



C09-M-303

3247

**BOARD DIPLOMA EXAMINATION, (C-09)
SEPTEMBER/OCTOBER - 2020
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. State the parallelogram law of forces.
2. Define law of conservation of momentum.
3. What is the difference between centripetal force and centrifugal force?
4. Define the following :
 - (a) Normal reaction
 - (b) Coefficient of friction
5. State any three laws of dynamic friction.
6. What is simple machine? List out any three simple machines.

- * 7. An effort of 10 N is required to raise a load of 500 N. If the efficiency of a lifting is 70%, find the mechanical advantage and velocity ratio of the machine.
- 8. State parallel axis theorem.
- 9. Define moment of inertia and radius of gyration.
- 10. Differentiate between the terms 'machine' and 'structure'.

PART—B

10×5=50

- 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.

11. The forces acting at a point on a body are shown in Fig. 1 below. Determine the magnitude and directions of resultant :

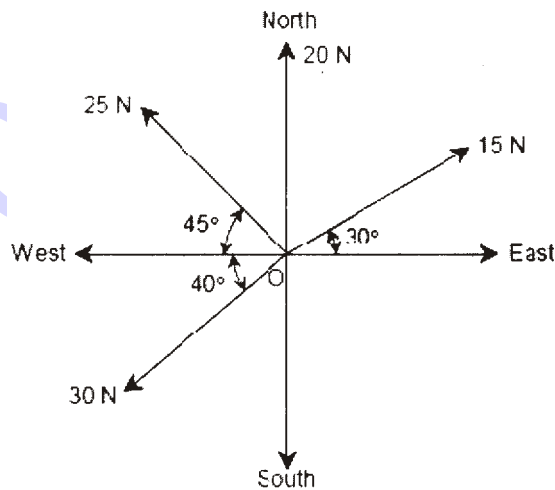


Fig. 1

12. A car of mass 1000 kg moves on a level road under the action of 981 newton of propelling force. Find the time taken by the car to increase its velocity from 24 kmph to 48 kmph and distance travelled during this time.

- * 13. A body of weight 570 N is hauled along a rough horizontal plane by a pull of 190 N acting at an angle of 30° with the horizontal. Find the coefficient of friction between body and the surface.
14. The pitch of a screw jack is 20 mm. The mean diameter of the thread is 100 mm. The length of lever is 1 m. If coefficient of friction is 0.075, calculate the necessary effort at end of the lever when a load of 30 MN is (a) to be lifted and (b) to be lowered.
15. (a) A flywheel increases its speed from 30 r.p.m. to 60 r.p.m. in 10 seconds. Determine (i) the angular acceleration and (ii) no. of revolutions made by the wheel in time 10 seconds.
- (b) In a simple wheel and axle, the radius of the effort wheel is 360 mm and that of axle is 60 mm. Determine the efficiency if a load of 2352 N can be lifted by an effort of 588 N.
16. Find the law of machine in which an effort of 15 N raised a load of 70 N and an effort of 19 N raised a load of 90 N. Calculate the effort required to lift a load of 100 N. Also find the maximum mechanical advantage.
17. Find the moment of inertia of the following T-section about its centroidal axes shown in Fig. 2 below :

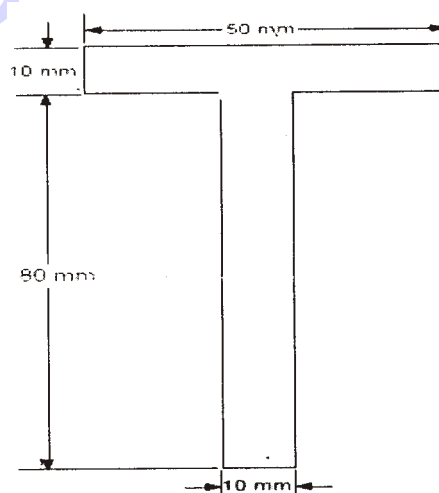
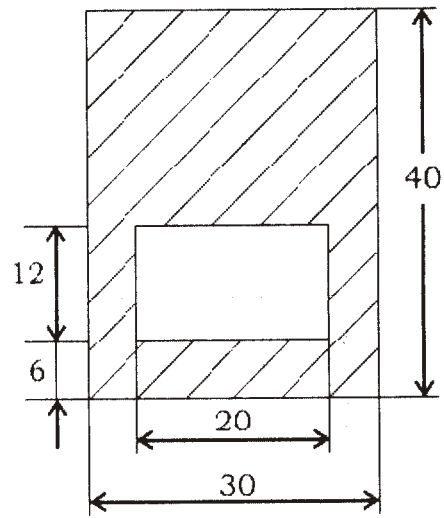


Fig. 2

- * **18.** (a) Find the centroid of the shaded regions shown in Fig. 3 below :



(All dimensions are in mm)

Fig. 3

- (b) Explain the pantograph mechanism with neat sketch.
