Roll No. ....

ME-801

B. E. (Eighth Semester) EXAMINATION, June, 2010

(Mechanical Engg. Branch)

MACHINE DESIGN – II

(ME – 801)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : (i) Attempt any *five* questions.

(ii) Assume suitable data, if necessary.

(iii) Use of design data is permitted.

1. (a) Discuss the various factors which affect wear.   10

   (b) Discuss various stages of wear.   10

2. (a) Define compatibility, conformability and embeddability as applied to bearing meterials.   6

   (b) Design a journal bearing to support a load of 4500 N at 600 rpm. The bearing liner is made of bronze becked babbit and the journal is of hardened steel. Oil rings are used to lubricate the bearings. Take ambient temperature as 20°C and the oil temperature in bearing as 80°C.   14

3. (a) Explain with sketches the bearings used for axial loading.   8

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(b) In a particular application, a bearing is to support 4500 N station any radial load. The shaft rotates at 1,000 rpm and the total life desired is 30,000 hrs. The running conditions are steady. Select a suitable bearing. 12

4. (a) Discuss causes and remedies of gear tooth failure. 6

(b) A compressor, running at 250 rpm, is driven by a 15 kW, 870 rpm motor through a pair of $14\frac{1}{2}°$ full depth gears. Estimate the module, the beam width, the no. of teeth on each gear using Lewis equation. 14

5. (a) For a bevel gear having a pitch angle θ_p , derive the expression between formative and actual numbers of teeth. 10

(b) Explain the mode of failure in worm gearing. 10

6. Design a $20°$, involute worm gear for transmitting $11 \cdot 25$ kW. The centre distance between worm and worm wheel shafts is $0 \cdot 25$ m and the speed reduction $10 \cdot 5$ to 1. The worm shaft is rotating at 1200 rpm. 20

7. Design an aluminium alloy piston for single acting four-stroke engine from the following data : 20

Piston diameter = 90 mm.

Speed = 1500 r.p.m.

Length of the stroke = 99 mm.

Mean effective pressure = $0 \cdot 7$ N/mm^2

bsfc = $0 \cdot 26$ kg/kWH :

L/r ratio = 4.

Heat conducted through the piston crown = 10% of heat generated during combustion

Calorific value of the fuel = 42 MJ/kg

Assume of η_{mech} of engine = 80%

8. Write short notes on the following : 5 each
   (a) Advantages of CAD systems
   (b) Piston slap
   (c) Boundary lubrication
   (d) Herringbone gears