UNIVERSITY COLLEGE TATI

# UNIVERSITY COLLEGE TATI (UC TATI)

| FINAL EXAMINATION QUESTION BOOKLET | |
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| COURSE CODE | : DND 1023 3/1 |
| COURSE | : WELDING PROCESSES |
| 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**

## QUESTION 1

a) The Shielded Metal Arc Welding (SMAW), also known as Manual Metal Arc (MMA) welding process was first developed in Russia in late 19th century, using bare wire consumables.

i. List **three (3)** basic tools required for the MMA welding process. (3 marks)

ii. List **four (4)** typical defects of the MMA welding process. (4 marks)

iii. Explain the heat distribution among electrode and parent metal for Direct Current positive (DC+) polarity. (2 marks)

iv. Describe the effects of Voltage or arc too high in MMA welding process. (2 marks)

v. Describe **three (3)** disadvantages of MMA welding process. (6 marks)

b) There are three mains electrode covering material in MMA welding process, which are Cellulose, Basic and Rutile. Describe **four (4)** functions of electrode covering material. (8 marks)

## QUESTION 2

a) The weld symbols are used to transfer information from the design office to the workshop or field. Describe **five (5)** basic components of weld symbols:

(5 marks)

b) The weld symbols are used to transfer information from the design office to the workshop or field. Construct the welding symbols for the given details in figure 1.

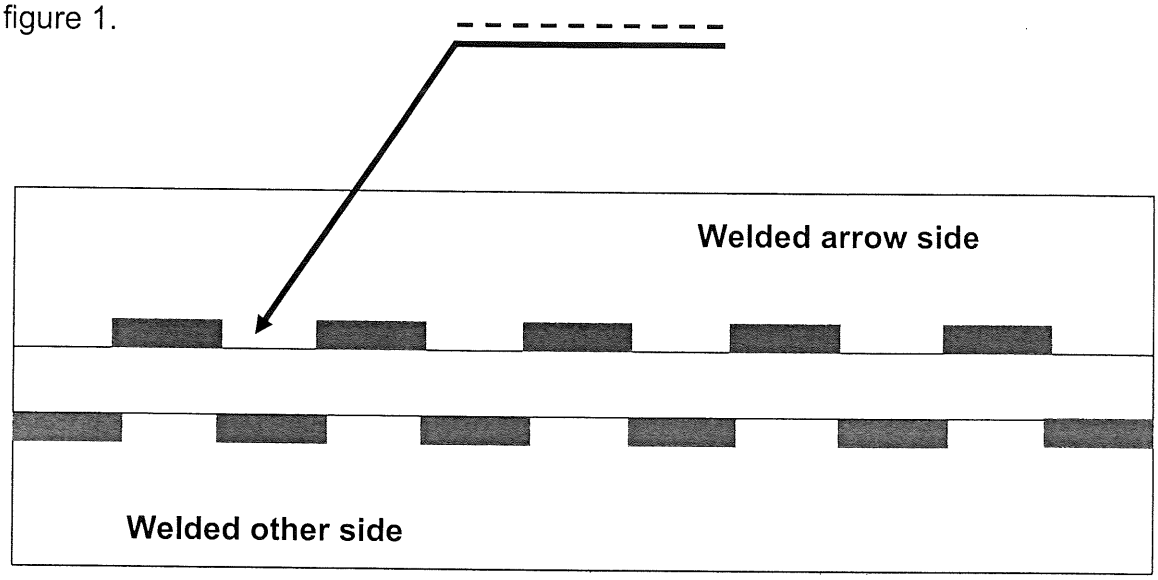



**Figure 1**

**Welded arrow side:**
Fillet welds with 8 mm leg lengths. The length of each weld is 35 mm and the distance between each weld is 30 mm.

**Welded other side:**
Fillet welds with 11 mm leg lengths. The length of each weld is 32 mm and the distance between each weld is 38 mm.

**Welding process**: Tungsten Inert Gas (TIG) for fillet welds.

**Location**: Weld to be carried out on site/field area.

**Additional requirement:** Welding to be carried out all round component (peripheral weld)

(12 marks)

c) Construct the symbol drawing for the welded cruciform joint provided in figure 2 below. All groove welds are welded with the MMA process and fillet welds with the MAG process. Fillet weld leg length for arrow side is 10 mm and other side is 7 mm.

(8 marks)

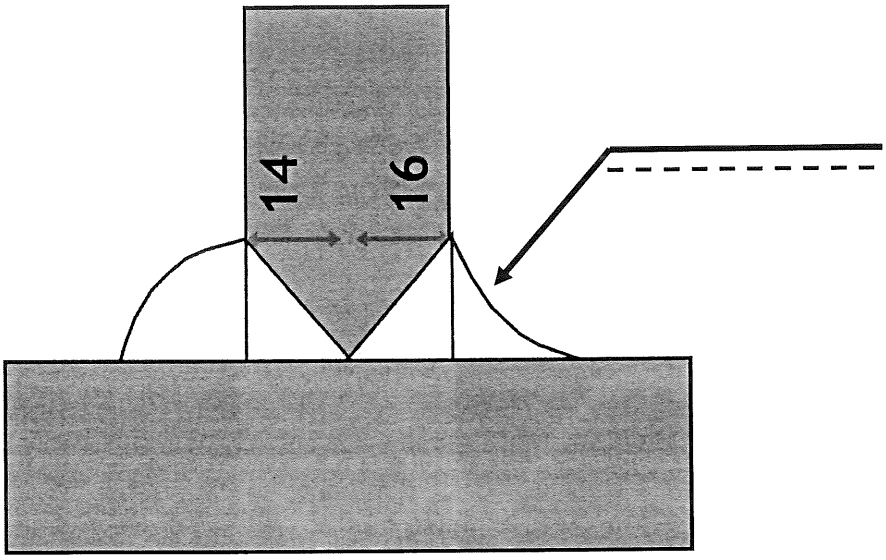



**Figure 2**

## QUESTION 3

a) Gas Metal Arc Welding (GMAW) is a welding process in which an electric arc forms between a consumable wire electrode and the work piece metal, which heats the work piece metal causing them to melt and join.

i. List **three (3)** typical defects in GMAW. (3 marks)

ii. Identify **four (4)** variable parameters in GMAW. (4 marks)

iii. State **four (4)** types of molten metal transfer mode in GMAW process. (4 marks)

iv. Describe **two (2)** advantages of GMAW. (4 marks)

v. Explain **two (2)** function consumable wire electrode in GMAW. (4 marks)

b) The main function of shielding gas in GMAW is to protect the electrode and weld pool from contamination. Describe the characteristic of the shielding gas used in GMAW for the followings:

i. 100% carbon dioxide gas. (2 marks)

ii. A mixture of Argon gas and Helium gas. (2 marks)

iii. A mixture of 20% Argon gas and 80% carbon dioxide gas. (2 marks)

## QUESTION 4

a) Gas Tungsten Arc Welding (GTAW), also known as Tungsten Inert Gas (TIG) welding, is an arc welding process that uses a non-consumable tungsten electrode to produce the weld.

i. List **four (4)** typical defects of TIG welding. (4 marks)

ii. State **two (2)** types of inert gas used in TIG welding. (2 marks)

iii. Describe **three (3)** advantages of TIG welding. (6 marks)

b) Tungsten electrode and shielding gas are the welding parameters in TIG welding process.

i. List **two (2)** types of materials used as an electrode in TIG welding. (2 marks)

ii. Describe **three (3)** characteristics of sharper electrode type. (6 marks)

iii. Explain the effect of weld penetration and bead width if the vertex angle of TIG electrode is increases. (5 marks)

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