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 $\text{Sin}^2\theta + \text{Cos}^2\theta = 1$. (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 16^{th} root of the cardinality of *P(P(P(P(P(∅)).* (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+... (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 tpes of food. (2 marks)