Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER–III • EXAMINATION – WINTER - 2013

Subject Code: 2630003 Date: 31-05-2014

Subject Name: Stastical Methods

Time: 02:30 pm - 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.**

Q.1 **(a)** Draw Box Plot for following data **07**
3450,3550,3650,3480,3355,3310,3490,3730,3540,3925,3520,3480

(b) Answer the following
(I)Write Properties of Poisson distribution. **04**
(II)Write differences between qualitative and quantitative data **03**

Q.2 **(a)** The time needed to complete a final examination in a particular college course is normally distributed with a mean of 80 minutes and a standard deviation of 10 minutes. Answer the following questions. **07**

a. What is the probability of completing the exam in one hour or less?
b. What is the probability that a student will complete the exam in more than 60 minutes but less than 75 minutes?
c. Assume that the class has 60 students and that the examination period is 90 minutes in length. How many students do you expect will be unable to complete the exam in the allotted time?

(b) Nine percent of undergraduate students carry credit card balances greater than $7000. Suppose 10 undergraduate students are selected randomly to be interviewed about credit card usage. **07**

a) What is the probability that two of the students will have a credit card balance greater than $7000?
b) What is the probability that none will have a credit card balance greater than $7000?
c) What is the probability that at least three will have a credit card balance greater than $7000?

OR

(b) The time required to pass through security screening at the airport can be annoying to travelers. The mean wait time during peak periods at International Airport is 12.1 minutes. Assume the time to pass through security screening follows an exponential distribution. **07**

a. What is the probability it will take less than 10 minutes to pass through security screening during a peak period?
b. What is the probability it will take more than 20 minutes to pass through security screening during a peak period?
c. It is 8:00 A.M. (a peak period) and you just entered the security line. To catch your plane you must be at the gate within 30 minutes. If it takes 12 minutes from the time you lear security until you reach your gate, what is the probability you will miss your flight?

Q.3 **(a)** *Playbill* magazine reported that the mean annual household income of its readers is \$119,155. Assume this estimate of the mean annual household income is based on a sample of 80 households, and based on past studies, the population standard deviation is known to be σ = \$30,000. **07**

a. Develop a 90% confidence interval estimate of the population mean.

b. Develop a 95% confidence interval estimate of the population mean.

(b) Explain different sampling methods **07**

OR

Q.3 **(a)** A population proportion is 0.40. A simple random sample of size 200 will be taken and the sample proportion will be used to estimate the population proportion. **07**

a. What is the probability that the sample proportion will be within ±.03 of the population proportion?

b. What is the probability that the sample proportion will be within ±.05 of the population proportion?

(b) Write limitations of chi-square test. **07**

Q.4 **(a)** Answer the following

(I) Define Type-I and Type-II errors **03**

(II) A sample of 400 male students, it is found to have a mean height of 171.38 cm. Can it be reasonably regarded as a sample from a large population with mean height 171.17 cm and population standard deviation 3.30 cm?(Take α = 0.05) **04**

(b) A company is interested in finding out if there is any difference in average salary received by managers of two divisions. Accordingly samples of 12 managers in the first division and 10 managers in the second were selected at random. The result are given below : **07**

	I division	II division
Sample size	12	10
Average Monthly Salary	12500	11200
Sample Standard Deviation	320	480

Is there any significant difference between average salary received by managers of two divisions at 5 % significant level?

OR

Q.4 **(a)** Answer the following

(I)Define Two types of Hypothesis **03**

(II) Ten oil tins are taken at random from an automatic filling machine. The mean weight of 10 tins is 15.8kg with a standard deviation of 0.5 kg. Does the sample mean differ significantly from the intend weight of 16 kg at 5% level of significance? **04**

(b) A random sample of 500 persons belonging to urban area 200 are found to be commuters of public transport. In another sample of 400 persons belonging to ruler area 200 are found to be commuter of public transport Discuss whether the data reveal that proportion of commuters of public transport is significantly higher for ruler area as compared to urban area at 1% level of significance? **07**

Q.5 **(a)** The sales (in thousand Rs) data of an item in six shops before and after a special promotional campaign are as under: **07**

Shops	A	B	C	D	E	F
Before campaign	53	28	31	48	50	42
After campaign	58	29	30	55	56	45

Did the campaign make any significant difference in sale at 5% Significant level?

(b) Given are five observations collected in a regression study on two variables. **07**

x_i	2	6	9	13	20
y_i	7	18	9	26	23

a. Develop a scatter diagram for these data.

b. Develop the estimated regression equation for these data.

c. Use the estimated regression equation to predict the value of y when $x = 6$.

OR

Q.5 **(a)** Define the chi-square test. **07**

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

Number turned up	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

(b) The data from exercise 1 follow. **07**

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

The estimated regression equation for these data is $\hat{y} = 0.20+2.60x$.

a. Compute SSE, SST, and SSR.

b. Compute the coefficient of determination r^2.

c. Compute the sample correlation coefficient.

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