POKHARA UNIVERSITY

Level: Bachelor Semester:Fall Year : 2020
Programme:BE Full Marks: 100
Course:Probability and Sataistics 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 distribution of 500 students of a college find the marks if only 20% students had failed and also minimum marks obtained by the top 25% of the students . 7

Marks	0-20	20-40	40-50	50-60	60-80	80-100
No. of students	50	100	150	90	60	50

Also represent the data by histogram so locate the mode.

b) The nine measurements that follow are furnace temperatures recorded on successive batches in a semiconductor manufacturing process (units are): 953, 950, 948, 955, 951, 949, 957, 954, 955. 8

i. Calculate the sample mean, sample variance, and standard deviation.

ii. Construct a box plot of the data.

2. a) The contents of urns I,II and III as follows: 7

1 white, 2 black and 3 red balls.

2 white,1 black and 1 red balls.

4 white ,5 black and 3 red balls

One urn is chosen at random and two balls drawn. They happen to be white and red. What is the probability that they came from urn II.

b) A company produces machine components which pass through an automatic testing machine. 5% of the components entering the testing machine are defective. However, the machine is not entirely reliable. If a component is defective there is 4% probability that it will not be rejected. If a component is not defective there is 7% probability that it will be rejected. 8

i) What fraction of all the components are rejected?

ii) What fraction of the components rejected are actually not defective?

iii) What fraction of those not rejected are defective?

3. a) let X be a continuous random variable with p.d.f. 8

$P(x) = ax \quad ; \quad 0 \le x \le 2$

$= a \quad ; \quad 2 \le x \le 4$

$= ax+3a \quad ; \quad 4 \le x \le 6$

Otherwise elsewhere

i. Determine the constant 'a'.

ii. find $p(X \le 1.5)$ and $p(1.5 \le X \le 2.5)$

iii. Obtain E(X) .

b) Joint probability distribution of X and Y is given by; 7

$f(x,y) = 4xy\, e^{-(x2+y2)} : x>0 , y \ge 0$

i) Test whether X and Y are independent or not?

ii) Find the conditional density of X given Y=y.

4. a) The number of accident in a year attributed to taxi driver in a city is poisson distribution with mean 3.Out of 1000 taxi driver ,find approximately the number of taxi drivers with i)more than 3 accidents in a year) less than 2 accidents in a year. 7

b) In an examination, 25% of the student got marks more than 80 and 30% of the students got marks less than 45.Assuming the marks to be normally distributed, find mean and standard deviation of the marks of the students. 8

5. a) What do you mean by unbiased estimator? Consider a population of 5 units with 4, 2, 10, 6 and 8. Show that sample mean of size 2 is unbiased estimator of population mean. 7

b) The quantity demanded of a certain product before advertisement and after advertisement is given below: 8

Before	50	54	60	58	52	48	53
After	52	56	58	62	55	52	53

Is advertisement effective? Test at 5% Level of significance.

6. a) A manufacture of gun powder has developed a new powder which is designed to produce a muzzle velocity equal to 3000 ft/sec. seven shells are loaded with the charge and muzzle velocities measured. The resulting velocities are as follows: 3005,2935,2965,2905, 2995 and 3905.Does these data present sufficient evidence to indicate that the average velocity differs from 3,000 ft/sec? 7

b) The following tables gives the ages and blood pressure of 10 women. 8

Age(X)	56	42	36	47	49	42	60	72	63	55
Blood Pressure(Y)	147	125	118	128	145	140	155	160	149	150

i) Find the coefficient of determination and interpret it.
ii) Find the regression equation Y on X.
iii) Find the standard error.
iv) Estimate the blood pressure of a women whose age is 45 years.

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

a) Applications of statistics in engineering
b) Binomial distribution and condition to apply
c) Sampling and estimation with criteria of good estimator