POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year: 2024
Programme: BCSIT | Full Marks: 100
Course: Linear Algebra and Probability | Pass Marks: 45
Time: 3 hrs.

Candidates are required to answer in their own words as far as practicable. The figures in the margin indicate full marks.

Section "A"

Very Short Answer Questions

Attempt all the questions. [10×2=20]

1. What are statistics? Mention its two applications on IT.
2. In a class of 50 students 10 have failed and their average marks is 2.5. The total marks secured by entire class were 275. Find the average marks of those who have passed.
3. Find out the combined standard deviation from the following data:

	Type A	Type B
No. of observations	100	400
Mean	50	55
Standard Deviation	10	12

4. A random variable X has the following probability distribution. Find the value of K and calculate mean.

Values of X: (X)	-2	-1	0	1	2	3
Probability: P(X)	0.1	k	0.2	2k	0.3	k

5. Calculate Karl Pearson's correlation coefficient for the given table.

X	2	3	4	5	1
Y	6	9	12	15	3

6. If the population standard deviation is 78, find the sample size necessary to estimate the true mean within 50 points for a confidence level of 95 percent?
7. If E(X)=68 and Var(X)=9, then compute:
   a) E(5X+4) b) Var(10X-7)
8. Define variables and discuss its types.
9. A random sample of 500 oranges were taken from a large consignment and it was observed that 65 were found to be bad. Find the standard error of proportion of bad oranges.
10. What is hypothesis testing? Explain in brief.

Section "B"

Descriptive Answer Questions

Attempt **any five** questions. [5×10=50]

11. The marks obtained by 50 students in statistics test are given below:

40	48	45	54	49	58	36	76	76	85
48	48	48	47	56	34	39	72	28	67
57	58	57	57	49	64	62	64	10	66
50	48	47	54	32	38	71	26	67	67
52	52	53	38	55	58	22	84	27	15

i. Construct a frequency distribution table of class size 10.
ii. Compute the mean of the data.
iii. Find the standard deviation and coefficient of variation of the data.

12. a. Medhavi college has announced advertisement for the post of Senior Accountant to fulfill one vacant post. The application of the potential candidates is presented in the following table.

Age (Years)	BBA Degree holder	MBA Degree holder
Under 25	60	8
25-35	7	26
Above 30	9	10

If one of the applicants is selected at random, find the probabilities that

i. he has completed MBA given that he is above 30 years old.
ii. he has done BBA and he lies between 25 to 30 years.

b. There are three machines A, B, and C producing 1000, 2000 and 3000 articles per hour respectively. These machines are known to be producing 1%, 2% and 3% defectives respectively. One article is selected at random from an hour production of the three machines and found to be defective. What is the probability that is produced from Machine 'A'?

13. The advertisement expenses and the sales of a new product are recorded as below:

Advertisement Expenditure (Rs. 1000)	1	5	6	8	10
Sales (Rs. 1000)	50	60	80	100	110

i. Estimate the sales when the advertising expenses is Rs. 9,000 creating a regression equation.
ii. Compute the correlation coefficient and coefficient of determination of the data.

14. a. Electric bulbs manufactured by X and Y companies gave the following results.

	X	Y
Number of bulbs used	100	100
Mean life in hours	1300	1250
Standard deviation	85	93

Test whether there is any significant difference in the mean life of the two makers?

b. A manufacturer claims that the average weight of a packet of chips is 250 grams. A sample of 36 packets is selected, and the sample mean weight is found to be 245 grams with a standard deviation of 8 grams. At a 1% significance level, test the manufacturer's claim.

15. a. What is sampling? Discuss various sampling techniques with their meris and demerits.

b. From a population of 540, a sample of 60 individuals is taken. From this sample, the mean is found to be 6.2 and standard deviation 1.368

i. Find the estimated standard error of the mean

ii. Construct a 96% confidence interval for the mean.

16. a. At a particular university it has been found that 20% of the students withdraw without completing the Business Statistics course. Assume that 18 students have registered for the course this semester;

i. What is the probability that none will withdraw?

ii. What is the probability at most 2 will withdraw?

b. The income of a group of 20,000 persons was found to be normally distributed with mean Rs.7,500 and standard deviation Rs. 500. Find the lowest income of richest 20% of persons.

Group "C"

Long Answer Questions

Attempt **any two** questions. [2×15=30]

17. There are a number of possible measures of sales performance, including how consistent a salesperson is in meeting established sales goals. The data that follow represent the percentage of goal met by each of three salespeople over the last 5 years.

Ram	88	68	89	92	103
Shyam	76	88	90	86	79
Hari	104	88	118	88	123

i. Who is better?

ii. Who is more intelligent?

iii. If consistency is the criteria for awarding, who should be awarded?

18. a. A Statistics analysis of 100 long distance telephone calls made from the headquarters of the bricks and clicks. Computer corporation indicates that the length of these calls is normally distributed with $\mu = 240$ seconds and $\sigma = 40$ seconds.

i. What percentage of these calls lasted less than 180 seconds?

ii. How many calls lasted less than 180 seconds or more than 300 seconds?

b. In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

19. Salesman in various sectors are assigned to increase the sales. Data are recorded as below.

Region (Sales in '000 Rs.)		
1	**2**	**3**
20	30	25
80	40	50
50	30	40
60	40	30
70	50	40

At 5% level of significance, test whether there is significant difference in sales due to the region.