

00875

**B.Tech. MECHANICAL ENGINEERING  
(BTMEVI)**

**Term-End Examination  
June, 2012**

**BIME-031 : KINEMATICS AND DYNAMICS OF  
MACHINES**

*Time : 3 hours*

*Maximum Marks : 70*

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

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1. Derive an expression for determining the length of a belt in a cross belt drive. **10**
  
2. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shaft 195 cm apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25 ? **10**

3. A bicycle and rider of mass 100 kg are travelling at the rate of 16 km/hr on a road. A break is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will it make before it comes to rest ? The pressure applied on the brake is 100 N and  $\mu = 0.05$ . 10
4. Describe the construction and operation of a prony brake or a rope brake absorption dynamometer. 10
5. Define the following terms as applied to cam with a neat sketch : 10
- (a) Base circle
  - (b) pitch circle
  - (c) pressure angle
  - (d) prime circle, and
  - (e) stroke of the follower.
6. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. Derive the expression for velocity and acceleration during out stroke and return stroke of the follower. 10

7. Derive an expression for the minimum number of teeth required on a pinion to avoid interference in involute gear teeth. 10
8. Explain with a neat sketch the 'sun and planet wheel'. 10
9. What do you understand by gyroscopic couple? Derive a formula for its magnitude. 10
10. Write short notes on *any two* of the following : 2x5=10
- (a) Band and Block Brake
  - (b) Law of gearing
  - (c) Gear train
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