

B. E. Sem VII CBSGS  
Mechanical Engg.  
Machine Design-II

13/05/2016  
11 am to 2 pm

QP Code : 31247

TIME:3 HRS

MAXIMUM MARKS:80

- Question No. 1 is compulsory.
- Attempt any three questions from the remaining.
- Assumption made should be clearly stated.
- Use of PSG Design Data Book is permitted.

Q.1 Answer any four

- (a) Write the requirements of gear material. 5
- (b) Write the advantages and limitations of Hydrostatic Bearing. 5
- (c) According to uniform wear theory, prove that for maximum torque capacity of plate clutch,  $R_i = 0.577 R_o$ . 5
- (d) Explain the significance of pressure angle in cam and follower design. 5
- (e) With neat sketch explain force analysis of Helical gear. 5

Q.2 A single stage spur gear box is used to transmit 15 kW power at 1440 rpm of pinion. The desire transmission ratio is 4:1  
Assume 20 degree FD involute profile and material C55Mn1 for pinion and gear.

- Find the module
- Check gear for Lewis Dynamic Load
- Check gear for wear strength
- Write Constructional Details.

- Q.3 (a) Design a Bevel gear pair for following specification, 15  
 Rated power = 25KW  
 Input speed = 960 rpm  
 Output speed = 240 rpm  
 Shafting intersecting angle = 75 degree.
- (b) What are the materials commonly used for mechanical seals. Explain 5  
 Stationary and Rotating Mechanical Seal with application.
- Q.4 (a) A full journal bearing has a journal diameter of 25 mm, with a unilateral 10  
 tolerance of  $-0.03$  mm. The bushing bore has a diameter of 25.03 mm  
 and a unilateral tolerance of 0.04 mm. The l/d ratio is 0.5. The load is 1.2  
 kN and the journal runs at 1100 rev/min. If the average viscosity is  
 55mPa/s, find the minimum film thickness, the power loss, and the side  
 flow for the minimum clearance assembly.
- (b) Select DGBB for the shaft diameter of 60mm which rotates at 1440rpm 10  
 with radial load of 2500N and Axial load of 1200N, Expected life of the  
 bearing is 25000 hrs and load factor is 1.2.
- Q.5 (a) Design a chain based on bearing failure and check for tensile failure for 10  
 the following specification. ( Design should include, Number of teeth  
 on sprockets, centre distance, pitch, number of link and chain length)  
 Specification:
- I. Rated power : 8 KW
  - II. Input speed : 84 rpm
  - III. Output speed : 20 rpm
  - IV. Nature of load and duty: mild shock and 8 - 10 hrs

(b) Find the flat belt dimensions and life in hours for the following 10 specification,

Power = 25KW, Input Speed = 1440rpm, Output Speed = 720rpm, Centre distance = 3 m.

Q.6 (a) A cone Clutch is used to transmit 20KW at 1200 rpm. The coefficient of friction is 0.2, while the permissible intensity of pressure is  $0.25\text{N/mm}^2$ . The semi cone angle is 15 degree, the larger diameter of the friction surface is 240mm. if the overload factor is 1.25, determine 1) The dimensions of the clutch, 2) Axial force required to engage and disengage the clutch.

(b) A Rotary disc cam with central translatory roller follower has following 10 motion.

Forward Stroke of 25mm in  $120^\circ$  of cam rotation with SHM motion, dwell of  $60^\circ$  of cam rotation and return stroke of 25mm in  $100^\circ$  of cam rotation with SHM. Remaining dwell to complete the cycle. Mass of the follower is 1Kg and cam shaft speed is 600 rpm. The maximum pressure angle during forward stroke and return stroke is limited to  $25^\circ$ . The external force during forward stroke is 300 N and that of return stroke is 50N.

- I. Draw displacement, Velocity and Acceleration time diagram
- II. Find Prime circle radius, Base circle radius
- III. Calculate radius of curvature of pitch curve and cam profile
- IV. Determine the width of the cam