POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2018
Programme: BE Full Marks: 100
Course: Probability Statistics Pass Marks: 45
Time : 3hrs.

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 following data set represents the number of new computer accounts registered during ten consecutive days. 7
43, 37, 50, 51, 58, 105, 52, 45, 45, 10.
   i. Compute the mean, median and standard deviation.
   ii. Draw a box and whisker plot and and identify whether it is skewed or not.

   b) After the implementation of an economic program to uplift the economic condition of a community following information were found. 8

Monthly income (Rs 000)	4-6	6-8	8-10	10-12	12-14	14-16	16-18
After the plan (no of families)	8	65	37	15	15	5	5

Construct an ogive to find
   i. Find the number of families whose monthly income is between Rs. 8,000 to Rs.14, 000.
   ii. Find the number of families whose monthly income is above Rs. 12,000.

2. a) A firm has 80% of its service calls made by a contractor and 10% of these calls result in customer complaints. The other 20% of the service calls are made by their own employees, and these calls have a 5% complaint rate. Find the probability of a complaint. Also, using Bayes theorem to find the probability that a complaint was from a customer whose service was provided by the contractor. 8

   b) Three bags contain 3 video cards and 2 network cards, 5 video cards and 6 network cards, 2 video cards and 4 network cards respectively. 7

One card is drawn from each urn. Find the expected number of video cards.

3. a) Messages arrive at an electronic message center at random times, with an average of 9 messages per hour. 3×5
   i. What is the probability of receiving at least five messages during the next hour?
   ii. What is the probability of receiving exactly five messages during the next hour?

   b) The average diameter of a sample of 1000 pipes is 2.6 inches and standard deviation is 0.55. Assuming that the diameter of pipes is normally distributed. Find the number of pipes of diameter
   i. Greater than 2 inches.
   ii. Between 2 and 3.1 inches

   c) A continuous random variable X has the following density function.

$$f(x) = kx^2 \quad for\ 0 < x < 1$$
$$0 \quad otherwise$$

   i. Find the value of k
   ii. P(0<X<0.7)
   iii. E(X)

4. a) In a random sample of 300 households in a city 223 have computer. Set an approximate 95% and 99% limits to the true value of proportion of households with computer in the whole city. 7

   b) A random sample of 200 bolts manufactured by machine A and of 100 bolts manufactured by machine B showed 19 and 5 defective bolts respectively. Test the hypothesis that machine B is performing better than A at 5% level of significance. 8

5. a) The sales data of steel for a steel factory in six shops before and after a special promotional campaign are as under: 7

Shops	A	B	C	D	E	F
Before campaign	53	28	31	48	50	42
After campaign	58	29	30	55	56	45

Can the campaign be judged to be a success? Test at 5% level of significance.

   b) Describe the importance of sampling. Two types of drugs were used on 5 and 7 patients for reducing their weight. Drug A was imported 8

and drug B indigenous. The decrease in the weight after using the drugs for six months was as follows:

Drug A	12	13	11	14	10		
Drug B	9	12	14	15	10	9	8

Is there a significant different in the efficiency of two drugs?

6. a) A firm administers a test to sales trainees before they go into the field. The management of the firm is interested in determining the relationship between the test scores and the sales made by the trainees at the end of one year in the field. The following data were collected for 14 sales personnel who have been in the field one year. 10

Salesperson	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Test Scores (X)	26	37	24	45	26	50	28	30	40	34	29	30	43	38
Number of unit sold (y) (in thousand	9	14	8	18	10	19	11	13	17	15	13	16	20	17

Calculation shows that $\sum X = 480$ $\sum X^2 = 17296$

$\sum Y = 200$ $\sum Y^2 = 3044$

$\sum XY = 7215$

i. Find the correlation coefficient between the test scores and number of units sold.

ii. Assuming a linear relationship, use the least squares method to find the regression equation and interpret the meaning of y-intercept and slope.

iii. Compute the residual for salesperson 9.

iv. Compute coefficient of determination.

b) Represent by means of histogram. 5

Wage	10-15	15-20	20-25	25-30	30-40	40-60	60-80
No of workers	7	19	28	15	12	12	8

7. Write short notes on: **(Any two)** 2×5

a) Characteristics of good estimator.

b) Error in hypothesis testing

c) Correlation and regression analysis