



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTUARIAL SCIENCES

UNIVERSITY SPECIAL EXAMINATION FOR DEGREE OF BSC

2020/2021 ACADEMIC YEAR

COURSE CODE: SMA 3114

COURSE TITLE: Analytical Methods for Computing

EXAM VENUE:

STREAM: (BSc)

DATE:

EXAM SESSION: NOVEMBER, 2020

TIME:

Instructions:

- 1. Answer Question ONE(COMPULSORY) and any other TWO 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 - COMPULSORY [30 MARKS]

- (a) State and prove the second Law of De’Morgan for any two sets P and Q. (5 marks)**
- (b) Show tha the empty set is unique. Moreover, show that it is a subset of any set. (5 marks)**
- (c) Show that square root of 5 is an irrational number. (5 marks)**
- (d) In a town 71% of the population use Yu, 79% use Airtel and 94% use any of the lines. Determine the percentage of people who use both lines. (5 marks)**
- (e) Show that the set $\{0, 1\}$ is a Boolean set. Describe its significance in computing. (5 marks)**
- (f) Describe the terms: Digraph, Loop, Quiver and matrix as used in computing. (5 marks)**

QUESTION TWO (20 MARKS)

- (a) Distinguish between Permutation and Combination. (4 marks)
- (b) How many different committees of 8 can be chosen from a group of 11 if only 4 people qualify for treasurer. (8 marks)
- (c) Show that $\sin^2 \theta + \cos^2 \theta = 1$. (8 marks)

QUESTION THREE (20 MARKS)

- (a) Determine whether $\sqrt{2} + \sqrt{3}$ is rational or irrational. (7 marks)
- (b) Is $B = \{x \in \mathbf{N} : x^2 - \frac{5}{14}x - \frac{1}{14} = 0\}$ a set? Explain. (6 marks)
- (c) Find the 16th root of the cardinality of $P(P(P(P(P(\emptyset))))$. (7 marks)

QUESTION FOUR (20 MARKS)

- (a). When a number is divided by 10 the remainder is six and when divided by thirteen, the remainder is nine. Find three possible number of this kind. (7 marks)
- (b). Describe the significance of graphs and networks to computing. (8 marks)
- (c). Find the sixth term and the sum of the first eight terms of the series $40+20+10+\dots$ (5 marks)

QUESTION FIVE (20 MARKS)

- (a). Define: A set; Equal sets; Relation. (6 marks)
- (b). A research conducted on the eating habits among 405 people gave the following data in respect of three types of food:

Chapati.....	149
Beans.....	101
Rice.....	118
Chapati and Beans.....	41
Chapati and Rice.....	49
Beans and Rice.....	43
Eat all the three types of food...	15

- (i) Present the above information on a Venn diagram. (5 marks)
- (ii) Find the total number of people who eat at least two types of food. (3 marks)
- (iii) Find the total number of people who eat two types of food only. (2 marks)
- (iv) Find the total number of people who eat one type of food only. (2 marks)
- (v) Find the number of those who eat none of the 3 types of food. (2 marks)