



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (ME/PE)/SEM-8/ME-824/2010**

**2010**

**ADVANCED SENSORS FOR ENGINEERING  
APPLICATION AND NDT**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$

i) Which of the following is used for clean fluids only ?

- a) Ultrasonic flow meter
- b) Turbine flow meter
- c) Laser Doppler anemometer
- d) Hot-wire anemometer.

ii) Optical pyrometer is used to measure

- a) light intensity
- b) low temperature
- c) high temperature
- d) light intensity and high temperature.



- iii) Loudness level is the sound power level at
- a) Low frequency of 100 Hz
  - b) Frequency of 1000 Hz
  - c) High frequency of 10000 Hz
  - d) None of these.
- iv) Electromagnetic flow meter must be
- a) Mounted vertically
  - b) Mounted horizontally
  - c) Rotated at constant speed to develop proper emf
  - d) Can be mounted in any position.
- v) Developer is used in die penetrant test to
- a) Clean the surface
  - b) Draw the traces of penetrants
  - c) Both (a) and (b)
  - d) None of these.
- vi) Magnetic particle testing can detect
- a) Surface flaws
  - b) Sub-surface flaws
  - c) Both (a) and (b)
  - d) None of these.
- vii) Radiations used for radiographic inspection are
- a) X-rays
  - b) Gamma rays
  - c) Neutron beams
  - d) All of these.



- viii) Acoustic emission monitoring can detect only
- a) Static flaws
  - b) Growing flaws
  - c) Any of these
  - d) None of these.
- ix) Eddy current testing method is applicable to
- a) Ferrous metals
  - b) Non-ferrous metals
  - c) Both (a) and (b)
  - d) None of these.
- x) Ultrasonic wave emitting capacity of air is
- a) Good
  - b) Poor
  - c) Medium
  - d) None of these.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Distinguish between the basic differences in the construction and performance of thin plate diaphragms and membranes and indicate the materials used for each of them.
3. Describe briefly the die penetrant inspection method.
4. What types of defects can be detected by eddy current inspection method and how ?
5. How can acoustic emission method be used to determine the location of a flaw ?
6. Describe how silicon sensors can be used to sense radiation.



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. What are the advantages of an ultrasonic flow meter ?  
Discuss the oscillating loop method used in ultrasonic flow meter. How is laser Doppler anemometer used for velocity measurement ?  $4 + 4 + 7$
8. Write the advantages and disadvantages of NDT method. How can radiographic inspection be used to detect flaws in an object ? What are the limitations of radiographic testing ?  $6 + 2 + 7$
9. Write the principle of magnetic particle testing. What is the primary material related limitation of magnetic particle testing ? Describe how the orientation of a flaw with respect to a magnetic field can affect its detectability during magnetic particle inspection.  $5 + 2 + 8$
10. Explain the ultrasonic inspection method. Briefly describe the three types of ultrasonic inspection methods.
11. What is Hall effect transducer ?  
Define 'Hall coefficient'.  
How can thermographic inspection be used to reveal defects ?  $3 + 3 + 9$
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