SYIT/SEM IV/EXT/COST

Time: 2½ Hrs. **Marks:75**

Note: **(1) All questions are compulsory with internal choice.**
(2) Symbols have their usual meanings.
(3) Statistical table will be provided on request.
(4) Scientific calculator fx 82 series or lower version is only permitted.

Q.1 **Attempt Any Three of the following.** **(15)**

(a) Define factors and data frames in 'R'. How to create them?

(b) State and explain properties of standard deviation.

(c) Find the mean deviation from arithmetic mean for the following data giving the number of defects in 50 units in a production line.

No. of defects 'x'	5	6	7	8	9	10	Total
No. of units 'f'	8	10	15	10	5	2	50

(d) Calculate the standard deviation of the heights of 10 students given as

Height (in cms)	161	162	160	163	160	163	164	170	164	164

(e) Calculate P_{35} and P_{80} from the following data.

Marks	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
No. of students	1	3	11	21	43	32

(f) Compute the median for the following data.

Size	5	6	7	8	9	10	11	12	13
Frequency	48	52	56	60	63	57	55	50	52

Q.2 **Attempt Any Three of the following.** **(15)**

(a) For the following probability density function, $f(x) = \begin{cases} 2e^{-2x} & , x \geq 0 \\ 0 & , x < 0 \end{cases}$. Find

(i) $P(1 \leq X \leq 3)$ (ii) $P(X \geq 0.5)$

(b) Explain the relation between raw moments and central moments.

(c) A survey of 500 television viewers produced the following information: 285 watch football, 195 watch hockey, 115 watch basketball, 45 watch football and basketball, 70 watch football and hockey, 50 watch hockey and basketball, 50 do not watch any of the three games. Create a Venn diagram and then determine the probability that a viewer selected at random will watch

(i) all three games.

(ii) exactly one of the three games.

(d) Twenty sample of size 100 each are selected from a very large consignment of blades. Find the expected number of samples that will have at least 14 defective blades, if the consignment has 10% defective blades.

(e) It has been found that 2% of the tools produced by a certain machine are defective. What is the probability that in a shipment of 400 such tools,

(i) 3% or more will prove defective?

(ii) 2% or less will prove defective?

(f) Obtain Karl Pearson's measure of skewness for the following data.

Values	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	6	8	17	21	15	11	2

Q.3 **Attempt Any Three of the following.** **(15)**

(a) A candidate in an election claim that, in a locality, 90% voters support him. Verify his claim; if in a random sample of 400 voters from a locality, 320 supported him.

(b) Explain one-tailed and two-tailed tests.

(c) Measurements of the diameter of a random sample of 200 ball bearings made by a certain machine during one week showed a mean of 0.824 inch and a standard deviation of 0.042 inch. Find

(i) 95% confidence limit (ii) 99.73% confidence limit

for the mean diameter of all the ball bearings.

(d) A certain coin is showed up 270 head in 500 tosses. Test the claim that the coin is unbiased.

(e) The average mark scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls.

(f) What is hypothesis test? Explain types of hypotheses. Explain level of significance.

Q.4 **Attempt Any Three of the following.** **(15)**

(a) In an experiment to study the independence of hypertension on smoking habits, the following data are taken from 180 individuals.

	Non smokers	Moderate smokers	Heavy smokers	Total
Hypertension	21	36	30	87
No-hypertension	48	26	19	93
Total	69	62	49	180

Test the hypothesis at 0.05 level of significance, that the presence or absence of hypertension is independent of smoking habits

(b) In an experiment on immunization of cattle from the tuberculosis, the following results were obtained

	Affected	Unaffected
Inoculated	11	31
Not inoculated	14	4

Examine the effectiveness of vaccine in controlling the incidence of disease at 1% level of significance.

(c) 20% of apples in a large consignment are found to be bad. Find the probability that atleast 25% apples are bad in sample size 400 drawn from it

(d) Fit a Poisson distribution to the following data and test the goodness of fit.

x	0	1	2	3	4	5
f	20	34	27	15	3	1

(e) Write a short note on contingency table.

(f) Following data represent the last digit of the scooter passing at a certain traffic signal, observed during last one hour.

Last digit	0	1	2	3	4	5	6	7	8	9
Frequency	12	20	14	12	21	18	17	26	19	21

Test the claim that all digits are equally likely to occur at 5% level of significance.

Q.5 **Attempt Any Three of the following.** **(15)**

(a) Write a short note on regression.

(b) Find the co-efficient of correlation for the following data.

x	2	5	8	10	6	3	1
y	4	6	7	8	5	4	3

(c) Write a short note on correlation.

(d) Fit a least square Parabola of the form $y = a + bx + cx^2$ to the set of data given below.

x	1.2	1.8	3.1	4.9	5.7	7.1	8.6	9.8
y	4.5	5.9	7.0	7.8	7.2	6.8	4.5	2.7

(e) State the advantages and disadvantages of free hand curve.

(f) Fit a straight-line trend value for the following series. Estimate the number of production units for 2002.

Year	1995	1996	1997	1998	1999	2000	2001
Production unit	125	128	133	135	140	141	118

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