IT (1)

(2½ Hours)

[Total Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labelled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. Define the following
i) Range ii) Quartile deviation iii) Mean Deviation
iv) Standard deviation v) Variance

b. Calculate the mean and standard deviation for the following table giving the age distribution of 542 members

Age (in years)	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

c. Calculate the Semi-inter quartile range, coefficient of variation for the following data

Wages	170-180	180-190	190-200	200-210	210-220	220-230	230-240	240-250
No. of persons	52	68	85	92	100	95	70	28

d. From the following data calculate Q_1 and Q_3 and Quartile deviation.

Marks more than	10	20	30	40	50	60	70
Number of Students	12	30	54	76	91	101	112

e. Find the Geometric mean for the following distribution

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	5	7	15	25	8

f. Compute Mean deviation and semi-interquartile range (Q. D.) 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

2. Attempt *any three* of the following: **15**

a. 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

[TURN OVER]

(2)

b. Find the second, third and fourth central moments of the frequency distribution given below.

Class limits	110-114.9	115-119.9	120-124.9	125-129.9	130-134.9	135-139.9	140-144.9
Frequency	5	15	20	35	10	10	5

c. What is kurtosis? Explain types of kurtosis and measures of kurtosis.

d. 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 d not watch any of the tree games. Create a Venn diagram and then determine the probability that if a viewer is selected at random.

I. Watch all three games
II. Exactly one of the three games

e. If a pair of dice is thrown and X denotes the sum of the numbers on them. Find the probability distribution of X. Also find the expectation of X.

f. A random sample of 400 men is found to have a mean height of 69.2 inches and a standard deviation of 2.7 inches. Find

a) The 95 percent confidence limits of the true average height.
b) The 99 percent confidence limits of the true average height.

3. Attempt *any three* of the following: **15**

a. What is hypothesis test? Explain types of hypothesis. Explain level of significance.

b. A random sample of 100 balls selected from a large consignment of cricket balls gave 10% defective balls. Find 99% confidence limits for the percentage of defective balls in the consignment.

c. 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.

d. 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.

[TURN OVER]

e. Obtain 99% confidence limits for the population mean using the following sample observations

Number of bananas	0-100	100-200	200-300	300-400	400-500
Number of Trees	2	11	15	9	5

f. Form the given sample of 100, 35 are working as a professor. Construct a 95% confidence interval for the probability that almost most of the education people from the sample are working as a professor.

4. Attempt *any three* of the following: 15

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

b. It is known that 30% male adults are unmarried in a certain city. A sample of 100 male adults is selected at random from the city. Find the chance that the sample includes

i) 25% to 32% ii) at most 33% of an unmarried male adults

c. 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.

d. In an experiment of immunization of cattle from tuberculosis the following results were obtained.

	Affected	Unaffected
Inoculated	11	31
Not inoculated	14	4

Examine the effective of vaccine in control the incidence of the disease at 1% level of significance.

e. Using the data given in below table to decide whether we can conclude that standard of a salesman has significant effect on hD performance in field selling at 5% level of significance.

	Performance in field			Total
	Disappointing	Satisfactory	Excellent	
Poor dressed	21	15	6	42
Well dressed	24	35	26	85
Very well dressed	35	80	58	173
Total	80	130	90	300

[TURN OVER]

(4)

f. Two sample polls of votes for two candidates. A and B for a public office are taken, one from among the residents of rural areas. The results are given in the adjoining table. Examine whether the nature of the area is related to voting preference in this election.

Area	Votes for		Total
	A	B	
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

5. Attempt *any three* of the following: **15**

a. 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

b. Fit a parabola for the given data

X	0	1	2	3	4
Y	5	4	9	20	37

c. Explain the following
   i) Coefficient of correlation
   ii) Standard Error of Estimate

d. The following data relate to advertising and sales.

Advertising Expenditure	1	2	3	4	5
Sales	10	20	30	50	40

Obtain the two regression equations.

e. The marks obtained by 10 students in Mathematics (X) and Statistics (Y) are given below. Find the coefficient of correlation between X and Y.

Roll No	1	2	3	4	5	6	7	8	9	10
X	75	30	60	80	53	35	15	40	38	48
Y	85	45	54	91	58	63	35	43	45	44

f. On the basis of a sample size 27, a regression equation of y on x was found to be $y = 0.25 + 2.00x$. If $\sigma_{yx} = 3$ and $\sigma_{xy} = 750$ find 95% and 99% confidence limits for the regression coefficient.