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BME-056

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

Term-End Examination

DATE **December, 2014**

BME-056 : THEORY OF MACHINE

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. **1** is **compulsory**. Answer any **four** more questions from the remaining. Use of scientific calculator is permitted.*

1. Select suitable answer from the given four alternatives. *7×2=14*

(i) The mechanism forms a structure, when the number of degrees of freedom (n) is equal to

(a) zero

(b) one

(c) two

(d) three

(ii) In a Screw-Jack, the effort required to lift the load W is given by

(a) $P = W \tan (\alpha - \phi)$

(b) $P = W \tan (\alpha + \phi)$

(c) $P = W \cos (\alpha - \phi)$

(d) $P = W \cos (\alpha + \phi)$

(iii) The power transmitted by a belt is maximum, when the maximum tension in the belt (T) is equal to

(a) $\frac{Tc}{4}$

(b) $\frac{Tc}{3}$

(c) $\frac{2\,Tc}{3}$

(d) 3 Tc

(iv) The size of the gear is usually specified by

(a) pressure angle

(b) circular pitch

(c) pitch circle diameter

(d) diametral pitch

(v) When the sleeve of a Porter governor moves upwards, the governor speed

(a) increases

(b) decreases

(c) remains unaffected

(d) None of the above

(vi) In order to have a complete balance of the several revolving masses in different planes

(a) the resultant force must be zero.

(b) the resultant couple must be zero.

(c) both the resultant force and couple must be zero.

(d) None of the above

(vii) The natural frequency (in Hz) of free longitudinal vibrations is equal to

(a) $\frac{1}{2\pi}\sqrt{\frac{s}{m}}$

(b) $\frac{1}{2\pi}\sqrt{\frac{g}{\delta}}$

(c) $\frac{0{\cdot}4985}{\sqrt{\delta}}$

(d) All of the above

2. (a) Explain the following terms : *7*

(i) Lower pair

(ii) Kinematic chain

(b) Sketch and explain any one inversion of a double slider crank chain. *7*

3. A body, resting on a rough horizontal plane required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction. *14*

4. Derive an expression for the length of a belt in a cross belt drive. *14*

5. A pulley is driven by a flat belt, the angle of lap being 120°. The belt is 100 mm wide and 6 mm thick and weighs 1000 kg/m^3. If the coefficient of friction is 0·3 and the maximum stress in the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and also determine the corresponding speed of the belt. *14*

6. (a) Define free vibrations and forced vibrations. What are the causes and effects of vibrations ? *7*

   (b) A body of mass 20 kg is suspended from a spring which deflects 15 mm under this load. Calculate the frequency of free vibration and verify that a viscous damping force amounting to approximately 1000 N at a speed of 1 m/s is just-sufficient to make the motion a periodic. *7*

7. (a) What is the function of a governor ? How does it differ from that of a fly wheel ? *7*

   (b) What are the different types of governors ? Explain the working of Porter governor. *7*