KIBABII UNIVERSITY

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UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER
SPECIAL/SUPPLIMENTARY EXAMINATIONS
FOR THE DEGREE OF B.ED (SCIENCE) AND BSC (PHYSICS)

COURSE CODE: SPH 325

COURSE TITLE: THE STEELS

DURATION: 2 HOURS

DATE: 8/2/21 **TIME:** 11 – 1 Pm

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 2 printed pages. Please Turn Over

Question One

(a) Differentiate between carbon steels and alloy steels. (2 marks)

(b) Define the following terms as used in alloys

i) system (2 marks)
ii) Components (2 marks)
iii) Phase (2 marks)

(c) State the Hume-Rothery rules of alloying. (3 marks)

(d) State four factors that determine the grainsize of austenite. (2 marks)
(e) State four likely effects of increasing the grain size of austenite. (2 marks)
(f) What is a TTT diagram? (1 mark)
(g) Define hardenability. (1 mark)
(h) Explain the Jominy end-quench test.(4 marks)
(i) Discuss the influence of quenching medium, specimen, size and geometry on hardness of steels. (4 marks)
(j) Differentiate between tempering and ageing. (2 marks)
(k) Why should a steel be subjected to tempering? (2 marks)
(l) What is the importance of combining hardening with either tempering or ageing? (1 mark)

Question Two

Discuss the factors that affect selection of materials. (20 marks)

Question Three

Discuss the properties that are used to classify materials. (20 marks)

Question Four

(a) Use a diagram to classify metal clearly indicating where steels and all their classes belong among metals. (8 marks)
(b) Discuss the types of steels and their mechanical properties. (12 marks)

Question Five

(a) Describe casting as a process of forming steels. (10 marks)

(b) Discuss the four mechanisms of phase transformation. (10 marks)