

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

Term-End Examination

December, 2018

BIME-011 : MACHINE DESIGN – II

Time : 3 hours

Maximum Marks : 70

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

1. Select the most suitable answer from the given four alternatives :

7×2=14

(a) In a full journal bearing, the angle of contact of the bearing with the journal is

(i) 120°

(ii) 180°

(iii) 270°

(iv) 360°

- (b) **Ball bearings are usually made from**
- (i) **low carbon steel**
 - (ii) **medium carbon steel**
 - (iii) **high speed steel**
 - (iv) **chrome nickel steel**
- (c) **The gears are termed as medium velocity gears, if their peripheral velocity is**
- (i) **1 – 3 m/s**
 - (ii) **3 – 15 m/s**
 - (iii) **15 – 30 m/s**
 - (iv) **30 – 50 m/s**
- (d) **The Lewis equation in spur gears is used to find the**
- (i) **tensile stress in bending**
 - (ii) **shear stress**
 - (iii) **compressive stress in bending**
 - (iv) **fatigue stress**
- (e) **The helix angle for single helical gears ranges from**
- (i) **10° to 15°**
 - (ii) **15° to 20°**
 - (iii) **20° to 35°**
 - (iv) **35° to 50°**

(f) The number of starts on the worm for a velocity ratio of 40 should be

- (i) single
- (ii) double
- (iii) triple
- (iv) quadruple

(g) The length of the cylinder is usually taken as

- (i) equal to the length of piston
- (ii) equal to the length of stroke
- (iii) equal to the cylinder bore
- (iv) 1.5 times the length of stroke

2. A pair of spur gears, having $14\frac{1}{2}^\circ$ involute full depth teeth is to transmit 12 kW at 300 rpm of the pinion. The velocity ratio is 3 : 1. The static strengths of cast iron gear and steel pinion are 60 MPa and 105 MPa respectively. Determine the module, face width and the pitch diameter of gears. Also check for wear.

14

3. Design 20° involute worm and gear to transmit 10 kW with worm rotating at 1400 rpm and to obtain a speed reduction of 12 : 1. The distance between the shafts is 225 mm. 14

4. Select a suitable ball bearing to carry a radial load of 10,000 N and an axial load of 4000 N. The shaft rotates at 1000 rpm. Average life is 5000 hours. Take mild shock. 14

5. A vertical four-stroke compression ignition engine has the following specifications :

Brake power	=	5.00 kW
Speed	=	1200 rpm
Indicated mean effective pressure	=	0.35 N/mm^2
Mechanical efficiency	=	0.80

Determine the dimensions of the cylinder. 14

6. Determine the safe power which can be transmitted by a pair of helical gears, 20° full depth, 25° helix, having normal module of 5 mm. Both the gears are made of forged C – 30 steel and have a face width of 77 mm. The pinion speed is 2000 rev/min and it has 20 teeth. The velocity ratio is to be 5 to 1. 14

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

- (a) Backlash
 - (b) Herringbone Gears
 - (c) Heat Dissipation in Worm Gearing
 - (d) Collar Bearing
 - (e) Reliability of Bearing
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