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BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
DME—FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

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

PART—A   2×15=30

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

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

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

1. What are the conditions of equilibrium of a coplanar system of forces?

2. State Lami's theorem.

3. Define equilibrant.

4. State Varignon's principle.

5. State the laws of solid friction.

6. Define the term 'angle of friction'.

7. Define the coefficient of friction.

8. Define the term 'angle of repose'.

9. Write the formula for parallel axis theorem.

10. Define radius of gyration.

11. Define the term 'velocity'.

12. Define time of flight.

13. State the law of conservation energy.

14. Give three examples of rotary motion in daily life.

15. What is a simple machine? List out any two simple machines.

16. Define the term 'ideal machine'.

17. What is the difference between ideal machine and self-locking machine?

18. Define velocity ratio.

19. Define the efficiency of a machine.

20. Draw the graph for law of machine.

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PART—B   10×5=50

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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.

21. The following forces act at a point :

(a) 30 N towards East
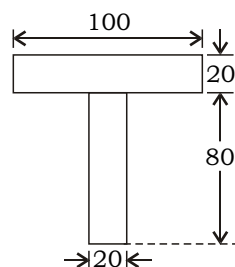
(b) 25 N towards North

(c) 35 N towards West

(d) 45 N towards South

Find the magnitude and direction of resultant force.

22. A body of weight 500 N is dragged up on a plane inclined at 30° to the horizontal. A force of 400 N inclined at 20° with the plane, can just move the body up the plane. Find the coefficient of friction.

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23. An *I*-section is made up of top flange 80 mm × 20 mm, web 120 mm × 20 mm and bottom flange 100 mm × 20 mm. Find out I_{xx} and I_{yy} of the section.

24. A point is moving with uniform acceleration. In the eleventh and fifteenth seconds from the commencement it moves through 7·2 m and 9·6 m respectively. Find the initial velocity and acceleration with which it moves.

25. A cricket ball of mass 100 gm moving with a velocity of 20 m/s is brought to rest by a player in 0·05 s. Find the impulse of the ball and the average force applied by the player.

26. In a simple wheel and axle, a load of 2500 N is raised by an effort of 500 N. Determine the efficiency if the diameter of wheel is 400 mm and diameter of axle is 64 mm.

27. In a lifting machine an effort of 98 N lifts a load of 2450 N and an effort of 127·4 N lifts a load of 3920 N. Establish the law of machine.

(a) Calculate the effort required to lift a load of 5880 N.

(b) Find the load that can be lifted using an effort of 196 N.

(c) What is the effort lost in friction?

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

(b) Find the centroid of T-section shown in the figure below :

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