

Code No: 5215AN

**R15**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**

**M. Tech II Semester Examinations, February - 2017**

**EXPERIMENTAL STRESS ANALYSIS**

**(Machine Design)**

**Time: 3hrs**

**Max.Marks:75**

**Note:** This question paper contains two parts A and B.  
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A**

**5 × 5 Marks = 25**

- 1.a) What do you understand by plane stress and plane strain? Explain. [5]
- b) What are the Manual null balance strain indicators? [5]
- c) Write short notes on ceramic based brittle coatings. [5]
- d) State and explain stress optic law. [5]
- e) What are the applications of Birefringent coatings? [5]

**PART - B**

**5 × 10 Marks = 50**

- 2.a) Write the equations of compatibility conditions. [5]
- b) What are the characteristics of strain gauges? Explain briefly about electrical strain gauges. [5+5]

**OR**

3. The state of a stress at a point is given by:  $\sigma_x=120$ ,  $\sigma_y=140$ ,  $\sigma_z=66$ ,  $\tau_{xy}=45$ ,  $\tau_{yz}=-65$  and  $\tau_{zx}=25$ MPa. Determine the three principal stresses. [10]
4. What type of recording instruments are used for strain gauges? Explain how dynamic recording of high frequencies are measured. [10]

**OR**

5. Discuss how the lower and intermediate frequencies are measured by dynamic recording system. [10]
- 6.a) Explain the failure theories of brittle coatings. [5]
- b) What are the various crack detection methods? [5+5]

**OR**

7. Explain in detail about the mechanism of formation of moire fringes. [10]
8. Describe the effects of stressed model in a plane polariscope with a neat sketch. [10]

**OR**

9. Write short notes on the following:  
a) Isochromatic fringe patterns  
b) Isoclinic fringe pattern. [5+5]

10. Discuss the following methods:

- a) Stress freezing techniques
- b) Curing method in locking model deformation.

[5+5]

**OR**

11. Explain the normal and oblique incidence methods as applied to Birefringent coatings. How these methods help in separating the principal stresses? [10]

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