

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Probability and Statistics (New)

Semester: Fall

Year : 2024  
Full Marks : 100  
Pass Marks : 45  
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) The average electricity consumption and standard deviation of two sets of households are as follows: 8

Statistic	Set I	Set II
Mean:	65 units	72 units
Standard deviation:	13 units	18 units
No. of households:	50	40

Which set is more variable in consumption? Calculate the coefficient of variation of the combined set.

- b) State Baye's Theorem. In a class of 75 students, 15 students were considered to be very intelligent, 45 as medium and rest below the average. The probability that a very intelligent student fails in examination is 0.005, the medium student failing has probability 0.05 and corresponding probability for a below average is 0.15. If a student is known to have passed the examination, what is the probability that he is below the average? 7
2. a) A random variable X has the following probability function: 7

X	-2	-1	0	1	2
P(x)	0.2	0.1	0.3	0.3	0.1

Find:

- $E(x)$
- $E(2x-3)$
- $V(x)$

- b) Out of 800 families in a certain city with 4 children each, what percentage would be expected to 8
- 1 boy and 3 girls.

- at least one boy <sup>and</sup> find the Expected number of families having 2 boys.

Assume boys and girl having equal probabilities.

3. a) Define exponential distribution. Derive its mean and variance. 7

OR

The mileage in thousands of miles which car owners get with a certain kind of tyre is a r.v having exponential distribution with  $\lambda = 0.5$ . What is the probability that such tyre will be still in operating condition after 4000 hours?

- b) Suppose X and Y have the following joint probability mass function. 8

	X	2	3
Y			
1		0.1	0.15
2		0.2	0.3
3		0.1	0.15

Find:

- The Marginal distribution of X and Y.
  - The conditional probability of Y given that  $X=3$ .
  - $F(2,2)$  and  $F(3,2)$ .
  - Variance of X and Variance of Y.
4. a) What do you mean by unbiased estimator? Consider a population of 5 units with 4,2,0,6,8. Show that sample mean of size 2 is unbiased estimator of population mean. 7
- b) A random sample of 500 bulbs was taken from the manufacturing company, among them 65 were found to be defective. Assign the limits in which the non-defective bulbs produced by the company at 95% confidence levels. 8

OR

A random sample of 300 first year students of ABC Campus was selected from total 2500 students. The mean and standard deviation of marks in Statistics of these 300 students were found to be 50 and 10. Find 99% confidence interval for average marks of all students.

5. a) A certain college conducts both morning and evening classes intended to be identical. A random sample of 200 morning class 7

students yield examination result as average score of 72.4 with a standard deviation of 14.8. A random sample of 100 evening class students yield examination result as average score of 73.9 with a standard deviation of 17.9. Are the average score of morning and evening classes equal at 5% level of significance?

b)

A principal of the college thought that memory power training is better for learning process of students, then memory power training were lunched. The memory capacity of the students were noted before and after training. The data recorded as:

Is the training effective at 5% level of significance?

Before Training	56	42	36	47	49	42	60	72	63
After training	147	125	118	128	145	140	155	160	149

6. a) In an experiment to study the dependence of hypertension smoking habits, the following data were taken on 180 individuals.

Cases	Non smokers	Moderate smokers	Heavy smokers
Hypertension	21	36	30
No Hypertension	48	26	19

Test the hypothesis that presence or absence of hypertension is independent of smoking habits. Use  $\alpha=0.05$ .

- b) Write the properties of correlation coefficient and regression coefficient.
7. Write short notes on: (Any two)
- Normal distribution
  - Central limit theorem
  - Properties of good estimator