

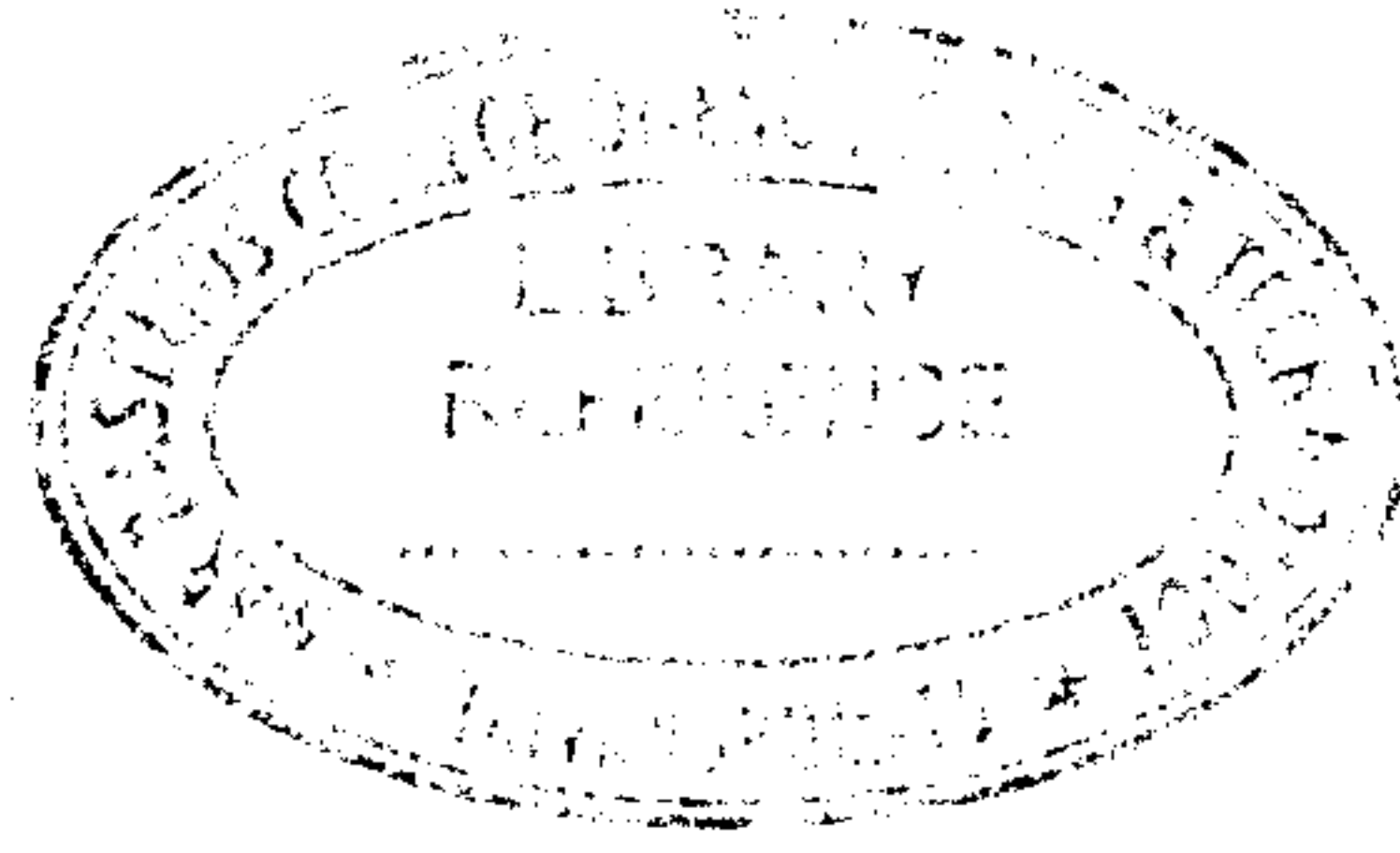


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**B – 5261**

Reg. No. : .....

Name : .....



**Seventh Semester B.Tech. Degree Examination, February 2017  
(2008 Scheme)  
08.705 – DESIGN OF MACHINE ELEMENTS II (M)**

Time : 3 Hours

Max. Marks : 100

- Instructions :** 1) Answer **all** questions from Part **A** and **one full** question from **each** Module of Part **B**.  
2) Assume **any missing** data suitably.  
3) Use of approved design data Hard Book **Permitted**.

**PART – A**

1. With reference to gears, explain what is meant by form factor and velocity factor.
2. Explain the difference between cycloidal and involute teeth of gear.
3. Define the following terms used in worm gearing.
  - a) Lead angle
  - b) Normal pitch
  - c) Velocity ratio and
  - d) Axial pitch.
4. Derive Lewis equation for gears.
5. Explain the theory of Hydrodynamic Lubrication.
6. Explain the important physical characteristics of a good bearing material.
7. Explain needle bearings with sketch and state their practical applications.
8. Explain the causes of failure of crank shafts.
9. Why clutches are usually designed on the basis of uniform wear ?
10. Which type of the cross-section do you prefer for the main body of the connecting rod and why ?  
**(10×4=40 Marks)**

P.T.O.



## PART – B

## Module – I

11. A helical gear drive for a speed ratio of 3 is to be designed for transmitting 10 hp from a motor running at 1200 rpm. The gear is of cast iron and the pinion is of cast steel. Assume helix angle as  $30^\circ$ . Design the gear set. **20**
12. A pair of bevel gears is required to transmit 32 kW at 500 rpm. The output shaft is running at 200 rpm and is at  $75^\circ$  to the input shaft. The safe stress for the pinion is 150 MPa and for the gear is 80 MPa. Design the gear set. **20**

## Module – II

13. Design a journal bearing to support a load of 5000 N at 750 rpm. A good quality of oil is supplied to oil rings. The material is plastic bronze. Also calculate minimum oil film thickness, amount of artificial cooling required and rise in temperature. **20**
14. A single row deep groove ball bearing is subjected to a 30 seconds work cycle that consists of the following two parts :

|                  | Part I | Part II |
|------------------|--------|---------|
| duration (sec.)  | 10     | 20      |
| radial load (kN) | 50     | 20      |
| axial load (kN)  | 14     | 7       |
| speed (rpm)      | 720    | 1440    |

The static and dynamic load capacities of ball bearing are 50 and 68 kN respectively. Calculate the expected life of the bearing and average life in hours. **20**

## Module – III

15. Design an aluminium alloy piston for single acting four-stroke engine from the following data :
- Piston diameter = 90 mm; Speed = 1500 rpm; Length of stroke = 99 mm;
- Mean effective pressure =  $0.7 \text{ N/mm}^2$ . Fuel consumption = 0.26 kg/kwh,  $\frac{L}{r}$  ratio = 4
- Heat conducted through the piston crown = 10% of heat generated during combustion. Calorific value of the fuel = 42 MJ/kg, Assume mechanical efficiency of engine as 80%. **20**
16. A centrifugal clutch, transmitting 20 kW at 750 rpm consists of four shoes. The clutch is to be engaged at 500 rpm. The inner radius of the drum is 165 mm. The radius of the centre of gravity of the shoes is 140 mm, when the clutch is engaged. The coefficient of friction is 0.3, while the permissible pressure on friction lining is  $0.1 \text{ N/mm}^2$ . Calculate :
- the mass of each shoe; and
  - the dimensions of friction lining. **20**

**(3×20=60 Marks)**