National Academy of Science and Technology

Dhangadhi Engineering College

Dhangadhi, Kailali

Pre-University Examination

Level: Bachelor | Semester – Fall (V) | Year : 2020

Programme: BE(Computer) | 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.) The weekly salaries of 84 workers in a factory are given below:

Salary	300-310	310-320	320-330	330-350	350-370	370-410
No. Of workers	8	12	28	18	16	10

Construct a histogram, frequency polygon and frequency curve. Also find mode from histogram.

b) The lives of two models (A and B) of refrigerators in a recent survey are shown below: 7

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 life of each model of these refrigerators?
ii. Which model has greater uniformity? 8

2. a) The following are the numbers of minutes that a person had to wait for the bus to work on 15 working days, 10,1,13,9,5,9,2,10,3,8,6,17,2,10,15 Draw a box plot and interpret the result. 7

b) State and prove Baye's theorem. 8

OR

The contents of urns I, II and III are as follows:

1 white, 2 black and 3 red balls
2 white balls, 1 black and 1 red balls.
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 form urns I,II or III?

3. a) A random variable X has the following probability mass function 7

X:	**-2**	**-1**	**0**	**1**	**2**	**3**
P(x)	**0.1**	**K**	**0.2**	**2K**	**0.3**	**K**

Find:

i. The value of K
ii. Expected value of X
iii. Standard deviation of X

b) If 5% of the electric bulbs manufactured by a company are defective, use poisson distribution to find the probability that in a sample of 100 bulbs, 8

i) none is defective

ii) at least one is defective

iii) at most 2 bulbs are defective

iv) 5 bulbs are defective

4. a) In a certain city, the daily consumption of electric power (In millions of Kilowatt-hours) 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 a daily capacity of 12 million of kilowatt hours. What is the mean of this gamma distribution? What is the probability that this power supply will be inadequate on any given day? 7

b) If $f(x,y) = 8xy$, $0<x<1$, $0<y<2$
$= 0$, otherwise 8

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

5. a) Population consists of the value 7,6,8,4,10. Prove that sample mean of size 3 is unbiased estimator of the population mean. 7

b) A random sample of 10 boys had the following I. Q's 70, 120, 110, 101, 83, 88, 95, 98, 107 and 100. Find the reasonable range in which most of the mean I.Q. values of samples of 10 boys lie (Use $\alpha = 5\%$) 8

6. a) In a simple of 300 high school students from a city,200 are found to use dot pens. In one of 900 from a neighbouring city, 450 are found to use dot pens. Do the data indicate that the cities are significantly different with respect to the habit of using dot pens around the students? ($\alpha = 5\%$) 7

b) The following are the heights in centimeter and weights in kilogram of 8 men: 8

Height	160	168	174	176	180	181	182	185
Weight	65	66	68	70	75	76	78	80

i. Develop the estimating regression equation of weight on height.
ii. Estimate the weight of men whose height is 175cm.

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

a) Source of Data.
b) Characteristics of normal distribution
c) Criteria of good estimator