POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2019
Programme: BE Full Marks: 100
Course: Probability and 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) From the following frequency distribution, 7

Obtained marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	5	10	17	24	9	6	4

Construct an ogive that will help you the answer to find the number of students securing marks:

i) Less than 35 marks
ii) Between 20 and 50 marks
iii) More than 25 marks

b) The life of two model A and B of refrigerators in a recent survey shown below: 8

Life (No. of years)	Model A	Model B
0-2	5	2
2-4	16	7
4-6	13	12
6-8	7	19
8-10	5	9
10-12	4	1

i) What is the average life of each model of these refrigerators?
ii) Which model has greater uniformity and why?

2 a) From a group of 3 Nepalese, 4 Indians and 5 Americans a sub-committee of 4 persons are selected at randomly. Find the probability that the sub-committee will consists i) 3 Nepalese and 1 Indian ii) 1 Nepalese, 1 Indian and 2 American iii) 4 American 7

b) In a certain factory machines I, II and III are all producing springs of the same length. of their production machines I, II and III produces 2%, 1% and 3% defective springs respectively. of the total productionof springs in the factory, machines I produces 35%, machines II produces 25% and machine III produces 40%. if one spring is selected at random from the total springs produced in a day, find 8

i. the probability that it is defective
ii. the conditional probability that it was produced by machine III.

3 a) The following table presents a discrete probability distribution associated with the daily demand for a product. 7

Number demand per day (X)	10	20	30	40	50	Total
P(X)	0.08	0.24	0.28	0.3	0.1	1

i. Determine the mean daily demand
ii. What is the standard deviation of daily demand? 8

b) Suppose that the random variables X and Y have the joint p.d.f.

$$f(x,y) = \begin{cases} kx(x-y) & 0 < x < 2 \quad x < y < x \\ 0 & otherwise \end{cases}$$

i) Evaluate the constant k

ii) Find the marginal probability density function X and Y

iii) Find the conditional probability distribution of Y given X=x.

4 a) In an examination 15% of the candidates got first class (60% marks or above), while 40% failed (securing below 40% marks). Assuming the marks to be normally distributed, estimate the mean and standard deviation. 8

b) An experiment succeeds twice as often as it fails. Find the chance that in the next six trials there will be at least 4 successes. (Binomial distribution) 7

5 a) A random sample of 100 articles selected from a batch of 2000 article shows that the average diameter of the article is 0.354 with standard deviation 0.048. Find the 95% confidence interval for the average of batch of 2000 articles. 7

b) In a certain factory there are two independent processes manufacturing the same item. The average weight in a sample of 250 items produced from one process is found to be 120grams with standard deviation of 12 grams, while the corresponding figures in a sample of 400 items from the other process are 124 and 14. Test whether two mean weights differ significantly or not at 10% level of significance. 8

6 a) ABC Physical Fitness claims that completion of their weight loss programme will result in a weight loss. To test this claim, SIX persons were selected of random and they were put through the weight loss programme and weights before and after the programme recorded. Test the claim of fitness centre at α=0.05. The weights in pounds in six persons recorded before and after the programme are as follows. 7

Person	1	2	3	4	5	6
Weight (before)	145	200	160	185	164	175
Weight (after)	143	190	165	183	160	176

b) An engineering student has a summer job with the forestry service. He measured the tree trunk diameters (x in inches) and related them to the age of the tree (y in years). The following information was obtained: 8

$n= 6, \sum X=21, \sum Y=26, \sum X^2=91, \sum Y^2=142.52, \sum XY=113.8$

i. Find the regression equation of y on x and estimate the age of the tree whose diameter is 4 inches.

ii. Find the correlation coefficient between x and y and interpret its meaning.

iii. Determine coefficient of determination and interpret it.

iv. Compute standard error of the estimate.

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

a) Criteria of a good estimator

b) Application of statistics in engineering

c) Assumptions for binomial distribution