B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2014

BIME-011 : MACHINE DESIGN–II

Time : 3 hours   *Maximum Marks : 70*

Note: *(i)*   *Attempt **Five** questions.*

        (ii)   *Question No. **1** is **compulsory**.*

        (iii)   *Use of Machine Design Data Book and Scientific Calculator is **permitted**.*

        (iv)   *Assume missing data suitably.*

1. Select the most appropriate answer and write it in the answer book.   **7x2=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) The listed life of a rolling bearing, in a catalogue, is the :

        (i)   Minimum expected life

        (ii)   Maximum expected life

        (iii)   Average life

        (iv)   None of these

   (c) Which of the following is antifriction bearing ?

        (i)   Journal bearing

        (ii)   Needle bearing

        (iii)   Pedestal bearing

        (iv)   Collar bearing

(d) The size of gear is usually specified by :
    (i) Pressure angle
    (ii) Circular pitch
    (iii) Pitch circle diameter
    (iv) Diametral pitch
(e) The helix angle for double helical gear may be made up to
    (i) 45°   (ii) 60°
    (iii) 75°   (iv) 90°
(f) In worm gears, the angle between the tangent to the thread helix on the pitch cylinder and the plane normal to the axis of worm is called :
    (i) Pressure angle
    (ii) Lead angle
    (iii) Helix angle
    (iv) Friction angle
(g) The length of the cylinder in I.C. engine 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 bronze spur pinion rotating at 600 rpm drives **14** 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 stand point of strength.

3. Design a suitable gearing to transmit 70 HP. The **14** pinion runs at 6000 rpm. The speed ratio is 3.

4. 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 hour of continuous service) and steady. **14**

5. Select a suitable bearing which is to operate at 1600 rpm and is acted upon by a 8000N radial load and 5000 N thrust load. The inner ring rotates, the load is steady and the service is continuous. The shaft diameter, from strength consideration, is 45 mm and the life expectancy is 500 hrs. **14**

6. A vertical four stroke compression ignition engine has the following specifications : **14**
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.

7. (a) Discuss the reasons for using tapered skirt for pistons. **7+7**
   (b) Explain with sketches the working of any two types of thrust bearing.

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