

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: DND 2043
COURSE	: RADIOGRAPHIC TESTING
SEMESTER/SESSION	: 2-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **All** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 6 PRINTED PAGES INCLUDING COVER PAGE

RADIOGRAPHIC TESTING (DND 2043)

QUESTION 1

- a) Assume that you are an industrial radiographer. Your employer have an Iridium-192 sealed source was bought on 22 April 2007, which has a maximum activity of 75 curies and half-life of 75 days. (assume that 1 year = 360 days and 1 month = 30 days).
- i. Calculate the source activities on 30 September 2007. (7 marks)
 - ii. Calculate the safe distance for radiation workers and members of the public if the source were to be used on 30 September 2007 for field work. (7 marks)
 - iii. Sketch the area that your made from calculation for supervised and controlled area (worker and public area). (5 marks)
- b) The technique applied in radiographic inspection of a particular component or weld part is selected by considering the possible defect being sought, the accessibility and the shape of the object.
- i. List **three (3)** types of radiography techniques. (3 marks)
 - ii. Describe the arrangement of Single Wall Single Image (SWSI) technique exposure for plate test sample. (3 marks)

RADIOGRAPHIC TESTING (DND 2043)

QUESTION 2

- a) The number 50 (1.27mm) on the IQI or penetrameter denotes the thickness of the penetrameter in thousands of an inch. If we have specimen 63.5 mm thick and the smallest hole visible in a radiograph is 2T (2.54 mm).
- Describe the definition of Radiographic contrast and Radiographic definition. (4 marks)
 - Calculate the percentage sensitivity of the radiograph. (6 marks)
 - If the hole visible is 4T, calculate the new percentage sensitivity. (7 marks)
- b) Given specimen thickness = 5 mm. The smallest DIN wire visible on radiograph is wire no.14 (diameter 0.16 mm).
- List the characteristics of IQI or Penetrameter. (5 marks)
 - Calculate the percentage IQI sensitivity of the radiograph. (5 marks)

RADIOGRAPHIC TESTING (DND 2043)

QUESTION 3

- a) Generally, all worker must take effort to ensure the exposure he wil received is kept as minimum as possible which is known as '*As Low As Reasonably Achievable (ALARA)*':
- i. State **three (3)** the radiation safety principles. (3 marks)
 - ii. Explain the relationship of Question a) i. to the amount of radiation received by the radiographer. (6 marks)
- b) Radiographic operation is to be performed in a workshop using a x-ray machine.
- i. Describe **two (2)** common emergency situations that could arise from this operation. (5 marks)
 - ii. Explain **five (5)** action to be taken by the radiographer after realizing that an accident has occurred involving x-ray machine. (5 marks)
- c) Emergency situations most likely arise when ionizing radiations are in used. For this matter, different actions are requiring to be. Explain emergency procedures when source is jammed in its guide tube. (6 marks)

RADIOGRAPHIC TESTING (DND 2043)

QUESTION 4

- a) Safety is most important things for radiographer to make themselves keep away from hazard during work. Careless about safety may affect for worker and public in short or longer time.
- i. List **three (3)** important points shall be checked regarding the use of survey meter. (3 marks)
 - ii. List **six (6)** personal and area safety equipment for x-ray and gamma-ray. (6 marks)
 - iii. Explain the purpose of test shot before start the inspection. (2 marks)
- b) After the radiographic exposure has been made, the film must be processed so that the latent image can be made visible.
- i. List **five (5)** steps of film processing procedure by it sequences. (5 marks)
 - ii. List **seven (7)** steps of film loading and unloading procedure by it sequences. (7 marks)

-----End of questions-----

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ATTACHMENT 1

$$A = A_0 \exp \left(\frac{-0.693 t}{T_1} \right)$$

$$d = \sqrt{\frac{eA}{I}}$$

$$\% = 100/x \sqrt{(t.h / 2)}$$

$$\% = (\varnothing \text{ wire} / X) 100 \%$$

$$I_1 / I_2 = D_2^2 / D_1^2$$

$$E = A \times T$$

----- End of attachment -----