Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V(OLD) EXAMINATION – SUMMER 2019

Subject Code: 151905 **Date:17/06/2019**

Subject Name: Machine Design - I

Time: 02:30 PM TO 05:00 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 is the importance of wear considerations in design? Explain the measures to minimize the wear. **07**

(b) Explain the following terms: **07**
(i) Notch sensitivity (ii) Standardization (iii) Endurance limit (iv) Hertz's Contact stress (v) Creep

Q.2 **(a)** Explain the following: **07**
(i) Soderberg diagram for fatigue loading. (ii) Design for ergonomics.

(b) A component machined from a plate made of steel 45C8 (S_{ut} = 630 N/mm^2) is shown in Fig. A. It is subjected to a completely reversed axial force of 50 kN. The expected reliability is 90% and the factor of safety is 2. The size factor is 0.85. Determine the plate thickness t for infinite life, if the notch sensitivity factor is 0.8. **07**

OR

(b) A rotating bar made of steel 45C8 (S_{ut} = 630 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**

Q.3 **(a)** Compare the belt and chain drive. Discuss the different types of belts and their material used for power transmission. **07**

(b) Explain Following **07**
1) State and explain the factors affecting the selection of a suitable antifriction bearing.
2) Explain the effects of the L/D ratio and C/D ratio parameters on the performance of journal bearing.

OR

Q.3 **(a)** Explain Lubricant and properties of lubricants for sliding contact bearing. **07**

(b) What are the salient features used in the design of forging? Explain. **07**

Q.4 **(a)** Describe the series of preferred numbers. Standardize six speeds between 250 to 1400 rpm and State the series of torque for 0.5 kW drive. **07**

(b) Write a detailed note on disc (bellievele) springs and explain the buckling of spring. How can it be prevented? **07**

OR

Q.4 **(a)** Explain the different types of end covers of used in pressure vessels. **07**

(b) Define the following terminology related to helical spring with neat sketch: **07**
(a) Spring index (b) spring stiffness (c) Pitch (d) Wahl's stress factor (d) Free length (e) solid length (f) surge in spring.

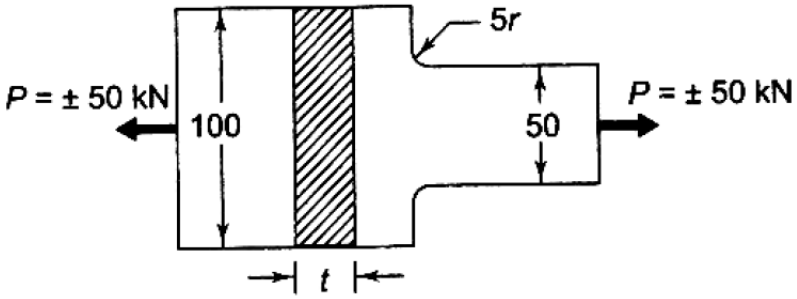
Q.5 **(a)** What is Self energizing and self locking brake? What is the condition of self-locking in differential band brake? Why it should be avoided in speed control brake? **07**

(b) State the different equations used for thick cylinder design with their conditions and limitations. **07**

OR

Q.5 **(a)** What are the design consideration points in the design of a friction clutch? Discuss briefly the considerations for selection of friction lining material. **07**

(b) The center to Centre distance between two sprockets of a chain drive is 600 mm. The chain drive is used to reduce the speed from 180 rpm to 90 rpm on the driving sprocket has 18 teeth and a pitch circle diameter of 480 mm. Determine **07**
1. No. of teeth on the driven sprocket
2. Pitch and the length of chain.



Que : 2 (B) - Fig (A)

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