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NBCA/D-25

37003

LOGICAL ORGANIZATION OF COMPUTER

B23-CAP-103

Time : Three Hours]

[Maximum Marks : 50

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. Answer the following questions in brief :

- (a) What are self-complementing codes ?
- (b) Represent A9 in ASCII code.
- (c) What is principle of duality ?
- (d) State rules to draw a truth table.
- (e) What is AND gate ? Draw its truth table.
- (f) What is a multiplexer ?
- (g) What is a state table ? Explain with an example.

## Unit I

2. (a) Convert  $(85.2)_{10}$  into binary and hexadecimal number systems.
- (b) What are weighted BCD codes ? Write 2421 BCD codes and represent 93 in this code.
3. (a) Discuss Hamming Code. Explain, how Hamming Code is used for single-bit error detection and correction with a step-by-step example.
- (b) Convert + 17 and - 17 into sign-magnitude, 1's complement, and 2's complement assuming 8-bit representation.

## Unit II

4. (a) Perform  $(18)_{10} - (21)_{10}$  in 1's complement representation in 6-bit register.
- (b) State and explain the basic Boolean theorems.

5. (a) What is a Canonical SOP form ? Convert  $F(A, B, C) = A + BC'$  into canonical SOP form.

(b) Solve using 4-variable K-Map and also consider don't care conditions :

$$F(A, B, C, D) = \Sigma m(1, 3, 7, 11, 15) + d(0, 2, 5, 8))$$

### Unit III

6. (a) Why are NAND and NOR gates called universal gates ? Prove that NAND gate can implement NOT, AND and OR operations.

(b) What is an XOR gate ? Explain its symbol, truth table, Boolean expression and applications.

7. (a) Define a Full Adder. Draw its truth table. Design its circuit using Half Adders and logic gates.

(b) What is a Comparator ? Design a 4-bit comparator using logic gates.

## Unit IV

8. (a) What is race-around condition ? How does JK flip-flop overcome it ?
- (b) Explain Serial-In Parallel-Out (SIPO) register. Describe with an example and timing diagram.
9. (a) What is a shift register ? Design a 4-bit shift right register.
- (b) What is an excitation table ? Derive excitation tables for D and T type flip-flops.



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JAVA OOP FOUNDATIONS

B23-CAP-301

Time : Three Hours]

[Maximum Marks : 50

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

**(Compulsory Question)**

1. Answer the following :

- (a) What is the difference between JDK and JRE ?
- (b) Define event delegation model.
- (c) What is the difference between throw and throws ?
- (d) Explain Final, finally and finalize.
- (e) What is a package ? Give an example.

**Unit I**

2. Explain the concept of Object-Oriented Programming (OOP) by describing its four main principles : encapsulation, inheritance, polymorphism and abstraction. Illustrate how these principles work in the structure of a simple Java program.

3. (a) Differentiate between primitive data types in Java with examples.
- (b) Write a Java program to demonstrate typecasting and looping constructs.

### **Unit II**

4. Define interfaces in Java and explain, how are they implemented and extended. Illustrate your explanation with an example that demonstrates how Java achieves multiple inheritance using interfaces.
5. Explain the concept of packages in Java and differentiate between built-in and user-defined packages. Write a Java program that demonstrates the use of a userdefined package to organize classes effectively.

### **Unit III**

6. What are Exceptions ? Discuss the various types of exceptions in Java-Programming. How can you handle them ? Write Java code to handle your own Exception.
7. (a) Differentiate between Byte Stream and Character Stream in Java.
- (b) Write a Java program to read and write data using File I/O operations.

## Unit IV

8. What are Event Listeners in Java AWT ? Describe the working of at least *three* common event listeners with suitable examples and explain why the delegation event model is preferred over the inheritance-based model.
  
9. What are AWT Classes ? Write Java Program to generate Even numbers and Odd numbers in TextField 'T1 and T2 respectively' while pressing Button 'Even' and 'Odd'.



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DATA BASE TECHNOLOGIES

B23-CAP-303

Time : Three Hours]

[Maximum Marks : 50

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

### Compulsory Question

1. (a) What is Data Independence ? Explain the importance of different types of data independence with examples.
- (b) Define Entity, Entity Set and Entity Type. Discuss their significance in the database design process.
- (c) What is Sub-queries in SQL ? Discuss types of sub-queries (single-row, multi-row, correlated) with appropriate examples.
- (d) What is a Primary Key Constraint ?
- (e) Define Functional Dependency. 5×2=10

## Unit I

2. (a) Discuss the limitations of the File-Based System. How does the Database Approach address these limitations ? Support your answer with examples.
- (b) Explain the DBMS Environment. Discuss its major components and the functions performed by each component. 5+5=10
3. (a) Who are Database Users ? Explain the roles and responsibilities of Database Administrator (DBA).
- (b) Elaborate on the 1-Tier, 2-Tier and 3-Tier Database Architectures. Compare their structures, advantages and typical applications. 5+5=10

## Unit II

4. What are Data Models ? Explain the Hierarchical, Network and Relational data models in detail. Compare their structure, advantages and limitations. 10
5. What is the Relational Data Model ? Explain the concepts of relations, tuples, attributes and constraints. Discuss why the relational model is widely used. 10

### Unit III

6. (a) Write and explain basic SQL Queries using suitable tables. Include examples of :

(i) SELECT

(ii) INSERT

(iii) UPDATE

(iv) ORDER BY

(v) GROUP BY.

(b) What are Join operations in SQL ? Explain the following joins with examples :

(i) Inner Join

(ii) Left (Outer) Join

(iii) Right (Outer) Join

(iv) Full Join.

5+5=10

7. (a) Explain union and intersection and Cartesian product operations in relational algebra with examples.

(b) Differentiate between tuple relational and domain relational calculus.

5+5=10

## Unit IV

8. Explain Inference Rules for Functional Dependencies (Armstrong's Axioms). Discuss how these axioms help in deriving additional functional dependencies. — 10
  
9. What is Boyce-Codd Normal Form (BCNF) ? Explain how BCNF differs from 3NF and provide an example showing decomposition into BCNF. 10



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## DATA SCIENCE ESSENTIALS WITH PYTHON

Paper : B23-CDS-302

Time : 3 hrs.

Max Marks: 50

Sr. No.	Note: Attempt five questions, selecting exactly one question from each unit. Question number I is compulsory. All questions carry equal marks.	Marks allotted
<b>Compulsory Question</b>		
I(a)	How does data science integrate various disciplines, and why is this integration important?	
(b)	Differentiate between descriptive and inferential statistics with an example for each.	
(c)	What is the purpose of the <code>range()</code> function in Python? Provide an example of its use.	
(d)	What are the basic steps for creating and writing to a file in Python?	2.5*4=10
<b>UNIT - I</b>		
II(a)	Examine the growth and future trends in data science. How are emerging technologies such as AI and machine learning influencing the field?	5
(b)	Identify the key users of data science within an organization and discuss how they utilize data science in their roles.	5
III	What are the core components of data science, and how do they contribute to the entire data lifecycle? Describe each component in detail with examples.	10
<b>UNIT - II</b>		
IV(a)	What is probability sampling, and why is it used in data analysis?	5
(b)	The number of goals scored by a team in 10 consecutive matches are: 3, 5, 6, 4, 2, 5, 8, 7, 6, 4. Calculate the mean, median, mode, variance, and standard deviation of the number of goals scored.	5
V(a)	For a sample of 15 students' ages: 20, 21, 23, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, calculate the 95% confidence interval for the population mean age. Use the sample mean and standard deviation.	5
(b)	Describe the normal distribution and its significance in statistical analysis.	5
<b>UNIT - III</b>		
VI(a)	Briefly explain the history of Python and discuss its initial purpose and motivation for development.	5
(b)	Write a Python program to check if a given string is a palindrome. A string is considered a palindrome if it reads the same backward as forward.	5
VII	Describe the significance of data structures in Python, such as lists, tuples, dictionaries, and sets. Discuss how these data structures enhance Python's efficiency in data manipulation.	10
<b>UNIT - IV</b>		
VIII	Discuss list operations in Python, including accessing, modifying, slicing, and deleting elements. Include examples demonstrating each operation.	10
IX	Write a Python program to count the frequency of each word in a given text file and display the results as a dictionary.	10

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Total Pages : 3

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NBCA/D-25  
MACHINE LEARNING FUNDAMENTALS  
USING PYTHON  
Paper-B23-CDS-501

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt *five* questions in all selecting at least one question from each unit. Question no. 1 in compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) What is NumPy, and why is it important for numerical computing in Python?
- (b) Define Machine Learning.
- (c) What is supervised learning?
- (d) What is unsupervised learning?
- (e) Which type of learning is customer segmentation an example of? (5×2=10)

**UNIT-I**

2. (a) What is array indexing and slicing in NumPy? Explain with examples. (5)
- (b) What is data preprocessing? Explain missing value handling in Pandas. (5)

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3. (a) Differentiate between labelled and unlabelled datasets with examples. (5)
- (b) Explain AUC (Area Under Curve) and ROC curve in brief. (5)

#### UNIT-II

4. (a) Explain the difference between Regression and Classification tasks in supervised learning.(5)
- (b) What is a Confusion Matrix? Explain its components (TP, FP, TN, FN). (5)
5. (a) Write a detailed note on real-world applications of Machine Learning. Explain at least five areas. (5)
- (b) Briefly describe the history and evolution of Machine Learning. (5)

#### UNIT-III

6. (a) Explain the concept of entropy and information gain in Decision Trees. (5)
- (b) Differentiate between Linear and Non-linear Regression with examples. (5)
7. (a) Explain Logistic Regression and its use in classification tasks. (5)
- (b) What is the role of distance metrics in KNN? Name any two metrics. (5)

#### UNIT-IV

8. (a) Explain the working of K-Means clustering. (5)
- (b) Explain the terms dendrogram, agglomerative clustering, and divisive clustering. (5)
9. (a) Describe the key parameters of DBSCAN and their role. (5)
- (b) What is PCA? Explain its main objective. (5)
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**NBCA/D-25**

**CLOUD COMPUTING FOR DATA SCIENCE**

Paper : B23-CDS-502

(BCA)

Time : Three Hours]

[Maximum Marks : 35

**Note** : Attempt *five* questions in all. Q. No. 1 is compulsory.  
Attempt *four* more questions selecting *one* question  
from each unit.

**Compulsory Question**

1. Answer the following questions in brief :
  - (a) Explain resource pooling and measured service in cloud computing.
  - (b) Differentiate between Virtual Desktop Infrastructure (VDI) and Remote Desktop Services (RDS).
  - (c) Differentiate between backup and archiving in the context of cloud storage.
  - (d) List and explain the key benefits of deploying ML models on the cloud.

## UNIT-I

2. (a) Define cloud computing? Discuss the advantages and limitations of cloud computing.  
(b) What are service models in cloud computing? Explain SaaS and IaaS models with examples.
3. (a) Define Grid Computing and explain its architecture.  
(b) Differentiate between RESTful and SOAP-based web services.

## UNIT-II

4. Define virtualization. Explain application virtualization, server virtualization and storage virtualization in detail.
5. (a) What are cloud computing deployment models? Explain private and community cloud computing models.  
(b) Explain how cloud computing accelerates machine learning development and deployment.

## UNIT-III

6. (a) Explain the concept and working of cloud storage systems.  
(b) Describe how cloud storage integrates with data processing frameworks?

7. (a) Define block storage and explain how it works?
- (b) Define object storage and explain its architecture.

#### UNIT-IV

8. (a) What is Artificial Intelligence as a Service (AIaaS)? Discuss the major components and working of AIaaS.
  - (b) Compare self-managed ML systems and managed ML platforms.
- 
9. (a) Explain the architecture and key features of Amazon SageMaker.
  - (b) Define Azure Machine Learning Studio and its main components.
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NBCA/D-25  
COMPUTER NETWORKS  
Paper-B23-CDS-503  
(BCA)-(DS)

Time : Three Hours]

[Maximum Marks : 50

**Note :** Question Number 1 is compulsory. Attempt four questions in all selecting at least *one* question from each unit.

**Compulsory Question**

1. (a) Define bandwidth and latency.  
(b) State any *two* objectives of computer networks.  
(c) What is subnetting?  
(d) Describe the concept of a VPN (Virtual Private Network).  
(e) Define MIB in SNMP. (5×2=10)

**UNIT-I**

2. Explain the functions of each of the seven layers of OSI reference model with appropriate diagrams. 10
3. (a) Describe various components of a computer network. 5  
(b) Differentiate between analog and digital signals. 5

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## UNIT-II

4. Explain different error detection and correction techniques. 10
5. (a) Describe the concept of framing. 5  
(b) Explain Ethernet technology. 5

## UNIT-III

6. Describe the working of routing protocols OSPF, and BGP. Compare their features too. 10
7. (a) Compare TCP and UDP in detail. 5  
(b) Describe the importance of network security. 5

## UNIT-IV

8. Explain the Domain Name System (DNS). Describe the DNS resolution process with a neat diagram. 10
  9. Write a short note on the following :
    - (a) POP3.
    - (b) NFV.
    - (c) SNMP.
    - (d) VoIP. 10
-

PVOC/D-25 : 22424

## DIGITAL MARKETING USING CANVA

Paper : B25-VoC-144

Time : 3 hrs.

Max Marks: 50

Sr. No.	Note: A candidate is required to attempt five questions in all, selecting one question each from Unit- I to Unit- IV. Question No. 1 is compulsory. All questions carries equal marks.	Marks allotted
I	<p><b>Compulsory Question:</b></p> <p>a) Compare Traditional Marketing and Digital Marketing. Discuss with suitable examples.</p> <p>b) Discuss about any two file formats in which Canva allows downloading content.</p> <p>c) Define visual content? Mention any two uses of Instagram Stories.</p> <p>d) Explore any two key metrics used in campaign analytics.</p> <p>e) Describe the components of content calendar.</p>	5*2 = 10
II	<p style="text-align: center;"><b>Unit- I</b></p> <p>Describe the key components of digital marketing. Explain the role of each component in developing a successful digital marketing strategy.</p>	10
III	<p>a) Explain different Social Media Marketing Platforms. Highlight their features and suitability for different types of audiences.</p> <p>b) Discuss the concept of Audience Targeting. Explain methods used to identify, segment, and target audiences in digital marketing.</p>	5+5 = 10
IV	<p style="text-align: center;"><b>Unit- II</b></p> <p>Discuss the process of creating designs using templates in Canva. Explain how templates help in maintaining brand consistency and saving design time?</p>	10
V	<p>a) Describe the steps involved in designing social media posts using Canva. Explain best practices for creating engaging and audience-friendly content.</p> <p>b) What are Canva elements and grids? Explain how they help in structuring and improving the visual appeal of marketing content.</p>	5+5 = 10
VI	<p style="text-align: center;"><b>Unit- III</b></p> <p>Compare the social media platforms Instagram, Facebook, and LinkedIn. Highlight differences in their audience, content style, features, and marketing usage.</p>	10
VII	<p>Discuss how content strategy differs across platforms. Explain how businesses should adapt visuals and messaging for Instagram, Facebook, and LinkedIn.</p>	10
VIII	<p style="text-align: center;"><b>Unit- IV</b></p> <p>Discuss the concept of target audience. Explain how demographic, psychographic, and behavioral factors influence audience selection in a campaign.</p>	10
IX	<p>Discuss the role of analytics and insights in campaign evaluation. Explain metrics used to measure performance on social media and websites.</p>	10