Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**MCA INTEGRATED– SEMESTER III- EXAMINATION –SUMMER-2022**

**Subject Code: 2638602 Date: 13/06/2022**

**Subject Name: Basic Statistics**

**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.**

**Q.1** **(a)** Do as directed. **7**

1) Define Kurtosis.
2) The outcomes of an experiment are classified as _____.
3) If Null Hypothesis is accepted when it is false, it will be Type-I error. – True or false? Justify your answer.
4) If P (A) = 0.8, P (B) = 0.5 and P (A ∪ B) = 0.9 find P (A|B).
5) As the sample size increases, standard error also increases. (T/F) ? Justify.
6) The difference between the highest and the lowest observations in the data set is called _____.
7) If Standard deviation = 8 and Coefficient of variation = 64% then compute mean.

**(b)** Consider a sample with data values of 2890, 2710, 2880, 2755, 2850, 2880, 2920, 3050, 2950, 3325, 3130 and 2940. **7**
(i) Provide the five number summaries for the data.
(ii) Show the Box Plot for the data.

**Q.2** **(a)** A random sample of 81 units is taken, producing a sample mean of 211 with a population standard deviation of 6. Construct 95% confidence level interval to estimate population mean. **7**

**(b)** Find following from binomial formula: **7**
**(i)** If n=4 , p =0.10 then find P(x=3)
**(ii)** If n=20 , p =0.06 then find P(x < 3)
**(iii)** If n=20 , p=0.06 then find P(x= greater than or equal 3)

**OR**

**(b)** The probability that a bomb dropped from an aero plane will hit the target is 0.4. Five bombs are dropped from the aero plane to destroy a bridge. 2 bombs are sufficient to destroy the bridge. What is the probability that the bridge will be destroyed? **7**

**Q.3** **(a)** Suppose that IQ scores of students have a bell-shaped distribution with a mean of 100 and a standard deviation of 15.
1. What percentage of people should have an IQ score between 85 and 115? **4**
2. What percentage of people should have an IQ score between 70 and 130 **3**

**(b)** 1) Define Mutually exclusive events and independent events. **2**
2) Find out P(B|F), P(G|C) and P(D|F) for the following Data: **5**
Events:- Finance =A, Manufacturing =B, Communication = C, Northeast = D, Southeast=E, Midwest = F, West= G

| | | Geographic Location | | | |
|---|---|---|---|---|---|
| | | Northeast | Southeast | Midwest | West |
| **Industry Type** | Finance | .12 | .05 | .04 | .07 |
| | Manufacturing | .15 | .03 | .11 | .06 |
| | Communication | .14 | .09 | .06 | .08 |

**OR**

**Q.3** **(a)** Define the normal distribution. **7**

Marks of large number of students are distribution normally with mean 55 and standard Deviation 13. If a student is selected at random what is the probability that his marks will be Between (1) 43 and 67 (2) 35 and 75 (3) More then 60

**(b)** Airline passengers arrive randomly and independently at the passenger screening facility at a major international airport. The mean arrival rate is 10 passengers per minute.

**a)** Compute the probability of no arrivals in one minute period. **3**

**b)** Compute the probability that three or fewer passengers arrive in one minute period. **2**

**c)** Compute the probability of no arrivals in a 15 second period. **2**

**Q.4** **(a)** Suppose that during any hour in a large department store, the average number of shoppers is 448, with a standard deviation of 21 shoppers. What is the probability that a random sample of 49 different shopping hours will yield a sample mean between 441 and 446 shoppers? **7**

**(b)** A random sample of 1,000 persons from town A, 400 is found to be consumers of wheat. In a sample of 800 from town B, 400 are found to be consumers of wheat. Do these data reveal a significant difference between town A and town B, so far as the proportion of wheat consumer is concerned? **7**

**OR**

**Q.4** **(a)** A simple random sample of 50 items from a population with $\sigma = 6$ resulted in a sample mean of 32. Provide a 90%, 95% and 99% confidence intervals for the population mean. **7**

**(b)** Give Difference between (i) One tailed and two tailed test (ii) Type-I and Type-II Error. **7**

**Q.5** **(a)** Five observations taken for two variables follow: **7**

| | | | | | |
|---|---|---|---|---|---|
| X | 12 | 21 | 28 | 8 | 20 |
| Y | 17 | 15 | 22 | 19 | 24 |

(1) Develop the estimated regression equation by computing the values of $b0$ and $b1$.

(2) Use the estimated regression equation to predict the value of $y$ when $x$ = 10.

**(b)** In a study of job satisfaction, a series of tests was administered to 50 subjects. The following data were obtained: higher scores represent greater dissatisfaction. Construct a stem-and-leaf display for the data. **7**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 87 | 67 | 92 | 41 | 90 | 76 | 58 | 59 | 50 | 75 |
| 80 | 70 | 69 | 88 | 85 | 81 | 73 | 61 | 46 | 97 |
| 50 | 81 | 75 | 65 | 77 | 47 | 87 | 60 | 92 | 71 |
| 70 | 53 | 61 | 84 | 70 | 74 | 43 | 89 | 83 | 46 |
| 84 | 78 | 69 | 78 | 74 | 76 | 64 | 76 | 67 | 64 |

**OR**

**Q.5** **(a)** Consider following data. **7**

| | | | | | |
|---|---|---|---|---|---|
| X | 2 | 4 | 5 | 7 | 8 |
| Y | 2 | 3 | 2 | 6 | 4 |

Assume regression equation of these data is : $\hat{\mathbf{Y}} = 2.65 + (0.25)\,X$

**(i)** Compute the SSE, SST & SSR

**(ii)** Compute the Coefficient of Determination ( $r^2$ )

**(b)** List all types of sampling methods. Explain any two Probabilistic and any two non-probabilistic sampling methods. **7**

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