POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2018
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) An investigator wants to study the speed of cars at Araniko highway and he collected the speed of 30 vehicles and speed were, 7

35, 37, 42, 45, 47, 48, 50 55,
67 70, 75, 80, 90, 95, 94, 48,
55, 60, 71 63, 70, 65, 80, 55,
40, 35, 36, 85, 79, 30

i. Present the above data in stem and leaf display.
ii. Construct continuous frequency distribution using Struge's rule and construct the cumulative curve and find median speed, speed of first 25% vehicles, speed of first 75% vehicles and also compute the percentage of vehicles whose speed lies between 40 to 70 km.

b) The lives of two models (A and B) of refrigerators in a recent survey are shown below 8

Life (No. of years)	No. of refrigerators	
	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 of each model of these refrigerators?
ii. Which model has greater uniformity?

2. a) The contents of urns I, II and III are as follows: 5
1 white, 2 black and 3 red balls; 2 white balls, 1 black and 1 red balls and 4 white, 5 black and 3 red balls. One urn is chosen at random and two balls are drawn. They happen to be white and red. What is the probability that they come from urns, I, II or III?

b) Define axiomatic approach of probability. In a certain locality of town, a survey of 600 women about the fuels for cooking revealed that 230 use kerosene oil, 175 women use electricity and 40 women use both. Find the probability that a women selected use; 5
i. At least one of the fuel
ii. Neither of the fuel
iii. Kerosene oil only
iv. Electricity only
v. Exactly one

c) In Bharatpur city, the daily consumption of electric power can be treated as a random variable having a gamma distribution with $\alpha=3$ and $\beta=2$. If the power plant of this city has daily capacity of 12 million kilowatt hours, what is the probability that this power supply will be inadequate on any given day? 5

3. 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 driver with: i) More than 3 accidents in a year and ii) Less than 2 accident 7

b) Diameters of bolts produced by a particular machine are normally distributed with mean 0.760 cm and standard deviation 0.012 cm. Specifications call for diameters from 0.720 cm to 0.780 cm. 8

i) What percentage of bolts will meet these specifications?
ii) What percentage of bolts will be smaller than 0.730 cm?

4. a) $f(x,y) = 4xy$, if $0<x<1$, $0<y<1$ 8
$= 0$, otherwise

i) Verify that f(x,y) is a p.d.f.
ii) Find the marginal probability density function of X and Y.
iii) Find whether X and Y are independent or not.

b) How do you distinguish point estimation from interval estimation? What are the characteristics of good estimator, explain it. 7

5. a) The quality control Engineer at a light bulb factory needs to estimate the average life of a large shipment of light bulbs. The process standard deviation is known to be 100 hours. A random sample of 64 light bulbs indicated a sample average life of 350 hours. 7

i) Calculate the standard error of mean.

ii) Set up a 95% confidence limits for the true average life of light bulbs in this shipment.

b) A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustment before likely they could be shipped, while same was true for 14 of 400 tractors produced on another assembly line. At the 0.05 level of significance, does this support claim that the second production line does superior work? 8

6. a) A random sample of 10 boys had the following I.Q. Scores. 70, 120, 110, 101, 88, 83, 95, 107, 100, 98. Do these data support the assumption of a population mean I.Q. scores of 100? 7

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

$n = 6, \sum x = 21, \sum x^2 = 91, \sum y = 26, \sum y^2 = 142.52, \sum xy = 113.8$

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 the result in practical manner.

iii) Determine coefficient of determination and interpret the result.

iv) Compute the standard error of the estimate.

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

a) Types of errors in hypothesis testing and procedure of testing of hypothesis

b) Central limit theorem

c) Probability mass function and probability density function