

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (OLD) EXAMINATION – WINTER 2018****Subject Code:151905****Date: 07/12/2018****Subject Name: Machine Design - I****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What do you mean by standardization? Explain role of preferred numbers in standardization? **04**
- (b) What is Endurance Limit? Explain Design criteria with Solderberg's line. **04**
- (c) Explain design of components for forging. **03**
- (d) Explain Manufacturing and assembly considerations in machine design **03**
- Q.2** (a) Define stress concentration factor. Explain methods for reducing stress concentration with figure. **07**
- (b) A rotating bar made of steel 45C8 ($S_{ut} = 630 \text{ N/mm}^2$) is subjected to a completely reversed bending stress. The corrected endurance limit of the bar is 315 N/mm^2 . Calculate the fatigue strength of the bar for a life of 90,000 cycles. **07**
- OR**
- (b) What is the importance of wear considerations in design? Explain the measures to minimize the wear **07**
- Q.3** (a) Explain the following and state how can they be prevented? (i) Buckling of spring (ii) Surge in springs **07**
- (b) Explain the different types of stresses induced in a belt with neat sketch and State the different belt tension adjustment devices with neat sketch. **07**
- OR**
- Q.3** (a) (i) Give detailed classification of spring. List the materials for helical and leaf Spring **03**
- (ii) What is nipping in a leaf spring? Discuss its role. Derive equation for finding nipping in spring. **04**
- (b) Two parallel shafts connected by a crossed belt, are provided with pulleys 480 mm and 640 mm in diameters. The distance between the center line of the shaft is 3 m. Find by how much the length of the belt should be changed if it is desired to alter the direction of rotation of the driven shaft. **07**
- Q.4** (a) Sketch and explain various types of ends used for pressure vessels giving practical applications of each. **07**
- (b) (i) Discuss bearing seals & lubrication of rolling contact bearings. **04**
- (ii) Discuss causes of failure of antifriction bearing. **03**
- OR**
- Q.4** (a) A seamless cylinder with storage capacity of 0.025 m^3 is made of plain carbon steel 30C8 ($S_{ut} = 500 \text{ MPa}$) and it is used for storing a liquid at 15 MPa pressure. The length of cylinder is twice its inner diameter. If the factor of safety is 2.5, determine the dimensions of the cylinder. **07**
- (b) Give the difference between (i) Sliding contact bearing and Rolling contact bearing. (ii) Hydrodynamic and Hydrostatic bearings **07**

- Q.5 (a) List the factors affecting selection suitable clutch. What are the design consideration points in the design of a friction clutch? 07
- (b) Discuss briefly the considerations for selection of friction lining material. What do you mean by a self-energizing brake and a self-locking brake? 07

OR

- Q.5 (a) Why a positive clutch is used? Describe, with the help of neat sketches the working of jaw or claw clutch. 07
- (b) Compare the simple band brake and differential band brake. Explain the importance of $p-v$ product in brake design 07

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