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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, August 2020

Course: Quality inspection and NDT techniques **Semester: 8th**
Program: B.Tech.(Mechanical) & B.Tech.(Mechanical + Specializations) **Time 03 hrs.**
Course Code: MTEG 353 **Max. Marks: 100**

SECTION A (30 X 1=30 Marks)

Multiple Choice Questions:

1. **MCQ: (3X1=3)**
   i. The defects takes place due to imperfect packing of atoms during crystallization process is
      a) Line defect
      b) Surface defect
      c) Point defect
      d) None of the above
   ii. The strength is the ability of the material to resist
      a) Deformation under stress
      b) Externally applied force resulting breaking or yield
      c) Fracture due to impact load
      d) None of the above
   iii. Non-destructive testing is used to determine
      a) location of defects
      b) chemical composition
      c) corrosion of metal
      d) All of these
2. **MCQ: (3X1=3)**
   i. In what acoustic frequency range works AE testing usually?
      a) 10 Hz - 100 kHz
      b) 20 kHz - 100 kHz

c) 20 kHz - 1 MHz

d) 1 MHz-5 MHz

ii. Which property of the acoustic signal better represents the nature of the defect?

a) Counts of the acoustic emission

b) signal Duration of the signal

c) Rise time

d) None of the above

iii. Detection of an acoustic emission signal depends on:

a) Duration of the signal

b) Amplitude of the signal

c) Rise time of the signal

d) Frequency of the signal

3. MCQ: (3X1=3)

i. The profilometry method of laser include:

a) stylus profilometry

b) optical profilometry

c) white light inferomentry

d) All of these

ii. The abbreviation of LVDT is

a) Linear Variable Differential Transformer

b) Linear Variable Differential Transducer

c) Logarithmic Variable Differential Transformer

d) Logarithmic Variable Differential Transducer

iii. Liquid penetrant testing is based on the principle of

a) Polarized sound waves in a liquid

b) Magnetic domains

c) Absorption of X rays

d) Capillary action

4. MCQ: (3X1=3)

i. Magnetic lines of force enter and leave a magnet at:

a) Saturation
b) L/D ratios of greater than 4 to 1
c) Flux concentration points
d) Poles

ii. A magnetic field which is contained completely within the test piece is called a

a) Confined field
b) Longitudinal field
c) Circular field
d) Saturated field

iii. A leakage field is strongest when a discontinuity interrupts the magnetic flux lines at an angle of

a) Zero degrees
b) 45 degrees
c) 90 degrees
d) 180 degrees

5. MCQ: (3X1=3)

i. The piezoelectric material in a search unit which vibrates to produce ultrasonic waves is called:

a) A backing material
b) A lucite wedge
c) A transducer element or crystal
d) A couplant

ii. An oscilloscope display in which the screen base line is adjusted to represent the one way distance in a test piece is called a

a) A scan display
b) B scan display
c) C scan display
d) D scan display

iii. A common use of ultrasonic testing is

a) Cleaning

b) Detecting of sub-surface indications
c) Determination of the test piece ductility
d) Communications

6. Fill in the blanks: (5X1=5)

i. Stiffness of the material is the ability of it to resist_____.
ii. Generation of eddy currents depends on the principle of_____.
iii. _____ discontinuity types could typically be found with a liquid penetrant test.
iv. Degree of removal of _____ during washing the most important factor in determining the archival quality of radiographic film.
v. The ability to separate echos from reflectors close together in depth is called_____.

7. **True/False:** (5X1=5)

i. Mild steel has the maximum ductility compared to copper and aluminum.
ii. Eddy currents generated in a test object, 90 degrees to the coil winding plane..
iii. A penetrant process in which excess penetrant is removed with an organic solvent is called Post-emulsified.
iv. Radiographic enlargement to distinguish small defects is possible only with a very small source or focal spot size radiation source.
v. The speed of sound in a given material depends on the density and elasticity of the material.

8. Match the following: (5X1=5)

i.	Nichrome	– Faraday
ii.	electromagnetic induction	- Longitudinal wave
iii.	emulsifying agent	– Isotopes
iv.	gamma radiography	– Electric resistance
v.	compression wave	- Water washable

SECTION B (5 X 10 = 50)

9. What is Non-Destructive Testing (NDT)? What is the difference between Defects or discontinuities?
10. What are the major 5 NDT methods? What are the factors affecting the choice of NDT method.
11. Explain the principles in Acoustic Emission method and also explain the defect location calculation based on time differences.
12. Explain any 3 applications of eddy current testing method and list the advantages of ECT.
13. Explain the LASER theory in NDT. List the advantages and disadvantages of this method.

OR

Briefly explain the objective, principle and test procedure in DYE penetrant testing method.

SECTION C (1 X 20 = 20)

14. (a) Write a note on Discontinuities and defects in magnetic particle testing. Also brief its applications.

    (b) Explain the exothermic and endothermic reactions in thermal testing method.

OR

(a) Explain the Time – Distance – Shielding – containment in radiographic testing.

(b) Brief the following:

i. ultrasonic transducer

ii. Attenuation domain transducer

iii. Frequency domain transducer
iv. Time domain transducers
v. Advantage of ultrasonic testing