



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION

SEMESTER 2

SESSION 2016/2017

COURSE NAME : TESTING IN WELDING PRODUCT
COURSE CODE : BBW 30202
PROGRAMME CODE : BBD
EXAMINATION DATE : JUN 2017
DURATION : 2 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **TWELVE (12)** PAGES

- S1** Liquid penetrant testing is based on the principle of
- A capillary action
 - B magnetic domains
 - C absorption of X rays
 - D polarized sound waves in a liquid
- S2** A hydrometer is used to measure
- A penetrant viscosity
 - B cleaner specific gravity
 - C penetrant specific gravity
 - D specific gravity of water based wet developers
- S3** An internal rupture caused by working steel at improper temperatures is called a
- A Lap
 - B Cold shut
 - C Forging burst
 - D Slag inclusion
- S4** Cracks which are caused by alternating stresses above a critical level are called
- A Critical cracks
 - B Fatigue cracks
 - C Cycling cracks
 - D Stress corrosion cracks
- S5** Most commercial ultrasonic testing is accomplished using frequencies between
- A 1 and 25 kHz
 - B 0.2 and 25 MHz
 - C 1 and 1 000 kHz
 - D 15 and 100 MHz
- S6** The term is used to refer to the product of wave velocity and density is
- A Index of refraction
 - B Acoustic impedance
 - C Reflection co-efficient
 - D The velocity-density ratio

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- S7 A penetrant that is self-emulsifying is called
- A Water washable
 - B Post-emulsified
 - C Solvent removable
 - D Dual sensitivity method
- S8 A penetrant process which employs an emulsifier as a separate step in the penetrant removal process is called
- A Water washable
 - B Post-emulsified
 - C Solvent removable
 - D Dual sensitivity method
- S9 A penetrant process in which excess penetrant is removed with an organic solvent is called
- A Dual method
 - B Water washable
 - C Post-emulsified
 - D Solvent removable
- S10 Which of the following pre-cleaning processes is not recommended?
- A Shot blasting
 - B Detergent cleaning
 - C Vapour degreasing
 - D Ultrasonic cleaning
- S11 A wire brush should be used for pre-cleaning
- A only as a last resort
 - B when rust is to be removed
 - C when grease and oil must be removed
 - D when grinding burrs must be removed
- S12 Magnetic particles testing is most likely to find subsurface discontinuities in
- A soft steels with low permeability
 - B soft steels with high permeability
 - C hardened steels with low permeability
 - D hardened steels with high permeability

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- S13** A lamination in steel plate would be classified as what type of discontinuity?
- A Service
 - B Inherent
 - C Processing
 - D None of the above
- S14** Cracks which are caused by a combination of tensile stress and corrosion are called:
- A Cycling cracks
 - B Critical cracks
 - C Fatigue cracks
 - D Stress corrosion cracks
- S15** Which of the following types of intensifying screens are not used in industrial radiography?
- A Lead
 - B Fluorescent
 - C Silver halide
 - D All of the above
- S16** The piezoelectric material in a search unit which vibrates to produce ultrasonic waves is called a
- A couplant
 - B lucite wedge
 - C backing material
 - D transducer element or crystal
- S17** When a small diameter tube is placed in a glass of water, water rises in the tube to a level above the adjacent surface. This is called
- A Viscosity
 - B Surface tension
 - C Capillary action
 - D Barometric testing
- S18** Which of the following chemical elements are normally held to a minimum in liquid penetrant materials when testing nickel based alloys?
- A Carbon
 - B Sulphur
 - C Oxygen
 - D Nitrogen

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- S19** Which of the following is the most desirable method of pre-cleaning a test piece prior to penetrant testing?
- A Emery cloth
 - B Sand blasting
 - C Wire brushing
 - D Vapour degreasing
- S20** The most effective NDT method for locating surface cracks in ferromagnetic materials is
- A Ultrasonic testing
 - B Radiographic testing
 - C Liquid penetrant testing
 - D Magnetic particle testing
- S21** A seam would be classified as what type of discontinuity?
- A Service
 - B Inherent
 - C Processing
 - D None of the above
- S22** Which of the following are ferromagnetic materials?
- A Iron, cobalt, nickel
 - B Iron, copper, nickel
 - C Aluminium, iron, copper
 - D Copper, aluminium, silver
- S23** Betatrons are used to produce X-rays in what range?
- A 0-50 keV
 - B 50-500 keV
 - C Several MeV
 - D 500-1000 keV
- S24** Which of the following is an isotope not artificially produced for industrial use?
- A Ir-192
 - B Co-60
 - C Ra-226
 - D All of the above

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- S25** One half value layer of lead for Iridium-192 is approximately
- A 4 mm
 - B 2 mm
 - C 12 mm
 - D 25 mm
- S26** The intensifying action of lead screens is caused by
- A electron emission
 - B secondary X-ray emission
 - C fluorescence of lead screens
 - D secondary gamma ray emissions
- S27** Most of the energy applied to an X-ray tube is converted into:
- A heat
 - B light
 - C x-rays
 - D ultraviolet radiation
- S28** The divergence of an ultrasonic beam is dependent on
- A test specimen density
 - B the sound wave's angle of incidence
 - C transducer wavelength and diameter
 - D the degree of damping of the ultrasonic transducer
- S29** A noisy base line, or hash may result in
- A fatigue cracks
 - B large grain size
 - C laminations in the test piece
 - D discontinuities at an angle to the test piece surface
- S30** Sound waves which travel on the surface of a solid in a manner similar to waves on a water surface are called
- A Shear waves
 - B Primary waves
 - C Rayleigh waves
 - D Compression waves

- S31** Lamb waves are formed in a part which has
- A thickness of about four wavelengths
 - B thickness greater than about ten wavelengths
 - C thickness approximately equal to the wavelength
 - D low acoustic impedance compared to the transducer crystal material
- S32** When the motion of the particles of a medium is transverse to the direction of propagation, the wave being transmitted is called a
- A Shear wave
 - B Lamb wave
 - C Surface wave
 - D Longitudinal wave
- S33** Which of the following statements accurately describes the capabilities of liquid penetrant testing?
- A Liquid penetrant testing is useful for locating subsurface discontinuities in a test piece
 - B Liquid penetrant testing is useful for locating discontinuities in porous materials
 - C Liquid penetrant testing is useful for locating discontinuities which are open to the surface in non-porous materials
 - D None of the above
- S34** Which of the following discontinuity types could typically be found with a liquid penetrant test?
- A Fatigue cracks
 - B Internal slag in a weld
 - C Internal slag in a casting
 - D Sensitization in austenitic stainless steel
- S35** Which of the following chemical elements are normally held to a minimum in liquid penetrant materials, when testing stainless steel and titanium?
- A Oil
 - B Carbon
 - C Chlorine
 - D Hydrogen

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- S42** A radiation producing device which emits radiation of one or a few discreet wavelengths is
- A a betatron
 - B an X ray machine
 - C a linear accelerator
 - D a gamma ray source
- S43** Radiography of tubular sections using a double wall, double viewing technique is mainly applicable to sections
- A over 38 mm in diameter
 - B under 25 mm in diameter
 - C 88 mm in diameter or less
 - D 125 mm in diameter and less
- S44** Which of the following is the most common method of packaging film?
- A Rolls
 - B Pre-packaged ('day-pack')
 - C Individual sheets for use in cassettes
 - D All of the above
- S45** Which of the following types of radiation is particulate?
- A X
 - B Alpha
 - C Gamma
 - D None of the above
- S46** What is the most important factor in determining the archival quality of radiographic film?
- A Film density
 - B Image quality
 - C Degree of removal of fixer residues during washing
 - D Degree of removal of developer residues during washing
- S47** When a longitudinal wave is incident upon an inclined interface and is refracted at ninety degrees, the angle of the incident longitudinal wave is called
- A the Snell angle
 - B the Snell constant
 - C the first critical angle
 - D the mode conversion constant

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- S48** When a longitudinal wave sound beam passes through an acoustic interface at some angle other than zero degrees
- A plate waves are generated
 - B surface waves are generated
 - C the first critical angle is reached
 - D reflection, refraction and mode conversion will occur
- S49** Which of the following test frequencies would generally provide the best penetration in a 12 inch thick specimen of coarse-grained steel?
- A 1.0 MHz
 - B 2.25 MHz
 - C 5.0 MHz
 - D 10 MHz
- S50** Sound waves of a frequency beyond the hearing range of the human ear are referred to as ultrasonic waves or vibrations, and the term embraces all vibrational waves of frequency greater than approximately
- A 2 kHz
 - B 20 kHz
 - C 200 kHz
 - D 2 MHz
- S51** Most commercial ultrasonic testing is performed at frequencies between
- A 1 MHz and 10 MHz
 - B 1 MHz and 25 MHz
 - C 1 MHz and 100 MHz
 - D 10 MHz and 50 MHz
- S52** Which of the following may cause magnetic particle test indications?
- A A brazed joint in ferromagnetic materials
 - B A shrink fit joint in ferromagnetic materials
 - C A joint between two ferromagnetic materials of different permeability
 - D All of the above
- S53** A discontinuity which is produced during solidification of the molten metal is called
- A service
 - B inherent
 - C processing
 - D none of the above

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- S54** Magnetic lines of force enter and leave a magnet at
- A Poles
 - B Saturation
 - C Flux concentration points
 - D L/D ratios of greater than 4 to 1
- S55** Most scattered radiation which adversely affects the radiographic image quality Originates, from
- A the test piece itself
 - B other nearby objects
 - C the lead intensifying screens
 - D floors and walls adjacent to the test piece
- S56** An effect of scattered radiation is to:
- A Decrease film density
 - B Decrease required exposure time
 - C Diminish contrast, detail and clarity of radiographic image
 - D All of the above
- S57** Which of the following can be a source of spurious ultrasonic signals?
- A Shape or contour of the test piece
 - B Surface roughness of the test piece
 - C Mode conversion within the test piece
 - D All of the above
- S58** Which of the following is true?
- A $\text{Wavelength} = \text{velocity} \div \text{frequency}$
 - B $\text{Velocity} = \text{frequency} \div \text{wavelength}$
 - C $\text{Velocity} = \text{wavelength} \div \text{frequency}$
 - D $\text{Frequency} = \text{velocity} \times \text{wavelength}$
- S59** Higher frequency transducers produce which of the following?
- A Greater sensitivity, resolution and attenuation
 - B Greater sensitivity, resolution and penetration
 - C Greater penetration, attenuation and resolution
 - D Greater beam spread, sensitivity and resolution

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S60 The longitudinal wave incident angle which results in formation of a rayleigh wave is called

- A normal incidence
- B the first critical angle
- C the second critical angle
- D any angle above the first critical angle

- END OF QUESTION -

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