GUJARAT TECHNOLOGICAL UNIVERSITY
MCA – SEMESTER – IV • EXAMINATION – SUMMER - 2017

Subject Code:3640001   **Date:30/05/2017**
Subject Name: Basic Statistics
Time: 10:30 AM TO 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)** (i) State different applications of statistics in business and economics. **04**
    (ii) Answer the following questions. **03**
        (1) If A and B are mutually exclusive events then what is the value of $P(A \cap B)$.
        (2) Define independent events.
        (3) The lowest level of data measurement is the _____ level. (Nominal, ordinal)

(b) Determine the value of the coefficient of correlation r, for the following data. **07**

X	4	6	7	11	14	17	21
Y	18	12	13	8	7	7	4

Q.2 **(a)** (i) Prepare stem and leaf display of the following data. **07**

44	18	39	40	59
46	59	37	15	73
23	19	90	58	35
82	14	38	27	24
71	25	39	84	70

  (ii) Draw box plot for the following data.
    24,25,28,37,35,28,36,12,40,29

(b) (i) 15% of the screw produced by machine are defective. A random sample of 10 screws are selected. Find **07**
  (1) What is the probability that the sample contains exactly 3 defective?
  (2) What is the probability that the sample contains at most 4 defective?
  (ii) Define the following terms in brief:
    1. Skewness
    2. Ogive
    3. Correlation

OR

(b) Construct a histogram and a frequency polygon for the following data. **07**

Classes	10-20	20-30	30-40	40-50	50-60	60-70	70-80
frequency	9	7	10	6	13	18	15

  Also obtain arithmetic mean of the given data.

Q.3 **(a)** (i) Two dice are thrown simultaneously. What is the probability of getting **07**
    (1) 8 as the sum of two numbers that turn up (2) a doublet?
  (ii) During a war, on an average one ship out of 9 got sunk in a certain voyage. Find the probability that exactly 5 out of a convey of 6 ships would arrive safely.

(b) In a manufacturing plant, machine A produces 10% of a certain product, machine B produces 40% of this product, and machine C produces 50% of this product. Five percent of machine A products are defective, 12% of machine B products are defective, and 8% of machine C products are defective. The company inspector has just sampled a product from this plant and has found it to be defective. Determine the revised probabilities that the sampled product was produced by machine A, machine B, or machine C. **07**

<div align="center">OR</div>

Q.3 **(a)** For two events A and B in the sample space of a random experiment $P(A) = 2P(B) = 4P(A \cap B) = 0.6$. Find the probability of following events: (1) $A' \cap B'$ (2) $A' \cup B'$ (3) $A - B$ (4) $B - A$ **07**

(b) In a city, daily sale of petrol at a petrol pump follows normal distribution and its mean and standard deviation are 33,000 litre and 3000 litre respectively. (1) Obtain the percentage of days of a month during which the daily sales of petrol is less than 30,000 litre. (2) During the month of May, how many days are expected so that the sale of petrol is between 32,000 litre to 35,000 litre? **07**

Q.4 **(a)** The average number of annual trips per family to amusement parks in the United States is Poisson distributed, with a mean of 0.6 trips per year. What is the probability of randomly selecting an American family and finding the following? **07**
a. The family did not make a trip to an amusement park last year.
b. The family took exactly one trip to an amusement park last year.
c. The family took two or more trips to amusement parks last year.
d. The family took three or fewer trips to amusement parks over a three-year period.
e. The family took exactly four trips to amusement parks during a six-year period.

(b) Explain following terms. **07**
(1) Simple Random Sampling (2) Stratified Random Sampling
(3) Cluster Sampling   (4) Systematic Sampling

<div align="center">OR</div>

Q.4 **(a)** A population has a mean of 50 and a standard deviation of 10. If a random sample of 64 is taken, what is the probability that the sample mean is each of the following? **07**
a. Greater than 52
b. Less than 51
c. Less than 47
d. Between 48.5 and 52.4
e. Between 50.6 and 51.3.

(b) (1) A random sample of 81 items is taken, producing a sample mean of 47. The population standard deviation is 5.89. Construct a 90% confidence interval to estimate the population mean. **07**
(2) Suppose a random sample of 85 items has been taken from a population and 40 of the items contain the characteristic of interest. Use this information to calculate a 95% confidence interval to estimate the proportion of the population that has the characteristic of interest.

Q.5 **(a)** (1) A sample of 400 male students is found to have a mean height of 151.38 cm. Can it reasonably regarded as a sample from a large population with mean height 171.17 cm. and standard deviation 3.30cm? **07**
(2) In a hospital 480 female and 520 male babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal numbers?

(b) Determine the equation of the regression line for the following data, and compute SSR, SSE, & SST. **07**

X	2	6	8	8	12	16	20	20	22	26
Y	58	105	88	118	117	137	157	169	149	202

OR

Q.5 (a) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a standard deviation of 5 months. A random sample of 6 bulbs gave the following values. **07**

Life of months : 24,26,30,20,20,18

Can you regard the producer's claim to be valid at 1% level of significance?

(b) For the data given below. **07**

X	1	2	3	4	5
Y	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 $x = 4$.

(3) Develop a 95% prediction interval for y when $x = 4$.

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