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BIME-011

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

00362 **December, 2017**

BIME-011 : MACHINE DESIGN – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Question no. **1** is **compulsory**. Assume missing data suitably. Use of machine design data book and scientific calculator is permitted.*

1. Choose the correct answer from the given alternatives : *7×2=14*

(a) A sliding bearing which can support steady loads without any relative motion between the journal and the bearing is called

(i) Zero film bearing

(ii) Boundary lubricated bearing

(iii) Hydrodynamic lubricated bearing

(iv) Hydrostatic bearing

(b) The property of a bearing material which has the ability to accommodate shaft deflections and bearing inaccuracies by plastic deformations without excessive wear and heating is known as

(i) Bondability

(ii) Embeddability

(iii) Comfortability

(iv) Fatigue strength

(c) 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

(d) The difference between the tooth space and tooth thickness as measured on the pitch circle is called

(i) Clearance

(ii) Face width

(iii) Backlash

(iv) Working depth

(e) When two non-intersecting and non-coplanar shafts are connected by gears, the arrangement is known as

(i) Spur gearing

(ii) Helical gearing

(iii) Bevel gearing

(iv) Spiral gearing

(f) Factor of safety for fatigue loading is the ratio of

(i) Elastic limit to the working stress

(ii) Young's modulus to the ultimate tensile strength

(iii) Endurance limit to the working stress

(iv) Elastic limit to the yield point

(g) Stress concentration factor is the ratio of

(i) Maximum stress to the endurance limit

(ii) Nominal stress to the endurance limit

(iii) Maximum stress to the nominal stress

(iv) Nominal stress to the maximum stress

2. (a) What is surface fatigue ? Explain. Discuss the methods to increase the wear load capacity of a gear. *7*

(b) Draw a pair of gear teeth and indicate all the gear terminologies on the same. *7*

3. Design a pair of cast iron spur gears to transmit 15 kW at 1440 rpm of the pinion. The desired transmission ratio is 5 : 1. The centre distance between shafts should be very close to 400 mm. *14*

4. (a) A torque of 250 N-m acts upon the shaft of a helical gear whose pitch circle diameter is 300 mm. The gear has 60 teeth and runs at 250 rpm. The pressure angle of the teeth in transverse plane is 18° and the angle of helix is 28°. Calculate : *10*

(i) Power transmitted

(ii) Normal force on the gear tooth

(iii) Force transmitted to the shaft

(b) What is interference in gears ? How can you overcome it ? Elaborate in brief. *4*

5. Design a suitable worm gear drive to transmit 5 kW at 1200 rpm. The speed ratio is to be 25 and the centre distance is 250 mm. *14*

6. (a) What is the function of a lubricant ? What are the various methods of lubrication ? Explain any one method of lubrication in brief. *7*

   (b) Discuss the salient features of the procedure of selection of bearing for various applications. *7*

7. (a) A journal bearing 150 mm in diameter and 225 mm long supports a load of 8900 N at 1200 rpm. The radial clearance is 0·075 mm and the bearing wastes 1495 watts in friction. What is the viscosity of oil in cP at the operating temperature ? *8*

   (b) What are the basic functions of piston rings ? Which material is preferred for making piston rings ? Why ? Discuss. *6*

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

   (a) Reliability of Bearing

   (b) Thrust Ball Bearing

   (c) AGMA and Indian Standards

   (d) Dynamic Tooth Load

   (e) Velocity Factor

   (f) Crank Pin
