



- (vii) Inductive reasoning is  
 (a) data collection analysis method (b) theory data collection analysis method  
 (c) data collection method (d) both (a) and (b)
- (viii) Which of these must be avoided in technical writing?  
 (a) Facts (b) Grammar  
 (c) Punctuation (d) Personal feelings
- (ix) Plagiarism in research is  
 (a) Creative use of another person's data  
 (b) Copying unscrupulously and making use of it  
 (c) Quoting and citing another author  
 (d) Using own previous work
- (x) A man takes a step forward with probability  $p$  and backwards with probability  $q$ . The probability that at the end of 11 steps, he is 1 step away from the starting point is  
 (a)  ${}^{11}C_6 p^5 q^5$  (b)  ${}^{11}C_6 p^6 q^6$  (c)  ${}^{11}C_6 p^5 q^6$  (d)  ${}^{11}C_6 p^6 q^5$

*Fill in the blanks with the correct word*

- (xi) \_\_\_\_\_ is used to include mathematical expressions in-line within text in Latex.
- (xii) \_\_\_\_\_ sampling is helpful as it is free from personal biases.
- (xiii) The sum of deviations from the \_\_\_\_\_ is always zero.
- (xiv) Variables whose values cannot be expressed numerically are called \_\_\_\_\_ variables.
- (xv) Mean and variance are equal in \_\_\_\_\_ distribution.

### **Group - B**

2. (a) Design a framework of planning stages involved in the preparation of a thesis. [[CO2](Design/LOCQ)]  
 (b) Comment on the major problems faced by researchers in India. [[CO2](Analyse/IOCQ)]  
 (c) Design a comprehensive layout of a project report. [[CO2](Design/HOCQ)]  
**4 + 4 + 4 = 12**
3. (a) How does one go about developing working hypotheses? [[CO1](Design/HOCQ)]  
 (b) Determine the significance of literature review in a research problem. [[CO2](Understand/LOCQ)]  
 (c) Give a brief idea about Analytical and Descriptive research. [[CO1](Understand/LOCQ)]  
**4 + 4 + 4 = 12**

### **Group - C**

4. (a) Comment on the steps involved in the techniques of interpretation. [[CO3](Understand/IOCQ)]  
 (b) Analyze the precautions that a researcher should take during interpretation of a report. [[CO2](Analyze/IOCQ)]

- (c) Define problem formulation and explain its importance in research. [[CO2](Understand/LOCQ)]  
**4 + 4 + 4 = 12**
5. (a) How can you examine your hypothesis by measures of central tendency? [[CO3](Examine/HOCQ)]
- (b) Design an experiment using the 'Randomized block design' method. [[CO3](Design/HOCQ)]
- (c) Discuss the sources of error in measurement during research work. [[CO4](Analyze/IOCQ)]  
**4 + 4 + 4 = 12**

### Group - D

6. A biologist assumes that there is a linear relationship between the amount of fertilizer applied to tomato plants and the subsequent yield of tomatoes. Eight tomato plants, of the same variety, were selected at random and treated, weekly, with a solution in which x grams of fertilizer was dissolved in a fixed quantity of water. The yield, y kilograms, of tomatoes was recorded:

Plant	A	B	C	D	E	F	G	H
x	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
y	3.9	4.4	5.8	6.6	7.0	7.1	7.3	7.7

- (i) Plot a scatter diagram of yield, y, against amount of fertilizer, x.
- (ii) Calculate the equation of the least squares regression line of y on x.
- (iii) Estimate the yield of a plant treated, weekly, with 3.2 grams of fertilizer.
- (iv) Indicate why it may not be appropriate to use your equation to predict the yield of a plant treated, weekly, with 20 grams of fertilizer. [[CO5](Understand/IOCQ)]  
**(3 + 6 + 2 + 1) = 12**
7. (a) A manufacturer produces light-bulbs that are packed into boxes of 100. If quality control studies indicate that 0.5% of the light-bulbs produced are defective, what percentage of the boxes will contain:  
(i) no defective? (ii) 2 or more defectives? [[CO5](Understand/IOCQ)]
- (b) A factory uses tools of a particular type. From time to time failures in these tools occur and they need to be replaced. The number of such failures in a day follows Poisson distribution with mean 1.25. At the beginning of a particular day there are five replacement tools in stock. A new delivery of replacements will arrive after four days. If all five spares are used before the new delivery arrives then further replacements cannot be made until the delivery arrives. Find  
(i) the probability that three replacements are required over the next four days.  
(ii) the expected number of replacements actually made over the next four days. [[CO5](Understand/HOCQ)]  
**(2 + 4) + (1 + 5) = 12**

### Group - E

8. (a) What do you understand by the term "self plagiarism"? [[CO6](Remember/LOCQ)]
- (b) Can you suggest some practices to avoid plagiarism? [[CO6](Remember/LOCQ)]

- (c) What are the different types of patent that you know of? [[CO6](Remember/LOCQ)]  
 (d) What is IPR? [[CO6](Remember/LOCQ)]  
**3 + 5 + 3 + 1 = 12**

9. (a) Given two data sets identified by X and Y. Write Excel functions to find:

- (i) Mean of data set X
- (ii) Median of data set X
- (iii) Mode of data set X
- (iv) Variance of data set X
- (v) Covariance between data sets X and Y
- (vi) Correlation between data sets X and Y

[[CO5](Remember/LOCQ)]

(b) Draw the bar chart and pie chart for the following data. The height of students, in cm, of class 9 in a school, divided in five categories:

Category	I Height ≤ 120	II 120 < Height ≤ 135	III 135 < Height ≤ 150	IV 150 < Height ≤ 165	V Height > 165
No. of students	50	90	110	60	50

[[CO5](Apply/IOCQ)]

**(1 × 6) + 6 = 12**

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	35.42	37.5	27.08