THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

092 WORKSHOP TECHNOLOGY

(For Both School and Private candidates)

Time: 3 Hours **Year: 2019**

Instructions

1. This paper consists of section **A**, **B** and **C** with total of f**ourteen (14)** questions.
2. Answer **all** questions in section **A** and **B**, and **three (3)** questions from section **C.**
3. Section **A** carries **ten (10)** marks , section **B,** and C carry **forty five (45)** marks each.
4. Cellular phones, and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet (s).

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SECTION A (10 marks)

Answer **all** questions in the section

1. Choose the correct answer from the given alternatives and write its letter beside the item number in their answer booklets:

i) A machinist in a workshop observes that the temperature of the metal rises when machining it. What is the cause of heat generation?

A. Plastic deformation

B. Elastic deformation

C. Isotropic deformation

D. Twining

E. Refining of grains.

ii) You are required to select a metal for particular work. Which characteristics would you consider in identifying mild steel from other ferrous metals?

A. Red and scaly surface with rolling marks

B. Grey and sand surface

C. Fine and smooth surface with bluish sheen

D. Smooth and black surface

E. Smooth and fine surface.

iii) The following table shows pairs of materials and their respective products:

Which one represents the correct matched pair of material and product?

S/N	**Material**	**Products**
1	Silicon steel	Transformer stampings
2	Duralumin	Cooking utensils
3	Gun metal	Bearings
4	Bronze	Swords

A. 1, 2 and 3

B. 1 and 2

C. 1 and 3

D. 2 and 3

E. 3 and 4.

iv) Which pair of heat treatment processes can be used to make steel strong and tough?

A. Tempering and annealing

B. Annealing and normalising

C. Normalising and tempering

D. Hardening and tempering

E. Anodizing and carburising.

v) Which process is suitable to produce steel materials for use in structural construction works?

A. Casting

B. Extrusion

C. Rolling

D. Forging

E. Deep drawing.

vi) In which condition do carbon and iron exist when steel is heated to eutectic state?

A. Insoluble in solid and liquid state

B. Soluble in liquid state

C. Soluble in solid state

D. Insoluble in liquid state

E. Soluble in solid and liquid states.

vii) Which one is a necessary condition for plastic moulding?

A. Application of heat only

B. Application of pressure only

C. Application of heat and pressure

D. Application of plasticizers only

E. Application of pressure and plasticizers.

viii) One of the properties of copper and aluminium is their good conductivity of electricity but aluminium is preferably used in overhead electricity transmission line. Why is it so?

A. It is in weight and better in electric conductivity than copper.

B. It is better in corrosion resistance and electric conductivity

C. It is less in weight and cheaper than copper

D. It is better in corrosion resistance and less in weight than copper

E. It is less in weight and better in electric conductivity than copper.

ix) Which one of the following are the limits of size for the component which is manufactured with the dimensions 30 ± 0.05 mm?

A. 30.00 mm, - 0.05 mm and +0.05 mm

B. 29.95 mm, - 0.05 mm and + 0.05 mm

C. 29 mm and 31 mm

D. 29.95 mm and 30.05 mm

E. 30 mm and 30.05 mm.

x) Which one is the best cutting solution for drilling mild steel?

A. Lard oil

B. Paraffin

C. Soluble oil

D. Turpentine

E. Natural oil.

SECTION B (45 marks)

Answer **all** questions from this section

2. (a) State the required property for a material to be used for casting parts with intricate shapes.

   (b) Give three materials which have desirable properties for casting intricate shaped components.

3. (a) Give one lubricant in solid state

   (b) Give four types of lubricant in liquid state.

4. Give five reasons of employing heat treatment to steel.

5. (a) Identify the type of cast iron which is easily machined.

   (b) Give the purpose of chilled castings as it is applied in cast iron production.

   (c) Identify two components in which cast iron is used as engine construction material.

6. Identify the types of metals which correspond to the following types of sparks:
   a) Sparks in long, light yellow streaks with a little tendency to burst.
   b) Similar sparks as material in test (a) but has more sparks which burst with sparkler effect.
   c) Numerous little yellow stars burst very close to the grinding wheel.
   d) Interrupted spark lines with a dark red, ball shaped spark at the end.
   e) Definite torpedo shaped spark with a feather like effect near the end. It changes from a dark red to gold colour.

7. (a) Outline the benefits of using limits, fits and tolerances in manufacturing of mechanical components.

   (b) Give three methods in which parts made with interference fit can be assembled.

8. Give five reasons for non-ferrous metals to have wide application in our daily activities.

9. (a) Differentiate induction hardening from flame hardening.

(b) Give two factors on which the depth of hardness for case hardened part depend.

10. (a) Outline three properties of aluminium material which make it more popular.

(b) Identify four common forms in which aluminium material is supplied during its manufacturing.

SECTION C (45 marks)

Answer any **three (3)** questions from this section

11. (a) Describe the type of test that can be used to verify the suitability of steel in hand as a construction material for a structural work which will be subjected to shock loads.

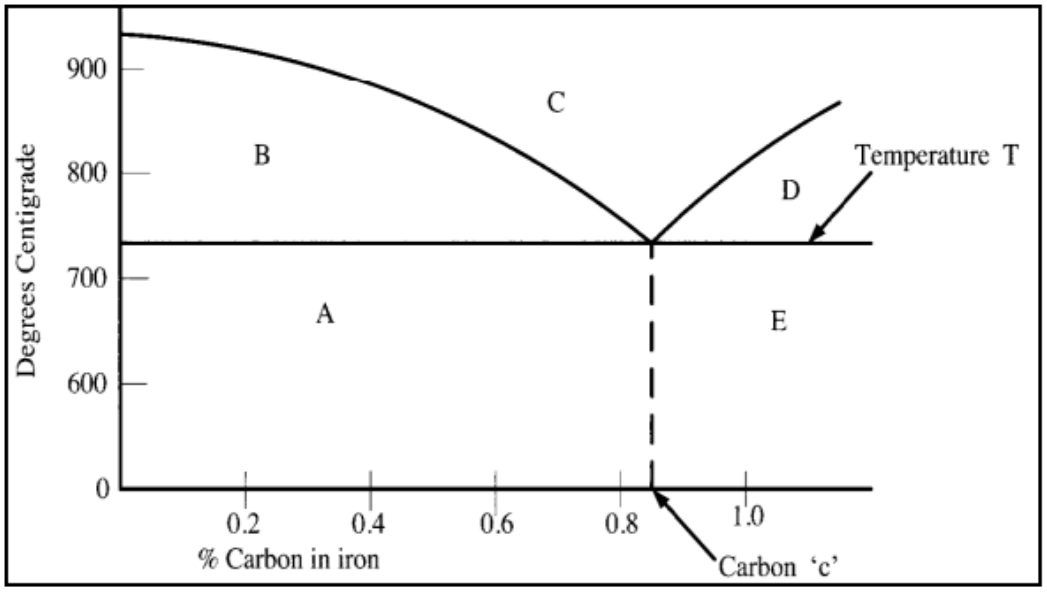
(b) Explain the Brinel Testing procedure for steel.

12. (a) Produce a shaft that can be able to fit on a plain bronze bushing of 35.05mm diameter. If the clearance required between shaft and bush is 0.05 mm, with the aid of drawing indicate limits and tolerances of the fit.

(b) State the allowance obtained in 12(a).

(c) Briefly explain three types of limit gauges used in checking components.

13. (a) (i) Explain the composition and characteristics of the iron in the regions marked as A, B, C, D and E of the iron carbon thermal equilibrium.



(b) State two factors which tend to cause warping and cracking of metals during quenching.

(c) Give three reasons as to why some hot rolled steel need to be cold rolled.

14. (a) Compare cold working from hot working hot working processes by giving five points.

(b) Suggest the suitable material for making each of the following components:

i) Base plate of a pillar drilling machine

ii) Blade of a power hacksaw

iii) Crane hooks and chains

(c) Give reasons of their choice of material in 14(b) for any two parts.