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Reg. No.................................

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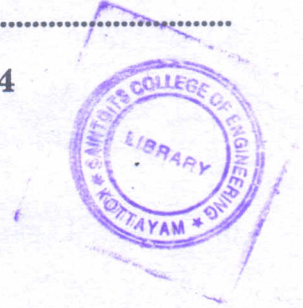
B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Eighth Semester

Branch : Mechanical Engineering

MACHINE DESIGN AND DRAWING—II (M)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Answer **two** *questions each from Part* A *and Part* B.
Design data book is permitted. Missing data may be appropriately assumed.

Part A

1. (a) Differentiate between types of gears. (7 marks)

   (b) Design a pair of spur gears for transmitting 65 kW. at 1250 r.p m. of pinion using cast steel with safe static bending stress of 125 MPa, K = 3/(3 + V), Gear ratio 2.25 : 1. BHN for pinion is 300. The teeth are 20° full depth involutes.

      (18 marks)

2. (a) Briefly explain AGMA standards. (5 marks)

   (b) Explain the design of gear with Lewis equation. Given following details :

      Two parallel shafts are connected by two helical gears with 25° full depth teeth.

      Helix angle – 20°, static stress = 150 MPa, power to be transmitted is 50 kW at 1,500 r.p.m.. BHN = 250, gear ratio = 4 : 1.

      (20 marks)

3. (a) Explain gear forces and effects. (5 marks)

   (b) Determine the tangential force at the mean radius and axial thrust on the pinion and gear. Given that two shafts are connected perpendicularly by a pair of bewel gears. Number of teeth is 30 ; power to be transmitted is 20 kW with 500 r.p.m. of pinion. The module of 20° full depth involutes teeth at outer radius is 5 mm.

      (20 marks)

4. (a) What formative number of teeth ? (5 marks)

   (b) Design a worm and worm gear drive for a reducing speed by 25. Pinion rotates at 750 r.p.m. and transmitting 40 kW.

      (20 marks)

      [2 × 25 = 50 marks]

Turn over

Part B

5. (a) What is lubrication ?   (5 marks)

   (b) Explain the design of ball-bearing with radial load 2 kN, axial thrust 1 kN, rotation speed 5000 r.p.m., diameter of the spindle is 35 mm. Expected to work for 50 hours/week in a year.

                    (20 marks)

6. A journal bearing 150 mm. long and 40 mm. diameter supports a radial load 7.5 kN. the shaft speed is 150 r.p.m. Oil used in SAE 60 at 25°C inlet temperature. Using clearance ratio 600, find the rise in temperature, maximum films pressure and minimum film thickness.

7. Explain how friction losses, hydrodynamic oil flow through bearing, oil leakage amount, temperature rise and maximum pressures are calculated. Explain the parameters needed.

8. Select a suitable impeller for a centrifugal pump with following specifications :

   Discharge : 1000 l.p.m.

   Speed : 2000 r.p.m.

   Suction lift : 5 m. of water.

   Deliver head : 30 m. of water.

                    (2 × 25 = 50 marks)