



C09-M-303

**3247**

**BOARD DIPLOMA EXAMINATION, (C-09)**

**OCT / NOV – 2015**

**DME – THIRD SEMESTER EXAMINATION**

**ENGINEERING MECHANICS**

Time : 3 hours ]

[Total Marks : 80

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**PART - A**

3 X 10 = 30

**Instructions :** (1) Answer **all** questions.  
(2) Each questions carries **three** marks.  
(3) Answers should be brief and straight to the point and shall not exceed **five** simple sentences.

1. Define the following terms and give one example for each of them.
  - (a) Scalar quantities
  - (b) Vector quantities.
2. State six applications of simple harmonic motion in engineering.
3. A stone is dropped from a tower and strikes the ground after 4 seconds. Find the velocity of stone at the end of 4 seconds and height of the tower.
4. What horizontal force is required to pull a body of weight 200 N along a horizontal surface? Assume coefficient of friction as 0.2
5. Explain the principle of screw jack.
6. Differentiate between an ideal machine and a practical machine.
7. State the conditions for reversibility and selflocking of simple machines.
8. Define centroid of a lamina.
9. Define polar moment of inertia and express it mathematically.
10. What is inversion of mechanism? List any two inversions of a slider crank chain mechanism.

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**PART - B**

10 × 5 = 50

\* **Instructions :** (1) Answer any **five** questions.

(2) Each question carries **ten** marks.

(2) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A wheel is rotating at 30 r.p.m. It is uniformly accelerated for 50 seconds during which it makes 40 revolutions. Find —
- angular velocity at the end of this interval;
  - time required to reach a speed of 80 rpm.
12. The following forces act at a point
- 25 N inclined at  $35^\circ$  towards north of east.
  - 20 N towards North
  - 30 N towards North West
  - 20 N inclined at  $20^\circ$  towards south of west
- Find the magnitude and direction of the resultant force.
13. A body resting on a rough horizontal plane required a pull of 90 N inclined at  $30^\circ$  to the plane to just move it. It was also found that a push of 110 N inclined at  $30^\circ$  to the plane just moved the body. Determine the weight of the body and the coefficient of friction.
14. a) State the laws of static and dynamic friction.  
b) Define the following terms : (i) Angle of repose (ii) Normal reaction (iii) Co-efficient of friction.
15. Explain first-order, Second-order and third-order lever with practical example.
16. A channel section has dimensions as 60 mm x 140mm x 60 mm, with a uniform thickness of 20 mm. Find its moments of inertia about the centroidal axes.
17. a) A bullet of mass 100 gm is fired into a target with a velocity of 360 m/s. The mass of the target is 9 kg and it is free to move. Find the loss of kinetic energy.  
b) In a lifting machine an effort of 240 N raises a load of 1800N. The velocity ratio of the machine is 9. Calculate effort lost in friction and efficiency at this load.
- \* 18. a) Find the centre of gravity of a hemisphere of radius 50mm.  
b) Draw a neat sketch of four- bar chain and explain briefly.