

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

Term-End Examination

June, 2017

00171

BIME-011(S) : 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 permitted. Assume missing data suitably.

1. Select the correct answer and write it in the answer book. 7×2=14
- (a) Which one of the following are anti-friction bearings ?
- (i) Sleeve bearings
 - (ii) Gas lubricated bearings
 - (iii) Ball and roller bearings
 - (iv) Journal bearings
- (b) Diameter of washer is generally taken
- (i) equal to nut size
 - (ii) less than nut size
 - (iii) bigger than nut size
 - (iv) any size irrespective of nut size

- (c) Which type of gears will be used for non-parallel and non-intersecting shafts ?
- (i) Helical gears
 - (ii) Hypoid gears
 - (iii) Worm gears
 - (iv) Herring bone gears
- (d) An involute gear should have a minimum of
- (i) 8 teeth
 - (ii) 12 teeth
 - (iii) 16 teeth
 - (iv) 20 teeth
- (e) In order to avoid interference for 20° pressure angle teeth, the minimum number of teeth should be
- (i) less than 11
 - (ii) more than 11
 - (iii) less than 6
 - (iv) None of the above
- (f) For a spur gear, the product of circular pitch and diametral pitch is equal to
- (i) unity
 - (ii) $\frac{1}{\pi}$
 - (iii) module
 - (iv) π

- (g) Gear teeth are made harder to avoid
- (i) abrasion
 - (ii) bending
 - (iii) pitting
 - (iv) wear
2. A bronze spur pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ratio of 4 : 1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength. 14
3. Design a worm gearing to transmit 20 HP from an electric motor running at 1500 rpm to a machine running at 75 rpm. Load is intermittent (< 3 hours of continuous service) and steady. 14
4. 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/mm²
 - Mechanical efficiency = 0.80
- Determine the dimensions of the cylinder. 14

5. A journal bearing is proposed for a centrifugal pump. The diameter of the journal is 0.15 m and the load on it is 40 kN. Its speed is 950 rev/min. Complete the design calculation for the bearing. 14
6. A pair of helical gears are to transmit 16 kW. The teeth are 20° stub in the diametral plane and have a helix angle of 45° . The pinion runs at 10,000 rpm and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa, determine a suitable module, and face width from static strength considerations. Check the gears for wear. 14
7. (a) Discuss the design considerations for a crank pin.
(b) State the reasons for adopting involute curves for a gear teeth profile. 7+7
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