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BIME-022

DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

00146 **June, 2015**

BIME-022 : POWER TRANSMITTING ELEMENTS

Time : 2 hours *Maximum Marks : 70*

Note : *Answer any **five** questions in all. All questions carry equal marks. Question no. 1 is compulsory. Design data book and scientific calculator is permitted.*

1. Choose the best answer for the following : *7×2=14*

(a) Taper on a rectangular key is

(i) 1 in 10

(ii) 1 in 16

(iii) 1 in 4

(iv) 1 in 100

(b) The sleeve of a Muff Coupling is designed as

(i) Solid shaft

(ii) Tapered shaft

(iii) Hollow shaft

(iv) Thick cylinder

(c) The stresses produced in the belt drive are

(i) Shear stresses

(ii) Compressive

(iii) Tensile

(iv) Both Tensile and Compressive

(d) For a given number of teeth, speed of the sprocket reduces as the Chain Pitch

(i) Increases

(ii) Decreases

(iii) Remains constant

(iv) All of the above

(e) The gears are termed as medium velocity gears, if their peripheral velocity is

(i) 1 – 3 m/sec

(ii) 3 – 15 m/sec

(iii) 15 – 30 m/sec

(iv) 30 – 50 m/sec

(f) Helix angle for a single helical gear ranges from

(i) 10° to 15°

(ii) 15° to 20°

(iii) 20° to 35°

(iv) 35° to 50°

(g) If b denotes the face width and L denotes the cone distance, then Bevel factor is written as

(i) $1 - b/L$

(ii) $1 + b/L$

(iii) b/L

(iv) L/b

2. (a) Find the diameter of a solid shaft to transmit 20 kW at 200 rpm. The ultimate shear stress for steel may be taken as 360 MPa and factor of safety as 8. If a hollow shaft is to be needed in place of the solid shaft, find the inside and outside diameters when the inside to outside diameter is 0·50. 7

(b) Give the classification of different shafts and their application. 7

3. (a) With a suitable sketch, explain the classification of keys and give the application of any two keys. 7

(b) Design the rectangular key for a shaft of 50 mm diameter. The shearing and crushing stresses for key material are 42 MPa and 70 MPa. 7

4. (a) Derive the Geometric relationship for the length of an open belt drive. Assume suitable data. 7

(b) Describe the advantages and disadvantages of V–Belts. 7

5. (a) Explain the advantages and disadvantages of chain drives. 7

(b) Explain the construction of wire ropes with suitable diagrams. 7

6. (a) With a suitable sketch, explain the terminology associated with spur gears. 7

(b) A bronze spur pinion rotating at 600 rpm, drives a CI spur gear at a transmission ratio 4 : 1. The allowable static stress for bronze pinion and cast iron spur gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. Face width of both the gears is 50 mm. Find the power that could be transmitted from the point of view of strength. 7

7. (a) Explain the Gear Hobbing process with a suitable sketch. 7

(b) Determine the face width of a pair of helical gears which is 16 times the module from the data given below : 7

Power P = 15 kW,

Teeth 20° full depth involute,

Helix angle $\phi = 45°$,

Speed of pinion 10,000 rpm,

Pitch circle diameter of pinion = 80 mm,

Pitch circle diameter of gear = 320 mm.

Allowable static strength $\sigma_0 = 100$ MPa.

8. (a) With suitable sketches, explain the different types of Bevel gears. 7

(b) Explain the different methods of lubricating worm gears. 7