No. of Printed Pages : **3 + Drawing Sheet**

BIME-031

00240

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2013

BIME-031 : KINEMATICS AND DYNAMICS OF MACHINES

Time : 3 hours *Maximum Marks : 70*

Note: *Attempt **any seven** questions. All the questions are to be answered in English Language only. Use of scientific calculator is permitted.*

1. A body of weight 0.45 kN is pulled up along an inclined plane having inclination 30° to the horizontal at a steady speed. Find the force required if the co-efficient of friction between the body and plane is 0.25 and force is applied parallel to the inclined plane. If distance travelled by the body is 10 m along the plane, find the work done on the body. **10**

2. Two parallel shafts 60 cm apart are to be connected by a belt running over pulleys of diameters 600 mm and 400 mm respectively. Determine the approximate length of the belt required. **10**

   (a) If the belt is open

   (b) If the belt is crossed

3. A simple band brake is applied to a rotating drum of dia 50 cm. The angle of lap of the band on the drum is 270°. One end of the band is attached to a fulcrum pin of the lever and other end is to a pin 100 mm from the fulcrum. If the co-efficient of friction is 0.25 and a braking force of 90 N is applied at a distance of 60 cm from fulcrum. Find the braking torque when the drum rotates in the clockwise direction. **10**

4. Describe with the help of a neat sketch construction and working of Epicyclic Train Dynamometer. **10**

5. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and uniform retardation. Derive expression for velocity and acceleration during outstroke and return stroke of the follower. **10**

6. A cam rotating clockwise with a uniform speed is to give the roller follower of 20 mm diameter the following motion : **10**

   (a) Follower to move outwards through a distance of 30 mm during 120° of cam rotation.

   (b) Follower to dwell for 60° of cam rotation.

(c) Follower to return to its initial position during 90° of cam rotation.

(d) Follwer to dwell for the remaining 90° of cam rotation.

The minimum radius of cam is 45 mm and the line of stroke of the follower is off set 15 mm from the axis of the cam and the displacement of the follower is to take place with simple harmonic motion on both the outward and return strokes. Draw the cam profile.

7. Derive an expression for the velocity of sliding between a pair of involute teeth. State the advantages of involute profile as a gear tooth profile. 10

8. Find the expression for the minimum number of teeth on the wheel in order to avoid interference. 10

9. Define the term spin and precession. Explain the gyroscopic effect on a two wheeler vehicle. 10

10. State the laws of static, dynamic and solid friction 10