

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER-III • EXAMINATION – WINTER • 2014

Subject Code: 2630003

Date: 29-12-2014

Subject Name: Statistical Methods

Time: 10:30 am - 01:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Answer the following questions: **07**
1. State the application of statistics in business and economics.
 2. State the different scales of measurement.
 3. Give an example of stem and leaf plot.
 4. What is meant by equally likely events?
 5. Give an example of binomial probability distribution.
 6. What does correlation coefficient represent?
 7. What is the significance of coefficient of determination?
- (b)** Suppose that IQ scores of students have a bell-shaped distribution with a mean of 100 and a standard deviation of 15. **07**
1. What percentage of people should have an IQ score between 85 and 115?
 2. What percentage of people should have an IQ score between 70 and 130?
- Q.2 (a)** Phone calls arrive at the rate of 48 per hour at the reservation desk for an organization. **07**
1. Compute the probability of receiving three calls in a five-minute interval of time.
 2. Compute the probability of receiving exactly 10 calls in 15 minutes.
- [Hint: Use Poisson distribution]
- (b)** The average stock price for companies making up the top 100 companies is Rs. 30 and the standard deviation is Rs. 8.2. Assume the stock prices are normally distributed. **07**
1. What is the probability a company will have a stock price of at least Rs. 40?
 2. What is the probability a company will have stock price less than Rs. 20?
- OR**
- (b)** The time between arrivals of vehicles at a particular intersection follows an exponential probability distribution with a mean of 12 seconds. **07**
1. What is the probability that the arrival time between vehicles is less than or equal to 12 seconds?
 2. What is the probability that the arrival time between vehicles is less than or equal to 6 seconds.
- Q.3 (a)** A population has a mean of 200 and a standard deviation of 50. A simple random sample of size 100 will be taken and the sample mean $\bar{x}$ will be used to estimate the population mean. **07**
1. What is the expected value of $\bar{x}$?
 2. What is the standard deviation of $\bar{x}$?
 3. Show the sampling distribution of $\bar{x}$?
 4. What does the sampling distribution of $\bar{x}$ show?
- (b)** A population has a mean of 200 and a standard deviation of 50. Suppose a simple random sample of size 100 is selected and $\bar{x}$ is used to estimate μ . **07**
1. What is the probability that the sample mean will be within ± 5 of the population mean?
 2. What is the probability that the sample mean will be within ± 10 of the population mean?

OR

- Q.3 (a)** In an effort to estimate the mean amount spent per customer for dinner at a restaurant, data were collected for a sample of 49 customers. Assume a population standard deviation of Rs. 5. **07**

1. At 95% confidence, what is the margin of error?
2. If the sample mean is Rs. 24.80, what is the 95% confidence interval for the population mean?

- (b)** Sales personnel for a distributor submit weekly reports listing the customer contacts made during the week. A sample of 65 weekly reports showed a sample mean of 19.5 customer contacts per week. The sample standard deviation was 5.2. **07**
Provide 90% and 95% confidence intervals for the population mean number of weekly customer contacts for the sales personnel.

- Q.4 (a)** In a simple random sample of 600 men taken from a big city, 400 are found to be smokers. In another simple random sample of 900 men taken from another city, 450 are smokers. Do the data indicate that there is a significant difference in the habit of smoking in the two cities? **07**

- (b)** For a random sample of 10 persons, fed on diet A, the increased weight in pounds in a certain periods were: **07**

10, 6, 16, 17, 13, 12, 8, 14, 15, 9

For another random sample of 12 persons fed on diet B, the increase in the same period were:

7, 13, 22, 15, 12, 14, 18, 8, 21, 23, 10, 17.

Test whether the diets A & B differ slightly as regards their effect on the increase in the weight.

[Use value of 't' at 5% level]

OR

- Q.4 (a)** 200 digits are chosen at random from a set of tables. The frequencies of the digits are as follows: **07**

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use Chi-square test to assess the correctness of the hypothesis that the digits were distributed in equal numbers in the tables from which they were chosen.

- (b)** In an experiment on pea-breeding, a scientist obtained the following frequencies of seeds: 15 round & yellow, 101 wrinkled & yellow, 108 round & green, 32 wrinkled & green. According to his theory of heredity, the numbers should be in the proportion of 9:3:3:1. Is there any evidence to doubt the theory at 5% level of significance? **07**

- Q.5 (a)** For the below given data on share prices of two companies, **07**

Week	1	2	3	4	5	6	7	8	9	10
x (MUL)	10425	10220	9862	10367	9929	10595	11113	10922	11111	10306
y (M&M)	1387	1346	1333	1409	1395	1464	1527	1499	1516	1357

1. Obtain the regression equation of variable 'y' dependent on variable 'x'.
2. Obtain and comment on the goodness of the fit of the above equation.

- (b)** For the data given below: **07**

x_i	2	3	5	1	8
y_i	25	25	20	30	16

1. Compute r^2 .
2. Compute sample correlation coefficient.

OR

Q.5 (a) For the following data

07

x_i	1	2	3	4	5
y_i	3	7	5	11	14

1. Estimate the standard deviation of $\hat{y}_p$ when $x = 4$.
2. Develop a 95% confidence interval for the expected value of 'y' when $x = 4$.

(b) For the given data,

07

x (Students' GPA)	2.6	3.4	3.6	3.2	3.5	2.9
y (Students' starting salaries)	3300	3600	4000	3500	3900	3600

1. Develop 95% confidence interval for the mean starting salary for all students with 3.0 GPA.
2. Develop a 95% prediction interval for the starting salary of a student with a GPA of 3.0.
