

BUSINESS ANALYTICS
(CSBS 4243)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) Analytics in the mortgage industry mainly helps organizations to?
 - (a) Increase interest rates
 - (b) Assess credit risk and customer profiles
 - (c) Eliminate loan approvals
 - (d) Reduce data collection
- (ii) Data visualization primarily helps managers to:
 - (a) Replace statistical analysis
 - (b) Understand patterns and trends easily
 - (c) Increase database storage
 - (d) Eliminate decision uncertainty
- (iii) Hypothesis testing is mainly used to:
 - (a) Estimate sample size
 - (b) Test assumptions about population parameters
 - (c) Visualize data
 - (d) Remove outliers
- (iv) Statistical inference enables managers to:
 - (a) Eliminate uncertainty
 - (b) Draw conclusions about populations using sample data
 - (c) Replace descriptive statistics
 - (d) Remove probability theory
- (v) Which forecasting method is most appropriate when no historical data exists for a new product?
 - (a) Exponential Smoothing
 - (b) Moving Average
 - (c) Qualitative or Judgmental Forecasting (e.g., Delphi Method)
 - (d) Linear Trend Projection

- (vi) In time series forecasting, 'Seasonality' refers to:
 - (a) Changes in data caused by the four seasons only
 - (b) Short-term, regular periodic fluctuations that repeat within a year or less
 - (c) Long-term movements in a single direction over many years
 - (d) Unpredictable "shocks" to the system like a pandemic or strike
- (vii) A 'Predictive Spreadsheet Model' would most likely be used for:
 - (a) Summarizing last year's tax returns
 - (b) Estimating future cash flows based on growth assumptions
 - (c) Finding the optimal mix of products to maximize profit
 - (d) Creating a list of employee contact information
- (viii) Which algorithm is most commonly used to solve linear optimization models?
 - (a) Decision Tree induction
 - (b) Gradient Descent
 - (c) The Simplex Method
 - (d) K-Means Clustering
- (ix) The "Maximin" strategy is best described as
 - (a) Maximizing the maximum possible regret
 - (b) Choosing the alternative with the best "worst-case" scenario.
 - (c) Assuming all outcomes are equally likely
 - (d) Minimizing the total cost of the project
- (x) To calculate the Expected Monetary Value (EMV), one must know:
 - (a) The shadow price of the decision
 - (b) Only the payoffs
 - (c) Only the probabilities
 - (d) Both the payoffs and their associated probabilities

Fill in the blanks with the correct word

- (xi) Platforms like Facebook and Twitter generate large volumes of data used in _____ analytics.
- (xii) Measures such as mean, median, and mode are examples of _____ statistics.
- (xiii) A probability distribution that deals with countable outcomes is called a _____ probability distribution.
- (xiv) The Excel function commonly used to generate random numbers between 0 and 1 is _____.
- (xv) _____ analysis in decision trees studies how changes in input values affect the final decision.

Group - B

- 2. (a) Briefly discuss structured data, unstructured data and semi structured data in business enterprises with example. [[C01](Remember/LOCQ)]
- (b) Discuss briefly the importance of data visualization and reporting in Business Analytics. [[C02](Remember/LOCQ)]

- (c) Analyse correlation and covariance and discuss how they help in identifying relationships between business variables?
[[C03](Analyse/IOCQ)]

3 + 3 + 6 = 12

3. (a) Compare and contrast Descriptive Analytics, Predictive Analytics and Prescriptive Analytics with example.
[[C01](C04)(Understand/LOCQ)]
- (b) Analyse the significance of percentiles and quartiles in business decision-making scenarios.
[[C04](Understand/LOCQ)]
- (c) A stockist has 30 items in a lot, out of which 5 are defective. A customer selects 3 items from the lot. i) What is the probability that all 3 items are defective? (ii) What is the probability that out of the 3 items, 2 are non-defective and 1 is defective?
[[C04](Apply/IOCQ)]

5 + 3 + 4 = 12

Group - C

4. (a) There are two contractors A and B for the completion of a project. A does the first part of the project and then B completes the project. B cannot start until A has finished. If A finishes on time, B has an 80% chance of completing the project on time. If A does not finish on time, B has a 30% chance of completing the project on time. If A has a 60% chance of finishing his work on time, what is the probability that the project will be completed on time?
[[C04](Apply/IOCQ)]
- (b) Explain the logic of hypothesis testing in business analytics.
[[C03](C05)(Understand/LOCQ)]
- (c) Explain how ANOVA extends two-sample testing?
[[C03](Understand/LOCQ)]

6 + 4 + 2 = 12

5. (a) Probability that home will be on fire during a year is 0.001. An insurance company offers to sell owner of such a home Rs 25 lakhs 1 year term insurance policy for a premium of Rs 5000, what is the expected gain of the insurance company?
[[C04](Apply/IOCQ)]
- (b) Discuss how statistical inference supports evidence-based management?
[[C03](Understand/LOCQ)]
- (c) When are two-sample hypothesis tests appropriate? Provide a business example.
[[C03](C05)(Understand/LOCQ)]

6 + 3 + 3 = 12

Group - D

6. (a) Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations: $2Y - X - 50 = 0$ and $3Y - 2X - 10 = 0$.
[[C04](Apply/IOCQ)]
- (b) Explain Serial Correlation in time series analysis.
[[C01](C04)(Understand/LOCQ)]
- (c) Explain prescriptive spreadsheet models and their managerial relevance.
[[C01](C04)(Understand/LOCQ)]

6 + 2 + 4 = 12

7. (a) Describe the key benefits of Predictive Analytics in different business sectors.

[[CO4](CO6)(Remember/LOCQ)]

(b) Compare and contrast between autoregressive and moving average models.

[[CO4](Analyse/IOCQ)]

(c) Explain how does simulation help in risk analysis?

[[CO4](Understand/LOCQ)]

4 + 5 + 3 = 12

Group - E

8. (a) Discuss the application of optimization in 'Staffing and Scheduling'.

[[CO5](CO6)(Understand/LOCQ)]

(b) Define Prescriptive Analytics and explain its role in decision-making.

[[CO5](Remember/LOCQ)]

(c) Explain how does the Blending Problem utilize optimization?

[[CO5](Analyse/IOCQ)]

5 + 3 + 4 = 12

9. (a) Explain the significance of Breakeven Analysis for managers.

[[CO5](Understand/LOCQ)]

(b) Define Decision Trees and their primary components.

[[CO5](Remember/LOCQ)]

(c) Explain the Maximax strategy for decision-making without probabilities.

[[CO4](CO5)(Understand/LOCQ)]

4 + 3 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	61.46	38.54	0