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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(MATHEMATICS)

Date: 16th August, 2016.
Time: 8.30am – 10.30am

KMA 102 – INTRODUCTION TO PROBABILITY AND STATISTICS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Differentiate between the following statistical terms ;

i) Simple and compound events

ii) Independent and dependent events

iii) Mutually exclusive and exhaustive events

(6 Marks)

b) Calculate the Geometric Mean from the following data;

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	3	7	8	15	5

(6 Marks)

c) The following table shows the probabilities, for the number of breakdowns of a machine in a week.

No. of breakdown	1	2	3	4	5
Probability	0.20	0.38	0.20	0.12	0.10

i) What is the probability that there will be less than one break down?

(1 Mark)

ii) What is the probability that there will be two break downs?

(1 Mark)

iii) Find the mean and variance of the number of machine break downs

(5 Marks)

d) The following facts were gathered before and after an industrial dispute;

	Before Dispute	After Dispute
No. of Workers	516	508
Mean Wages	49.50	51.75
Variance of Wages	100.00	121.00

Compare the position before and after the dispute in respect of coefficient of variation. Hence or otherwise comment on the disparity on the wages received by the workers.

(5 Marks)

e) It is expected that 10% of production from a continuous process would be defective. Find the probability that in a sample of 10 units chosen at random;

i) Exactly 2 will be defective

(3 Marks)

ii) At least 2 will be defective

(3 Marks)

QUESTION TWO (20 MARKS)

a) The following data relate to weekly wages paid to workers in two factories A and B

Wages	**Number of Worker**	
	A	**B**
Up to 5	20	15
5 – 10	18	20
10 – 15	30	35
15 - 20	35	30
20 - 25	20	18
25 - 30	15	17

Find out;

i) Standard deviation in the factories A and B separately

(6 Marks)

ii) Standard deviation in two factories taken together

(4 Marks)

b) The number of industrial injuries per working week in a particular factory is known to follow a Poisson distribution with mean 0.5. Find the probability that;

i) In a particular week there will be;

a) Less than two accidents

(3 Marks)

b) More than two accidents

(4 Marks)

ii) In a three-week period, there will be no accident.

(4 Marks)

QUESTION THREE (20 MARKS)

a) A discrete random variable has the following probability mass function

x	3	4	5	6	7
$\Pr(X = x)$	0.1	a	0.3	b	0.2

If $E[X] = 5.2$. Find the values of a and b

(7 Marks)

b) State the Bayes' Theorem

(3 Marks)

c) A chance that a doctor A will diagnose disease B correctly is 60%. The chance that a patient will die by this treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease B died. What is the chance that his disease was?

i) Correctly diagnosed

(6 Marks)

ii) Wrongly diagnosed

(4 Marks)

QUESTION FOUR (20 MARKS)

The daily expenditure of 100 families is given as;

Expenditure	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of Families	5	13	21	37	15

Calculate the following and interpret your results;

i) Karl- Pearson's coefficient of skewness

(10 Marks)

ii) Kurtosis value using the method quartiles and percentiles

(10 Marks)

QUESTION FIVE (20 MARKS)

a) Consider the following data;

Class Interval	5 - 10	10 -15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45
Frequency	6	5	15	10	5	4	3	2

Calculate;

i) Arithmetic mean

(4 Marks)

ii) Geometric Mean

(4 Marks)

iii) Harmonic Mean

(4 Marks)

b) Use Poisson approximation to the binomial distribution to calculate the probability that a consignment of 10000 electronic components, each of which has a 0.02% probability of being faulty, contains perfect items.

i) At most 5 are perfect

(4 Marks)

ii) More than 3 are perfect

(4 Marks)