Course Code	**:**	**BCS-040**
Course Title	**:**	**Statistical Techniques**
Assignment Number	**:**	**BCA_NEW/BCAOL(III)040/Assign/2026-27**
Maximum Marks	**:**	**100**
Last Date of Submission	**:**	**31st October, 2026 (For July 2026 Session)**
	:	**30th April, 2027 (For January 2027 Session)**

Note: This assignment has 16 questions of 80 marks (each question carries equal marks). Answer all the questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1: In a study on per capita income for a particular year in a city, the following weekly observations were made:

Per Capita Income: 14K–15K, 15K–16K, 16K–17K, 17K–18K, 18K–19K, 19K–20K
Number of Weeks: 5, 10, 20, 9, 6, 2

Draw a **histogram** and a **frequency polygon** on the same scale. Also explain the usefulness of both diagrams in representing grouped data.

Q2: The following data show the age groups of students and the number of regular players in each group:

Age Groups	: 15–16,	16–17,	17–18,	18–19,	19–20,	20–21
Number of Students	: 200,	270,	340,	360,	400,	300
Number of Regular Players:	150,	152,	170,	180,	180,	120

Apply Chi-Square Statistic and determine whether there is any relationship between **age** and **playing habits** of students. Interpret the result clearly.

Q3: The mean marks and standard deviations of students in two subjects are given below:

Subject A: Mean = 36, Standard Deviation = 11
Subject B: Mean = 85, Standard Deviation = 8
Coefficient of correlation between A and B = ±0.66

Determine the two equations of regression and calculate the expected marks in Subject A corresponding to **75 marks** obtained in Subject B.

Q4: A drilling machine bores holes with a mean diameter of **0.5230 cm** and standard deviation of **0.0032 cm**. Calculate the **2-sigma** and **3-sigma** upper and lower control limits for samples of size 4. Also prepare and explain the control chart.

Q5: Construct **5-yearly moving averages** from the following sales data:
Year: 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012
Sale: 105, 107, 109, 112, 114, 116, 118, 121, 123, 124, 125, 127, 129

Explain how moving averages help in identifying trends in a time series.

Q6: In 120 throws of a single die, the following frequencies were observed:

Faces : 1, 2, 3, 4, 5, 6
Observed Frequency: 30, 25, 18, 10, 22, 15

Use the **chi-square goodness of fit test** to verify whether the hypothesis that the die is biased is acceptable or not.

Q7: A company wants to estimate how monthly cost is related to monthly output. The data are given below:

Output in Tons: 1, 2, 4, 8, 6, 5, 8, 9, 7
Cost in Lakhs: 2, 3, 4, 7, 6, 5, 8, 8, 6

Fit the best linear regression line, taking monthly output as the dependent variable and monthly cost as the independent variable. Use the regression line to predict the cost when output is **4 tons per month**.

Q8: The probability that at least one of two independent events occurs is **0.5**. The probability that the first event occurs but not the second is **3/25**, and the probability that the second event occurs but not the first is **8/25**. Find the probability that none of the two events occurs.

Q9: Marks of six students are given below:

Raj = 54, Anil = 50, Amit = 52, Om = 48, Rita = 50, Renu = 52

From this population, samples of size 2 are to be selected. Determine the total number of possible samples and construct the **sampling distribution of means**.

Q10: Two new types of petrol, called premium and super, are introduced in the market, and their manufacturers claim that they give extra mileage. The data on extra mileage are:

Ordinary Petrol: 1, 2, 2, 1
Premium Petrol: 2, 2, 1, 3
Super Petrol : 4, 1, 2, 3

Use **ANOVA** to test whether premium or super petrol gives extra mileage. Also estimate the error variance and write a conclusion.

Q11: Two floppies are selected at random without replacement from a box containing **7 good** and **3 defective** floppies. Let A be the event that the first floppy drawn is defective and B be the event that the second floppy drawn is defective. Find **P(B/A)** and **P(B/A^c)**. Also show that: **P(B) = P(B/A)P(A) + P(B/A^c)P(A^c)**

Q12: Calculate the **mean** and **standard deviation** for the following grouped data:

Class Interval:	0–10,	10–20,	20–30,	30–40,	40–50,	50–60,	60–70
Frequency:	7,	8,	10,	36,	12,	17,	10

Interpret the result in terms of average performance and variability.

Q13: An incomplete frequency distribution of 200 observations is given below. The median of the distribution is 46. Determine the missing frequencies using the median formula. Also write any two merits and any two demerits of the median.

Class Interval:	10–20,	20–30,	30–40,	40–50,	50–60,	60–70,	70–80
Frequency:	12,	30,	?,	65,	?,	25,	18

Q14: Define **random experiment** and **random variable**. Explain the types of random variables with suitable examples from real-life situations.

Q15: Explain and compare the following sampling methods with suitable examples:

(a) Cluster sampling
(b) Stratified sampling
(c) Systematic sampling

Also mention one situation where each method is most suitable.

Q16: Explain the following with the help of suitable examples:

a) Binomial distribution
b) t-test for mean
c) Properties of a good estimator
d) F-test for equality of two variances
e) Control Charts

Q1: In a study on per capita income for a particular year in a city, the following weekly observations were made:

Per Capita Income: 14K–15K, 15K–16K, 16K–17K, 17K–18K, 18K–19K, 19K–20K
Number of Weeks: 5, 10, 20, 9, 6, 2

Draw a histogram and a frequency polygon on the same scale. Also explain the usefulness of both diagrams in representing grouped data.

Answer

Each income interval has equal width of 1K, so the height of each histogram rectangle is its frequency. The total frequency is 5 + 10 + 20 + 9 + 6 + 2 = **52 weeks**. For a frequency polygon, plot frequency against each class midpoint, join successive points by straight lines, and close the polygon to zero at the neighbouring imaginary class midpoints.

Income class	Midpoint (K)	Weeks
14K–15K	14.5	5
15K–16K	15.5	10
16K–17K	16.5	20
17K–18K	17.5	9
18K–19K	18.5	6
19K–20K	19.5	2