

**B.Tech. MECHANICAL ENGINEERING  
(BTMEVI)****Term-End Examination****June, 2014****BIME-031 : KINEMATICS AND DYNAMICS OF  
MACHINES***Time : 3 hours**Maximum Marks : 70*

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

1. An applied force of 1500 N is required to be able to move the body up with uniform velocity up an inclined plane of angle  $12^\circ$  with force acting parallel to the plane. With the inclined plane angle increased to  $15^\circ$ , the applied force increased to 1700 N. Determine the mass of the body and the coefficient of friction between the body and the surface of inclined plane. **10**
2. With the help of neat sketch describe internal shoe brakes used in automobiles. **10**
3. Construct the cam profile for the follower having following specification : **10**
  - (a) Base circle of cam = 30 mm diameter
  - (b) Cam rotates with 1200 rpm clockwise
  - (c) Roller follower has diameter = 10 mm
  - (d) Roller follower axis is offset right = 5 mm

- (e) Outward stroke = 25 mm with uniform acceleration and retardation to  $120^\circ$
- (f) Dwell at maximum position of follower =  $60^\circ$
- (g) Return stroke =  $90^\circ$  with uniform acceleration and retardation
4. Two gears 20 and 40 involute teeth respectively are in mesh. Pressure angle is  $20^\circ$  and module is 12 mm. The line of contact on each side of the pitch point is half the maximum possible length. Determine the height of the addendum for each gear wheel. 10
5. An epicyclic gear train shown in fig 1. Gear A is fixed to the frame. The arm B and gear C and D are free to rotate on the shaft. Gear A, C and D have 100, 101 and 99 teeth respectively. Pitch circle diameters of all are the same so that the planet gear P has 20 teeth meshes with all of them. Determine the revolutions of gears C and D for one revolution of the arm B. 10

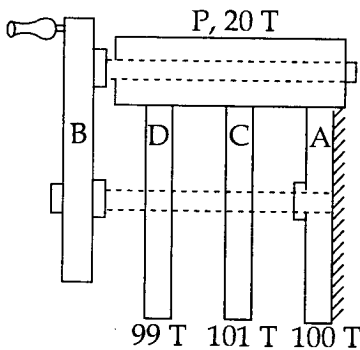


Fig. 1

6. With the help of neat sketch describe plane of spinning, plane of precessional, plane of torque, precessional axis and torque axis in gyroscope. 10
7. Discuss the effect of centrifugal tension on power transmitted by belt drive over pulley. 10
8. With the help of neat sketch discuss the pressure angle for : 10
- (a) cam-follower
  - (b) involute profiled gear mesh
9. Describe the effect of gyroscopic couple effect due to rotating parts on 4 - wheel vehicle turning towards right. 10
10. Write short notes on **any two** of the following : 10
- (a) Friction circle in journal bearing
  - (b) Circular cam with flat face follower
  - (c) Interference and undercutting in involute gear teeth
-