POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2015
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) The test scores of the students in probability and statistics are listed below. Construct a stem-and leaf plot of the scores. 7

92	78	73	89	98	89	83	75	83	94
99	69	71	96	67	81	73	88	86	82
63	73	76	82	84	89	92	95	78	87

Also, find the lowest score of the best 25% of the students.

b) Lives of two models A & B of objects in a recent survey are: 8

Life	0 -2	2-4	4-6	6-8	8-10	10-12
Model A	5	16	13	7	5	4
Model B	2	7	12	19	9	1

Which model has greater uniformity?

2. a) In a company, there are 4 Civil engineers, 5 IT officers and 6 finance officers. A committee of 3 members has to be formed from random selection. What is the probability that committee consists of 7

i. All civil engineers.
ii. One civil engineer.
iii. At least one civil engineers.

b) State Bayes' Theorem. In a certain recruitment test, there are multiple choice questions. There are 4 possible answers to each question and of which one is correct. An intelligent student knows 80% of the answer. If intelligent student gets the correct answer, what is probability that he is guessing? 8

3. a) A marksman firing bullets at a target and probability of hitting the target at any trial is 0.7. Find probability that his seventh shot is his fourth hit. 5

c) The time (in hours) required to repair a machine is exponentially distributed with parameter $\lambda = \frac{1}{3}$. What is the probability that the repair time exceeds 3 hours. Also find the probability that machine will required within 3 hours. 5

d) Batteries last an average of 60 days with standard deviation of 10 days. Sixty batteries are bought. What is the probability that 5

i. Mean life of all 60 batteries exceeds 61 days.

ii. Mean life differs from 60 days by more than 3 days.

a) The length of time (in minutes) that a certain lady speaks on the telephone is found to be random phenomenon, with a probability function specified by the probability density function f(x) as: 7

$$f(x)=\begin{cases} Ae^{-\frac{x}{5}}, & x\geq 0 \\ 0, & otherwise \end{cases}$$

i. Find the value of A.

ii. What is the probability that the number of minutes that she will talk over the phone is more than 10 minutes?

iii. Find the mean and variance of talk time on the telephone.

b) The joint probability density function of two dimensional random variable (X,Y) is given by 8

$$f(x,y)=\begin{cases} \frac{1}{8}(6-x-y); & 0<x<2,\ 2<y<4 \\ 0; & otherwise \end{cases}$$

Determine:

i. Marginal probability density function of X and Y.

ii. Find conditional probability density of Y given X=x.

iii. Examine whether X and Y are independent.

a) 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) An IQ test was administered to 7 persons before and after they were trained. The results are given below: 8

Candidates	I	II	III	IV	V	VI	VII
IQ before training	130	135	120	133	142	137	126
IQ after training	138	131	130	135	146	146	138

Test whether the training is designed properly.

6. a) A social study group wants to determine views expressed by people that there is too much violence on television in these days. It is noted that 70% of 2000 men selected at random believed so, 60% of 4000 women selected at random also believed that there is too much violence on television. The group wants to test whether there is a significant difference in the viewers of men as compared to views expressed by women. 7

b) The following table given the age x and blood pressure y of 10 women. 8

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

i. Find correlation coefficient between age and pressure. Also find coefficient of determination and interpret it.

ii. Fit a regression equation that best describe the above data.

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

a) Criteria of good estimator.

b) Box and Whisker Plot.

c) Properties of normal distribution.

5 1/2