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4054**BOARD DIPLOMA EXAMINATION, (C-14)****MARCH/APRIL-2019****DME - FIRST YEAR EXAMINATION****ENGINEERING MECHANICS**

Time: 3 Hours

Max. Marks: 80

PART-A**10x3=30M**

Instructions : 1) Answer **all** questions. Each question carries **three** marks
2) Answer should be brief and straight to the point

- 1) State any three conditions of equilibrium of a body acted upon by coplanar forces.
- 2) State parallelogram laws of forces.
- 3) Calculate coefficient of friction when $F=69$ N, $R=140$ N.
- 4) State the law of static friction.
- 5) Define Moment of Inertia.
- 6) State D'Alemberts principle.
- 7) Define Kinematics and Kinetics.
- 8) Write any three differences between reversible machine and self locking machine.
- 9) Mention the uses of simple machine.
- 10) What is inversion of a mechanism and give examples of it.

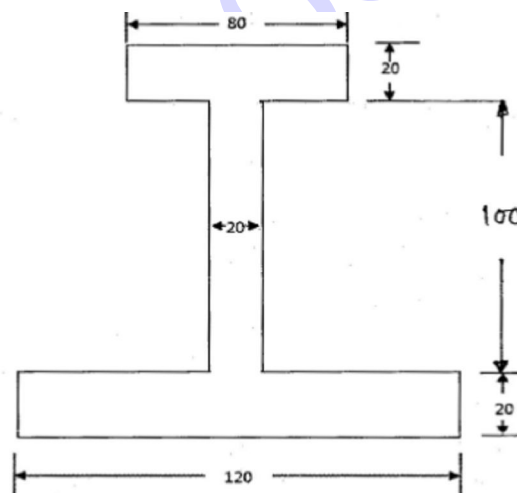
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PART-B

5x10=50M

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

- 11) Find the magnitude and direction of the single force that brings the following system of concurrent forces into equilibrium.
A force of 20 N acting due east
A force of 25 N acting 40° north of east
A force of 10 N acting 50° west of north
A force of 30 N acting vertically downwards.
- 12) An effort of 1500N is required to just move certain body up an inclined plane of angle 12° , acting parallel to the plane. If the angle of inclination is increased to 15° , then the effort required is 1720N. Find the weight of the body and the coefficient of friction.
- 13) An I section is made up of 3 rectangles as shown in fig. Find Moment of Inertia of the section about the horizontal axis passing through the Centre of Gravity of the section.



(All dimensions are in mm)

- 14) a) Determine the position of centroid and calculate the moment of inertia about its horizontal centroidal axis of a T-Section which has flange $200 \text{ mm} \times 50 \text{ mm}$ and web $200 \text{ mm} \times 50 \text{ mm}$. 6M
- b) State lammi's theorem and triangle law of forces. 4M

- 15) A point moves with S.H.M. When this point is 0.75m from the mid path, its velocity is 11m/s and when 2 meters from the center of its path velocity is 3m/s. Find its angular velocity, periodic time and its maximum acceleration.
- 16) A man of 800kg is accelerated from rest for 30 sec at the end of which time its velocity is 15m/s . What is a) final kinetic energy and b) the power expended.
- 17) A load of 3500N is lifted by the first system pulley in which three pulleys are movable, find the V.R if the efficiency is 85% .Also find the effort required and the effect of friction.
- 18) a) Define the following terms of simple machines, 8M
 a) Machine
 b) Mechanical advantage
 c) Velocity ratio
 d) Efficiency
- b) Define lower pair and higher pair and give examples. 2M

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