



**TECHNICAL UNIVERSITY OF MOMBASA**

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**DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING**

**UNIVERSITY EXAMINATION**

**FOR**

**DIPLOMA IN MECHANICAL ENGINEERING**

**EME 1131: MATERIALS AND PROCESSES**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL**

**TIME: 2HOURS**

**DATE: APRIL 2016**

**Instructions to candidates**

**You should have the following for this examination**

- **Answer booklet, examination pass and student ID**
- **This paper consist of five questions**
- **Attempt any three questions**
- **All questions carry equal marks**
- **Do not write on the question paper.**

**QUESTION ONE**

- a) i. Describe the **four** main classifications groupings of engineering materials and give **two** examples of each type.
- ii. State any **two** general properties for each main classification given in (a) above

**(12marks)**

- b) State **four** chief iron ores and describe the term “gauge” **(3marks)**
- c) Explain the function of the blast furnace and the function of the **four** additional charging materials into the blast furnace. **(5marks)**

### QUESTION TWO

- a) i. Define ferrous metals and give **two** example of such a classification. **(3marks)**
- b) i. Define non-ferrous metals and state any **two** common examples such a classification.
- ii. Explain one distinct property for each of the metals stated in (a) and (b) above **(7marks)**
- c) i. With the aid of a line diagram illustrate the production of iron and steel by the blast furnace. **(6marks)**
- d) i. Differentiate clearly between the “wet” and “dry” production process of copper.
- ii. State any **FOUR** common forms of supply for non-ferrous metals. **(4marks)**

### QUESTION THREE

- a) i. Define the term alloy and state **four** purposes of alloying metal.
- ii. State any **four** common alloying elements to metals **(6marks)**
- b) i. Define the term plastics and differentiate between the two groups of plastics.
- ii. State **three** main properties and **three** applications of such plastics. **(8marks)**
- c) Discuss elastomers stating **six** principles and **six** applications of all plastics. **(6marks)**

### QUESTION FOUR

- a) i. Describe the process of forgework and name any **four** common forging tools and equipment's.
- ii. Explain the “upsetting or jumping up” and the “fullering” process. **(10marks)**

- b) i. Define the heat treatment process of metals and state the main purpose of heat treatment.
- ii. Describe a thermocouple and use a labelled sketch to illustrate its construction.
- (10marks)**

#### **QUESTION FIVE**

- a) i. Define the mechanical properties of materials and give any **Four** examples.
- ii. Clearly differentiate between “stress” and “strain” in terms of strength of materials.
- (8marks)**
- b) Clearly differentiate between (NDT) nondestructive and (DT) destructive testing giving **two** examples for each method.
- (6marks)**
- c) i. Describe corrosion of metals and state any **two** major factors that govern the rate of corrosion
- ii. State **two** mechanisms of corrosion and any **two** methods of corrosion protection.
- (8marks)**