



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**FIRST YEAR EXAMINATION FOR THE DEGREES OF
BACHELOR OF SCIENCE (STATISTICS) BACHELOR OF
SCIENCE (COMPUTER SCIENCE), BACHELOR OF
(ECONOMICS AND STATISTICS) BACHELOR OF SCIENCE
(GENERAL) AND BICT**

STAT 111: INTRODUCTION TO PROBABILITY AND STATISTICS I

STREAM: R

TIME: 2 HRS

DAY: FRIDAY [14.30 – 16.30 P.M]

DATE: 30/01/2026

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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INSTRUCTIONS

- Answer question **ONE** and any other **TWO** questions.

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in statistics.
- i) Population **(1 Mark)**
 - ii) Sample **(1 Mark)**
 - iii) Parameter **(1 Mark)**
 - iv) Statistic **(1 Mark)**
 - v) Variable **(1 Mark)**
- b) Given the probability distribution of a discrete random variable X as shown below, determine the value of the constant k hence find $P(6 < X \leq 8)$. **(4 Marks)**

X	4	5	6	7	8	9
$P(X=x)$	0.1	3k	0.2	0.25	4k	2k

- c) A company surveyed 12 of its employees. Below is a table of their years' experience with the company and their income.

Experience (Full years)	10	8	4	12	7	6	1	3	4	5	12	7
Salary (Rs 000's)	41	33	27	46	29	33	20	27	44	32	38	32

- i) Using the calculator, obtain the Pearson's product moment correlation coefficient for this data. What does this statistics mean? **(2 Marks)**
 - ii) Compute the coefficient of determination and briefly explain what it means **(2 Marks)**
 - iii) Obtain the last squares regression line using a calculator **(2 Marks)**
 - iv) What is the expected salary for a person with 9 years of experience? **(1 Mark)**
- d) Let A and B be two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cup B) = \frac{2}{3}$.

Find;

- i) $P(A \cap B)$ **(1 Mark)**
- ii) $P(A/B)$ **(2 Marks)**

- iii) $P(B^c/A)$ (2 Marks)
- e) A random sample of 30 households from an urban residential estate gave the following number of persons per household:
5, 6, 3, 1, 2, 3, 3, 3, 4, 5, 3, 2, 6, 4, 3, 5, 4, 3, 3, 4, 3, 3, 1, 2, 4, 3, 4, 2, 4, 4
- i) Construct an ungrouped frequency distribution for the data (3 Marks)
- ii) Calculate the mean from (i) above (3 Marks)
- iii) Calculate the standard deviation from (i) above (3 Marks)

QUESTION TWO (20 MARKS)

- a) State Bayes' theorem (3 Marks)
- b) A truth AI App under development has the property that 90% of the guilty suspects are properly judged, while 10% of guilty suspects are improperly found innocent. On the other hand, innocent suspects are misjudged 1% of the time. If a suspect is selected from a group of suspects of which only 5% have ever committed crime and the App indicates that he is guilty, what is the probability that he is innocent? (7 Marks)
- c) A committee of five people is to be chosen from 9 men and 4 women. What is the probability that;
- i) All the five chosen are men (2 Marks)
- ii) Two of the five people chosen are women. (3 Marks)
- d) The probability that 'A' solves a problem in Math's is $\frac{2}{5}$ and the probability that 'B' solves it is $\frac{3}{8}$.
If they try independently find the probability that:
- i) Both solve the problem. (2 Marks)
- ii) At least one solves the problem. (3 Marks)

QUESTION THREE (20 MARKS)

The table below shows the age of thirty five people in a certain company.

Age	10-19	20-29	30-39	40-49	50-59	60-69
Number of employees	3	5	12	7	5	3

Calculate;

- i) Mean (3 Marks)
- ii) Mode (3 Marks)
- iii) Median (3 Marks)
- iv) Standard deviation (5 Marks)
- v) 4th Decile (3 Marks)
- vi) 90th percentile (3 Marks)

QUESTION FOUR (20 MARKS)

The following data shows the advertising expenses (in thousands dollars) and the sales (in thousands dollars) in a random sample of six supermarkets.

Advertising cost (X)	1.5	1.0	2.8	0.4	1.3	2.0
Sales (Y)	36	28	54	19	29	43

- i) Find the regression equation. (9 Marks)
- ii) Calculate the correlation coefficient and comment on your answer. (4 Marks)
- iii) Compute the coefficient of determination for the above data and comment on your answer. (3 Marks)
- iv) Estimate the Net operating profit when the Advertising cost is \$7000 (2 Marks)
- v) State two uses of regression analysis. (2 Marks)

QUESTION FIVE (20 MARKS)

a) The table below shows the age of 200 employees in given company.

Age	20-24	25-29	30-34	35-39	40-44	45-49
No. of people	21	59	52	26	22	20

- i) Draw a histogram and a Frequency Polygon on the same graph. (4 Marks)
- ii) Calculate the Quartile Deviation (5 Marks)

b) In certain town, male and female each form 50% of the population. It is known that 20% of the males and 5% of the female are unemployed. A research studying the employment situation selects an unemployed person at random, what is the probability that the persons so selected is male.

(4 Marks)

c) Given two events A and B such that $P(A) = 0.4$ while $P(A \cup B) = 0.7$,

i) Distinguish between; mutually exclusive events and independent events **(2 Marks)**

Hence find P (B) if A and B are;

ii) Mutually exclusive events **(3 Marks)**

iii) Independent events **(2 Marks)**