

**DIPLOMA IN MECHANICAL ENGINEERING  
(DMEVI)**

**Term-End Examination**

**June, 2012**

**BIME-022 : POWER TRANSMITTING ELEMENTS**

*Time : 2 hours*

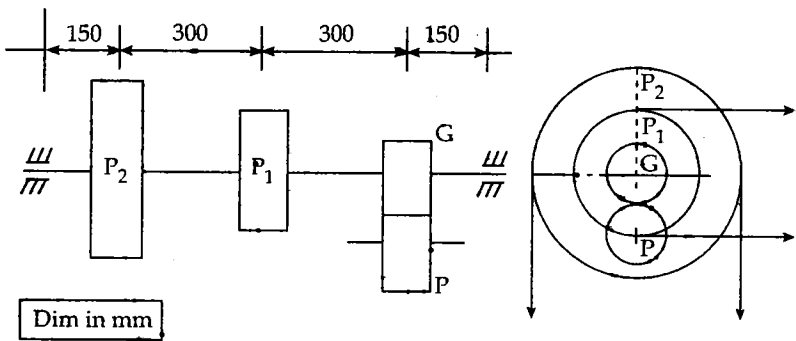
*Maximum Marks : 70*

**Note :** (i) Question - 1 is *compulsory* (ii) Attempt five questions.

1. (a) The life of an open belt in comparison to a cross belt is : **2x7=14**  
(i) more (ii) less  
(iii) equal (iv) unpredictable.
- (b) The standard angle between the sides of V - belt is.  
(i) 25° (ii) 30°  
(iii) 40° (iv) 45°
- (c) In an involute gear, the base circle must be :  
(i) at root circle  
(ii) under root circle  
(iii) above root circle  
(iv) above pitch circle.
- (d) The pressure angle recommended by BIS for gears is :  
(i) 14.5° (ii) 20°  
(iii) 25° (iv) 30°

- (e) A shaft directly coupled to a power source is called
- (i) Line Shaft
  - (ii) Counter Shaft
  - (iii) Flexible Shaft
  - (iv) Jack Shaft
- (f) Which of the following is a flexible coupling :
- (i) Muff
  - (ii) Split muff
  - (iii) Flange
  - (iv) Bush type
- (g) The polar Moment of Inertia of the shaft diameter 'd' is
- (i)  $\frac{\pi}{8}d^4$
  - (ii)  $\frac{\pi}{16}d^4$
  - (iii)  $\frac{\pi}{32}d^4$
  - (iv)  $\frac{\pi}{64}d^4$

2. Two pulleys, 450 mm and 200 mm diameters mounted on parallel shaft 1.95 m apart are connected by a crossed belt. Find the length of the belt and angles of contact between the belt and each pulley. If the larger pulley rotates at 200 rpm find the power transmitted. Take max permissible tension and coefficient of friction as 1 kN and 0.25 respectively. 14
3. A line shaft receives power through a gear and pinion as shown in Figure below : 14



Use pressure angle  $\alpha = 20^\circ$

The pinion is connected to an electric motor delivering 30kW at 1200 rpm, of which 20kW is supplied to a milling machine through a horizontal pulley drive at P<sub>1</sub> and the remainder of the power is supplied to a planer through pulley P<sub>2</sub> by a vertical belt. The diameters of gears and pinion are 300 mm and 100 mm respectively. The dia of pulleys P<sub>1</sub> and P<sub>2</sub> are 750 mm and 900 mm. respectively. If the ratio of belt tension in both drives is 2.0, design the shaft on the basis of strength.

4. Design a taper key for a shaft of diameter 75 mm transmitting 45 kW at 225 rpm. The allowable compressive strength may be taken as  $160 \text{ N/mm}^2$ . 14
5. A compressor is being driven by an electric motor by a chain drive. The speed of motor and compressor are 1000 rpm and 350 rpm respectively. The pitch circle diameter and No. of teeth for the smaller sprocket are 152 mm and 25 respectively. The centre distance between the two sprockets is 568 mm. Find the length of chain. 14
6. (a) What are herringbone gears ? Where are they used ? Explain in brief. 14  
(b) How are bevel gears with classified ? Explain in brief with block diagram.
7. (a) Describe Gear hobbling process. 14  
(b) What are the advantages and disadvantages of using involute profiles Vis - a - Vis cycloidal profile in gears ?
8. Write short - notes of *any four* of the following
- (a) Compare belt and gear drive  $4 \times 3\frac{1}{2} = 14$   
(b) V - belt Vs flat - belt drives  
(c) Suitability of cast iron as a gear material  
(d) Different criteria for design of shafts  
(e) Types of stresses induced in keys.  
(f) Whirling of shafts.