

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER– V • EXAMINATION – SUMMER 2015

Subject Code: X51903**Date: 13/05/2015****Subject Name: MACHINE DESIGN-I****Time:02:30 pm - 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)** Explain following in brief. **07**
- (1) Soderberg's Equation
 - (2) Bearing Characteristics Number
 - (3) Spring Rate and Spring Index
 - (4) Endurance Limit
- (b)** Explain in Brief - Design Procedure for Journal Bearing. **07**
- Q.2 (a)** Design a Helical Compression Spring for maximum load of 1000 N for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa. **07**
- Modulus Of Rigidity is 84 KN/mm².
 Take Wahl's Factor $K = 4C - 1/4C - 4 + 0.615/C$, Where C = Spring Index
- (b)** Explain the Design parameters for Welding in brief. **07**
- OR**
- (b)** What is Pressure Vessel? Classify Pressure Vessels & explain its Design Procedure. **07**
- Q.3 (a)** A closed cylinder of 300 mm inner diameter is to be designed to withstand an internal pressure of 25 MPa, Which is made of plain carbon steel (Ultimate stress = 440 N/mm², tensile yield stress = 240 N/mm² and Poisson's ratio = 0.29). If factor of safety is 1.5, determine the thickness of cylinder wall using : **07**
- i) Max. principal stress theory,
 - ii) Max. principal strain theory,
 - iii) Max. Shear stress theory.
- (b)** Design A Circular Flanged Pipe Joint **07**
- OR**
- Q.3 (a)** State the various Applications of Belt Drives & Chain Drives. **07**
- (b)** Describe the factors affecting in the selection of a suitable Antifriction Bearing. **07**
- Q.4 (a)** Enumerate the various Stresses induced in the Belt. **07**
- (b)** Discuss the various types of Clutches with at least one practical application for each. **07**

OR

- Q.4 (a)** Write a detail note: Leaf Springs. **07**
- (b)** Which are the desirable properties for Bearing materials? Describe in brief. **07**
- Q.5 (a)** State Different types of Brakes. Explain the Internal Expanding Shoe Brake with its Design Procedure. **07**
- (b)** A simply supported beam has a concentrated load at the centre which fluctuates from a value of W to $4W$. The span of beam is 500 mm & its cross section is circular with a diameter of 60 mm. Take ultimate stress of 700 N/mm^2 , yield stress of 500 N/mm^2 , endurance limit if 300 N/mm^2 for reverse bending & factor of safety of 1.3. Calculate the maximum value of W . Take a size factor of 0.85 & surface finish factor of 0.9. **07**
- OR**
- Q.5 (a)** Elaborate the S-N diagrams for different types of materials. **07**
- (b)** Define the Construction of wire Ropes. How wire ropes are most likely to fail? **07**
