



**UNIVERSITI KUALA LUMPUR
MALAYSIA FRANCE INSTITUTE**

**FINAL EXAMINATION
JANUARY 2014 SESSION**

SUBJECT CODE : FWB 34303
SUBJECT TITLE : NON DESTRUCTIVE TEST
LEVEL : BACHELOR
TIME/DURATION : 2.5 HOURS
DATE :

INSTRUCTIONS TO CANDIDATES

- 1. Please read the instructions given in the question paper CAREFULLY.**
 - 2. This question paper is printed on both sides of the paper.**
 - 3. Please write your answers on the answer booklet provided.**
 - 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.**
 - 5. This question paper consists of Sections A and B.**
 - 6. Answer all questions in English.**
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THERE ARE 4 PRINTED PAGES OF QUESTIONS, EXCLUDING THIS PAGE

SECTION A (Total: 40 marks)**INSTRUCTION: Answer ALL questions****Please use the answer booklet provided.****Question 1**

Successful and consistent application of non-destructive testing techniques depends heavily on personal training. Define the duties of Level 1, 2 and 3 personnel in the qualification of certification of Non Destructive **(NDT)** system.

(8 marks)

Question 2

Explain the differences of properties for radiation X and Gamma used as an industrial radiography **(RT)** method in inspection of welded specimen.

(8 marks)

Question 3

Illustrate the sound waves that exit in various modes used in ultrasonic testing (UT) method. You may use your sketch to facilitate your explanation.

(8 marks)

Question 4

Magnetic particle testing **(MT)** is a non-destructive testing method for detecting surface and subsurface discontinuities in ferromagnetic. What are the basic steps of magnetic particle **(MT)** testing method? Explain briefly for each of the basic step.

(8 marks)

Question 5

Describe the advantages and limitations of liquid penetrant (LPT) testing method?

(8 marks)

SECTION B (Total: 60 marks)**INSTRUCTIONS: Answer FOUR (4) questions only.****Please use the answer booklet provided.****Question 1**

X-ray is one of the sources of radiation use in industrial radiography **(RT)** method.

- i) Illustrate the requirement for x-ray production and explain how x - ray is generated? Some illustration or sketch may be helpful in your explanation. (6 marks)
- ii) What are the significant of kV and mA for generating x-ray beam? (5 marks)
- iii) What are the disadvantages of industrial radiographic techniques (4 Marks)

Question 2

In industry, the Eddy Current **(ET)** method is normally use for inspection on conductive material.

- i) Illustrate the principle of Eddy Current **(ET)** in material inspection? (5 marks)
- ii) Explain the depth of penetration or the skin depth in Eddy Current **(ET)**. You may used you sketch to facilitate your explanation (5 marks)
- iii) What are the advantages of eddy current **(ET)**? (5 marks)

Question 3

Ultrasonic Testing (UT) method uses high frequency sound energy to perform the inspection and detection the flaw in material.

- i) Sketch and label the construction ultrasonic of probe design (5 marks)
- ii) What are the important characteristics during the set-up of UT equipment? (5 marks)
- iii) What are the limitation of Ultrasonic testing (UT) (5 marks)

Question 4

Infrared Thermography (**IRT**) method use as for non-destructive testing aims to detect subsurface features (*i.e.* subsurface defects), on the temperature differences (**DT**) observed on the investigated surface during monitoring by an infrared camera.

- (a) Illustrate the emissivity and block body in Infrared Thermography (**IRT**) (5 marks)
- (b) Describe the difference between passive and transient Infrared Thermography (**IRT**) (10 marks)

Question 5

Digital Industrial Radiography (**DIR**) is a method that uses digital technology instead of traditional photographic film. The advantages include time efficiency through by passing chemical processing and the ability to digitally transfer and enhance images. Also less radiation can be used to produce an image of similar contrast to conventional radiography.

- i) There are three types of classification in Digital Industrial Radiography (**DIR**) system being used. Illustrate the basic principle and the advantages for each system. (7 marks)
- ii) Describe the differences of radiographic parameters between conventional industrial radiography (**RT**) and digital radiography. (8 marks)

Question 6

The Acoustic Emission (**AE**) method in **NDT** is based on the generation of transient elastic waves during the rapid release of energy from localized sources within a material. The source of these emissions in metals is closely associated with the dislocation movement accompanying plastic deformation and the initiation and extension of cracks in a structure under stress.

- i) Illustrate the continuous energy in Acoustic Emission (**AE**).
(3 marks)
- ii) Sketch and discuss briefly a typical acoustic emission signal parameters used for interpretation?
(6 marks)
- iii) What are the limitations of Acoustic Emission (**AE**)?
(6 marks)

END OF QUESTIONS