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C-14-M-105

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2016

DME—FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

Time : 3 hours ]

[ Total Marks : 80

**PART—A**

3×10=30

- Instructions** : (1) Answer **all** questions.  
(2) Each question carries **three** 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. Define (a) force and (b) moment of force.
3. State the laws of static friction.
4. Define the following terms :
  - (a) Angle of friction
  - (b) Coefficient of friction
5. Define centre of gravity and centroid.
6. Differentiate between centrifugal force and centripetal force.
7. State the law of conversion of energy.

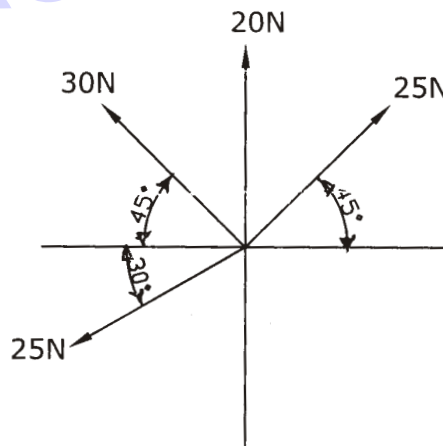
- \* 8. Define (a) reversible machine and (b) irreversible machine.
9. In lifting machine an effort of 240 N raises a load of 1800 N. The velocity ratio of the machine is 9. Calculate the efficiency of the machine.
10. Define the following terms :
- (a) Link
- (b) Kinematic pair

**PART—B**

10×5=50

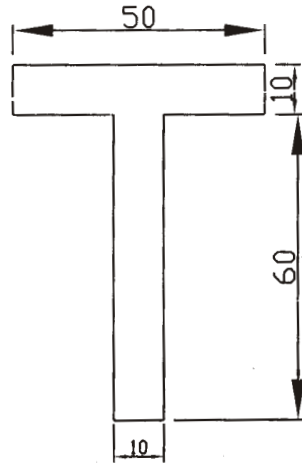
- Instructions** : (1) Answer *any five* questions.  
 (2) Each question carries **ten** marks.  
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Determine the magnitude and direction of the resultant of the following system of forces : 10



12. A body of weight 490.5 N rests on a plane, inclined at 20° to the horizontal. A horizontal force of 250 N just move the body up the plane. Find the coefficient of friction. 10

- \* **13.** Find the moment of inertia of the following T-section about its centroidal axes (all dimensions are in mm) : 10



- 14.** A wheel rotating at 30 rev/min is uniformly accelerated for 1.5 minutes during which time it makes 75 revolutions. What is the angular velocity of the wheel at the end of this interval and the further interval required for the wheel to reach an angular velocity of 100 rev/min? 10
- 15.** A bullet of mass 30 gm is fired with a velocity of 420 m/s. It penetrates into a plank through 3 cm. Compute the resistance offered by the plank. 10
- 16.** (a) A lamp weighing 10 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  $60^\circ$  with the ceiling. Find the tension in wire and cord. 5
- (b) Find the moment of inertia of rectangular lamina of 30 mm wide and 70 mm deep about its centroidal axes. Also find its least radius of gyration. 5
- 17.** Draw a neat sketch of double purchase crab winch and derive an expression for velocity ratio. 10
- \* **18.** (a) With neat sketch, explain the working of beam engine. 5
- (b) In a second system of pulleys an effort of 200 N lifts a load of 1200 N. Determine the efficiency, if the system contains 5 pulleys in each block. 5

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