Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA Integrated– SEMESTER III– EXAMINATION – SUMMER 2016

Subject Code:4430603 **Date: 13/05/2016**

Subject Name: Statistical Methods (SM)

Time: 02:30 pm To 5:00 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)** Define the following **07**

1) Mutually exclusive events
2) Ogive Curve
3) Median
4) Co-Variance
5) Binomial distribution
6) Type-I error
7) Null Hypothesis

(b) (I) Answer the following objective question. **03**

1) Consider a sample with data values of 27, 25, 20, 15, 30, 34, 28 and 25 then what is 65th percentile?
2) If sd=9.65 and error is 2 then at 95% confidence level, then what will be the sample size?
3) Following are the wages of 8 workers in rupees 50, 62, 40, 70, 45, 56, 32 and 45 then If one of the workers is selected at random, what is the probability that his wage would be lower than the average wages?

(II) Determine whether the following statements are true or false: **04**

1) 'r' is negative when both the variables are decreasing.
2) If two events A and B are independent , the probability that both will occur is given by P(A).P(B)
3) The order of arrangement is important in permutation.
4) As the sample size increases, Standard error also increases.

Q.2 **(a)** Find the co-variance of cholesterol and Diastolic B.P. **07**

Person	1	2	3	4	5	6	7	8	9	10
Cholesterol	307	259	431	317	274	267	320	274	336	300
Diastolic B.P	80	75	90	74	110	70	85	88	78	79

(b) Data on the 30 largest bond funds provides 1-year and 5-year percentage returns for the period ending March 31, 2000. Suppose we consider a 1-yearreturn in excess of 2% to be high and a 5-year return in excess of 44% to be high. 15 of the funds had a 1-year return in excess of 2%, 12 of the funds had a 5-year return in excess of 44% and six of the funds had both a 1-year return in excess of 2% and a 5-year return in excess of 44%. **07**

(1) What is the probability that a fund has a high 1-year return or a high, 5 year return or both?
(2) What is the probability that a fund has neither a high 1-year return nor a high 5-year return?

OR

(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 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?

Q.3 (a) Two laboratories A and B carry out estimates of fat content in ice-cream made by a firm. A sample is taken from each batch, halved, and the separated halves sent to the two laboratories. The fat content obtained by laboratories is recorded below: **07**

Batch No.	1	2	3	4	5	6	7	8	9	10
Lab A	7	8	7	3	8	6	9	4	7	8
Lab B	9	8	8	4	7	7	9	6	6	6

Is there a significant difference between the mean fat content obtained by the two laboratories A and B?

(b) A sample of items selected from normal population is 10, 5, 7, 8, 20, 25, 15, 2 and 12. Compute point estimate and 95% interval estimate of population mean. **07**

OR

Q.3 (a) A company has recently created a new hair dryer A with fewer parts than the current hair dryer B. 300 units of each type of hair dryer were tested. 50 units of type A and 75 units of type B failed in a performance test. Can you conclude that new hair dryer is more reliable? **07**

(b) A survey of 611 office workers investigated telephone answering practices including how often each office worker was able to answer incoming telephone calls and how often incoming telephone calls went directly to voice mail. A total 281 office workers indicated that they never need voicemail and are able to take every telephone call. **07**

1) What is the point estimate of the proportion of the population of office workers who are able to take every telephone call?
2) At 90% confidence, what is margin of error?
3) What is the 90% confidence interval for the proportion of the population of office workers who are able to take every telephone call.

Q.4 (a) In a partially destroyed laboratory records on the analysis of correlation data, only the following are legible. Variance of X = 9, Regression equations **07**

$8X - 10Y + 66 = 0$, $40X - 18Y = 214$

Find

(1) Mean of X and Y

(2) Standard Deviation of Y

(b) Power impacts for 8 observations were prepared at different compaction pressure and Hardness of the tablet, the following data obtain. **07**

Observation	1	2	3	4	5	6	7	8
Pressure in tons (x)	0.25	0.75	1	1.5	2	2.5	3	4
Hardness in Kg. (y)	1	1.3	1.9	2.6	2.8	3.3	4.2	5.3

Calculate coefficient of correlation and interpretation of your answer.

OR

Q.4 (a) From the following data calculate two equation of line of regression. **07**

	X	Y
Mean	60	67.5
Standard Deviation	15	13.5

Correlation co-efficient between X and Y is 0.50 also estimate the value of Y for X = 72 Using the appropriate Regression equation.

(b) The results of a national survey of 3000 adults showed that adults sleep for 6.9 hours a day on an average with a standard deviation 1.2 hours. Mention Chebyshev's theorem. Using it, find the percentage of adults who sleep between 4.5 and 9.3 hours per day. **07**

Q.5 **(a)** The following table gives the yields on 15 sample fields under three varieties of seeds. **07**

Yields		
A	B	C
5	3	10
6	5	13
8	2	7
1	10	13
5	0	17

Compute One-Way ANOVA table and find the value of F at 5% level of significance.

(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 the Brand	60	45	55	50	210
Total	100	100	100	100	400

Develop a Table of observed and expected frequencies and calculate the sample Chi-Square Value. State Null and alternate Hypothesis and state that whether brand share is same across four region at $\alpha=0.05$

OR

Q.5 **(a)** National Transportation Safety Board (NTSB) wants to examine the safety of compact cars, midsize cars, and full-size cars. It collects a sample of three for each of the treatments (cars types). Using the hypothetical data provided below, test whether the mean pressure applied to the driver's head during a crash test is equal for each types of car. **07**

Compact Car	Mid Size Car	Full size car
643	469	486
655	427	456
702	525	402

Compute One-Way ANOVA table and find the value of F at 5% level of significance.

(b) Define the chi-square test. **07**

A die is thrown 150 times and the following results are obtained.

Number Turned	1	2	3	4	5	6
Frequency	19	23	28	17	32	31

Test the hypothesis that the die is unbiased at 5 % level of significance (At 5 % level of significance for 5 d.f.= 11.07)

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