

[Time: 03 Hours]

[Total marks: 80]

- N.B.:**
1. Question No 1 is compulsory
  2. Solve Any Three questions from the remaining Five questions.
  3. Assume any suitable data if necessary with justification.
  4. Use of Standard Data Book is permitted
  5. Figures to the right indicate full marks.

**Q1.** Attempt any Four of the following.

- (a) With neat sketch explain force analysis of Bevel Gear? **05**
- (b) Derive Levis Beam Strength Equation? **05**
- (c) Why it is necessary to dissipate the heat generated when clutch operate? **05**
- (d) How various factors influence the life of a bearing? **05**
- (e) What is the significance of Pressure angle in cam and follower? **05**

**Q2.** A pair of spur gear is used to transmit power at 8kW from a motor rotating at 960 rpm to a machine with approximate reduction ratio of 3.7 **20**

- i) Select suitable material for pinion and gear,
- ii) Determine the module and face width of the gear to satisfy strength and wear.
- iii) Check the gear for dynamic load using Buckingham's formula

Describe the constructional details of gear and pinion.

**Q3.** (a) A worm reduction unit is required to transmit 15 kW power from an electric motor operating at 1440rpm. The output speed is 72 rpm and the load is with mild shock, normal duty. Determine **15**

- a. Selecting suitable material and design stresses
- b. Design worm and worm wheel for strength and wear
- c. Check for heat dissipation capacity

(b) Discuss the polygon effect in chain drive. **05**

**Q4.** A rotating disc cam and central translatory follower has following follow motion **20**

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Forward stroke of 25 mm is  $120^\circ$  rotation of cam with SHM. Dwell of  $60^\circ$  of cam rotation return stroke of 25 mm with SHM is  $100^\circ$  of cam rotation remaining dwell to complete the cycle. Mass of the follower is 1 kg and the cam shaft rotates at 500 rpm. Maximum pressure angle is  $25^\circ$  during forward stroke. The external force is 300 N during forward stroke and 50 N during return stroke.

