

**DIPLOMA – VIEP – MECHANICAL
ENGINEERING (DMEVI)**

Term-End Examination

June, 2017

00544

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours

Maximum Marks : 70

Note : Attempt **five** questions in all, out of which question no. 1 is **compulsory**. Use of scientific calculator is allowed.

1. (a) Two shafts X and Y are made of the same material. The diameter of the shaft X is twice that of shaft Y. The power transmitted by shaft X will be
- (i) twice of shaft Y
 - (ii) four times of shaft Y
 - (iii) eight times of shaft Y
 - (iv) sixteen times of shaft Y

- (b) Oldham coupling is used to connect two shafts
- (i) which are perfectly aligned
 - (ii) which are not in exact alignment
 - (iii) which have lateral misalignment
 - (iv) whose axes intersect at a small angle
- (c) A feather key is generally
- (i) loose in shaft and tight in hub
 - (ii) tight in shaft and loose in hub
 - (iii) tight in both shaft and hub
 - (iv) loose in both shaft and hub
- (d) When the speed of a belt increases,
- (i) the coefficient of friction between the belt and the pulley increases
 - (ii) the coefficient of friction between the belt and the pulley decreases
 - (iii) the power transmitted decreases
 - (iv) the power transmitted increases
- (e) The included angle for the V-belt is usually
- (i) $20^\circ - 30^\circ$
 - (ii) $30^\circ - 40^\circ$
 - (iii) $40^\circ - 60^\circ$
 - (iv) $60^\circ - 80^\circ$

(f) In order to have smooth operation, the minimum number of teeth on the smaller sprocket, for moderate speeds, should be

(i) 15

(ii) 21

(iii) 17

(iv) 25

(g) The backlash for spur gears depends upon

(i) modulus

(ii) pitch line velocity

(iii) tooth profile

(iv) Both (i) and (ii)

7×2=14

2. A triple threaded worm has teeth of 6 mm module and pitch circle diameter of 50 mm. If the worm gear has 30 teeth of $14\frac{1}{2}^\circ$ and the coefficient of friction of the worm gearing is 0.05, find the

(a) lead angle of the worm,

(b) velocity ratio,

(c) centre distance, and

(d) efficiency of the worm gearing.

14

3. Design a pair of equal diameter, 20 degree stub tooth helical gears to transmit 37.5 kW with moderate shock at 1200 rev/min. The two shafts are parallel and 0.45 m apart. Each gear is to be of steel. Find the module and face width of the teeth.

14

4. A leather belt $9 \text{ mm} \times 250 \text{ mm}$ is used to drive a cast iron pulley 900 mm in diameter at 336 rpm . If the active arc on the smaller pulley is 120° and the stress in the tight side is 2 MPa , find the power capacity of the belt. The density of leather may be taken as 980 kg/m^3 , and the coefficient of friction of leather on cast iron is 0.35 . 14
5. (a) List the various types of shafts and give the standard sizes of transmission shafts.
- (b) How are the keys classified ? Draw neat sketches of different types of keys and state their applications. 7+7
6. (a) How are the bevel gears classified ? Explain with neat sketches.
- (b) Discuss the advantages and disadvantages of V-belt drive over flat belt drive. 7+7
7. Write short notes on any **four** of the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Gear hobbing
- (b) Types of failures in bevel gears
- (c) Methods of gear lubrication
- (d) Relative advantages and limitations of chain drives
- (e) Whirling of shaft