



**UNIVERSITI KUALA LUMPUR
MALAYSIA FRANCE INSTITUTE**

**FINAL EXAMINATION
JANUARY 2014 SESSION**

SUBJECT CODE : FWB 24103
SUBJECT TITLE : WELD INSPECTION TECHNIQUE
LEVEL : BACHELOR
TIME / DURATION : 3.0 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 **TWO (2) sections**. Answer all questions in **Section A** and **Section B**.
 6. The **ISO 5817** standard will be provided and should be returned after the exam.
 7. Answer all questions in **English**.
-

THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answers All Questions.****Questions 1**

Explain the difference between a "**Liquid (Dye) Penetrant testing and Fluorescent Penetrant testing**". Where is it used and what is the main purpose of using them.

(10 marks)

Questions 2

In **Liquid (Dye) Penetrant testing**, what is a "**Developer**" and why is it necessary to use a developer?

(10 marks)

Questions 3

In **Liquid (Dye) Penetrant testing**, you will come across the term "**Dwell time**". What is it?

(10 marks)

Questions 4

Explain what you know about "**destructive testing**". Why are they important?

(5 marks)

Questions 5

Explain what you know about "**non-destructive testing**". Why are they important?

(5 marks)

SECTION B (Total: 60 marks)

ANSWER ALL QUESTIONS. Use Appendices 2 & 3 to Answer Questions 3 & 4 in Section B.

Question 1

Explain briefly about “**Liquid (Dye) Penetrant Testing (PT)**” and what are its main purpose, importance and limitations.

(10 marks)

Question 2

Explain briefly about the “**Root and Side Bend Tests**” and what are its main purpose, importance and limitations.

(10 marks)

Question 3

Appendix 1 below shows a photo of a “**Macro Sample ID AM1034**”. It is a 10X magnification from the actual sample.

- 3.1 Identify visible defects/imperfections on the macro sample and plot in the Macro report sheet in **Appendix 2**.
- 3.2 Number the defects/imperfections found in the Macro sample on the macro report sheet in **Appendix 2**.
- 3.3 Measure and size the defects/imperfections found on the Macro report sheet in **Appendix 2**.
- 3.4 Sentence the defects/imperfections in accordance to **ISO 5817 (Stringent)**. The ISO 5817 is provided.
- 3.5 A comment on the defects/imperfections and on the condition of the specimen is imperative.

(20 marks)

Question 4

Photo 1 below shows a Tee Joint specimen with a single sided fillet weld. Please read carefully the instructions below in order to conduct the visual inspection as per **Appendix 1** and to comply with the **ISO 5817 requirement**.



Photo 1 – Tee Fillet Joint

General Information:-

- (a) Specimen No.: *FW122*
- (b) Material Type: *carbon manganese steel*
- (c) Material Thickness: *12.0 mm X 300 mm*
- (d) Material size: *100 mm X 300 mm*
- (e) Welding process: *111*
- (f) Welding position: *PB*

Weld Information:

- (a) Vertical plate maximum weld height measured: *12.0 mm*
- (b) Vertical plate minimum weld height measured: *9.0 mm*
- (c) Horizontal plate maximum weld height measured: *10.0 mm*
- (d) Horizontal plate minimum weld height measured: *9.5 mm*
- (e) Throat maximum weld depth measured: *9.5 mm*
- (f) Throat minimum weld depth measured: *8.0 mm*

Information on Defects/Imperfections:

- (a) Toe undercut: *1.5 mm D X 50.0 mm L*
- (b) Poor stop start (Overlap): *2.5 mm D X 20.0 mm L*
- (c) Crater depression: *1.0 mm D X 15.0 mm L*
- (d) Grinding marks: *Area 30.0 mm X 30.0 mm*
- (e) Chipping marks: *Area 30.0 mm X 30.0 mm*
- (f) Stray arc: *Area 25.0 mm X 30.0 mm*
- (g) Stray arc: *Area 30.0 mm X 20.0 mm*
- (h) Surface Porosity: *Area 10.0 mm X 10.0 mm*
- (i) Slag: *1.0 mm D X 10 mm L*
- (j) Spatter: *Area 20.0 X 20.0 mm*
- (k) Scales: *Area 15.0 mm X 30.0 mm*

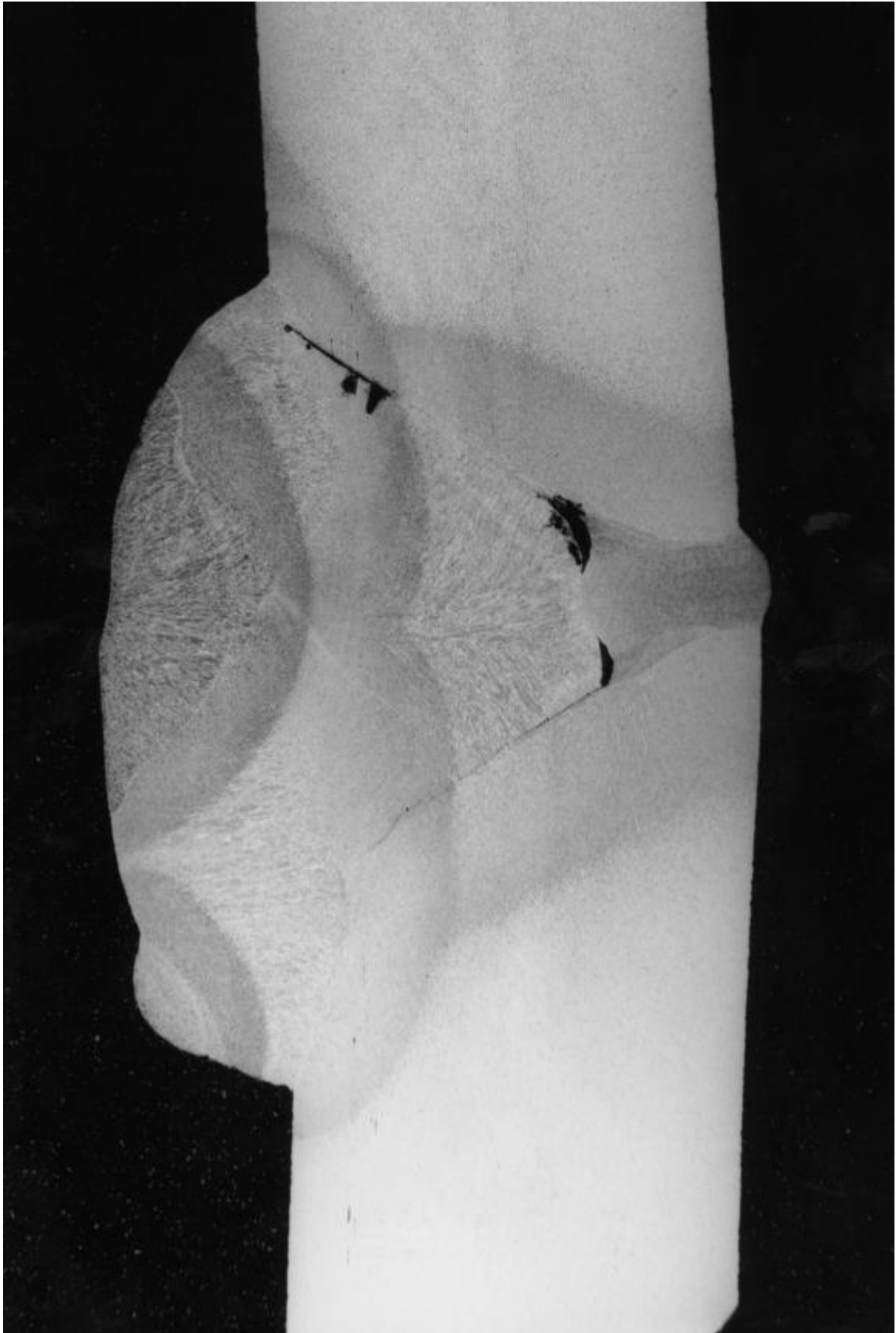
By using *Appendix 3*, your tasks shall be to identify the following:-

- 4.1 Measure and record as required in ***Appendix 3***;
- 4.2 Sentence the fillet weld dimensions in accordance to the design criteria as required in ***Appendix 3***;
- 4.3 Report the defects/imperfections as required in ***Appendix 3***;
- 4.4 Record defects/imperfections according to its length, depth and height as required in ***Appendix 3***;
- 4.5 Sentencing of all visible defects should be in accordance to ***ISO 5817 "Moderate" category (provided)***;
- 4.6 Your overall assessment as required in ***Appendix 3***;
- 4.7 Sign and print your name as required in ***Appendix 3***;
- 4.8 Your remarks and recommendations as required in ***Appendix 3***.

(20 marks)

END OF QUESTION

Appendix 1



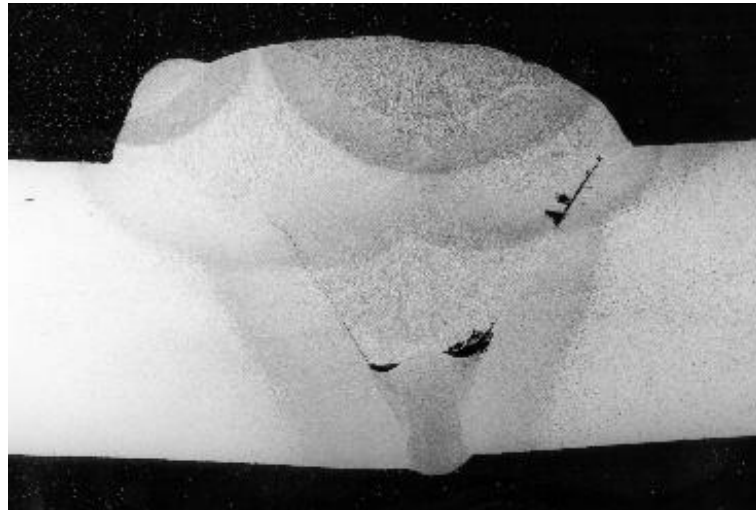
Macro Specimen ID AM1034

Appendix 2

MACRO INSTRUCTION/REPORT SHEET [ID: AM1034]

**CHECK PHOTOGRAPH ID MATCHES THIS REPORT ID
ALL DEFECTS TO BE REPORTED [AND SIZED IF REQUIRED]
THEN SENTENCED TO ISO 5817 LEVEL B [STRINGENT]**

**NOTE: PHOTOGRAPH IS AT X10 MAGNIFICATION
MATERIAL: LOW CARBON MANGANESE STEEL
WELDING PROCESS: [MMA/SMAW/111]**



No.	DEFECT	SIZE	ACCEPT/REJECT
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11	Excess weld metal		
12	Excess penetration		

Comments:

.....

Signature:

Date:

Print Full Name:

Appendix 3

Fillet Welded Joint

DEFECTS TO BE SENTENCED USING ISO 5817 "LEVEL D" (MODERATE)
WELD SIZE SENTENCED USING "DESIGN CRITERIA"

Specimen No.:

Material thickness:

1. Measure and record the following details:-

VERTICAL LEG LENGTH	(Max & Min)	Max..... mm	Min..... mm
HORIZAONTAL LEG LENGTH	(Max & Min)	Max..... mm	Min..... mm
DESIGN THROAT THICKNESS	(Max & Min)	Max..... mm	Min..... mm

2. Sentence the fillet weld dimensions using the following design criteria:-

MINIMUM LEG LENGTH:	Material Thickness
MAXIMUM LEG LENGTH:	Material Thickness + 3.0 mm
MINIMUM THROAT THICKNESS:	Material Thickness X 0.7 mm
MAXIMUM THROAT THICKNESS:	Material Thickness + 0.5 mm

The VERTICAL LEG LENGTH ACCEPT OR REJECT

Please state:

The HORIZONTAL LEG LENGTH ACCEPT OR REJECT

Please state:

The THROAT THICKNESS: ACCEPT OR REJECT

Please state:

3. Report the defects/imperfections for the following, how many places:-

- UNDERCUT APPEAR?
- OVERLAP APPEARS?
- LACK OF FUSION APPEARS?
- CRACKS APPEAR?
- POROSITY APPEARS?
- SOLID INCLUSIONS APPEAR?
- Misc. (ARC STRIKES, etc.)
-
-
-

4. For defects recorded – state the MAXIMUM length (and DEPTH if applicable) of each defect:-

UNDERCUT APPEAR?	Length: mm	Depth: mm
OVERLAP APPEARS?	Length: mm	Depth: mm
LACK OF FUSION APPEARS?	Length: mm	Depth: mm
CRACKS APPEAR?	Length: mm	Depth: mm
POROSITY APPEARS?	Length: mm	Depth: mm
SOLID INCLUSIONS APPEAR?	Length: mm	Depth: mm
Misc. (ARC STRIKES, etc.)	Length: mm	Depth: mm

5. Sentence the defects recorded using ISO 5817 “Level D” (Moderate):-

UNDERCUT APPEAR?	.....	ACCEPT or REJECT?
OVERLAP APPEARS?	.....	ACCEPT or REJECT?
LACK OF FUSION APPEARS?	.....	ACCEPT or REJECT?
CRACKS APPEAR?	.....	ACCEPT or REJECT?
POROSITY APPEARS?	.....	ACCEPT or REJECT?
SOLID INCLUSIONS APPEAR?	.....	ACCEPT or REJECT?
Misc. (ARC STRIKES, etc.)	.....	ACCEPT or REJECT?

6. Your overall assessment.

IS THE WELD ACCEPTABLE? YES or NO

SIGNATURE:

PRINT FULL NAME:

DATE:

7. REMARKS & RECOMMENDATIONS:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....