



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

**SCHOOL OF BIOLOGICAL, PHYSICAL MATHEMATICS AND ACTUARIAL
SCIENCES**

**UNIVERSITY EXAMINATION FOR DEGREE OF MASTER OF SCIENCE IN PURE
MATHEMATICS**

1st YEAR 2nd SEMESTER 2023/2024 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: 812

COURSE TITLE: ABSTRACT INTEGRATION II

EXAM VENUE:

STREAM: (Msc. Pure Mathematics)

DATE:

EXAM SESSION: TWO

TIME: 3.00 HOURS

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) Describe probability measure giving relevant examples. (5 marks)
- b) State and prove the Vitali's Covering Theorem. (9 marks)
- c) Construct a probability space from the activity of throwing a fair dice once. (6 marks)

QUESTION TWO [20 MARKS]

- a) Describe: Measurable function, Strong convergence and Limit point. (6 marks)
- b) State and prove Parseval's equality and Minkowski's inequality. (7 marks)
- c) State and prove Radon-Nikodym Theorem. (7 marks)

QUESTION THREE [20 MARKS]

- (a) Does convergence in L^p imply convergence in measure? Explain. (6 marks)
- (b) State and prove Banach's contraction principle. (7 marks)
- (c) Prove that strong convergence implies weak convergence in Borel spaces. (6 marks)

QUESTION FOUR [20 MARKS]

- a) Prove that Products of L^p -spaces are complete. (6 marks)
- b) State and prove the Browder-Kirk Theorem for fixed points. (7 marks)
- c) State and prove Monotone Convergence Theorem. (7 marks)

QUESTION FIVE [20 MARKS]

- a) By giving relevant application areas, state and prove Tonelli's Theorem. (7 marks)
- b) State and prove Cantor's intersection Theorem. (6 marks)
- c) State and prove Wiener Maximal Theorem. (7 marks)