1) Answer **all** questions.

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

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

1.   Write short notes along with line diagram on the following :   1½+1½

     (a)   Coplanar system of forces

     (b)   Non-coplanar system of forces

2.   Define and draw legible sketch of the following terms :   1½+1½

     (a)   Couple

     (b)   Moment of couple

3.   Define *(a)* Angle of Friction, *(b)* Angle of Repose.   1½+1½

4.   What is the horizontal force required to pull a body of weight 500 N along the horizontal surface? Take the coefficient of friction as 0·3.   3

5. Define the following :   1½+1½
   (a) Centroid
   (b) Center of gravity.

6. Define the following terms :   1½+1½
   (a) Amplitude
   (b) Time period
   (c) Frequency

7. A body projected vertically upwards and attains a maximum height of 500 m. Calculate the velocity of projection and also compute the time of flight.   3

8. Define the following :   1+1+1
   (a) Idle Machine
   (b) Reversible Machine
   (c) Self-locking Machine

9. What is simple machine? List out any four examples of simple machine?   1+2

10. What is kinematic pair? Give any two examples?   2+1

PART—B   10×5=50

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

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

             (3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. Find the magnitude and direction of the resultant force of the following forces system :

   • A force of 20 N acting due to East

   • A force of 25 N acting 40° North of East

   • A force of 10 N acting 50° West of North

   • A force of 30 N acting vertically down words.

12. A body resting on a rough inclined plane required a pull of 80 N inclined at 40° to a plane just move it. It was also finding that a push of 120 N inclined 30° to the plane just moved the body. Find *(a)* Weight of the body, *(b)* Coefficient of friction.

13. An angle section (L-Section) is specified as 125mm × 75mm × 10 mm. Find Moment of Inertia about centrodial axis.

14. A bullet of mass 100 grams is fired into target with a velocity of 360 m/sec. The mass of the target is 9 kg and it is free to move. Find the loss of Kinetic Energy.

15. A flywheel increases its speed from 60 PRM to 120 RPM in 20 seconds. Find *(a)* the number of revolutions made by the wheel in 10 seconds and *(b)* the angular acceleration.

16. The law of wheel and axle machine is P = 0·2 W + 50. The diameter of wheel is 600 mm and radius of axle is 50 mm. Determine *(a)* Mechanical Advantage, *(b)* Effort required to lift a load of 2000 N, *(c)* Maximum Efficiency, *(d)* Maximum Mechanical Advantage and *(e)* Load to be lifted by an effort of 520 N.

17. *(a)* A weight of 2 kN is supported by two strings as shown below. Find the tensions in the strings. 5
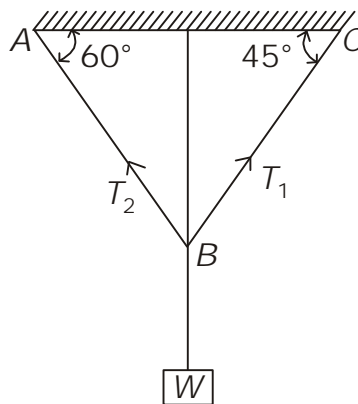
(b) Find Moment of Inertia of rectangular section lamina 50mm wide and 100 mm deep about centrodial axes. Also find its least radius of gyration. 5

18. (a) In a simple wheel and axle, the radius of effort wheel is 250 mm and that of axle is 50 mm. Determine velocity ratio, mechanical advantage and efficiency of the machine, if the load of 3000 N can be lifted an effort of 600 N and also calculate effort lost due to the friction. 5

(b) Explain Whitworth Quick Return Motion Mechanism with a neat sketch. 5

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