No. of Printed Pages : 4

BIME-031

B.Tech. – VIEP – MECHANICAL ENGINEERING

(BTMEVI)

00926

Term-End Examination

June, 2016

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 permitted.*

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. In a thrust bearing, the external and internal radii of the contact surfaces are 210 mm and 160 mm, respectively. The total load is 60 kN and the coefficient of friction is 0·05. The shaft is rotating at 380 rpm. Intensity of pressure is not to exceed 350 kN/m^2. Calculate

(a) the power lost in overcoming friction, and

(b) the number of collars required for the thrust bearing. *10*

3. The brake drum of a single block brake of diameter 300 mm is rotating at 400 rpm as shown in Figure 1. The force required at the end of the lever to apply the brake is 600 N. If the angle of contact is 90° and coefficient of friction between the drum and brake block is 0·3, find the braking torque. *10*

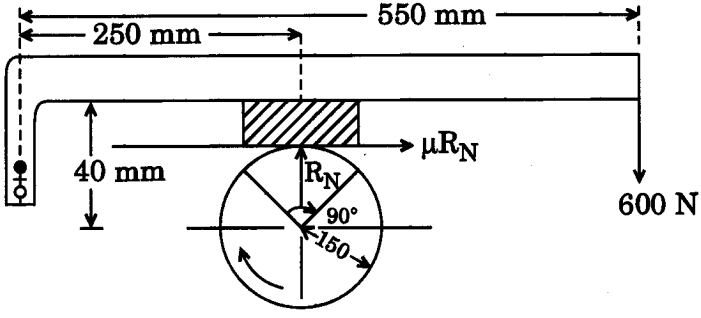

Figure 1

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

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

6. Discuss the effect of gyroscopic couple due to rotating parts on four-wheeler vehicle turning towards right. *10*

7. State the laws of static and dynamic friction. Prove that the angle of friction is equal to the angle of the inclined plane, when a solid body of weight W placed on the inclined plane, is about to slide down. *10*

8. A cam is to give the following motion to a knife-edged follower :

   (a) Outstroke during 60° of cam rotation

   (b) Dwell for the next 30° of cam rotation

   (c) Return stroke during 60° of cam rotation

   (d) Dwell for the remaining 210° of cam rotation

   The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and the return stroke. Draw the profile of the cam, when the axis of the follower passes through the axis of the cam shaft. *10*

9. The arm of an epicyclic gear train rotates at 100 rpm in the anticlockwise direction. The arm carries two wheels, A and B, having 36 and 45 teeth respectively. The wheel A is fixed and the arm rotates about the centre of wheel A. Find the speed of wheel B. What will be the speed of wheel B, if the wheel A instead of being fixed makes 200 rpm clockwise ? *10*

10. Write short notes on any ***two*** of the following : *10*

(a) Internal shoe brakes used in automobiles

(b) Laws of gearing

(c) Slip and creep in a belt drive