

Code: ME2T4, AE2T4

**I B.Tech - II Semester – Regular/Supplementary Examinations –
May 2017**

**ENGINEERING MECHANICS-II
(Common for ME & AE)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1.

- a) Define Translatory Motion. Give an example.
- b) What is Kinematics? In what way it differs from Kinetics?
- c) Write the equation for D`Alembert`s Principle for the rectilinear motion of a rigid body.
- d) Define Impulse. Give an example.
- e) State Work-Energy Principle for the straight line motion of a rigid body.
- f) Define Mass Moment of Inertia of a rigid body. Mention the units.
- g) What do you mean by the relative velocity of a body?
- h) What is Rotational Motion? Give an example.
- i) Define the Instantaneous Centre of a Rigid Body.
- j) Give the formulae for mass moment of inertia of a rectangular plate.

k) State the principle of Conservation of Energy. Give an example.

PART – B

Answer any **THREE** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. A small steel ball is shot vertically upwards from the top of a building , 25m above the ground with an initial velocity of 18m/sec. 16 M
- a) In what time, it will reach the maximum height?
 - b) How high above the building will the ball rise?
 - c) Compute the velocity with which it will strike the ground and the total time it is in motion.
3. A 750N crate rests on a 500N cart. The coefficient of friction between the crate and the cart is 0.3 and that between the cart and the road is 0.2. If the cart is to be pulled by a horizontal force P such that the crate does not slip, determine: 16 M
- a) the maximum allowable magnitude of P and
 - b) the corresponding acceleration of the cart.
4. Derive from fundamentals, an expression for the Mass Moment of Inertia of a solid cone of height H, base circle radius R and mass M about its geometrical axis. 16 M

5. A wheel rotating about a fixed axis at 20 revolutions per minute is uniformly accelerated for 70 seconds during which it makes 50 revolutions. Determine the following: 16 M
- the angular velocity at the end of this interval and
 - the time required to reach 100 revolutions per minute.
6. The T-shaped body rotates about a horizontal axis through point O. At the instant represented, its angular velocity is $\omega=3 \text{ rad/s}$ and its angular acceleration is $\alpha=14 \text{ rad/s}^2$ in the directions indicated. Determine the velocity and acceleration of a) point A and b) point B. 16 M

