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THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

092

WORKSHOP TECHNOLOGY
(For Both School and Private Candidates)

Time: 3 Hours

Thursday, 10th November 2016 a.m.

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in section A and B and **three (3)** questions from section C.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).



SECTION A (10 Marks)

Answer all questions in this section.

1. For each of the items (i) – (x), choose the correct answer from among the given alternatives and write its letter beside the item number in the answer booklet provided.

- (i) The furnace for converting iron ore into pig iron is called
A bessemer converter ~~B~~ blast furnace
C open hearth furnace D basic oxygen furnace
E crucible furnace.

- (ii) Which of the following is a ferrous material?
A Zinc B Limestone
C Silicon carbide D Iron
E Copper.

- (iii) Free machining steel is a category of steel which
A does not require machining
B can be machined without lubricant
C is easily machined
D has been forged
E has least amount of material to be machined.

- (iv) Greases are classified according to stiffness on a scale of
A 0 (stiffest) to 10 B 0 (stiffest) to 6
C 0 (stiffest) to 100 D 0 (stiffest) to 100
E 0 (stiffest) to 50.

- (v) Which of the following is the quenching fluid that cools most rapidly?
A Plain water B Molten salt
C Oil D Air
E Brine and caustic.

- (vi) Which of the following is used as a physical property to identify metals by virtue of their ability to reflect light?
A Reflectivity B Color
C Luster D Refractive index
E Absorptivity.

- (vii) Impact strength and stiffness are the properties of materials known as
A mechanical properties B chemical properties
C thermal properties D physical properties
E optical properties.

Oil
Brine
- Brine - mo
- water - ca
- oil -
- Air - s

SECTION C (60 Marks)

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

12. (a) Name the products of blast furnace and their uses. (08 marks)
- (b) Give the effects of the following alloying elements to steel:
(i) Chromium - *Hardness*
(ii) Manganese - *strength & toughness*
(iii) Nickel - *hardness*. (06 marks)
- (c) Name the elements which are combined to form the following metals:
(i) Brass - *Copper + Zinc*
(ii) Bronze - *Copper + Tin*
(iii) Gun-metal - *Copper + Zinc + Tin* - *transparent non-ferrous* (06 marks)
13. (a) What are the factors that lead to the decision of using oil or grease for lubrication? (10 marks)
- (b) Explain the methods of applying lubricants in machine parts. - *splash*
- *pressure* (06 marks)
- (c) What are the defects which may develop when oil in a machine has been in use for a long time under warm conditions? - *gravity* (04 marks)
14. (a) State six precautions which should be considered when immersing heated parts or tools in a quenching liquid. (12 marks)
- (b) Distinguish between annealing and normalizing of steel. (08 marks)
15. The designation of a fit is given as 110 K7/h6 , where $\text{K7/h6} = \begin{matrix} +0.010 & / & 0.00 \\ -0.025 & / & -0.035 \end{matrix}$
- (a) Name the basis system and type of fit of the destination. (02 marks)
- (b) Write the hole and shaft allowances. (08 marks)
- (c) Calculate the tolerances for the hole and shaft. (04 marks)
- (d) Calculate the limits. (02 marks)
- (e) Calculate the maximum clearance and interference. (04 marks)
16. (a) Why metals are better conductors of electricity than ceramics and polymers? (03 marks)
- (b) What are the three classifications of ceramic materials according to common characteristic or features? (03 marks)
- (c) (i) Mention four components which are made out of high speed steel material.
(ii) Enumerate four mechanical properties of metals? (10 marks)
- (d) What are the two categories of metal testing methods? (04 marks)

destructive?