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C23-M–105

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BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2024

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

1. State the triangle law of forces.

2. Write about the system of forces.

3. Write any three laws of solid friction.

4. State any three advantages of friction.

5. Define the terms *(a)* centroid and *(b)* centre of gravity.

6. State perpendicular axis theorem.

7. State law of conservation of momentum.

8. State Newton's third law of motion and give two examples.

9. Define the terms *(a)* lower pair and *(b)* higher pair.

10. Define reversibility of a machine and mention condition for reversibility.

PART—B

10×5=50

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

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

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

11. The following forces act at a point :

(i) 15 kN inclined at 30° towards North of East.

(ii) 20 kN towards North

(iii) 25 kN towards North-West

(iv) 30 kN inclined at 40° towards South of West.

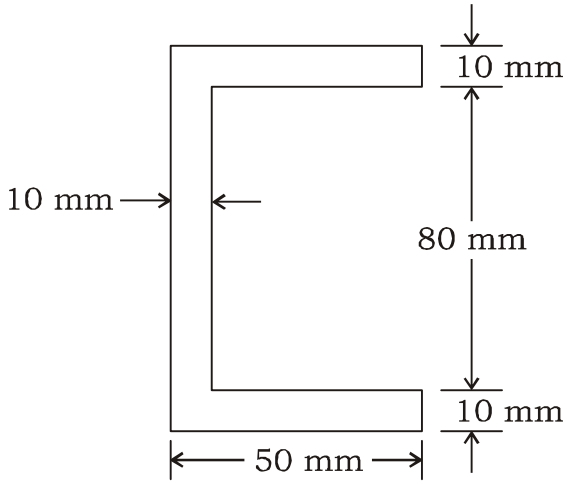
Find the magnitude and direction of the resultant of forces.

12. *(a)* Determine the magnitude of the resultant of the two forces of 12 N and 9 N acting at a point, if the angle between two forces is 60°.

(b) Find the centroid for the given T-section with 80 × 20 flange and 20 × 100 Web?

13. A body resting on a rough horizontal plane required a pull of 18 N inclined at 30° to the plane to just move it. It was also found that a push of 22 N inclined at 30° to the plane just moved the body. Determine *(a)* the weight of the body and *(b)* the co-efficient of friction.

14. Find the moment of inertia of channel section about X-axis and Y-axis passing through its centroid. Also find the radius of gyration.



15. A car is moving with a velocity of 20 m/s. The car is brought to rest by applying brakes in 4 seconds. Determine *(a)* The retardation and *(b)* Distance travelled by the car after applying brakes.

16. A mass of 50 kg is raised vertically from the ground through a height of 15 m in 40 seconds. Calculate *(a)* Gain in potential energy and *(b)* Power required.

17. Explain with a neat sketch the working of beam engine.

18. The number of teeth on the worm wheel of a double threaded worm and worm wheel is 60. The effort wheel diameter is 250 mm and the load drum is of 100 mm. Determine the effort required to lift a load of 300 N, if the efficiency of the machine is 50%.

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