# Electromagnetic Testing Level II Model Questions

1. A test specimen used as a basis for calibrating test equipment or as a comparison when evaluating test results is referred to as a:
   a. null balancer
   b. phase shifter
   c. reference standard
   d. high pass filter

2. In eddy current testing situation, which of the following can provide sources of noise?
   a. instrumentation electronic circuits
   b. nonspecific variations within the test object
   c. electrical interference
   d. all of the above

3. The ratio of the response or amplitude from signals of interest to the response or amplitude of indications that contain no useful information for the test being conducted is referred to as:
   a. Poisson's ration
   b. signal to noise ration
   c. the conductivity to permeability ratio
   d. the reactance to resistance ratio

4. IACS is a recognized abbreviation for:
   a. Induced Alternating Current System
   b. Inductively Activated Comparison System
   c. Internal Applied current System
   d. International Annealed Copper Standard

5. The process of comparing the reading or output of an instrument, device, or dial with a standard to determine the instrument's accuracy, capacity, or graduations is referred to as:
   a. Calibration
   b. differentiation
   c. integration
   d. phase shifting

6. The impedance of an eddy current test coil will increase if the:
   a. test frequency increases
   b. plate when volumetrically inspected
   c. sheets and metalized foil
   d. all of the above

7. An eddy current is a circulating electrical current induced in a conducting article by:
   a. gamma rays
   b. an alternating magnetic field
   c. a piezoelectric force
   d. any of the above

8. The conductivity of a material can be changed by changing the:
   a. alloy of the specimen
   b. heat treatment of the specimen
   c. temperature

d. all of the above

9. In eddy current test systems where encircling coils are used, coupling efficiency is referred to as:
   a. lift off
   b. edge effect
   c. fill factor
   d. phase differentiation

10. Which of the following test frequencies would produce eddy currents with the largest depth of penetration?
   a. 100 Hz
   b. 10 Hz
   c. 1 MHz
   d. 10 MHz

11. An eddy current test coil's opposition to the flow of alternating current is called:
   a. resistance
   b. inductive reactance
   c. impedance
   d. capacitive reactance

12. An increase in the impedance of an eddy current test coil will:
   a. cause an increase in the current flow through the test coil
   b. cause a decrease in the current flow through the test coil
   c. not affect current flow in the test coil
   d. decrease the voltage applied to coil

13. The single absolute coil arrangement can be used in:
   a. encircling coils only
   b. probe coils only
   c. probe and encircling coils only
   d. probe, encircling, and inside diameter coils

14. Which of the following, eddy current test coil arrangements uses one area of the test specimen as a reference standard against which another area on the same specimen is simultaneously compared?
   a. single absolute coil
   b. double absolute coil
   c. dc saturation coil
   d. differential coil

15. The readout mechanism used when testing by the ellipse method is a:
   a. meter
   b. strip chart recorder
   c. cathode ray tube
   d. any of the above

16. A reference standard used to ensure that the amplitude and phase characteristics of an eddy current system do not drift during continuous testing is called a:
   a. DGS standard
   b. calibration standard

c. reference block
d. none of the above

17. Which of the following could not be tested by the eddy current testing method?
a. a 102 mm (4in.) thick plate to be tested for small discontinuities throughout the plate
b. tubing to be tested for surface cracks
c. rod to be tested for laps and seams
d. tubing to be tested for variations in outside diameter

18. which of the following is not applicable to eddy current testing?
a. can be used for high speed testing
b. can accurately measure conductivity
c. can be set up to provide high sensitivity to small discontinuities
d. can penetrate up to 1521mm in a test part

19. The entire circumference of a test part is evaluated at one time when using:
a. an encircling coil
b. a probe coil
c. a secondary winding
d. none of the above

20. Which of the following products would be most applicable to a test using an inside coil?
a. sheet
b. rod
c. bolt hole
d. coating thicknesses

21. In order to generate measurable eddy currents in a test specimen, the specimen must be:
a. a conductor
b. an insulator
c. either a conductor or insulator
d. a ferromagnetic material

22. The characteristics of the alternating magnetic field in the vicinity of the ac coil are affected by:
a. the coil parameters
b. the magnitude of the applied ac current
c. the frequency of the applied ac current
d. all of the above

23. When conducting an eddy current test on tubing, the magnitude of the indication caused by a discontinuity is dependent on:
a. the depth of the discontinuity
b. the width of the discontinuity
c. the length of the discontinuity
d. all of the above

24. Which of the following discontinuities would be easiest to detect with an eddy current test?
a. a crack that lies parallel to the direction of the eddy current flow.
b. a discontinuity located in the center of a 51mm thick diameter
c. a radial crack that extends to the outer surface of a rod
d. a subsurface radial crack located at a depth of 13mm in a 51mm diameter rod

25. Eddy current test techniques can be used to :
    a. measuring coating thickness
    b. measure cladding thickness
    c. gauge the thickness of sheet
    d. all of the above

26. Eddy currents cannot be induced in:
    a. aluminum
    b. latex paint
    c. steel
    d. copper

27. Which of the following characteristics do not apply to magnetic materials?
    a. high permeability value
    b. no hysteresis
    c. definite saturation point on hysteresis loop
    d. appreciable residual magnetism

28. The impedance change of an eddy current test coil due to a change in test part characteristics can be most easily analyzed as a combined change in:
    a. capacitive reactance and resistance
    b. harmonic frequencies and inductive reactance
    c. signal amplitude and phase
    d. retentivity and harmonic frequencies

29. At a fixed test frequency, in which of the following materials will the eddy current penetration be greatest?
    a. aluminum (35 percent IACS conductivity )
    b. brass (15 percent IACS conductivity)
    c. copper (95 percent IACS conductivity)
    d. lead (7 percent IACS conductivity)

30. If the test frequency increases, the impedance variation of a pickup coil produced by a given change in conductivity will:
    a. increase
    b. remain the same
    c. decrease
    d. could do any of the above

31. Which of the following would be easier to detect in tubing by the eddy current method using the self comparison differential coil arrangement?
    a. gradual changes in diameter
    b. gradual changes in conductivity
    c. changes in temperature
    d. short flaws

32. In eddy current testing, the specimen is coupled to the test coil by:
    a. core coupling
    b. magnetic saturation
    c. the coil's magnetic field
    d. magnetic domains

33. A term used to define a surface coil mounted so that the coil can be rotated about the circumference of a test specimen is:
    a. bobbin coil
    b. encircling
    c. spinning coil
    d. gap coil

34. A term used to define an eddy current test coil which uses magnetic material to purposely shape the magnetic field is:
    a. bobbin coil
    b. encircling
    c. spinning coil
    d. gap coil

35. A term used to define the timing relationships involved in alternating current signals is:
    a. magnitude
    b. phase
    c. impedance
    d. reactance

36. When eddy current testing a nonferrous material, the choice of test frequency is determined by the:
    a. degree of phase discrimination required
    b. eddy current penetration needed
    c. rate of response required
    d. all of the above

37. When testing ferrous materials, a small but detectable portion of the magnetic flux in the material will pass outside the metal when a surface discontinuity is encountered. The flux is called:
    a. air flux
    b. leakage flux
    c. induced flux
    d. none of the above

38. If the conductivity of a test part in an eddy current test coil decreases, the magnitude of the eddy currents at a given depth in the test specimen:
    a. increases
    b. remains the same
    c. decreases
    d. may increase or decrease

39. Which of the following is not a commonly used eddy current testing readout mechanism?
    a. signal generator
    b. meter
    c. cathode ray tube
    d. strip chart recorder

40. Which of the following materials would have the highest resistivity value?
    a. aluminum with a 42 percent IACS rating

b. magnesium with a 37 percent IACS rating
c. cast steel with a 10.7 percent IACS rating
d. zirconium with a 3.4 percent IACS rating

**Ans:**

1. c
2. d
3. b
4. d
5. a
6. a
7. b
8. d
9. c
10. a
11. c
12. b
13. d
14. d
15. c
16. b
17. a
18. d
19. a
20. c
21. a
22. d
23. d
24. c
25. d
26. b
27. b
28. c
29. d
30. b
31. d
32. c
33. c
34. d
35. b
36. d
37. b
38. c
39. a
40. d