| BIME-031 |

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

00873   **June, 2018**

BIME-031 : KINEMATICS AND DYNAMICS OF MACHINES

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any* **seven** *questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. A belt of density 1 gm/cm^3 has a maximum permissible stress of 250 N/cm^2. Determine the maximum power that can be transmitted by a belt of 20 cm × 1·2 cm, if the ratio of the tight side to slack side tension is 2.   *10*

2. Explain, with the help of a neat sketch, the construction and working of an Epicyclic Train Dynamometer.   *10*

3. A rider on a bicycle of mass 100 kg is travelling at a rate of 16 km/hr on a road. A brake 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 coefficient of friction is 0·05.   *10*

4. Differentiate between path of contact and arc of contact with the help of a diagram for gear teeth having involute profile. *10*

5. 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*

6. 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 coefficient of friction between the body and the plane surface is 0·25 and the force is applied parallel to the inclined plane. Determine the work done on the body if the body travels 10 m along the plane. *10*

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

8. A simple band brake is applied to a rotating drum of diameter 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 the other end is attached to a pin 100 mm away from the fulcrum. If the coefficient of friction between the surfaces is 0·25 and a braking force of 90 N is applied at a distance of 60 cm from the fulcrum, find the braking torque when the drum rotates in the anti-clockwise direction.   *10*

9. Write short notes on the following :   *10*

   (a)   Gyroscopic Couple

   (b)   Angle of Repose and Law of Solid Friction