

B.TECH SEM – IV (2007 COURSE) (PRODUCTION ENGG.) :
WINTER - 2017
SUBJECT: DESIGN OF MACHINE ELEMENTS

Day: **Friday**
Date: **24/11/2017**

W-2017-2433

Time: **02.30 PM TO 05.30 PM**
Max. Marks: **80**

N.B.:

- 1) **Q. No. 1 and Q. No. 5** are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SPEARATE** answer book.
- 4) Use of non programmable **CALCULATOR** is allowed.

SECTION –I

- Q.1** a) “A square key is stronger against crushing than rectangular key”. Explain. **(05)**
- b) What are the applications of spring? **(04)**
- c) Discuss different types of Clutches. **(05)**
- Q.2** a) Find the diameter of a solid steel shaft to transmit 20kW at 200 rpm. The ultimate shear stress for the steel may be taken as 360mPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameters when the ratio of inside to outside diameter is 0.5. **(08)**
- b) What is muff Coupling? **(05)**
- Q.3** The lead screw of a lathe has acme threads of 60mm outside diameters and 8mm pitch. It supplies drive to a tool carriage which needs an axial force of 2000N. A collar bearing with inner and outer radii as 30mm and 60mm respectively is provided. The coefficient of friction for screw threads is 0.12 and for collar it is 0.1. Find the torque required to drive the screw and the efficiency of the screw. If the lead screw rotates at 30rpm. Find the power required to drive the screw. **(13)**
- Q.4** a) A multiple disc clutch has five plates having four pair of active friction surface. If the intensity of pressure is not to exceed 0.127 N/mm^2 , find the power transmitted and 500 rpm. The outer and inner radii of friction surface are 125mm and 75mm respectively. Assume uniform wear and take coefficient of friction 0.3. **(07)**
- b) What are the characteristics of materials for break lining? **(06)**

P. T. O.

SECTION-II

- Q.5** a) Discuss types of roller bearing. (05)
- b) What are the advantages of V- belt drive? (04)
- c) What are the methods of reducing stress concentration? (05)
- Q.6** a) Explain Stribeck's equation for static load carrying capacity. (08)
- b) Explain with neat sketch: (05)
- i) Radial bearing
- ii) Thrust bearing
- Q.7** a) What are the advantages and limitations of chain drive? (05)
- b) A belt drive consists of two V- belts in parallel, on grooved pulleys of the same size. The angle of the groove is 30° . The cross-sectional areas of each belt is 750mm^2 and $\mu = 0.12$. The density of the belt material is 1.2Mg/m^3 and the maximum safe stress in the material is 7MPa . Calculate the power that can be transmitted between pulleys of 300mm diameters rotating at 1500rpm . (08)
- Q.8** a) What are the causes of stress concentration? (04)
- b) A steel bar of 50mm diameters is subjected to a completely reversed bending stress of 250N/mm^2 . The ultimate tensile strength of steel is 600N/mm^2 . The surface finish factor and size factor are 0.43 and 0.85 respectively. The reliability factor is 0.897 . Assuming there is no stress concentration, determine the life of the bar. (09)
- Consider $S'_e = 300\text{N/mm}^2$, $K_c = K_d = 1$.

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