SYIT/SEM IV/COST/Regular

Time: 2½ Hrs. Marks:75

Note: (1) All questions are compulsory with internal choice.
(2) Figures to the right indicate full marks.
(3) Symbols have their usual meanings.
(4) Statistical table will be provided on request.
(5) Use of scientific calculator fx 82 series and below is only allowed.

Q.1 **Attempt any three of the following.** (15)

(i) 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

(ii) Compute Mean deviation and semi interquartile range for the following data.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	8	12	20	25	15	9	6	5	5

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

(iv) Calculate Q_1 and Q_3 from the following data

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of students	6	7	5	12	28

(v) Find the geometric mean of the following data.

x	7	8	9	10	11
f	2	3	5	7	3

(vi) State and explain properties of standard deviation.

Q.2 **Attempt any three of the following.** (15)

(i) 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
(a) all three games.
(b) exactly one of the three games.

(ii) 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

(iii) 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
(a) 3% or more will prove defective.
(b) 2% or less will prove defective.

(iv) 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.

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

(vi) Find the first four raw moments and then using relation, find the central moments for the following distribution.

Class Interval	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11	11 – 13	13 – 15
Frequency	1	3	5	8	4	3	1

Q.3 **Attempt any three of the following.** (15)

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

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

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(iii) 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.

(iv) A survey of 40 retired women revealed the mean age at which their income was maximum to be 45 years with a standard deviation of 6.3 years. Find 95% confidence limits for the mean age of maximum earnings of women who survive till they retire.

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

(vi) A car manufacturer claims that 40% of all cars built by his concern will be still in running condition after 10 years. A random sample of 400 cars built by his concern showed that 150 cars were still in running condition after 10 years. Test the claim at 1% level.

Q.4 Attempt any three of the following. (15)

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

(ii) Write a short note on contingency table.

(iii) Ten individuals are chosen at random from a population and their heights are found to be 63, 63, 64, 65, 66, 69, 70, 70, 71, 69 inches. Discuss the suggestions that the mean height of the universe is 65 inches.

(iv) 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.

(v) A random sample of 16 values from a normal population showed a mean of 41.6 inches and the sum of the squares of deviations from this mean equal to 135. Obtain 95% and 99% confidence limits for mean.

(vi) If χ^2 is a chi-square variate with standard deviation 4, find the mean, variance and mode of χ^2.

Q.5 Attempt any three of the following. (15)

(i) Write a short note on correlation.

(ii) In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible:
Variance of $X = 9$, Regression equations: $8X - 10Y + 66 = 0$, $40X - 18Y = 214$
Find
(i) mean values of X and Y.
(ii) the correlation coefficient between X and Y.
(iii) the standard deviation of X and Y.

(iii) Find the co-efficient of correlation between height of father and height of son from the following data.

Height of father	65	66	67	67	68	69	71	73
Height of son	67	68	64	68	72	70	69	70

(iv) Fit a least square regression line of y on x.

x	10	15	20	13	17	8	7
y	12	17	22	15	20	10	13

(v) Obtain the equation of the line of regression of y on x from the following data and estimate y for $x = 73$.

x	70	72	74	76	78	80
y	163	170	179	188	196	220

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

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