

II-B.Tech I-Semester Supplementary Examinations (BR20), JULY - 2023
PROBABILITY & STATISTICS

(Common to All Branches)

Time: 3 hours
 Max. Marks: 70

Question Paper consists of FIVE units, each carrying 14 marks
 Each unit has TWO questions; either of them should be answered
 All parts of a question must be answered at one place

1.a) Find the mean median and mode of the following numbers: (7M)

11,34,55,66,76,89,12,77,87,44,77.

1.b) The mean and standard deviation of a set of 100 observations were worked out as 40 and 5 respectively by a computer which by mistake took the value 50 in place of 40 for one observation. Find the correct mean and variance. (7M)

observation. Find the correct mean and variance.

1.c) Calculate coefficient of skewness based on quartiles and median from the following data. (14M)

variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	16	26	36	22	15	7	4

2.a) 20% of the items produced from a factory are defective. Find the probability in a sample of 5 chosen at random i) None is defective ii) one is defective iii) $p(1 < x < 4)$ (7M)

2.b) Derive mean & variance for Poisson Distribution. (7M)

(OR)

2.c) If x is Poisson distribution such that $3p(x=4) = \frac{2}{1}p(x=2) + p(x=0)$. Find i) Mean of Poisson distribution ii) $p(x \leq 2)$ (7M)

2.d) In a normal distribution, 7% of the items are under 35 and 89% of the items under 63. (7M)

3.a) A coin was tossed 960 times and returned heads 183 times. Test the hypothesis that the coin is unbiased. Use a 0.05 level of significance. (7M)

3.b) The blood pressure of 5 women before and after intake of a certain drug is given below. Test whether there is significant change in blood pressure at 1% level of significance. (7M)

	Before	After
1	110	120
2	120	118
3	125	125
4	132	136
5	125	121

(OR)

3.c) In one sample of 10 observations from a normal population, the sum of the squares of the deviations of the sample values from the sample mean is 102.4 and in another sample of 12 observations from another normal population, the sum of the squares of the deviations of the sample values from the sample mean is 120.5. Examine whether the two normal populations have the same variance. (7M)

- 3.d) The following table gives the classification of 100 workers according to sex and nature of work. Test whether the nature of work is independent of the sex of the workers. (7M)
- | | | | |
|---------|--------|----------|-------|
| | Stable | unstable | Total |
| Males | 40 | 20 | 60 |
| Females | 10 | 30 | 40 |
| | 50 | 50 | 100 |
- 4.a) Describe the Types of correlation with example. (7M)
- 4.b) Calculate coefficient of correlation from the following data (7M)
- | | | | | | | |
|---|----|---|---|----|----|----|
| X | 12 | 9 | 8 | 10 | 11 | 13 |
| Y | 14 | 8 | 6 | 9 | 11 | 12 |
- (OR)
- 4.c) From the following data calculate the rank correlation coefficient after making adjustment for tied ranks (7M)
- | | | | | | | | | | | |
|---|----|----|----|---|----|----|----|----|----|----|
| X | 48 | 33 | 40 | 9 | 16 | 16 | 65 | 24 | 16 | 57 |
| Y | 13 | 13 | 24 | 6 | 15 | 4 | 20 | 9 | 16 | 19 |
- 4.d) Find the curve of best fit of the type $y = ae^{bx}$ to the following data by the method of least squares. (7M)
- | | | | | | |
|---|----|----|----|----|----|
| X | 1 | 5 | 7 | 9 | 12 |
| Y | 10 | 15 | 15 | 12 | 15 |
| | 12 | | | | 21 |
- 5.a) You are given the values of sample mean (\bar{X}) and the range (R) for ten samples of size 5 each. Draw mean and range charts and comment on the state of control. (7M)
- | | | | | | | | | | |
|-----------|----|----|----|----|----|----|----|----|----|
| Sample No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| \bar{X} | 43 | 49 | 37 | 45 | 37 | 51 | 46 | 47 | 44 |
| R | 5 | 6 | 5 | 7 | 7 | 6 | 8 | 7 | 4 |
- 5.b) A daily sample of 30 items was taken over a period of 14 days in order to establish control limits. If 21 defectives were found, what should be upper and lower control limits of the proportion of defectives. (7M)
- 5.c) Describe the types of quality control and control charts. (7M)
- 5.d) The following table gives the number of defects in carpets manufactured (7M)
- | | | | | | | | |
|---------------|---|---|---|---|---|---|---|
| Carpet No | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| No of defects | 3 | 5 | 4 | 6 | 2 | 4 | 6 |
- Determine the central line and control limits for C-Chart.