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C09-M–303

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BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2021

DME - THIRD SEMESTER 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. State the parallelogram law of forces.

2. Define the terms *(a)* statics and *(b)* dynamics.

3. State Newton's third law of motion.

4. Define the term coefficient of friction.

5. Write the equation of frictional force in terms of normal reaction and coefficient of friction.

6. Define the terms mechanical efficiency with respect to simple machines.

7. Write mathematical expression for law of machine.

8. Write the coordinates of centroid of a rectangle with usual notations.

9. State Perpendicular axis theorem.

10. What is a mechanism? Give two examples.

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. The following forces act at a point : 20 N towards West; 15 N towards South; 25 N towards East and 30 N towards North. Draw the force diagram and find the magnitude of the resultant of force.

12. Classify and explain any three systems of forces with neat sketches.

13. Explain the terms *(a)* angle of friction and *(b)* laws of dry friction.

14. A body of weight 600 N is resting on a rough horizontal plane. The coefficient of friction between the body and surface is 0·25. Determine *(a)* the horizontal force required to pull the body and *(b)* the angle of friction.

15. *(a)* Explain the conditions for equilibrium of a body under coplanar forces.

(b) In a second system of pulleys the total number of pulleys is 8. The mechanical advantage is 60. Determine the efficiency of the system.

16. In a lifting machine, an effort of 100 N lifts a load of 2500 N and an effort of 130 N lifts a load of 3980 N.

(a) Establish the law of machine

(b) Calculate the effort required to lift a load of 6000 N.

17. An I section is made up of top flange 100 mm × 20 mm and web 120 mm × 20 mm and bottom flange 160 mm 20 mm. Determine MI about centroidal X-axis.

18. *(a)* Explain parallel axis theorem.

(b) Differentiate between machine and structure.

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