



C16-M-105

5045

**BOARD DIPLOMA EXAMINATION, (C-16)
OCTOBER/NOVEMBER-2018
DME- FIRST YEAR EXAMINATION**

ENGINEERING MECHANICS

Time : 3 Hours]

[Total Marks: 80

PART-A

2X15=30

- Instructions :**
1. Answer any **15** questions.
 2. Each question carries **2** marks.
 3. Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define vector quantity
2. Define the term couple.
3. State the Lami's theorem.
4. What do you mean by Equilibrant?
5. Define coefficient of friction.
6. What do you mean by 'Angle of Repose'?
7. State Laws of Solid Friction
8. Find the horizontal force (P) required to pull a body of weight 2000N along horizontal surface, coefficient of friction (μ) = 0.2
9. Define Centroid.
10. Define the term Radius of Gyration.
11. What is the difference between acceleration and velocity?
12. A particle starts from the rest and covers a distance of 200m, find the acceleration if the final velocity is 70 m/s.
13. Define Law of Conservation of Energy.

14. Define centripetal force.
15. Define Mechanical Advantage (M.A) of a simple machine.
16. State the condition when Mechanical Advantage (M.A.) is equal to the velocity ratio (V.R.)
17. State the condition for a Reversible machine.
18. State the condition for self-locking machine.
19. List any four simple machines.
20. What do you mean by Frictional Effort in simple machines?

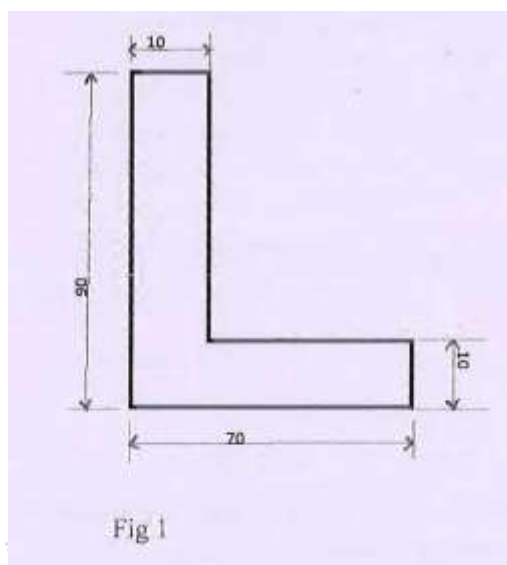
PART-B

10X5=50

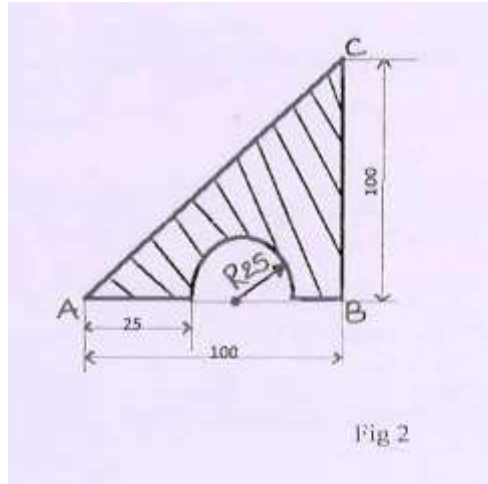
Instructions :

1. Answer any **Five** questions.
2. Each question carries **ten** marks.
3. Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

21. Find the magnitude and direction of the resultant force of two forces 800 N and 500 N act at point, if the angle between the two forces is 60°
22. The effort (P) required moving a load of 15 kN up the plane of 45° angle is 12 kN. Find the coefficient of friction (μ), if the effort (P) is applied parallel to the inclined plane.
23. Find the Moment of Inertia of the angle section shown in figure about XX and YY axes passing through its centre of gravity (C.G.). All dimensions are in mm.



24. (a) Find the centroid of the area shaded in the figure. About the axis AB. All dimensions are in mm.



- (b) Define Equilibrium and state the conditions for equilibrium.

25. A particle is projected with a velocity of 80 m/s at an angle of 45° to the horizontal. Find the Range, the maximum height and time of flight. Take acceleration due to gravity $g = 9.81 \text{ m/s}^2$

26. (a) Define work and power

- (b) A vehicle of mass 1200 kg attains a velocity of 50 m/s in 20 seconds. If the initial velocity is 20 m/s, then find its power

- * 27. Explain the working of Wheel and Axle and derive an expression for its velocity ratio.

28. (a) An effort of 500 N is applied to lifting machine to raise a load, out of which 20% is lost to overcome friction. If the velocity ratio of the machine is 15, Determine:

- (i) Load lifted
- (ii) Efficiency of machine.

- (b) Express graphically the Law of Machine for

- (i) Ideal machine
- (ii) Practical machine.
