



FOUNTAIN UNIVERSITY OSOGBO, NIGERIA

P.M.B.4491, OSOGBO, OSUN STATE.

COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES
2021/2022 SECOND SEMESTER EXAMINATIONS

Credit Unit/Status: 3 (C)

STA 210: Probability II

Time Allowed: 2hrs

INSTRUCTION(s): Answer ANY 4 THE QUESTIONS

QUESTION ONE

(a) Given that;

$$f(x) = \begin{cases} \frac{xy^2}{30}, & x = 1, 2, 3; y = 1, 2 \\ 0, & \text{elsewhere} \end{cases}$$

(10 Marks)

Show that X and Y are independent

(b) A fair die is tossed once. Let X denotes twice the number appearing, and Let Y denotes 1 or 3 accordingly as an odd and an even number that appears, Find the distribution of $X + Y$ (5Marks)

QUESTION TWO

(a) Let X be a random variable with Poisson distribution

a die in

(3 Marks)

(i) Obtain the moment generating function of X

(6 Marks)

(ii) Show that the mean and variance of random variable X above are equal.

(b) Given that;

$$f(x) = \begin{cases} kx, & 0 \leq x \leq 5 \\ 0, & \text{elsewhere} \end{cases}$$

(3 Marks)

(i) Find K

(3 Marks)

(ii) Calculate $\Pr(2 \leq x \leq 4)$

QUESTION THREE

(a) Every Saturday a fisherman goes to the river, the sea and a lake to catch fishes with probabilities $1/4$, $1/2$, and $1/4$, respectively. If he goes to the sea, there is an 80% chance of catching fish, the corresponding figures for the river and the lake are 40% and 60% respectively.

(3 Marks)

(i) Find the probability that he catches fish on a given Saturday.

(ii) What is the probability that he catches fish in at least three of the five

- consecutive Saturdays?
- (iii) If on a particular Saturday, he comes home without catching anything, where is it most likely he has been? (3 Marks)
- (b) In how many ways can a team of eleven be chosen from fifteen possible players if;
- (i) there is no restriction? (3 Marks)
- (ii) a particular player is to be included in the team? (3 Marks)

QUESTION FOUR

- (a) A pair of dice is rolled once, let X be a random variable denoting the sum of two numbers that appear;
- (i) Obtain the probability density of X . P_{100} (3 Marks)
- (ii) Obtain the cumulative density function of X and its graph. f_{100} (4 Marks)
- (b) A bag contains 10 white balls and 15 black balls. Two balls are drawn in succession with replacement, what is the probability that;
- (i) the first ball is black and the second is white (2 Marks)
- (ii) both are black (2 Marks)
- (iii) both are of different colour (2 Marks)
- (iv) the second is black given that the first is white (2 Marks)

QUESTION FIVE

- (a) State the probability mass function (pmf) of the following probability distributions;
- (i) Bernoulli distribution (1.5 Marks)
- (ii) Binomial distribution (1.5 Marks)
- (iii) Poisson distribution (1.5 Marks)
- (iv) Geometric distribution (1.5 Marks)
- (b) A student has the opportunity of retaking a public examination as much as he likes until he passes it. The teacher, after observing the student's level of preparation, put his chance of passing the examination in any attempt at 52%. If he must pass the exam, going by the teacher's belief, what is the probability that;
- (i) he takes the examination at most three times? (3 Marks)
- (ii) he does not pass in the first attempt? (3 Marks)

- (iii) Find the expected number of times he will sit for exam.

(3 Marks)

QUESTION SIX

- (a) A coin is tossed three times, let X representing number of heads be a random variable defined as;

x	0	1	2	3
$P(x)$	$1/8$	p	q	$1/8$

- (i) Obtain the values of p and q (3 Marks)
 (ii) Compute $E(X)$ (3 Marks)
 (iii) Show that the probability function is indeed a true probability function (3 Marks)

- (b) If A is the event that an even number appears and B is the event that an odd number greater than one occurs in a single throw of a die.

- (i) Show that events A and B are mutually exclusive (3 Marks)
 (ii) Find the probability of obtaining either an even number or an odd number greater than one (3 Marks)