Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA– SEMESTER –III EXAMINATION –SUMMER-2019

Subject Code:2630003 **Date: 17-05-2019**

Subject Name: Statistical Methods

Time:02.30 pm to 5.00 pm **Total Marks: 70**

Instructions:

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

Q.1(a) Define the following terms: **7**

1. Mutually Exclusive Events.
2. Sample size
3. Standard Error
4. Median
5. Histogram
6. Hypothesis
7. Types of Hypothesis.

(b) For a random sample of 10 persons, fed on diet A, the increase weight in pound in a certain period were: 10,6,16,17,13,12,8,14,15,9 **7**

For another random sample of 12 persons, fed on diet B , the increase weight in pound in a certain period were: 7,13,22,15,12,14,18,8,21,23,10,17.

Test whether the diet A and B differ significantly as regards their effects on increase in weight at 5% level of significance.

Q.2(a) Suppose that IQ scores of students have a bell shaped distribution with a mean of 100 and a standard deviation of 15. **7**

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? [Normal Distribution]

(b) Using given marks of 8 students in a sample, compute mean, median, mode, standard deviation and coefficient of variation. **7**

Marks : 93, 65 , 80, 97, 85, 87, 97, 60

OR

(b) The result of national survey showed that on average , adult sleep 6.9 hrs per night. Suppose that standard deviation is 1.2 hrs. Use Chebyshev's theorem to calculate the percentage of individual who sleep between 4.5 & 9.3 hrs. **7**

Q.3(a) If X is a Poisson variable such that P(X= 2) =9, P(X= 4) + 90P(X=6), find the mean and variance of X. **7**

(b) Define :

1. Type I and type II error **4**
2. Two tailed and one tailed test. **3**

OR

Q.3(a) In a certain city 250 men in a sample of 1000 were found to be smoker. In another city, the number of smokersnwasnn750 in a random sample of 2000. Does this indicate that there is a greater proportion of smokers in the second city than in the first? **7**

(b) A simple random sample of 50 items from a population with $\sigma = 6$ resulted in a sample mean of 32. Provide 90%, 95%, 99% confidence interval for the population mean. **7**

Q.4(a) According to BSNL, 71% of internet users connect their computers to the internet by normal telephone lines. Assume a population proportion p = 0.71. **7**

1. What is the probability that sample proportion from a simple random sample of 350 internet users will within ± 0.5 of the population proportion?
2. What is the probability that a sample proportion from a simple random sample of 350 internet users will be 0.75 or greater?

(b) Answer the following questions: **7**

1. For a population, if $\mu = 200$, $\sigma = 50$, $n = 100$ then find standard error of mean.
2. If A and B are mutually exclusive events then what is the value of P(AUB)?
3. If $n = 50$, $\sigma = 6$ and sample mean is 32 then what is the confidence interval for the population mean at 90% confidence level?
4. Considered a sample with te data values of 27, 25, 20, 15, 30, 34, 28 and 25 then what is 65^{th} percentile?
5. If $P(A) = a$, $P(B) = b$, and $P(A \cap B) = c$ then find the value of $P(A' \cup B')$.
6. If ${}^nP_r = 336$ and ${}^nC_r = 56$ then find the value of n and r.
7. What is the chances of getting at least one defective items are drawn randomly from a lot containing 6 items of which 2 are defective items?

OR

Q.4(a)1. Define : **3**

1. Level of significance
2. Degree of freedom

2. A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defective in a batch of 300. Test at 5% level of significance, Has the machine improved? **4**

(b) The number of defects per unit in a sample of 330 units of a manufactured product was found as follow: **7**

Number of defects	0	1	2	3	4
Number of units	214	92	20	3	1

Fit a Poisson distribution to the data and test for goodness of fit at 5% level of significance.

Q.5(a) The following information was obtaining from samples regarding the productivity scores(out of 10) of 5 and 7 individual using two different methods of production: **7**

Method 1	8	10	14	10	13		
Method 2	12	15	11	16	14	14	16

Is there a significant difference between the productivity of the two methods?

(b) The table given below gives average preferences for random samples of teens and adults: **7**

	Teens	Adults	Total
Coffee	50	200	250
Tea	100	150	250
Soft Drink	200	200	400
Other	50	50	100

Test for independence between age(i.e. adult and teen) and drink preferences at $\alpha = 0.05$.

OR

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 **7**

Shops	A	B	C	D	E	F
Before Campaign	55	25	35	50	50	40
After campaign	60	22	30	55	58	45

Did the campaign make any significant difference in sale?

(b) Given the data for two variable X and Y. **7**

X	6	11	15	18	20
Y	6	8	12	20	30

1. Develop an essential regression for these data.
2. Compute the residual.
3. Develop a plot of the residual against the independent variable X. Do the assumptions about the error terms seen to be satisfied?

****