

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-IV (New) EXAMINATION – WINTER 2015

Subject Code:2141907

Date:01/01/2016

Subject Name: MACHINE DESIGN & INDUSTRIAL DRAFTING

Time: 2:30pm to 5:00pm

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) Differentiate between (1) Torsional Shear Stress & Transverse Shear Stress 07
(2) Compressive Stress & Crushing Stress
- (b) Name the different theories of failures of mechanical components made of ductile material. Explain the maximum shear stress theory giving conservative zone. 07
- OR
- (b) Explain in brief Coulomb Mohr Theory of failure of the mechanical components. 07
- Q.2 (a) Describe Hertz contact stress theory giving suitable examples. 04
- (b) Design and draw a neat sketch of spigot rod for the cotter joint using the following data.. 10
Axial load 30 KN Tensile stress = 50 N/mm² Crushing Stress = 90 N/mm²
And Shear Stress = 35 N/mm².
- OR
- Q.2 (a) Determine the principal Stresses for 35mm rod diameter supported at end act as cantilever beam which is subjected to an axial compressive load of 15KN & twisting moment of 250Nm. 04
- (b) Design a Bell crank lever having load arm 500mm and effort arm of 150mm respectively. The maximum load to be raised is 4500N. Use the following allowable stresses for the pin and lever material. 10
Tensile Stress = 75 N/mm² Shear Stress = 60 N/mm² & Bearing pressure = 10 N/mm²
- Q.3 (a) Distinguish between beams, columns and strut giving suitable examples. 07
- (b) State and explain the CASTIGLIANO'S theorem and determine the magnitude of strain energy stored for a cantilever beam subjected to torsional moment T having span length L and cross sectional area A. 07
- OR
- Q.3 (a) What is slenderness ratio of column? How crippling stress is decided by using Euler's equations? Give the validity of the equation. 07
- (b) What are the limitations of Euler's equation how they are overcome? Explain the two empirical formula with the name. 07
- Q.4 (a) Compare the weight, strength and rigidity of a hollow shaft of same external diameter as that of solid shaft, Both the shaft are made of same material. Assume that the diameter ratio for the hollow shaft as 0.6. 07

- (b) A bracket is bolted to column by 6 bolts arrange in two column. The distance between bolts along the row is 75mm and along the column 50mm. The joint is subjected to maximum eccentric force of 50KN acting at 150mm away from the centre of column. Taking allowable stress in the bolt as 150N/mm^2 , Determine the size of each boolt. 07

OR

- Q.4 (a) A solid rectangular bar of 100mm width and 150mm depth is welded to vertical column by means of fillet weld all around. The joint is subjected to 25KN at distance of 500mm from the plane of weld . Determine throat thickness using allowable stress of weld is 75N/mm^2 . 07
- (b) Design a split muff coupling to transmit 30 KW power at100 rpm, using the following data. 07
- Number of bolts = 4, allowable shear stress for shaft and key = 40N/mm^2 , allowable tensile stress for the blots = 70N/mm^2 . Take co-efficient of friction = 0.3.
- Q.5 (a) Draw a neat sketch of turn buckle used for tie rods, giving design procedure. 07
- (b) What is magnitude of tolerance? Give the list of 6 manufacturing methods along with the recommended tolerance grade. 07

OR

- (b) Explain with the help of neat sketch the terminology used in relation with the tolerances. 07
