

Exam.	Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agric.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

**Subject: - Probability and Statistics (SH602)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Necessary tables are attached herewith.
- ✓ Assume suitable data if necessary.

1. Define measures of central tendency and measures of variance. Following data gives the distribution of marks of 50 students in statistics.

Marks more than	10	20	30	40	50	60	70
No. of students	50	45	35	20	10	4	1

Compute median marks. Also compute minimum marks obtained by a pass candidate if 60% student pass in the test. [6]

2. A problem in statistics is given to three students A, B and C whose chances of solving are  $\frac{1}{2}$ ,  $\frac{3}{4}$  and  $\frac{1}{4}$  respectively. If all of them try independently, what is the probability that

- a) at least one of them will solve it
- b) none of them can solve it
- c) exactly two of them can solve it

[6]

3. Define binomial distribution and explain the condition for Binomial distribution. [2+2]

4. If the probability that an individual suffers a bad reaction from a certain injection is 0.001, among 2000 individual

- a) obtain probability distribution function for suffering bad reaction
- b) determine the probability that
  - (i) exactly 3 individuals will suffer bad reaction
  - (ii) more than 2, individuals will suffer bad reaction

[6]

5. The breakdown voltage  $x$  of randomly chosen diode of a particular type is known to be normally distributed with mean 40 and standard deviation 1.5 volts. What is the probability that the breakdown voltage. Will be

- a) Between 39 and 42 Volts
- b) At most 43 Volts
- c) At least 39 Volts

[6]

**OR**

The distribution function for a random variable  $x$  is

$$f(x) = 1 - e^{-2x} \text{ for } x \geq 0$$

$$= 0 \text{ for } x < 0$$

- a) Find  $p(x > 2)$
- b) Find mean and variance of the variable  $x$ .

6. Define discrete and continuous random variable. Also describe the procedure to compute mean and variance for both variables. [4]
7. Define standard normal distribution. Write down its properties and importance of this distribution. [4]
8. A population consists of four number 2, 8, 14, 20,  
 a) Write down all possible sample size of two without replacement.  
 b) Verify that the population mean is equal to the mean of the sample mean. [6]
9. What are difference between point estimation and Interval estimation? Also discuss differences between estimation and Hypothesis testing. [3+3]
10. Define critical value. A manufacturer claimed that at least 95% of the water pumps supplied to the ABC Company confirmed to specification. However, the product manager at ABC Company wasn't satisfied with the claim of the manufacturer hence to test the claim, the manager examined a sample of 250 water pumps supplied last month and found that 228 water pumps 45 per the specification. Can you conclude that the production manager is right to doubt on the claim of the manufactures ( $\alpha = 0.01$ ) [6]
11. Three varieties of coal were analyzed by four chemists and the ash-content in the varieties were found as follows:

Varieties	Chemists			
	1	2	3	4
A	8	5	5	7
B	7	6	4	4
C	3	6	5	4

Test whether the varieties differ significantly in their ash-content? Test at 5% level of significance.

$$[F_{(2,9)} = 19.4, \quad F_{(3,9)} = 8.81].$$

12. Write the procedure of testing of Hypothesis for single proportion. [4]
13. The following data gives the number of twists required to break a certain kind of forged alloy bar and percentage of alloying element A present in the metal

Number of twists	41	49	69	65	40	50	58	57	31	36
Percentage of elements A	10	12	14	15	13	12	13	14	13	12

- a) Fit the regression equation of number of twists on percentage of element A. Determine the predicted number of twists required break an alloy when percentage of element is 20
- b) Find 99% confidence interval for the regression coefficient. [4]
14. The simple correlation coefficient between fertilizer ( $x_1$ ) seeds ( $x_2$ ) and productivity ( $x_3$ ) are  $r_{12} = 0.59$ ,  $r_{13} = 0.46$  are  $r_{23} = 0.77$  calculate the partial correlation coefficient  $r_{12.3}$  and multiple correlation  $R_{1.23}$  [4]