

[Time:3.00 Hrs]

[Marks:75]

- N.B:1.**
1. Q.1 is compulsory and carries 20 Marks.
 2. Q.8 is compulsory and carries 15 Marks.
 3. Attempt any Four questions from Q.2 to Q.7. Each of these questions carry 10 Marks.
 4. Figures to the right indicate full marks.
 5. Use of simple calculator is permitted.

Q.1 A) Select the correct option for the following statements/questions: (10)

- _____ is used to present data involving one variable.
 a) Multiple Bar diagram b) Pie diagram
 c) Simple bar diagram d) None of these
- The mean of 5 observation is 25 of which first four observation are 35, 20, 40 and 5 then the fifth value is _____.
 a) 25 b) 30 c) 15 d) 50
- Measure of dispersion which is affected most by extreme observation is
 a) Range b) Q.D c) M.D d) S.D.
- A distribution with a kurtosis less than 3 is called _____.
 a) Platykurtic b) Mesokurtic c) Leptokurtic d) Hyperkurtic
- If m is the mean of Poisson distribution, then $P(X=0)$ is given by _____.
 a) e^m b) e^{-m} c) e d) m^e
- The sampling error is defined as _____.
 a) difference between population and parameter
 b) difference between sample and parameter
 c) difference between population and sample
 d) difference between parameter and sample
- On which of the following does the critical value for a chi-square statistic rely?
 a) The degrees of freedom b) The sum of the frequencies
 c) The row totals d) The number of variables
- Normal Distribution is symmetric is about _____.
 a) Variance b) Mean c) Standard deviation d) Covariance
- If the values of regression coefficient are 0.2 and 0.8, then the values of correlation coefficient is _____.
 a) 0.6 b) -0.6 c) 0.36 d) 0.4
- As variability due to chance decreases, the value of F will _____.
 a) Decrease b) remain same c) Increase d) can not say

Q.1 B) State whether the statement is True or False: (10)

- i) A curve which is more peaked than the normal curve is called Leptokurtic.
- ii) The probability curve of normal distribution is symmetric.
- iii) The numerical value of a standard deviation can never be negative.
- iv) Mean is capable of further algebraic treatment.
- v) Coefficient of regression represent intersection of two regression line.
- vi) Goodness of fit of a distribution can be tested by t-test.
- vii) Z-test is used for comparing the means of two populations if you do not know the populations' standard deviation.
- viii) The F-ratio is computed in ANOVA.
- ix) Standard error is always negative.
- x) Discrete random variable takes only isolated values.

Q.2 Attempt any Two of the following: (10)

- A) Represent the following data by a subdivided bar diagram. The data represents figure of production of paper in thousand tones for the year 2005, 2006, 2007.

Types	2005	2006	2007
Printing and Writing	35	40	50
Wrapping	18	19	15
Boards	16	15	15
Special varieties	7	5	5
Total	76	79	85

- B) Find the D_3 in the following data:

Profit	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Firms	4	16	20	10	7	3

- C) If the arithmetic mean for the following data is 24.8, find the missing frequency.

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	9	11	-	12	8

Q.3 Attempt any Two of the following: (10)

- A) Calculate the range and coefficient of range for the following data:

Sales in (Crs.)	15-30	30-45	45-60	60-75	75-90
No. of Days	3	8	17	12	5

- B) Find the combined mean and S.D. for the following two groups with the details given below. Also find which group is more variable.

	Group I	Group II
observations	40	60
Mean	60	70
S.D.	8	5

- C) Find Bowely's coefficient of skewness for the following data:

Profit in Lakhs	4-8	8-12	12-16	16-20	20-24	24-28	28-32
No. of shops	3	8	12	17	15	11	4

Q.4 Attempt any Two of the following: (10)

- A) Manish and Mandar are trying to make Marketing planning. Probability that Manish can be success is
- $\frac{1}{5}$
- and Mandar can be success is
- $\frac{3}{5}$
- , both are doing independently. Find the probability that i) both are success. ii) Only Mandar will success but Manish will not success.

- B) Find the best decision by using EMV criterion for the following pair of Matrix. Also Calculate EPPI and EVPI.

State of nature	Decisions			
	A1	A2	A3	probability
S1	20	30	10	0.5
S2	60	40	30	0.3
S3	30	70	40	0.2

- C) In a group of 200 persons, 100 like sweet food items, 120 like salty food items and 50 like both. A person is selected at random find the probability that the person (i). Like sweet food items but not salty food items (ii). Likes neither.

Q.5 Attempt any Two of the following: (10)

- A) The average number of customers who appear at the counter of a bank in one minutes is 2. Find the probability that in a given minute (i). no customer appears, (ii). At most 2 customers appear. ($e^{-2} = 0.1353$)
- B) An unbiased coin is tossed 6 times. Find the probability of getting i) 3 heads, ii) at least 4 heads.
- C) In a sample of 5000 cases, the mean of certain test is 14 and standard deviation is 3. Assuming the distribution to be normal, How many score below 17?

[Given that $P(0 \leq Z \leq 1) = 0.3413$]

Q.6 Attempt any Two of the following: (10)

- A) The mean life of 100 electric blubs produced by a company is 2550 hours with a standard deviation 54 hours. Find 95% confidence limits for population mean life of electric blubs produced by the company.
- B) An IQ test was administered to 5 persons before and after they were trained. The results are given below:

Candidates	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after the training programme. (for 1% L.O.S)

- C) A company director is concerned that his company's share may be unevenly distributed throughout the country, in a survey in which sample of 200 customers are selected from four zones and are tabulated as under:

	Zone				
	I	II	III	IV	
Purchase the brand	80	110	90	100	380
Not purchase the brand	120	90	110	100	420
	200	200	200	200	800

At $p = 0.05$, use χ^2 to determine whether the company share is same across the four zones.

(χ^2 table value for 3 d.f at $\alpha = 0.05 = 7.815$.)

Q.7 Attempt any Two of the following: (10)

- A) Calculate the coefficient of correlation from the following given information and comment:
 $n = 6$, $\Sigma x = 105$, $\Sigma y = 305$, $\Sigma xy = 5110$, $\Sigma x^2 = 1855$ and $\Sigma y^2 = 18525$
- B) The average marks of 300 students in English and Hindi are 45 and 56 respectively while their respective standard deviations are 10 and 12. If the sum of the products of the deviations from the averages is 32724, find the regression equations. Also estimate the marks obtained in English if a student obtains 70 marks in Hindi.
- C) A die is thrown 5000 times and a throw of 2 or 6 is observed 1520 times. Test whether the die is biased? At 5% of level of significance.

Q.8 Attempt any Three of the following: (15)

- A) The probability distribution of daily demand of cell phones in a mobile gallery is given below. Find the expected value and variance.

Demand	5	10	15	20
Probability	0.4	0.22	0.28	0.10

- B) The average income of 100 men in a city is Rs. 15,000 with standard deviation Rs. 8,500 and the average income of 100 women is Rs. 12,000 and standard deviation Rs. 9000. Can it be said at 5% level of confidence that there is a significant difference between the average income of men and women?
- C) Calculate the rank correlation coefficient for the following data:

Company X	10	7	12	10	16	14	5	11	18	7
Company Y	6	11	5	9	6	10	15	18	6	8

- D) Write note on Simple Random Sampling without Replacement.
