| **BIME-022**

DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

$\Box\Box\Box1\,2$ December, 2016

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours   *Maximum Marks : 70*

*Note : Answer any **five** questions. All questions carry equal marks. Assume missing data suitably, if any.*

1. (a) Explain with a sketch how the velocities of different points in a link are calculated with instantaneous centre method.   7

   (b) Compare the hollow shaft with a solid shaft of same weight and material for torque transmission capacity.   7

2. (a) Derive an expression for the ratio of tensions for a flat belt passing over a pulley.   7

   (b) Explain the effect of slip and creep on the power transmitted by a belt drive.   7

3. (a) Discuss the constructional details of chains and sprocket wheels. What are the different types of chains ? 7

(b) A shaft running at 90 rpm is to drive another shaft at 225 rpm and transmit 10·3 kW. The belt is 115 mm and 12 mm thick and the coefficient of friction between the belt and pulley is 0·25. The distance between the shafts is 2·75 m and the smaller pulley is 600 mm in diameter. Calculate the stress in an open belt connecting the two pulleys. 7

4. (a) Discuss the desirable properties and selection of gear materials. Compare spur gears with helical gears. 7

(b) A pair of spur wheels with 14 and 21 teeth are of involute profile and pressure angle 16°. Find the maximum addenda on the pinion and gear wheel to avoid interference, if the module is 6 mm. Also find the maximum velocity of sliding on either side of the pitch point, if the pinion runs at 300 rpm. 7

5. (a) Explain the term interference. What is the necessary condition for no interference ? 7

(b) What are bevel gears ? Explain the bevel gear terminology and geometrical proportions with a sketch. 7

6. Design a rigid type of flange coupling to connect two shafts. The input shaft transmits 37·5 kW power at 180 rpm to the output shaft through the coupling. The service factor for application is 1·5. Take plain carbon steel 40C8 with $\sigma_{yt} = 380$ N/mm^2 for shaft, 30C8 with $\sigma_{yt} = 400$ N/mm^2 for keys and bolts and grey cast iron FG 200 with $\sigma_{ut} = 200$ N/mm^2. *14*

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

(a) Gear Shaving

(b) Lubrication of Chains

(c) Whirling of Shafts

(d) Rope Drum Design and Construction

8. Explain the following terms in brief : $4 \times 3\frac{1}{2} = 14$

(a) Herringbone Gears

(b) Gear Lapping and Gear Grinding

(c) Selection of Wire Ropes

(d) Shaft Design by Castigliano's Theorem