



C09-M-303

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BOARD DIPLOMA EXAMINATION, (C-09)
OCT/NOV—2018
DME—THIRD SEMESTER 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. Define coplanar system of forces.
2. Define the following terms :
 - (a) Inertia
 - (b) Momentum
3. Give the expression for centripetal force and explain the terms in it.
4. State any three laws of static friction.
5. Define limiting force of friction.
6. In a simple machine, a load of 20kN is lifted by an effort of 400N. Determine the mechanical advantages and efficiency of the machine, if the velocity ratio is 75.
7. Define ideal machine.
8. Define moment of inertia.
9. Define parallel axes theorem.

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[Contd...

10. What is meant by a mechanism?

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PART-B

10×5=50

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

11. The forces act at a point :

- (a) 15 N inclined at 30° towards North to East.
- (b) 20 N towards North.
- (c) 25 N towards North-west.
- (d) 30 N inclined at 40° towards South of West

Find the magnitude and direction of resultant force.

12. (a) Write down the applications of SHM.

(b) If the maximum acceleration and time period of a particle executing SHM are 5m/s^2 and 6.28 sec respectively find its amplitude.

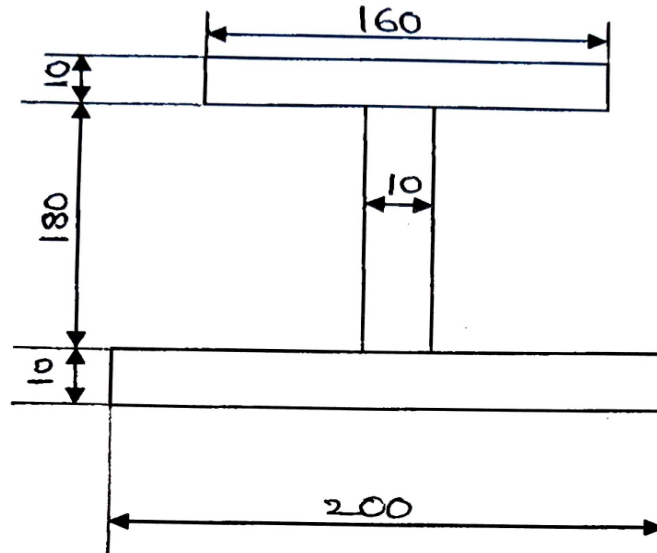
13. Drive an expression for the effort required to hold the body when it tends to move down the plane when the effort applied is parallel to the plane.

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

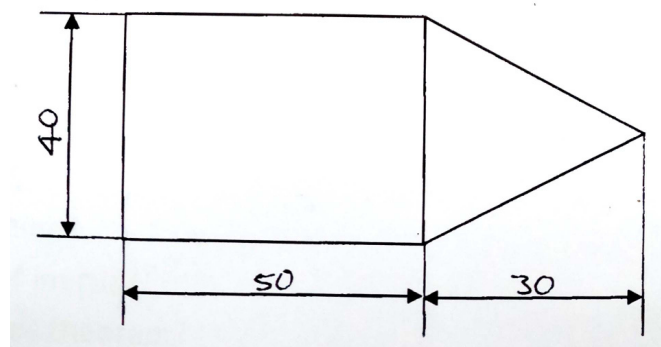
15. In a simple lifting machine, an effort of 500N is required to lift a load of 6 kN. The velocity ratio of the machine is 25. Determine the

- (a) Frictional effort.
- (b) frictional load.
- (c) Efficiency.

16. (a) Define couple. Give the examples of couple.
 (b) Explain differential wheel and axle. Derive the expression for its velocity ratio.
17. Determine the moment of inertia of I-section shown in the figure below about its centroidal axis. All dimensions are in mm.



18. (a) Explain with a neat sketch Ackerman steering gear mechanism.
 (b) Find the centroid (\bar{X} , \bar{Y}) of the composite section shown in the figure below. All dimension are in mm.



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