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C14-M–105

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2021

DME - FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

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

PART—A

4×5=20

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

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

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

1. Define force and write the units of force.

2. State the parallelogram law of forces.

3. List out various types of friction.

4. Define coefficient of friction.

5. Define Centre of gravity.

6. Define linear velocity and linear acceleration.

7. Define law of conservation of energy.

8. Define Simple machine and efficiency of simple machine.

9. List out any two simple machines.

10. Define *(a)* Link and *(b)* Kinematic pair.

PART—B

15×4=60

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

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

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

11. A lamp weighing 8 N is suspended from the ceiling by means of a wire. It is pulled to one side by a horizontal cord, until the wire makes an angle of 60º with the ceiling. Find the tension in the wire and cord.

12. A body of weight 300 N is just pulled on a horizontal plane by a force of 400 N inclined at 30º with the plane. Find the coefficient of friction between the body and the plane.

13. Find the moment of inertia about centroidal axis of rectangular lamina of length 60 mm and width 40 mm with central rectangular hole of length 30 mm and width 20 mm.

14. *(a)* Find the moment of inertia of a rectangular lamina of 60 mm wide and 100 mm deep.

(b) The resultant of two given forces is equal to each of the forces. Find the angle between the forces.

15. A bullet of a gun of mass 0·06 kg and is fired with a velocity of 320 m/s. What is the kinetic energy of the bullet? If the bullet penetrates into a block of wood 300 mm deep, what is the resistance offered by wood to the bullet?

16. A wheel rotating about a fixed axis at 20 r.p.m. is uniformly accelerated to 70 seconds during which time it makes 50 revolutions. Find the *(a)* angular velocity at the end of this interval and *(b)* time required for the speed to reach 100 rev./min.

17. A double-purchase crab has the following dimensions :

Effective diameter of the load drum = 180 mm

Length of the handle = 380 mm

No. of teeth on pinions = 20 and 30

No. of teeth on spur wheels = 75 and 90

When tested it was found that an effort of 80 N was required to lift a load of 1600 N and an effort of 135 N was required to lift a load a 3150 N.

Determine *(a)* law of machine and *(b)* probable effort to lift a load of 6000 N.

18. *(a)* A weight of 1000 N is lifted by an effort of 200 N, by second system of pulleys, having 5 pulleys in each block. Calculate Velocity ratio.

(b) Explain the Watt's mechanism along with a neat sketch.

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