

B.Tech. Degree III Semester Examination in Polymer Science and Rubber Technology, November 2008

PTF 1301 APPLIED STATISTICS

(New Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A

(Answer ANY FIVE questions)

(All questions carry EQUAL marks)

(5 x 5 = 25)

- I a) What is a measure of central tendency? What are the desirable characteristics of a measure of central tendency?
- b) The percentage of marks of ten students in Mathematics and Physics are given below. Calculate the rank correlation coefficient.

Roll No.	1	2	3	4	5	6	7	8	9	10
Marks in Maths	78	36	98	25	75	82	90	62	65	69
Marks in Physics	84	51	91	60	68	62	86	58	53	47

- c) Define (i) Sample Space (ii) Event (iii) Mutually Exclusive Events. Two fair dice are tossed. What is the probability that the sum of the numbers of the dice is 7?
- d) A continuous random variable X has the probability density function

$$f(x) = \begin{cases} a + bx; & 0 \leq x \leq 1 \\ 0 & \text{Elsewhere} \end{cases}$$

If the mean of the distribution is $\frac{1}{2}$ find a and b .

- e) Explain the following with reference to testing of hypothesis. (i) Null and alternative hypothesis (ii) Type I and Type II errors (iii) Critical Region (iv) Power of the test (v) Significance level of the test.
- f) Distinguish between CRD and RBD.
- g) Explain sequential sampling plan.

PART B

(5 X 15 = 75)

- II a) Calculate the coefficient of variation of the following data:
- | | | | | | |
|-----------|--------|---------|---------|---------|---------|
| Class | 0 - 10 | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 |
| Frequency | 3 | 10 | 36 | 18 | 3 |
- b) You are given the following data relating purchases and sales. Estimate the likely sales when purchases equal 100. (7)

Purchases	62	72	98	76	81	56	76	92	88	49
Sales	112	124	131	117	132	96	120	136	97	85

OR

- III a) Calculate Pearson's coefficient of skewness for the following distribution: (8)
- | | | | | | | | |
|-----------|-------|--------|---------|---------|---------|---------|---------|
| Class | 0 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 30 | 30 - 35 |
| Frequency | 3 | 5 | 9 | 21 | 15 | 10 | 7 |
- b) For the regression lines $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$ find (i) the mean values of x and y (ii) coefficient of correlation between x and y and (iii) the variance of y given that variance of x is 9. (7)

- IV a) Three machines A, B, C produce 60, 30, 10 percent respectively of the total production of a factory. It is estimated that A produces 2% defectives, B produces 3% defectives and C produces 4% defectives in their production. An item chosen randomly from the total production is found to be defective. What is the probability that it has come from machine A? (7)
- b) A manufacturer claims that at most 10% of his products are defectives. To test this claim 18 units are inspected and his claim is accepted if among this 18 at most 2 are defectives. Find the probability that his claim will be accepted if actual proportion of defectives is (i) 5% and (ii) 20%. (8)

OR

V a) Fit a Normal distribution to the following data:

Class	21 – 24	25 – 28	29 – 32	33 – 36	37 – 40
Frequency	4	8	12	10	6

(7)

b) 1000 electric bulbs with mean length of life 120 days are installed in a factory. If their length of life is normally distributed with a standard deviation 20 days,.

- i) How many will expire before 90 days?
 - ii) If it is decided to replace all the bulbs together, what interval should be allowed between replacement if not more than 10% should expire before replacement?
- (8)

VI a) Suppose that 64 senior girls from college A and 81 senior girls from college B had mean statures of 68.2 “and 67.3” respectively. If the standard deviation for statures of all senior girls is 2.43, is the difference between the two groups significant? (7)

b) The manufacturer of automatic sugar bagging machine claim that variance of the bag weights is less than or equal to 0.01. Do the following observation of weights of a randomly chosen sample of bags support the claim at 5% level of significance. 10.1, 9.8, 10.1, 9.9, 10.0, 9.7, 9.9, 10.0, 9.8. (8)

OR

VII a) A group of 7 week old chicken reared on high protein diet weigh 12, 14, 15, 11, 16, 14 and 16 ounces. A second group of 5 chicken on ordinary diet weigh 8, 10, 14, 10 and 13 ounces. Test whether there is evidence that additional protein has increased weight of chicken. (8)

b) A dice was thrown 180 times and the following results were obtained.

Number	1	2	3	4	5	6
Frequency	25	35	40	22	32	26

Test whether the dice is unbiased. (7)

VIII a) What are the basic principles of design of experiments. Explain each of them. (7)

b) Give the basic assumptions of ANOVA and explain the analysis of on way classification data. (8)

OR

IX a) Analyse the data given in the following table: (8)

Blocks	Varieties					
	V1	V2	V3	V4	V5	V6
I	30	23	34	25	30	13
II	39	22	28	25	28	32
III	56	43	43	31	49	17
IV	38	45	36	35	32	20
V	44	51	23	58	40	30

b) Explain analysis of a LSD. (7)

X a) Distinguish between variable control chart and attribute control chart. What are the important variable control charts in use? (7)

b) Control charts for \bar{X} and R are maintained for a certain quality characteristic. The sample size used is 7 and \bar{X} and R are computed for each sample. After 35 samples, we have found that $\sum \bar{x}_i = 7805$ and $\sum R_i = 1200$.

- i) Set up \bar{X} and R charts using these data.
- ii) Assuming both charts exhibit control, estimate the process mean and standard deviation. (8)

OR

XI a) Explain Double Sampling Plan. What is ASN? Derive ASN for Double Sampling Plan for attributes. (8)

b) What is meant by (i) Total Quality Control (ii) Quality Control Circles. (7)