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**BME-056**

# DIPLOMA IN MECHANICAL ENGINEERING (DME) / ADVANCED LEVEL CERTIFICATE COURSE IN MECHANICAL ENGINEERING (DMEVI / ACMEVI)

## Term-End Examination

## June, 2016

00740

## BME-056 : THEORY OF MACHINES

*Time : 2 hours* *Maximum Marks : 70*

***Note :*** *Answer any **five** questions. All questions carry equal marks. Assume any missing data suitably. Use of scientific calculator is allowed.*

**1.** Explain any ***four*** of the following terms : $4 \times 3\frac{1}{2} = 14$

(a) Angle of action

(b) Open belt drive

(c) Tapered roller bearings

(d) Type of friction

(e) Spiral cam

2. Explain the working of a straight line motion, with the Hart's mechanism, with a sketch. *14*

3. Describe the working of the following types of pairs with sketches : $4 \times 3\frac{1}{2} = 14$

   (a) Prismatic or Sliding pair

   (b) Cylindrical pair

   (c) Spherical pair

   (d) Planar pair

4. Discuss the working of the following type of followers : $4 \times 3\frac{1}{2} = 14$

   (a) Knife edge follower

   (b) Roller follower

   (c) Flat or mushroom follower

   (d) Spherical follower

5. Explain how the self locking is provided in the Screw jack, and prove that the maximum efficiency is given by the equation

$$e_{max} = \frac{1 - \sin \phi}{1 + \sin \phi}$$

where symbols carry usual meaning. *14*

6. (a) Derive the equation for mass moment of inertia of a flywheel for an IC engine. 7

(b) The turning moment diagram for a multi-cylinder IC engine is drawn to the following scale :

1 cm = 20° Crank angle

1 cm = 2·5 kNm

During one revolution of the crank the areas with references to the mean torque line are 3·62, (– 3·82), 3·56, (– 4·22), 4·30, (– 3·44) $cm^2$. Determine the mass moment of inertia to keep the fluctuation of mean speed within ± 25% with reference to mean speed. Engine speed is 220 rpm. 7

7. Explain the working of Hartnell Governor with a neat sketch. *14*

8. Write short notes on any ***two*** of the following : 7+7

(a) Dynamic Balancing

(b) Harmful Effect of Vibration

(c) Characteristics of Governors