THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

090 MECHANICAL ENGINEERING

Time: 2:30 Hours **Year: 2022**

Instructions

1. This paper consists of sections **A, B** and **C** with a total of **ten (10)** questions**.**
2. Answer **all** questions.
3. Section **A** and **C** carry **fifteen (15)** marks each, section **B** carries **seventy (70)** marks.
4. Cellular phones and any unathorized materials are **not** allowed in the assessmenmt room.
5. Write your **Assessment Number** at the top right hand corner of every page.

FOR ASSESSOR'S USE ONLY		
QUESTION NUMBER	**SCORE**	**ASSESSOR'S INITIALS**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		
CHECKER'S INITIALS		

2 303041 100455

SECTION A (15 Marks)

Answer **all** questions in this section

1. Choose the correct answer from the given alternatives and write its letter in the box provided.

   i) Which materials are used to charge the blast furnace during the production of pig iron? A

   A. Coke, limestone and iron ore

   B. Coke, limestone and slage

   C. Steel scraps, limestone and coke

   D. Limestone, air and pig iron.

   ii) You are required to cut a thin metal using hacksaw. Suggest which hacksaw blade is appropriate to use.

   A. Blades with tough teeth

   B. Blades with elastic teeth

   C. Blades with small pitch

   D. Blades with large pitch

   iii) Fixed, interlocking, automatics and trip guards are machine guards used to ensure safe work environment. Why most of the manufactures prefer to use an interlocking safety guards than others?

   A. It provides a tripping device inside the guard.

   B. It is operated by the moving part of the machine in which it is fitted.

   C. It forms an integral part of the machine a cannot be removed.

   D. It forms an integral part of the machine a can be removed.

   iv) Who is responsible to measure, analyze and interpret data for performance of mechanical components, device and engines in engineering field?

   A. Technician

   B. Technologist

C. Engineer

D. Artisan.

v) What is the relationship between science and technology?

A. Technology is the application of science

B. Science is the application of science

C. Science is a major application of technology

D. Technology is the major application of science.

vi) In gas welding, pressure regulators used has two gauges, what are the function of the gauges?

A. To indicate working and gas content in the cylinder

B. To vary regulator pressure and cylinder pressure

C. To balance regulator pressure and cylinder pressure

D. To vary regulator pressure and maintain cylinder pressure.

vii) Steel and cast iron are known as ferrous metal which are used in making different type of metallic components. What them?

A. Sulphur content

B. Carbon content

C. Tungsten content

D. Oxygen content.

viii) Which measuring instrument has features of try-square, bevel protractor, rule and scriber?

A. Depth gauge micrometer

B. Height gauge micrometer

C. Combination set

D. Inside micrometer.

ix) Which items are found in workshop first aid kit?

A. Pain killer tables, ARVS, Bandage, Scissors and Tincture

B. Spirt, Syringe, TB tablets, Gloves and Bandages

C. Bandages, Scissors, Pain killer tablets, Tincture and Spirit

D. Condom, ARVs, TB tablets, Gloves and Spirit.

x) The growth of industrial sector in Tanzania depends on the level of qualification to the workers. Who is responsible to perform routine product development and coordination of workforce, material and equipment?

A. An artisan

B. Craft person

C. Engineer technologist

D. Technician.

2. Match the descriptions in **List A** with the corresponding term in **List B** by writing the letter of the correct answer in the table provided.

LIST A	**LIST B**
i) A thing or situation which may cause injury	A. Accident
ii) An exposure to risk or chance to accident	B. Safe guard
iii) A quality or cndition of being safe from danger, injury or damage.	C. Safety
iv) State of sense of defence against attack	D. Danger
v) An expected happening that results in injury	E. Cautions
	F. Security
	G. Hazzards
	H. Precautions

ANSWERS

List A	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**
List B					

SECTION B (70 Marks)

Answer **all** questions from this section

3. You have been assigned to do laboratory analysison white and malleable cast iron. The results obervations were: increase of Ferrite phase,decrease of strength, , toughness lowered and yield of strenght.

   a) Which elements and their compositions were obtained in white cast iron ? Give five elements

      (i) .....

      (ii) .....

      (iii) .....

      (iv) .....

      (v) .....

   b) Briefly explain properties of mallebale cast Iron.

      (i) .....

      (ii) .....

      (iii) .....

      (iv) .....

      (v) .....

   c) Where cna white cast iron be used according to properties of white cast iron in analysis? Mention five Uses

      (i) .....

      (ii) .....

      (iii) .....

      (iv) .....

      (v) .....

4. Figure **1** shows mechanical device commonly used in te work shop. Study it carefully and the answer the questions that follow:

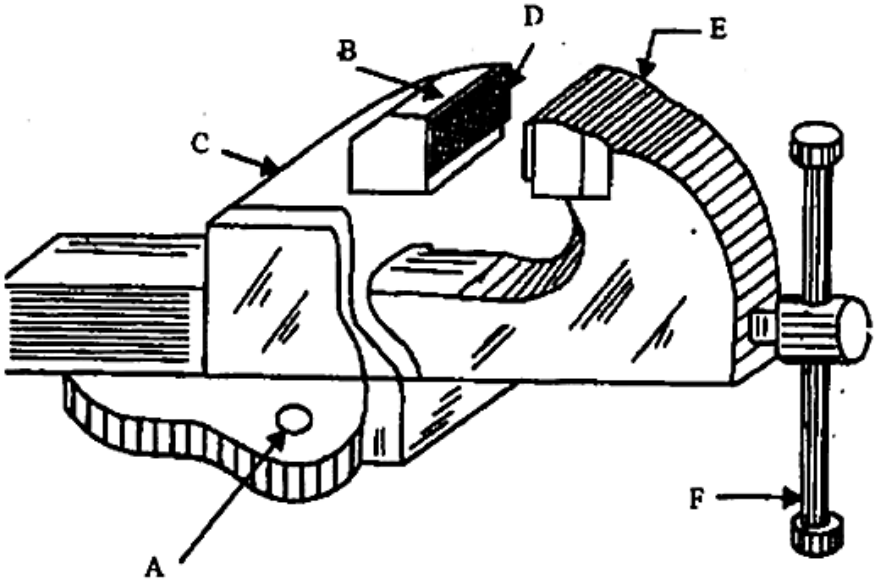


Figure 1

a) (i) Identify the component shown in Figure 1

.....

(ii) What is the main function of the component?

.....

.....

b) Name the parts marked by letters A to E

A. .....

B. .....

C. .....

D. .....

E. .....

c) (i) What type of materials is used to manufacture part D andE?

.....

.....

(ii) Why part D is knurled on one side? Briefly explain

.....

.....

(iii) Why part D must be covered with soft plate liners?

.....

.....

5. (a) Briefly explain the following terms as used in welding process

i) Arc crater

.....

.....

.....

ii) Arc blow

.....

.....

.....

iii) Welding polaritry

.....

.....

.....

iv) Flux

.....

.....

.....

v) Arc legth

.....

.....

.....

(b) Suppose you are working in welding and metal fabrication workshop. What five exceptional precautions you should observe?

(i) .....

(ii) .....

(iii) .....

(iv) .....

(v) .....

6. Your school built a new welding and metal fabrication workshop. Why preventive measures are to be taken soa as to prevent fire outbreak? Briefly explain using five points.

a) .....

b) .....

c) .....

d) .....

e) .....

7. (a) You were assigned to cut various pieces of metal with hand hacksaw in the bench workshop. During the process you observe that, there were teeth breakages, excessive teeth wear and blade breakage. What are the two causes of these faults?

i) Teeth breakages

- .....
- .....

ii) Excessive teeth wear

- .....
- .....

iii) Blade breakage

- .....
- .....

(b) What are the four safety precautions which should be taken in order to avoid the situations observed in (a)?

iv) .....

v) .....

vi) .....

vii) .....

8. What are the five advantages and five disadvantages of gas welding compared to other types?

Advantages

(i) .....

(ii) .....

(iii) .....

(iv) .....

(v) .....

Disadvantages

(i) .....

(ii) .....

(iii) .....

(iv) .....

(v) .....

9. (a) Water, Foarm and Carbon Dioxide (CO_2) are media used for fire extinguishers.Under which circumstance is it appropriate to use each media?

i) Water

.....

.....

.....

.....

ii) Form type

.....

.....

.....

.....

iii) Carbon dioxide (CO_2)

.....

.....

.....

.....

(b) Suppose you are working in a mechanical workshop and you are required to arrange the materials using materials handling equipment such as forklift. Briefly explain four precautions you will take when handling mechnaical equipment.

(i) .....

(ii) .....

(iii) .....

(iv) .....

SECTION C (15 Marks)

Answer **all** questions

10. Acertain company decided to install a plant for Iron and its product smelting from iron ores. They found out that there are Open hearth furnaces, Cupola furnace an Electric furnace.

    a) Giving a reason, advice the company management the type of furnace to install.

    .....

    .....

    .....

    .....

    .....

    .....

    .....

    .....

    .....

    .....

    b) What are the advantages of the furnace chosen in (a) when compared to others?

    (i) .....

    .....

    .....

    (ii) .....

    .....

    (iii) .....

    .....

    .....

(iv) .....

.....

.....

c) Pig iron production using cupola furnace may involve three main zone namely, combustion or oxidizing zone, reducing zone and melting zone. With the help of chemical reactions, describe the processes undergone in those zone

(i) Comustion or oxidizing

.....

.....

.....

Chemical reaction

.....

.....

.....

(ii) Reducing zone

.....

.....

.....

(iii) Chemical reaction

.....

.....

.....