

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

COURSE CODE	: DND 2113
COURSE	: LIQUID PENETRANT TESTING
SEMESTER/SESSION	: 2-2022/2023
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 up 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

QUESTION 1

- a) Liquid Penetrant Testing (LPT) is a surface testing method for detecting surface breaking defects. Classify the followings:
- i. **Two (2)** advantages of Visible Dyes Penetrant over Fluorescent Dyes. (3 marks)
 - ii. **Three (3)** types of material that can be inspected by LPT. (3 marks)
 - iii. **Three (3)** types of material that cannot be inspected by LPT. (3 marks)
- b) There are many important properties of penetrant such as wetting ability, viscosity, density and many more. Define the followings:
- i. Volatility (2 marks)
 - ii. Surface tension (2 marks)
 - iii. Flash point (2 marks)
 - iv. Viscosity (2 marks)
 - v. Density (2 marks)
 - vi. Fluorescent Penetrant (2 marks)
- c) Classify the Electromagnetic Spectrum wavelength for the followings:
- i. UV-A (2 marks)
 - ii. UV-B (2 marks)
 - iii. UV-C (2 marks)

QUESTION 2

- a) Viewing condition is the most important factor in conducting the Liquid Penetrant Testing. Define the followings:
- i. Minimum Day light or artificial White Light required. (1 mark)
 - ii. Maximum ambient background lighting for fluorescent technique. (1 mark)
 - iii. Minimum UV-A irradiance required for fluorescent technique. (1 mark)
 - iv. Maximum ambient background lighting at washing station for fluorescent technique. (1 mark)
 - v. Minimum UV-A irradiance required at washing station for fluorescent technique. (1 mark)
 - vi. Minimum time required for operator's eyes become dark-adapted for fluorescent technique. (1 mark)
 - vii. Water pressure for water washable penetrant removal technique. (1 mark)
 - viii. Water temperature range for water washable penetrant removal technique. (2 marks)
- b) Penetrant inspection is totally dependent on the principle of capillary action.
- i. Describe the definition of capillary action. (2 marks)
 - ii. Explain the relationship between the contact angle and wetting ability of penetrant. (2 marks)
 - iii. Classify the effect of penetrant dwell time for high surface component temperature. (3 marks)

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- c) The purpose of penetrant application is to cover the surface of the area to be tested with penetrant.
- i. Explain the definition the dwell time of penetrant. (2 marks)
 - ii. Describe **six (6)** basic steps in performing solvent removable penetrants testing. (6 marks)
 - iii. Classify **four (4)** types of penetrant application on test component. (4 marks)
 - iv. Classify **two (2)** types of developer application on test component. (2 marks)

QUESTION 3

- a) In order to develop indication, it must be done by using developer that assists in the detection of penetrant retained in the discontinuities.
- i. Describe the development time for penetrant testing. (2 marks)
 - ii. Classify **two (2)** functions of developer. (3 marks)
- b) Define the developer methods as accordance to **EN 571-1** for the followings:
- i. Form a (1 mark)
 - ii. Form b (1 mark)
 - iii. Form c (1 mark)
 - iv. Form d (1 mark)
- c) Define the following penetrant systems as accordance to **EN 571-1**:
- i. Type I (1 mark)
 - ii. Type II (1 mark)
- d) Define the penetrant removal techniques as accordance to **EN 571-1** for the followings:
- i. Method A (1 mark)
 - ii. Method B (1 mark)
 - iii. Method C (1 mark)
 - iv. Method D (1 mark)

QUESTION 4

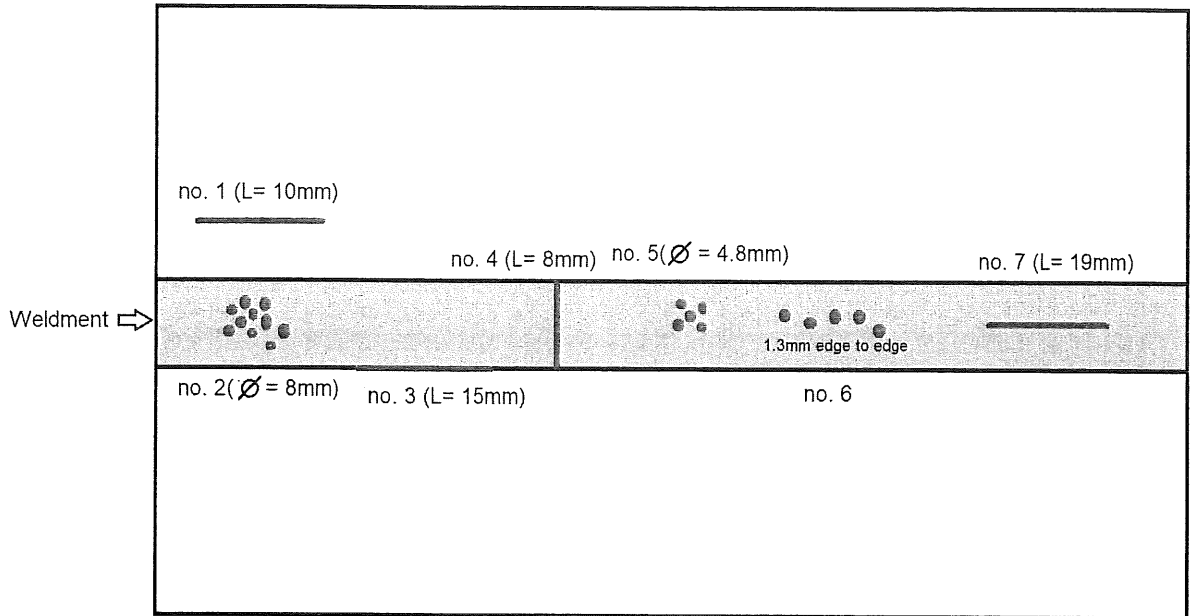


Figure 1

- a) Classify the Acceptance/Rejection criteria for Liquid Penetrant Testing accordance to ASME VIII, Division 1, Appendix 8. (8 marks)
- b) Describe the definition of the indications as per ASME B31.3, Liquid Penetrant Examination for the followings:
- i. Linear indication (2 marks)
 - ii. Rounded indication (2 marks)
 - iii. Relevant indications of penetrant testing. (2 marks)
- c) Refer to **figure 1**, state the defects name for number 1 to 7. (8 marks)
- d) Evaluate the following defects in **figure 1** as per Acceptance/Rejection criteria for ASME B31.3, Liquid Penetrant Examination:
- i. Defect no. 2 (2 marks)
 - ii. Defect no. 5 (2 marks)
 - iii. Defect no. 6 (2 marks)

-----End of question-----