4054

BOARD DIPLOMA EXAMINATION, (C–14)

APRIL/MAY—2015

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 and not exceed *five* simple sentences.

1. Convert the force of 10 kg into Newton.

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

3. Define the term angle of friction.

4. A body is being pulled by a force of 40 N on a rough inclined plane having coefficient of friction 0·3. Find the weight of the body.

5. Write the formula for parallel axis theorem and explain the terms.

6. State Newton's second law of motion.

7. Give any three examples of rotary motion in daily life.

8. Draw the graph illustrating the law of machine.

9. Draw the figure of second system of pulleys.

10. Define the term 'structure' and give two examples.

PART—B   10×5=50

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

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

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


11. The following forces act a point :

    (a) 30 N towards east

    (b) 25 N towards north

    (c) 35 N towards west

    (d) 45 N towards south

    Find the magnitude and direction of resultant force.   10

12. A body of weight 450 N is pushed by a force of 100 N on a rough horizontal plane. If the line of action of push is 25° with horizontal, find the coefficient of friction.   10

13. Determine MI of *C*-section shown in the figure below about centroidal axis. All dimensions are in mm :   10
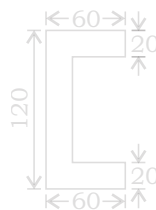
14. A bullet of mass 0·1 kg is fired into a target with a velocity of 350 ms^{-1}. The mass of the target is 10000 grams and it is free to move. Calculate loss of kinetic energy.   10

15. A body executing SHM has maximum displacement from mean position as 6 m. Find its amplitude, maximum acceleration and angular velocity, if its time period is π seconds. 10

16. The velocity ratio of lifting machine is 10. The initial frictional resistance is 20 N and increases uniformly at the rate of 0·01 N per Newton load. Find the effort required to lift a load of 5000 N and the efficiency at this load. 10

17. *(a)* Find least radius of gyration of a rectangular lamina of 50 mm base and 80 mm height. 5

    (b) Draw line diagram of Whitworth quick return mechanism and label is parts. 5

18. *(a)* The resultant of two equal forces acting at a point with an angle of 60° between them is 20 N. Find the magnitude of each force. 5

    (b) In a system of pulleys of the first type, there are three pulleys and a weight of 350 N can be supported by an effort of 50 N. Find the efficiency of the machine and moment of effort lost in friction. 5

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