Student's Assessment Number .....

THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

090 **MECHANICAL ENGINEERING**

Time: 2:30 Hours. **Year: 2024**

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 carries **15** marks; section B carries **70** marks and section C carries **15** marks.
4. All writing must be in **black** or **blue** ink and drawings must be in **pencil**.
5. Cellular phones and unauthorized materials are **not allowed** in the examination room.
6. Write your **Assessment Number** at the top-right hand corner of every page.

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

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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) During the mechanical engineering practical session the teacher provided the grinding disc labelled WA36K5R17. What does the alphabet A K and R indicated in the disc represent.

A Abrasive Grade

B Abrasive Structure and Prefix

C Abrasive Grade and Bond

D Abrasive Grain and Bond

(ii) The Form Two students were doing practical in a workshop. Suddenly an accident occurred whereby one of the students fell in the grinding machine. In such incidence who is the responsible person to be notified about an accident.

A The immediate supervisor

B The subject teacher

C The medical doctor

D Class representative

(iii) Rightward and leftward are two techniques which can be used in joining metal process by using gas welding. Why are rightward techniques merely applied than leftward techniques.

A The process is suitable for welding thin plates

B The process is suitable for welding both thin plates and thick plates

C The process is suitable for welding thick plates

D The process is suitable for joining dissimilar metals

(iv) Why is cast iron unfit for construction of a bridge compared to steel.

A It is brittle due to presence of austenite element

B It is brittle due to presence of ferrite element

C It is brittle due to lack of ferric material

D It is brittle due to presence of carbon element

(v) Which of the following is a proper setting used to prevent jamming or binding of hacksaw blade teeth.

A Kerf set

B Swarf set

C Rasp set

D Wavy set

(vi) The contractor needs porous materials to retain the amount of heat on construction of iron smelting furnace. Which one is an appropriate material needed for the construction.

A Steel casing

B Fire bricks

C Clay

D asbestos

(vii) Form Two students were required to draw circles which are beyond the capacity of a compass. Which alternative instrument may be used.

A Callipers

B Divider

C Trammels

D Height Gauge

(viii) The following are the factor which attribute to the outbreak of electrical fire except.

A poor quality of electrical installation of wiring

B application of electric rodent repellents in the cable

C poor maintenance of some of the fire hydrant

D unsystematic of dumping of wooden packing material

(ix) Which one of the following is a direct factor having impact on the risks associated with executer in the workshop.

A Make sure the floor is uneven

B Have the floor cleaned extra often

C Make sure the workplace is tidy

D Have the floor safety signed and marked

(x) Which of the following is used for dressing and trueing an abrasive grinding wheel on a tool and utility grinder.

A Diamond tool dresser

B Abrasive stick wheel dresser

C Huntington wheel dresser

D Truing wheel dresser

2. Match the properties of engineering material in **List A** with the corresponding metallic element in **List B** by writing a letter of the correct response in the table provided.

List A	**List B**
(i) The ability of metal to withstand deformation under compression without rapture (ii) Measure the amount of energy the material can absorb before failure taken place (iii) The ability of material to resist deformation (iv) The ability of material to withstand elongation under tension without rapture (v) The ability of material to sustain load without distortion.	A Toughness B Hardness C Malleability D Stiffness E Brittleness F Ductility G Resistance H Strength

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SECTION B (70 Marks)

Answer **all** questions from this section.

3. (a) Why students are encouraged to observe personal, equipment and environment safety during learning in workshop?

(i) .....

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(ii).....

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(iii).....

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(b) Why safety rules should be observed in industries? Give seven reasons.

(i).....

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(ii).....

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(iii).....

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4. (a) What is the difference between safety and health hazard?

   (b) What will happen when safety rule in workshop will not be observed? Give three points.

   (c) Why the following safety precautions are important when operating a machine?

   (i) Wearing safety glasses.

   (ii) Not wearing loose clothes.

   (iii) Keeping the machine and surrounding floor area clean.

   (iv) Stopping the machine to measure work or clean the machine.

   (v) Not operating a machine until you understand its control.

   (vi) Not operating the machine if the machine guard is removed.

5. (a) Distinguish between mechanical and physical properties of engineering material by giving five examples in each.

   (i)
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   (ii).....

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   (iii).....

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   (iv).....

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(v)

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(b) What is the difference between physical strength and chemical strength of metals as applied in engineering materials.

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6. (a) Draw and label six main parts of oxyacetylene welding plant.

(b) What are three advantages and disadvantages of oxyacetylene welding compared with other process?

(i) Advantages.

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

(ii) Disadvantages

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

7. The given figure below shows an oxyacetylene cutting blowpipe. Study the figure and answer the questions that follows:

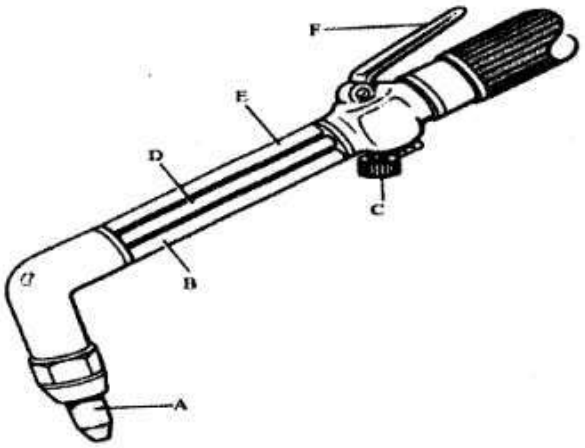

Figure 1

(a) Name the parts marked A-F.

A. .....

B. .....

C. .....

D. .....

E. .....

F. .....

(b) What is the main function of the part marked 'C'?

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(c) What will happen to the output flame if the part named ''C'' will be removed?

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(d) Give five procedures of lighting and adjusting the cutting blowpipe.

(i) .....

(ii) .....

(iii) .....

(iv) .....

8. You are provided with the following non-ferrous metals. Give two physical properties, which differentiate it from others and two applications of each.

(a) Aluminium

Physical properties

(i) .....

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(ii) .....

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Applications.

(i) .....

(ii) .....

(b) Copper.

Physical properties

(i) .....

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(ii) .....

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Applications.

(i) .....

(ii) .....

(c) Lead.

Physical properties

(i) .....

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(ii) .....

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Applications.

(i) .....

(ii) .....

(d) Silver.

Physical properties

(i) .....

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(ii) .....

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Applications.

(i) .....

(ii) .....

(e) Zinc.

Physical properties

(i) .....

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(ii) .....

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Applications.

(i) .....

(ii) .....

9. Some of the production activities in the industry include working with rotating, sliding, reciprocating and sharp edge machine and equipment. Therefore, a worker is mostly exposed to mechanical and physical hazard.

(a) What does the term 'mechanical hazard' mean as used in industry activities?

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(b) What are the four hazards which are considered as mechanical hazard?

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(c) What are the four precautions measures should be taken by a worker who is working in the industry?

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SECTION C (15 Marks)

Answer question number **ten (10).**

10. (a) Suppose you have found out of that most of your fellow students are confused on choosing the proper type of griding wheels capable for cutting various materials. Briefly explain three criteria to consider on deciding the type of griding wheel to use.

(i) .....

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(ii) .....

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(iii).....

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(b) What are the two-grinding wheel defects? Indicate a remedy for each?

Defect 1 and Remedy.

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Defect 2 and Remedy.

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(c) Briefly explain the term abrasive materials or grit as used in grinding wheel.

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(d) Give two examples of abrasive materials and their uses.

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