Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

ME-5003 (CBGS)

B.E. V Semester

Examination, December 2017

Choice Based Grading System (CBGS)

Design of Machine Elements

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions out of eight.
ii) All questions carry equal marks.
iii) Use of standard design data book of PSG/Mahadevan and Reddy is permitted in the exams.
iv) Assume suitable missing/misprint data, of any.

1. a) List out the stages involved in the design of a machine element.
   b) What is factor of safety? Discuss its importance.

2. A machine shaft running at 600 rpm is supported on bearings 700mm apart, 20kW power is supplied to the shaft through a 500mm diameter pulley located at 250mm to the right of right bearing. The power is transmitted from the shaft through a spur gear of 200mm diameter which is located at 250mm to the right of left of bearing. The belt drive is at an angle of 60° above the horizontal, The pulley weight is 700N. The ratio of belt tension is 2.5. The gear has 14½° involute teeth and meshes with another gear located directly over the shaft. Determine the shaft diameter assuming permissible shear stress as 45MPa.

3. a) What are the advantages and disadvantages of flat belt drive?
   b) What are the factors that affect power transmission by a belt drive?

4. In an open belt flat drive, the pulley diameters are 300mm and 450mm and the corresponding angles of lap are 160° and 200°. The smaller pulley runs at 240 rpm. The coefficient of friction between pulleys and belt is 0.3. It is found that the belt is on the point of slipping when 5kW power is transmitted. To increase the power transmitted two alternatives are suggested
   i) Increasing initial tension by 15% and
   ii) Increasing coefficient of function by 15%
   Which of the two methods would be effective.

5. a) Discuss classification of clutches.
   b) Discuss the design procedure of a rope brake.

6. A multiple disc clutch has five plates having four active frictional surfaces. Determine the maximum axial intensity of pressure between discs for transmitting 20kW at 520rpm. The inner and outer radii of the friction surface are 70 and 120mm respectively. Assume uniform wear and coefficient of friction on 0.25.

7. a) List out points to be considered while designing a gear drive.
   b) Write a note on Bevel gears.

8. A cast steel spur pinion (σ_d=200MPa) running at 450rpm transmits 20kW power to a cast iron gear (σ_d = 80MPa) running approximately 112 rpm. The load is steady. Design the drive and check for dynamic and wear load.

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