

**IV B.Tech I Semester Supplementary Examinations, November 2005**  
**EXPERIMENTAL STRESS ANALYSIS**  
**(Aeronautical Engineering)**

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

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1. (a) Define strain and strain gages. [6]  
 List various characteristics commonly used to judge the adequacy of a strain gage system for a particular application  
 (b) Define the following terms  
     i. Accuracy  
     ii. Sensitivity  
     iii. Precision  
     iv. Linearity  
     v. Hysteresis [2x5=10]
2. What are the various types of extensometers?  
 Explain mechanical and acoustical extensometer with their advantages and disadvantages. [16]
3. (a) Explain the principles and operation of electrical strain gauge. List down various uses of electrical strain strain gauges. [12]  
 (b) List four different carrier materials used in strain gage construction and give the reason for their use. [4]
4. (a) How the calibration of a strain gage circuit is carried out? What is the need of calibration ? [8]  
 (b) Design a parallel balance wheatstone bridge with the capability of measuring strain in increments of  $1 \mu\text{m/m}$  with a  $120 \Omega$  gage having  $S_g=2.0$ . Determine the range of this instruments. [8]
5. State stress-optic Law. Explain the stress optic law in terms of relative retardation and arrive at the following expression  

$$\frac{Nf\varepsilon}{h} = \varepsilon_1 - \varepsilon_2$$
 where  $f\varepsilon$  = material fringe value in terms of strain. [16]
6. What are isochromatic fringe patterns? How do you interpret isochromatic fringe patterns. [16]
7. What do you understand by Non-destructive testing techniques? List various technique of NDT and explain any three of them [16]
8. Write short notes on the following(any two)  
 (a) Brittle coating method and its advantages

(b) Filon's method based on equilibrium equations for separation of principal stresses.

(c) Rosettes. [2x8=16]

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