

Exam.Code:1016
Sub. Code: 7772

1129

M.E. (Mechanical Engineering)
Third Semester

MME-301: Advanced Machine Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, selecting atleast two questions from each Unit. Assume any missing data, if any. Supplement your answer with neat and labeled sketches wherever required.

x-x-x

UNIT - I

- I. Average yield strength of two different types of materials was evaluated by conducting five UTM tests for each material type as shown next.

Material 1: 200 MPa, 210 MPa, 220 MPa, 190 MPa, 180 MPa

Material 2: 200 MPa, 202 MPa, 205 MPa, 198 MPa, 195 MPa

Compare the yield strength performance of Material 1 and Material 2 based on statistical nature of material properties. (10)

- II. Compare stress-life approach over strain-life approach by taking an example. (10)

- III. A pair of calendering rolls are run together with a combination of rolling and sliding. Find the maximum tensile, compressive and shear stresses in the rollers. The roller radii are 1.5 in and 3.0 in and are each 30 in long. The force is 6000 lb, normal to the contact plane. Both materials are steel having coefficient of friction as 0.32. (10)

- IV. Derive the formula applicable for longitudinal stress waves in elastic media impact on beams. (10)

UNIT - II

- V. List major steps involved in structural dynamic modification of a drilling machine. (10)

- VI. Design a steel rod which is stretched between two fixed points for working temperature range of 0°F to 90°F. The tensile load at 90°F is 1500 lb. What will be the stress at 0°F? At what temperature will the stress be zero? Assume $\alpha = 6.5 \times 10^{-6}$ in/(in.°F) and $E = 29 \times 10^6$ psi. (10)

- VII. Design an accelerated life testing plan for compressors of a domestic refrigerator. How can this be useful in deciding warranty period for the compressors? (10)

P.T.O.

(2)

VIII. What are advantages and disadvantages of response surface method based optimal design over finite element method? Give examples. (10)

x-x-x