

**DIPLOMA IN MECHANICAL ENGINEERING
(DMEVI)**

Term-End Examination

June, 2011

01427

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours

Maximum Marks : 70

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- Note :** (1) Attempt *any five* questions. All question carry equal marks. Question no. 1 is *compulsory*.
(2) Design data hand book and calculator are allowed.
(3) Assume suitable data if required.
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1. Attempt all questions. **7x2=14**
- (a) Which of the following key is under compression rather than in bearing shear when under load ?
- (i) Saddle (ii) Barth
(iii) Feather (iv) Kennedy
- (b) The key will fail in which of the following manner ?
- (i) Shearing
(ii) Crushing
(iii) Both Crushing and Shearing
(iv) None of these.

- (c) In hydrostatic bearing the starting friction is :
- (i) very low
 - (ii) more
 - (iii) either more or less
 - (iv) uncertain
- (d) Which of the following is self-aligning bearing ?
- (i) Conical
 - (ii) Spherical
 - (iii) Rectangular
 - (iv) None of these
- (e) The product of circular pitch and diametral pitch is :
- (i) π
 - (ii) 2π
 - (iii) $\frac{\pi}{2}$
 - (iv) $\frac{D}{T}$
- (f) Which of the following is gear finish operations ?
- (i) Grinding
 - (ii) Lapping
 - (iii) Shearing
 - (iv) All of these
- (g) Lewis equation in gears is used to find the :
- (i) tensile stress
 - (ii) compressive stress in bending
 - (iii) contact stress
 - (iv) fatigue stress

2. (a) A shaft 40 mm diameter, is transmitting 35 kW power at 300 rpm by means of Kennedy Keys of 10×10 mm. The keys are made of steel 45C8 ($S_{yt} = S_{ye} = 380 \text{ N/mm}^2$) and the factor of safety is 3. Determine required length of the key. 7
- (b) What are the advantages and disadvantages of rigid flange coupling ? 7
3. (a) Why do you prefer V-Belt over a flat belt ? Describe in brief. 7
- (b) Distinguish between gear and chain-sprocket. 7
4. (a) Explain the phenomenon of interference in involute gears. How is it avoided. 7
- (b) In a spur gear drive which is required to transmit 45 kW at a pinion speed of 800 rpm. The velocity ratio is 3 : 5 : 1. The teeth are 20° full depth involute with 18 teeth on pinion. Both pinion and gear are made of steel. Find out module and face width. 7
5. (a) Write down advantages and disadvantages of helical gear over spur gear. 7
- (b) With the help of a sketch, explain how an axial thrust is generated in a helical gear. What is herringbone gear ? 7

6. (a) How the bevel gears classified ? Sketch neatly the working drawing of bevel gears in mesh. 7
- (b) Two cast Iron bevel gears connect shafts at 90° and transmit a tangential force of 1350 N. The teeth are 20° full depth. Take pitch line velocity about 3 m/s and the face width as 50 mm. Calculate dynamic load (Fd). 7
7. (a) A hardened steel worm rotating at 1250 rpm transmits 12 kW to a phosphorus bronze gear with a transmission ratio 15 : 1. The centre distance is 225 mm and teeth have $14\frac{1}{2}^\circ$ full depth involute form. Find out face width of the gear. 7
- (b) Explain in brief the importance of heat dissipation in worm and worm gear. 7
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