POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2021
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	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. Of students:	7	12	19	26	11	8	6

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

i. Less than 45 marks
ii. Between 30 and 70 marks.
iii. More than 35 marks.

b) The life of two model A and B of polythene bags in a recent survey shown below. 8

Bursting pressure (in lb.)	No. of Polythene bags	
	A	B
5-10	2	9
10-15	9	11
15-20	29	18
20-25	44	32
25-30	11	17
30-35	5	13

i. What is the average life of each model?
ii. Which model has greater uniformality and why?

2. a) From a group of 4 engineers, 2 physicists and 3 economists, 3 persons are selected at randomly. Find the probability that: 7

i. Consist of each kind.
ii. 1 engineer and 2 economists.
iii. At least one physicist.

b) State Baye's theorem and discuss its applications.The probability that the person has COVID is 0.03. PCR tests are available to determine whether the person actually has COVID. If COVID actually present, the probability that the PCR test will give a positive result (indicating that disease is present) is 0.09. If COVID is not actually present, the probability of a positive test result (indicating that it is present) is 0.02. What is the probability that COVID is actually present if a positive result has occurred (indicating the disease is present)? 8

3. a) A Random variable X had the following probability function. 8

X	-2	-1	0	1	2
P(X)	0.2	K	0.4	2k	k

i) Find the value of K
ii) E(X), E(4X+5), Var. (X) and Var (4X+5) 7

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)

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. 7

b) If two random variables have the joint probability density function. 8

$F(x,y)=\frac{2}{3}(x+2y)$; $0<x<1$, $0<y<1$.

i) Find marginal density function of X& Y.
ii) Find the conditional density of X given that Y=y.
iii) Are X and Y independent.

5. a) A random sample of size 64 has been drawn from a population with standard deviation 20. The mean of the sample is 80. Calculate 95% confidence limits for the population mean. How does the width of the confidence interval change if sample size is 256 instead? 7

b) 1000 articles from factory A are examined and found 97% of good quality, 1500 similar articles from factory B are found only 98% of good quality. Would you conclude that products of factory B are superior to those of factory A. Test the hypothesis at $\propto = 5\%$. 8

6. a) An I.Q. test was administrated to 5 persons before and after they were trained. The results are given below: 7

Candidates:	I	II	III	IV	V
IQ before training:	110	120	123	132	125
IQ After training:	120	118	125	136	121

Test at 5% level of significance that the training was success.

b) A chemical company wishing to study the effect of extraction time on the efficiency of an extraction operation obtained the data as follows: 8

Extraction time in minute (x): 27, 45, 41, 19, 35, 39, 19

Extraction efficiency in %(y): 57, 64, 80, 46, 62, 72, 52

i) Find the regression equation of y on x and estimate the y if x=40

ii) Find the coefficient of correlation between x and y

iii) Determine coefficient of determination and interpret it.

iv) Compute standard error of estimate.

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

a) Error in hypothesis testing

b) Probability and non-Probability Sampling

c) Application of statistics in engineering