

- (b) Alpha Mall is the target for many shoplifters in the past month, but owing to increased security precautions, 250 shoplifters have been caught. The data are tabulated as follow: 7

Gender	First-Time Offender	Repeat Offender
Male	60	70
Female	70	50

- The Probability that shoplifter is both Female and a first time offender
- The Probability that shoplifter is a first time offender, given that he is a male
- The Probability that shoplifter is a female, given that shoplifter is repeat offender

OR

- (b) An organization is planning a leisure trip for its employees. The only thing which can cancel the trip is thunderstorm. The weather service has predicted Dry conditions with probability 0.2, Moist Conditions with probability 0.45 and Wet conditions with probability 0.35. If the probability of a thunderstorm given dry conditions is 0.3, given moist conditions is 0.6, and given wet conditions is 0.8. If a thunderstorm occurs, 7
- What is the probability that moist conditions were in effect?
 - What is the probability that wet conditions were in effect?
 - What is the probability that dry conditions were in effect? (use Bayesian Analysis)

- Q.3** (a) Discuss various types of probability and non probability sampling techniques 7
- (b) One of the earliest applications of the Poisson Distribution was in analyzing incoming calls to a telephone switch-board. Analysts generally believe that random phone calls are Poisson distributed. Suppose phone calls to a switch-board arrive at an average rate of 2.4 calls per minute. 7
- If an operator wants to take a 1-minute break, what is the probability that there will be no calls during a 1-minute interval?
 - If an operator can handle at most five calls per minute, what is the probability that the operator will be unable to handle the calls in any 1-minute interval?
 - What is the probability that exactly three calls will arrive in a 2-minute interval?
 - What is the probability that one or fewer calls will arrive in a 15-second interval?

OR

- Q.3** (a) Explain in detail the characteristics of Uniform and hyper-geometric distribution 7

- (b) The lifetime of certain kinds of electronic devices have a mean of 300 hours and the standard deviation of 25 hours. Assuming that the distribution of these lifetimes which are measured to the nearest hour can be approximated closely with a normal distribution. 7
- What is the probability of lifetime of any one of these devices to be more than 350 hours?
 - What percentage will have lifetimes of 300 or less?
 - What percentage will have lifetimes from 220 to 260 hours?
- Q.4** (a) What is Hypothesis testing? Discuss steps in detail. 7
- (b) A Cable TV network company wants to provide modern facility to its consumers. The Company has a five year old data, which reveals that the average household income is Rs 120000. The company believes that the average income might have changed over the period. To verify the claim, it takes a sample of 40 households. From the sample, it is observed that the average income is 125000. From the historical data, population standard deviation is obtained as 1200. Use alpha as 0.05 to test the claim. 7

OR

- Q.4** (a) What are Type I and type II errors? Discuss in relation to level of significance. 7
- (b) An electronic goods company arranged a special training programme for its employees. The company wants to measure the change in the attitude of its employees after the training. The company selected a random sample of 10 employees. The scores by these employees are given in the table. Use $\alpha = 0.10$, to determine whether there is a significant change in the attitude of employees after the training programme. 7

Employee	1	2	3	4	5	6	7	8	9	10
Before	25	26	28	22	20	30	22	20	21	24
After	32	30	32	34	32	28	25	30	25	28

- Q.5** The following table gives the number of good and defective parts produced by each of the three shifts in a factory. 14

Shift	Good	Defective	Total
Day	900	130	1030
Evening	700	170	870
Night	400	200	600
Total	2000	500	2500

- A. Is there any association between the shift and the quality of the parts produced? Use 0.05 level of significance.
- B. Discuss various applications of Chi Square test with illustrations.

OR

Q.5

As the head of the department of a consumer research organization, you have the responsibility for testing and comparing the lifetime of four brands of electric bulbs. Suppose you test the lifetime of the three electric bulbs of each of the four brands. The data is shown below, each entry representing the lifetime of an electric bulb, measured in hundreds of hours. 14

Brand			
A	B	C	D
20	25	24	23
19	23	20	20
21	21	22	20

A. Use ANOVA to infer, whether the mean lifetimes of the four brands of electric bulbs are equal? $\alpha=0.05$

B. It can be inferred that more the price of the electric bulb, more will be the life time of it. Discuss the concept of correlation and regression techniques for finding the relationship between price and lifetime.
