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OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2017 /2018 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER REGULAREXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE(MICROBIOLOGY)

COURSE CODE: **STA 111**

COURSE TITLE: **INTRODUCTION TO PROBABILITY THEORY**

DATE: 24TH APRIL, 2018 **TIME: 9AM – 12.00 NOON**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 5 PRINTED PAGES **PLEASE TURN OVER**

STA 111: INTRODUCTION TO PROBABILITY THEORY

STREAM: MIC **DURATION: 3 Hours**

INSTRUCTIONS TO CANDIDATES

i. *Answer Question **TWO** questions in section Aand any other **THREE** questions in section B.*

ii. *Maps and diagrams should be used whenever they serve to illustrate the answer.*

iii. *Do not write on the question paper.*

SECTION A (31 marks): Answer ALL questions.

QUESTION ONE (16 Marks)

a) Briefly explain the following terms as used in probability:

i. Sample space [1Mark]

ii. Empty set [1Mark]

iii. Complement of a set [1Mark]

iv. Venn diagram [1Mark]

b) Let set A={1,2,3,4,5},B={4,5,6,7,8} and C={6,7,8,9}. Show that;

i) $A \cup B = B \cup A$[1Mark]

ii) $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$[2Marks]

c) Define the term power set? Hence find [1Mark]

P(S)? if S={1,2,3} [2Marks]

d) Suppose there are 3 roads from A to B. for each of these are 4 choices from B to C to another town D. How many possible routes are there? [2Marks]

e) Evaluate

i) $\frac{7!}{3!3!}$ [2Marks]

ii) $\frac{9C_5}{3!3!}$ [2Marks]

QUESTION TWO (15 Marks)

a) Eight birds are to be placed in eight different cages. How many arrangements are possible if each bird is placed in a separate cage? [2Marks]

b) Briefly explain the following terms as used in probability theory?

i) Mutually exclusive events [1Mark]

ii) Independent events [1Mark]

iii) Equally likely events [1Mark]

c) Alupe University College has three courses, namely Accountancy, research and statistics. The college has a total population of 500 students. Data obtained from the records of the college revealed the following; 329 students were undertaking accountancy course; 189 students were undertaking research course. 295 students were undertaking statistics course; 83 students were undertaking accountancy and research course; 217 students were undertaking accountancy and statistics course; 63 students were undertaking research and statistics course. With the aid of a Venn diagram determine the number of students undertaking all the three courses in Alupe University College? [5Marks]

d) A local motor vehicle assembly plant has initiated a project to manufacture and sell motor vehicle locally. The plant will manufacture motor vehicle with engine capacity of 1200cc, 1500cc or 1800cc. The body style of the motor vehicles of saloon, station-wagon or pick-up with a white, blue or cream body color. With the aid of a diagram determine the probability that a motor vehicle picked for purchase by a buyer is blue saloon with an engine capacity of 1500cc. [3Marks]

e) Let P={a,b,c} and Q={m,n}

Represent the product of set P and Q in a tree diagram. [2Marks]

SECTION B (39 marks): Answer any THREE questions. All Questions carry equal marks

QUESTION THREE (13 Marks)

a) Represent the product set of A={3,4,5} and B={6,8} using an arrow diagram? [3Marks]

b) I) How many committees of 4 people can be chosen from 5 men and 3 women? [2Marks]

II) From I) above how many of these could be all men? [2Marks]

III) From I) how many would consist of 2 men and 3 women? [3Marks]

c) How many 4 digit number can be made from the digit 2, 3,5,6,7, and 9. If no repetition of digit is allowed. [3Marks]

QUESTION FOUR (13 Marks)

a) Define the following terms

i) Permutation [2Marks]

ii) Combination [2Marks]

b) How many ways can twelve pieces of fruit be divided into two baskets containing five and seven pieces of fruit respectively? [3Marks]

c) A fair coin is tossed three times find the probability of getting a head in the third throw given that the first two tosses are heads? [3Marks]

d) In a class of 100 students 36 are male and studying accounting, 9 are male but not studying accounting, 42 are female and studying accounting, 13 are female and are not studying accounting. Use these data to deduce probabilities concerning a student drawn at random. [3Marks]

QUESTION FIVE (13 Marks)

a) A committee of three people is to be chosen at random from three men and two women. What is the probability that?

i) All three people chosen are men? [2Marks]

ii) One of the three chosen is a woman? [2Marks]

b) In a competitive examination, 30 candidates are to be selected. If all the 600 candidates appear in a writing test and 100 will be called for the interview

i) What is the probability that a person will be called for the interview? [1Mark]

ii) Determine the probability of a person selected if he has been called for the interview? [3Marks]

iii) What is the Probability that person is called for the interview and is selected? [3Marks]

c) Given $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{6}$ Find $P(A \cup B)$ [2Marks]

QUESTION SIX (13 Marks)

a) Two marbles are drawn in turn from a pack containing 3 red marbles and 6 white marbles, 7 black marbles and 9 green marbles. If drawing is done without replacement or with replacement. Determine the probability of having

i) Two white marbles [4Marks]

ii) A black then a green marble [5Marks]

iii) No red marble [4Marks]

QUESTION SEVEN (13 Marks)

a) A bag contains 8 black balls and 5 white balls. If two balls are draw from the bag one at a time. Find the probability of drawing a black ball and a white ball.

i) Without replacement [3Marks]

ii) With replacement [4Marks]

b) List three laws of probability [3Marks]

c) Suppose you went to a restaurant for a meal and the waiter informs you that there are;

i) Two choices of appetizers soup or juice

ii) Three choices of the main course, meat, fish and vegetable dish

iii) Two choices of dessert ice cream or cake

How many possible choices do you have for your complete meal? [3Marks]

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