

1T01417 - B.E.(MECHANICAL)(Sem VII) (CBSGS) Machine Design - II

[3 Hours]

[Total Marks : 80]

- N.B.** 1) **Question No. 1 is compulsory**
 2) Solve **Any Three** from remaining **Five** questions.
 3) Use of standard data book is permitted
 4) Assume suitable data if necessary, giving justification

- Q1 Answer any **Four** from the following
- a) Prove theoretically, in gear design tangential force transmitted is directly Proportional to beam strength? **5**
- b) Enumerate the factors that influence most the formation and maintenance of the thick oil film in hydrodynamic bearings **5**
- c) State the characteristics of the chain drive and discuss the polygon effect. **5**
- d) How much reduction in loading of a roller bearing will cause the expected life to be fifty percent more? **5**
- e) Justify the significance of Pressure angle in gear tooth design. **5**
- Q2 A rotary disc cam and central translator follower has following motion: - **20**
 Forward stroke = 25 mm in 100° rotation of cam with SHM, dwell to complete the cycle.
 Return stroke = 25 mm with SHM in 90° of cam rotation remaining dwell to complete.
 Mass of follower is 1 Kg and cam shaft rotates at 850 rpm and maximum pressure angle is 25° during forward stroke. The external force is 200 N during forward stroke and 50 N during return stroke.
 Determine
1. Base circle radius
 2. Design the cam
 3. Design the spring
 4. Calculate maximum cam shaft torque.
- Q3 A V- Belt drive is to transmit 15 KW to a compressor. The motor speed is 1200 rpm and compressor pulley runs at 550 rpm. The coefficient of friction between the belt and pulley is 0.25. The compressor operates for 12 hrs/ day. Design the drive for above application. Design should include following **20**
1. Section of V-Belt material
 2. Exact centre distance
 3. Belt size
 4. Number of belts
 5. Life of belt.

- Q4 Design a helical gear pair for the first stage of gear box having following specifications. **20**
 Power = 20 kW
 Input speed = 1440 rpm
 Output speed = 90 rpm
 (Design should include, module selection, checking for dynamic Load and contact stresses and construction type and constructional details of gear)
- Q5 A worm and worm wheel pair is to be design for a following specifications, **4**
 Power = 15KW, Worm speed = 960RPM, Velocity ratio = 28.
- i) Find the number of start and number of teeth on the gear. **4**
 - ii) Select suitable material and find the axial module of the worm based on wear criteria. **6**
 - iii) Check design for bending and dynamic load **5**
 - iv) Check the design for thermal conditions. **5**
- Q6 a) Select suitable Deep groove ball bearing for following specification: **10**
 Shaft diameter = 40mm, Radial load = 850N, Axial load = 700N, Speed = 760rpm, Expected life = 5000hrs, Reliability = 92%
- Q6 b) Design a chain based on bearing failure and check for tensile failure for the following specification. **10**
 Rated power : 22 KW
 Input speed : 1200 rpm
 Output speed : 250 rpm
 Nature of load and duty: mild shock and 8 - 10 hrs
 (Design should include, Number of teeth on sprockets, centre distance, pitch, number of link and chain length)