

GUJARAT TECHNOLOGICAL UNIVERSITY**MCA - SEMESTER-III • EXAMINATION – WINTER 2013****Subject Code: 630003****Date: 10-12-2013****Subject Name: Statistical Methods****Time: 02:30 pm TO 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use (may ask for) statistical tables wherever necessary.

Q.1 (a) Define briefly the following terms:**07**

- i) Median
- ii) Histogram
- iii) Mutually exclusive events
- iv) Judgment sampling method
- v) Skewness
- vi) Confidence interval
- vii) Correlation

(b) Police Record shows the following numbers of daily crime reports for a sample of days during the winter months and a sample of days during the WINTER months. **07**

Winter	18	20	15	16	21	20	12	16	19	20
WINTER	28	18	24	32	18	29	23	38	28	18

- i) Find mean and standard deviation for winter months
- ii) Find mean and standard deviation for WINTER months
- iii) Which distribution is more consistent?

Q.2 (a) Given the probabilities of three events, A, B, and C, occurring are $P(A) = 0.35$, $P(B) = 0.45$, and $P(C) = 0.2$. Assuming that A, B, or C has occurred, the probabilities of another event, X, occurring are $P(X/A) = 0.8$, $P(X/B) = 0.65$, and $P(X/C) = 0.3$. Find $P(A/X)$, $P(B/X)$, and $P(C/X)$. **07**

(b) Assuming that half of the Indian population is vegetarian. Estimate how many investigators out of 100 will report that 3 or less are vegetarian in the sample of 10 individuals. **07**

OR

(b) If the prices of new cars increase an average of four times every 3 years, find the probability of: **07**

- i) No price hikes in a randomly selected period of 3 years
- ii) Two price hikes
- iii) Four price hikes

- Q.3 (a)** Fit a straight line trend by the method of least squares to the following data and also forecast the earnings for the year 2010. **07**

Year	2002	2003	2004	2005	2006	2007	2008	2009
Dividend Payment	2.2	2.4	3.0	5.0	6.8	8.1	9.0	9.8

- (b)** The weights of items produced by a company are normally distributed with a mean of 45 gm and a standard deviation of 3 gm. What is the probability that a randomly selected item from the production will weigh at least 42 gm? **07**

OR

- Q.3 (a)** In a city of some Western country 70% of the married persons have children. What is the probability that at least three among four persons will have children? **07**

- (b)** Passengers arrive randomly and independently at the passenger-screening facility at a major international airport. The mean arrival rate is 10 passengers per minute. Compute the probability of no arrivals in a 15 second period. **07**

- Q.4 (a)** Explain briefly any four probabilistic sampling methods and three non-probabilistic sampling methods. **07**

- (b)** In a sample of 500 people from a village, 280 are found to be rice eaters and the rest are wheat eaters. Can we assume that both the food articles are equally popular? **07**

OR

- Q.4 (a)** A farmer owns 60 acres of wheat fields. Based on past experience, he knows that the yield from each individual acre is normally distributed with mean 120 quintals and standard deviation 12 quintals. Help the farmer plan for his next year's crop by finding: **07**

- The expected mean of the yields from his 60 acres of wheat.
- The standard deviation of the sample mean of the yields from his 60 acres.
- The probability that the mean yield per acre will exceed 123.8 quintals.
- The probability that the mean yield per acre will fall between 117 and 122 quintals.

- Q.4 (b)** A TV-documentary on overeating claimed that Indians are about 10 pounds overweight on average. To test this claim, eighteen randomly selected individuals were examined; their average excess weight was found to be 12.4 pounds, and the standard deviation was 2.7 pounds. At a significance level of 0.01, is there any reason to doubt the validity of the claimed 10-pound value? **07**

- Q.5 (a)** A credit insurance organization has developed a new high-tech method of training new sales personnel. The company sampled 16 employees who were trained the original way and found average daily sales to be Rs.688 and the sample standard deviation was Rs.32.63. They also sampled 11 employees who were trained using the new method and found average daily sales to be Rs.706 and the sample standard deviation was Rs.24.84. At $\alpha = 0.05$, can the company conclude that average daily sales have increased under the new plan? **07**

- (b)** An advertising firm is trying to determine the demographics for a new product. They have randomly selected 75 people in each 5 different age groups and introduced the product to them. The results of the survey are given below: **07**

Future Activity	Age group				
	18-29	30-39	40-49	50-59	60-69
Purchase frequently	12	18	17	22	32
Seldom purchase	18	25	29	24	30
Never purchase	45	32	29	29	13

Develop a table of observed and expected frequencies, and calculate χ^2 value. For the level of significance is 0.01, should the null hypothesis be rejected?

OR

- Q.5 (a)** Two different areas of a large eastern city are being considered as sites for day-care centers. Of 200 households surveyed in one section, the proportion in which the mother worked full-time was 0.52. In another section, 40 percent of the 100 households surveyed had mothers working at full-time jobs. At the 0.04 level of significance, is there a significant difference in the proportions of working mothers in the two areas of the city? **07**

- (b)** A brand manager is concerned that her brand's share may be unevenly distributed throughout the country. In a survey in which the country was divided into four geographical regions, a random sampling of 100 consumers in each region was surveyed, with the following results: **07**

	Region				Total
	NE	NW	SE	SW	
Purchase the brand	40	55	45	50	190
Do not purchase	60	45	55	50	210
Total	100	100	100	100	400

Develop a table of observed and expected frequencies and calculate the sample χ^2 value. State the null and alternative hypotheses and test whether brand share is the same across the four regions at $\alpha = 0.05$.
