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BIME-022

DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

00662

Term-End Examination

December, 2017

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt in total **five** questions. Question no. **1** is **compulsory**. Use of scientific calculator is allowed.*

1. (a) A keyway lowers

(i) the strength of the shaft

(ii) the rigidity of the shaft

(iii) both the strength and rigidity of the shaft

(iv) the ductility of the material of the shaft

(b) The design of shafts made of brittle materials is based on

(i) Guest's theory

(ii) Rankine's theory

(iii) St. Venant's theory

(iv) Von Mises theory

(c) When a belt drive is transmitting maximum power,

(i) effective tension is equal to the centrifugal tension

(ii) effective tension is half of the centrifugal tension

(iii) driving tension in the tight side is twice the centrifugal tension

(iv) driving tension in the slack side is twice the centrifugal tension

(d) The contact ratio for gears is

(i) zero

(ii) less than one

(iii) greater than one

(iv) None of these

(e) Hooke's law holds good up to

(i) yield point

(ii) elastic limit

(iii) plastic limit

(iv) breaking point

(f) The centrifugal tension in the belt

(i) increases the power transmitted

(ii) decreases the power transmitted

(iii) has no effect on the power transmitted

(iv) is equal to maximum tension on the belt

(g) The wire rope makes contact

(i) at the bottom of groove of the pulley

(ii) at the sides of groove of the pulley

(iii) at the sides and bottom of groove of the pulley

(iv) anywhere in the groove of the pulley *7×2=14*

2. (a) Discuss the function of a coupling. Give at least three practical applications of a coupling.

(b) How is the shaft designed when it is subjected to twisting moment only ? *7+7*

3. (a) What do you understand by Simplex, Duplex and Triplex chains ? Explain in detail.

(b) Discuss the characteristics and advantages of helical gears. *7+7*

4. (a) What is a Key ? State its function. What is the effect of keyway cut into the shaft ?

(b) Write the applications of the chain drive. Enumerate the advantages and disadvantages of the chain drive. *7+7*

5. A pulley of 0·9 m diameter revolving at 200 rpm is to transmit 7·5 kW. Find the width of a leather belt if the maximum tension is not to exceed 145 N in 10 mm width. The tension in the tight side is twice that in the slack side. Determine the diameter of the shaft and the dimensions of the various parts of the pulley, assuming six arms of pulley. Maximum shear stress is not to exceed 63 MPa. *14*

6. A compressor, running at 250 rpm, is driven by a 15 kW, 870 rpm motor through a pair of $14\frac{1}{2}°$ full depth gears. Estimate the module, the beam width, and the number of teeth on each gear using the Lewis beam equation. *14*

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

   (a) A.S.M.E. Code for Shaft Design

   (b) Gear Cutting Processes

   (c) Types of Failures in Worm Gearing

   (d) Rope Drum Construction

   (e) Splines