

Level: Bachelor Semester: Fall Year : 2019
 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 weight of (in lbs) of 40 students in a class are follows. 7

138 172 145 147 150 119 158 152
 168 142 157 147 102 144 165 136
 164 163 128 135 126 150 146 148
 145 125 146 153 138 156 173 140
 135 149 140 144 132 154 142 135

- i) Construct a frequency distribution with suitable class interval
 ii) Construct a less than Ogive.

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

Life(years)	No. of Model A	No. of 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 refrigeration's?
 ii) Which model has greater uniformity?

2. a) Define axiomatic approach of probability. A problem in statistics is given to three students A, B and C whose chances of solving it are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$ respectively. Find the probability that, 7

- i. The problem will be solved.
 ii. Only one of them can solve the problem.
 iii. None of them will solve the problem.
 iv. A solves it but B and C cannot.

- v. All three students A, B and C can solve the problem.

- b) Customers are used to evaluate preliminary product designs. In the past, 95% of highly successful products received good reviews, 60% of moderately successful products received good reviews, and 10% of poor products received good reviews. In addition, 40% of products have been highly successful, 35% have been moderately successful, and 25% have been poor products. 8

- i. What is the probability that a product attains a good review?
 ii. If a new design attains a good review, what is the probability that it will be a highly successful product?

3. a) A r.v. X has following probability distribution: 7

X	2	3	4	5	6	7
P(x)	0.1	K	0.2	2k	0.3	K

- i. Find the value of k
 ii. Find $E(x)$ and $V(x)$.
 iii. Find the distribution function of X.

- b) A two dimensional r.v. (XY) have following probability density function: 8

$$f(x, y) = \frac{2}{3}(x + y) \quad 0 < x < 1, 0 < y < 1$$

- i. Find marginal p.d.fs of X and Y individually.
 ii. Find Conditional pdf of X given $Y=y$
 iii. Check whether X and Y are independent or not.

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, 15% of the student got marks more than 60 and 40% of the students got marks less than 40.Assuming the marks to be normally distributed, find mean and standard deviation of the marks of the students. 8

5. a) The manufacturer of the Energy-saver furnace claims a mean energy efficiency of at least 0.83. A sample of 21 Energy-saver furnaces gives a sample mean of 0.81 and sample standard deviation of 0.060. Data show approximately a normal distribution. Test whether the manufacturer's claim can be rejected at the 5% level of significance. 7
- b) The strength of steel wire made by an existing process is normally distributed with a mean of 1250 and a standard deviation of 150. A batch of wire is made by a new process, and a random sample consisting of 25 measurements gives an average strength of 1312. Assume that the standard deviation does not change. Is there evidence at the 1% level of significance that the new process gives a larger mean strength than the old? 8
6. a) Scraps of iron were selected on the basis of their densities, X , and their iron contents, Y , were measured. The results were as follows: 8

X : 2.8 2.9 3.0 3.1 3.2 3.2 3.2 3.3 3.4

Y : 27 23 30 28 30 32 34 33 30

- i) Find the relationship between their densities and their iron content.
- ii) Find the regression equation of y on x by the method of least squares.
- b) A population consists of five members 2, 3, 6, 8 and 11. 7
- i. Draw all possible sample of size 2 that can be drawn from the population without replacement.
- ii. Find mean and variance of population.
- iii. Find the mean of sampling distribution of means and show that it is equal to the population mean.
7. Write short notes on: (Any two) 2×5
- a) Source of data and its types.
- b) Normal distribution and its characterises.
- c) Criteria of good estimator.