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BIME-022

01502

DIPLOMA IN MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

December, 2011

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours *Maximum Marks : 70*

Note : *(1) Attempt **five** questions in all. **All** questions carry **equal** marks. Question no. **1** is **compulsory.***

(2) Design data hand book and scientific calculators are allowed.

(3) Assume suitable data if required.

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1. Attempt all question : **2x7=14**

(a) Which of the following key transmits power through frictional resistance only ?

(i) Saddle Key (ii) Barth Key

(iii) Kennedy Key (iv) Tangent Key

(b) Tangent Key transmits force in :

(i) one direction only

(ii) two directions

(iii) both (i) and (ii)

(iv) none of the above

(c) Shaft is subjected to which of the following stresses.

(i) Bending

(ii) Torsional

(iii) Both (i) and (ii)

(iv) None of these

(d) For self locking which of the following condition is satisfied :

(i) $\phi > \alpha$

(ii) $\phi \leq \alpha$

(iii) both (i) and (ii)

(iv) None of these

(e) The length of the belt in an open belt drive is :

(i) variable (ii) constant

(iii) more (iv) less

(f) Power transmitted by increasing the initial tension is :

(i) more (ii) less

(iii) same (iv) all of these

(g) In involute gears, pressure angle :

(i) Increases

(ii) Decreases

(iii) Remains constant

(iv) none of these

2. (a) What is coupling ? What is difference between rigid and flexible coupling ? 7

(b) Standard cross-section for a flat key, which is fitted on a 50 mm diameter shaft, is 16×10mm. The Key is transmitting 475 N – M torque from the shaft to the hub. The Key is made of commercial steel ($S_{yt} = S_{yc} = 230 N/mm^2$). Determine the length of the key. If factor of safety is 3. 7

3. (a) What is the silent chain ? What are the advantages of the silent chain ? 7

(b) How will you designate V-belt ? 7

4. (a) Why involute gears are more commonly used as compared to cycloidal gears ? Describe in brief. 7

(b) A pair of 20 stub teeth spur gears is to transmit 20 KW. The pinion rotates at 500 rpm and the velocity ratio is 1:4. The allowable static stresses for gear and pinion materials are 100 MPa and 120 MPa. The pinion has 20 teeth and face width 10 times the module. Find out module and face width. 7

5. (a) Write a short note on manufacturing of gears . 7

(b) A 20° normal pressure angle helical pinion having 20 teeth and helix angle of 30° transmits 3 KW at 30 rev/s. The speed ratio is 4 and face with is 36 mm. Calculate tangential tooth load. 7

6. (a) In a right angled bevel gear drive, selecting the pinion alone determine the gear ratio of the drive. 7

(b) Find out tangential tooth load and velocity factor for two cast iron bevel gears having pitch diameter of 7.5 cm and 10 cm respectively. They are to transmit 2 KW at 1100 rpm of the pinion. The teeth profiles are $14\frac{1}{2}$ system. 7

7. (a) Find out face width of a worm gear to transmit 11KW from an electric motor running at 1500 rpm to a machine running at 75 rpm, 7

(b) Explain forces acting on bevel gear tooth. 7