Aerospace Structures Pre-Laboratory
Lab 9 Introduction to Nondestructive Evaluation
Section 4 Group 2
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Question 1

(4 points) *In a sentence or two, state your definition of NDE.*

Solution:

Nondestructive Evaluation (NDE) is a term describing analysis techniques that do not significantly disturb the material being tested. NDE techniques utilize everything from chemical testing to ultrasonic or acoustic evaluation.

Question 2

(3 points each) *Under what technology category (e.g. visual examination, chemical testing, etc.) is each of the three NDE techniques learned in this lab?*

Solution:

- Tap Testing; tap testing is a form of mechanical vibration testing.
- Ultrasonic Testing; ultrasonic testing is a form of mechanical vibration testing.
- Eddy Current Testing; eddy current testing is a form of electromagnetic radiation testing.

Question 3

(5 points) *How does tap testing determine the local stiffness of the part under testing?* (3 points) *What is being measured?*

Solution:

The computer-aided tap tester (CATT) taps the material and measures the contact time of the tap. By using the relationship

$$T = \pi\sqrt{\frac{M}{K}} \tag{1}$$

where T is the contact time in seconds, M is the mass of the tapper head, and K is the local stiffness of the material. The CATT is used in a grid pattern to generate a test image.

Question 4

(3 points each) *What are the three basic components in an ultrasonic immersion testing system?*

Solution:

Question 5

(15 points) *For the ultrasonic immersion testing, you are instructed to follow a strategy of "sequential search". Describe what this is and how it will be executed in the lab.*

Solution:

Question 6

(10 points each) *Describe what are A-, B- and C-scans in an ultrasonic testing?*

Solution:

Question 7

(10 points) *From what you learn in lecture notes, how does eddy current testing work?*

Solution:

Question 8

(10 points) *Why is eddy current testing useful for sorting out metallic materials?*

Solution: