JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTURIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF MASTER OF SCIENCE IN PURE MATHEMATICS

1st YEAR 1st SEMESTER 2018/2019 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: SMA 805

COURSE TITLE: GENERAL TOPOLOGY

EXAM VENUE: **STREAM: (Msc. Pure Mathematics)**

DATE: **EXAM SESSION:**

TIME:

Instructions:

1. **Answer any THREE questions only**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE [20 MARKS]

(a). Show that every convergent sequence in T_3-space has a unique limit. (10 marks)

(b). Show that every T_2-space is T_1-but a subspace of a normal space is normal. (6 marks)

(c). Describe 4 applications of the study of topology to real life giving examples. (4 marks)

QUESTION TWO [20 MARKS]

(a). Show that any constant map between two topological spaces is continous. (6 marks)

(b). Show that a map defined by, "is homeomorphic to" between topological spaces is an equivalence relation. (8 marks)

(c). Prove that a normal space need not be regular. (6 marks)

QUESTION THREE [20 MARKS]

(a). Describe the separation axioms in topological spaces (4 marks)

(b). Explain the meaning of cofinite topology, homotopy equivalence and null homotopic map. (6 marks)

(c). Prove that the property of a space being Lindelof is topological. (10 marks)

QUESTION FOUR [20 MARKS]

(a). Describe the following aspects of general topology: Denseness; Essential Connectedness; and Boundedness. (6 marks)

(b). Prove that all metric spaces are Hausdorff spaces. (8 marks)

(c). Prove that T_1-property is hereditary. (8 marks)

QUESTION FIVE [20 MARKS]

(a). Let A be a topological space. Prove that a subset B of A is open in A if and only if B is a neighbourhood of each point belonging to B. (4 marks)

(b). Show that the discrete topology is indeed a topology. (4 marks)

(c). State **without proofs**: Tietze's Extension Theorem and Urysohn's Lemma. (6 marks)

(d). Differentiate between a filter base and a net. (2 marks)

(e). Show that the Euclidean topological space is non-trivial. (4 marks)