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**BIME-031**

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

00383

## Term-End Examination

## December, 2018

## BIME-031 : KINEMATICS AND DYNAMICS OF MACHINES

*Time : 3 hours* *Maximum Marks : 70*

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

**1.** (a) What do you understand by the term friction ? Explain clearly why it comes into play. *7*

(b) How does the velocity ratio of a belt drive get affected, when some slip is taking place between the belt and the two pulleys ? *7*

**2.** (a) Describe the following terms applied to belt drive : *4*

(i) Slip

(ii) Creep

(b) A flat belt, 8 mm thick and 100 mm wide transmits 0·9 kg/m length. The angle of lap in the smaller pulley is 165° and the coefficient of friction between the belt is 0·3. If the maximum permissible stress in the belt is 2 $MN/m^2$, find the maximum power transmitted and initial tension in the belt. *10*

**3.** (a) Describe the construction and operation of band brake with the help of diagram. *10*

(b) What is the difference between absorption and transmission dynamometers ? *4*

**4.** (a) Explain with neat sketches the various types of cams and followers. *10*

(b) Why is roller follower preferred to knife-edge follower ? *4*

**5.** Draw the cam profile for a knife-edge follower with following data :

(a) Cam lift = 40 mm during 90° of cam rotation with SHM

(b) Dwell for the next 30°

(c) During the next 60° of cam rotation, the follower returns to its original position with SHM

(d) Dwell during the remaining 180°

The radius of the base circle of the cam is 40 mm. Determine the maximum velocity of the follower during its ascent and descent, if the cam rotates at 240 rpm. *14*

**6.** (a) What do you understand by 'gear train' ? Discuss the various types of gear trains. 7

(b) A pair of spiral gears connects two shafts inclined at 80°. The velocity ratio is 2 and the driver has 25 teeth of normal pitch of 12 mm and the spiral angle of 30°. Find the centre distance between the shafts. 7

**7.** (a) The moment of inertia of an aeroplane air screw is 6·75 kg $m^2$ and rotates at 1200 rpm. The aircraft makes a complete half circle turn in 10 seconds. Calculate gyroscopic couple on the aircraft and state its effect on the aircraft. The air screw rotates clockwise when viewed from the rear end. 7

(b) Explain the application of gyroscopic principles to aircrafts and ships. 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Gyroscopic Stabilization

(b) Sun and Planet Gear

(c) Contact Ratio

(d) Pressure Angle

(e) Centrifugal Tension

(f) Limiting Friction