**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF TECHNICAL & ENGINEERING EDUCATION & TRAINING**

**Bachelor of Education Honours Degree in Wood Technology**

**MATERIALS AND CONSTRUCTION**

**PTE 4288**

**SECOND SEMESTER EXAMINATION**

**MAY 2019**

This examination paper consists of 3 pages

**Time Allowed:** **3 hours**

**Total Marks:** **100**

**Special Requirements:** **None**

**Examiner's Name:** **Eng. T R Chikowore**

**INSTRUCTIONS AND INFORMATION TO CANDIDATE**

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Graph Paper

**Question 1**

a) Quality measures and controls are most commonly used in manufacturing but are also applied to many other industries and processes, including construction. Discuss the importance of quality control in construction. [15]

b) Using appropriate examples explain how you would carry out a Health and Safety inspection during the construction of double storey building. [10]

**Question 2**

a) Using appropriate examples and diagrams distinguish between brittle materials and ductile materials. [8]

b) Two points are marked on steel bar of 15 mm diameter. The distance between points was initially 75 mm. After applying a tensile force of 15 kN to the ends, the distance between the two points increased by 0.03 mm and the diameter decreased by 0.002 mm. Determine:
   i) Normal stress [5]
   ii) Longitudinal and lateral strains [4]

c) Distinguish between Simple cubic crystal structure and Face-centred cubic crystal structure. . [8]

**Question 3**

a) Describe any five characteristics you would consider when selecting good building stone. [10]

b) You have been hired as a materials expert in a particular project. Write a report describing the following types of plywood as well as their applications. [15]
   i) Soft wood plywood
   ii) Hard wood plywood
   iii) Tropical plywood

**Question 4**

a) A company is seeking to fire proof one of its storage area where they keep flammable materials. Suggest any three types of materials that they can use in their building. Describe the fire resting properties of those materials. [12]

b) Calculate the Atomic Packing Factor (APF) for the Body-Centred Cubic (BCC) crystal structure. [8]

c) Explain the importance of the Poisson's ratio in the analysis of the strength of products. [5]

**Question 5**

a) Describe any two types of imperfections that can be found with the atomic structure of materials. Use diagrams to aid your answer [12]

b) A 30 mm diameter high-strength steel rod must carry a load in tension of 150 KN. If the initial length of the stressed portion of the rod is 1.5 m, what is its final length? Take E = 220 GPa. [8]

c) Briefly explain the condition of insufficient water in the hydration of Portland cement. [5]

**END OF EXAMINATION**