



C14-M-105

4054

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2018

DME—FIRST YEAR 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) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define resultant force.

2. State triangle law of forces.

3. Define limiting force of friction.

4. A body weighing 200 N is placed on a horizontal plane. If the coefficient of friction between the body and the plane is 0.3, determine the horizontal force required to just slide the body on the plane.

5. State parallel axis theorem.

6. Define SHM and give two examples.

2+1=3

7. A body starts with a velocity of 8 m/s with an acceleration of  $3 \text{ m/s}^2$ . Find the distance travelled in 8 seconds.

8. Define mechanical advantage and velocity ratio.

$1\frac{1}{2}+1\frac{1}{2}=3$

9. What is meant by an ideal machine?

10. What is lower pair? Mention two examples.

2+1=3

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**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.

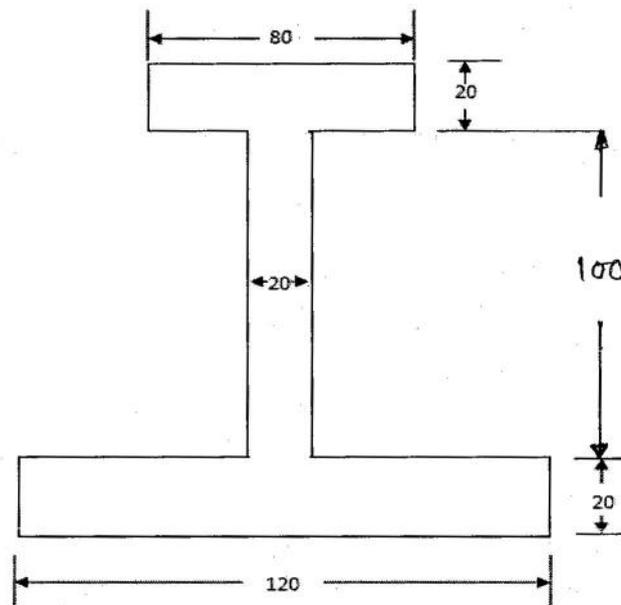
**11.** The following forces acting at a point :

- (a) 50 N towards East
- (b) 40 N towards North-East
- (c) 35 N inclined at 30° towards North of West
- (d) 55 N inclined at 40° towards South of West
- (e) 30 N towards South-East

Find the magnitude and direction of resultant force.

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

**13.** Find the MI of an I-section as shown in the figure about centroidal axes :



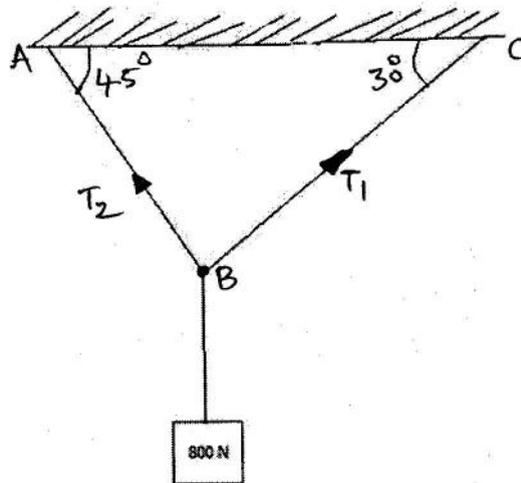
(All dimensions are in mm)

14. A body of mass 9 kg is moving along a smooth horizontal plane with a velocity of 15 m/s to the left when it is struck centrally by a bullet of mass 28 grams which passes right through it. The velocity of the bullet changes from 720 m/s to the right before impact to 120 m/s to the right after impact. Determine the velocity of the body just after impact.
15. A flywheel increases its speed from 30 r.p.m. to 60 r.p.m. in 10 seconds. Find the number of revolutions made by the wheel in 10 seconds and its angular acceleration.
16. What load will be lifted by an effort of 12 N if the velocity ratio is 18 and efficiency of the machine at this load is 60%? Determine the law of machine if the effort required is 7 N to run the machine at a load of 90 N.
17. (a) Explain about simple wheel and axle to lift loads by applying effort and derive the equation for velocity ratio.

$$2\frac{1}{2} + 2\frac{1}{2} = 5$$

- (b) A weight of 800 N is supported by two strings as shown in figure. Determine the tensions in each string.

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18. (a) Explain about any two inversions of four bar chain with neat diagrams.
- (b) Explain perpendicular axis theorem.

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