

**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M.Tech II-Semester Regular Examinations, May 2016
INSTRUMENTATION & EXPERIMENTAL STRESS ANALYSIS
(MACHINE DESIGN)**

Date:

Time: 3 hours

Max Marks: 60

Answer ONE Question from each unit

All questions carry equal marks

All parts of the question must be answered at one place only

UNIT-1

1. State and explain the static and dynamic performance characteristics of measuring instruments. (12M)

(OR)

2. (a) Explain the principle of operation of the following devices with neat sketches:
(i) LVDT (ii) Capacitive type Transducer (6M)
(b) Describe the construction and working of McLeod gauge for measurement of vacuum pressure. (6M)

UNIT-2

3. (a) Explain the working principle of Hot-wire anemometer for flow measurement. (6M)
(b) With the help of a neat sketch explain the working of an optical pyrometer. (6M)

(OR)

4. (a) Explain the torque measurements and also their practical significance. (6M)
(b) Explain the methods of motion and vibration measurement. (6M)

UNIT-3

5. What are the assumptions made in analyzing brittle coating stresses? Determine the expressions for coating stresses. (12M)

(OR)

6. (a) Explain the brittle lacquer method of stress analysis. (5M)
(b) Explain the various Grid methods. (7M)

UNIT-4

7. (a) Derive an expression for the output of an unbalanced Wheatstone bridge. (5M)
(b) Calculate the principal strains, stresses, their directions and the maximum shear stress in a steel plate if the strains measured in a three element rectangular rosette are $\epsilon_0 = 400 \times 10^{-6}$, $\epsilon_{45} = -150 \times 10^{-6}$, $\epsilon_{90} = -350 \times 10^{-6}$. Take $E = 210 \text{ GPa}$ and $\nu = 0.3$. (7M)

(OR)

8. (a) What do you understand by transverse sensitivity of a strain gauge? How this can be accounted in actual measurements? (4M)
(b) What is the necessity of using rosettes for strain measurement? Determine the principal stresses and strains by means of a delta-T rosette. (8M)

UNIT-5

9. (a) Explain clearly the properties of Photoelastic materials. (4M)
(b) Explain circularly polarized light. (4M)
(c) Write down the applications of Photoelasticity. (4M)

(OR)

10. (a) Derive the equations for the light passing through a plane polariscope with the polarizer and analyzer in crossed position. (8M)
(b) How to distinguish between isoclinics and isochromatics in a plane polariscope? (4M)
