JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTURIAL SCIENCES

UNIVERSITY EXAMINATION FOR BACHELOR OF SCIENCE DEGREE

1st YEAR 1st SEMESTER 2022/2023 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: WMB 9106

COURSE TITLE: ANALYTICAL METHODS FOR COMPUTING

EXAM VENUE: **STREAM: (BSc)**

DATE: **20/12/2022**   **EXAM SESSION: 9.00-11.00AM**

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). Show that there is no rational number whose square is 3. (5 marks)
(b). Given that $f(x)=2x^3+3x-23$ and $g(x)=x-2$. Find $f(3)$, $g(¾)$ and $(f/g)(x)$. (5 marks)

(c). Given that $\mathcal{D}=\{0,1,2,...,9\}$, $A=\{1,3,5\}$ and $B=\{2,3,5,7\}$. Find A^c, $B\cup A^c$ and $\mathcal{P}(A)$. (5 marks)

(d). Design a LOGIC circuit for the function $F3=(Y+Z')X+X'YZ$. (5 marks)
(e). When a number is divided by 11, the remainder is 6 and when divided by 14, the remainder is 9. Find three possible numbers of this kind. (5 marks)
(f). In a town, *81%* of the population use Colgate, *69%* use Aquafresh and *89%* use any of the two types of toothpastes. Determine the percentage of people who use both types of toothpastes. (5 marks)

QUESTION TWO (20 MARKS)
(a). Define Boolean algebra and hence show that the set *{0,1}* is a Boolean algebra. (10 marks)
(b). Distinguish between Permutation and Combination. (4 marks)
(c). How many different committees of 7 people can be chosen from a group of 10 if only 3 people qualify for assistant chairperson? (6 marks)

QUESTION THREE (20 MARKS)
(a). Define: Set; Equal sets; Range of a function. (6 marks)
(b). A research conducted on the eating habits among 435 people gave the following data in respect of three types of food:

          Chapati...152
          Beans.. 101
          Rice..119
          Chapati and Beans..............................43
          Chapati and Rice.................................49
          Beans and Rice....................................41
          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 students who eat at least two types of food. (3 marks)
(iii). Find the total number of students who eat two types of food only. (2 marks)
(iv). Find the total number of students who prefer one type of food only. (2 marks)
(v). Find the total number of students who prefer none of the 3 types of food. (2 marks)

QUESTION FOUR (20 MARKS)
(a). Prove that every positive integer is either odd or even. (6 marks)
(b). State and prove the Binomial Theorem by mathematical induction. (14 marks)

QUESTION FIVE (20 MARKS)
(a). Define the terms Gate and Combinatorial logic as used in computing. Use a diagram to illustrate the standard symbol for a NAND gate. (4 marks)
(b). Computing is indispensable in the daily running of activities in every institution. Trace the origin of computing and describe its importance and illustrate how it controls the world in terms of medicine, sports, elections, agriculture, war among other aspects. (16 marks)