

**S-0781**

**Sub. Code**

**23BDS1C1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**First Semester**

**Data Science**

**PROGRAMMING IN C**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. What is Constants?
2. Define the Data types.
3. Describe the If Statement.
4. Define while loop Statement.
5. What is array?
6. Define Nested Function.
7. Describe the Structures.
8. Define Macro substitution.
9. What is Pointers?
10. Define Pointers and Functions.

**Part B**

(5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain about the Constants, Variables and data types.

Or

- (b) List out the any three types of Operators with Example.

12. (a) List out the three IF statement with detail explanation.

Or

- (b) Explain about the Jumps in loops with example.

13. (a) Discuss about the one and two dimensional arrays with Examples.

Or

- (b) Explain about the Function with arrays detail explanations.

14. (a) Discuss about the Structure variables and array of structure.

Or

- (b) Explain about the Macro substitution with detailed explanation.

15. (a) Discuss about the initializing Pointers.

Or

- (b) Explain about the Pointers and arrays.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain about the Types of Operators with Examples.
  17. Discuss about the Decision making with If and If else statement.
  18. Details about the type of Arrays with Examples.
  19. Explain about the Structure and functions.
  20. Discuss about the type of Pointers with example.
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**S-0782**

**Sub. Code**

**23BDS1S1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**First Semester**

**Data Science**

**FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. Define Computer.
2. What is meant by microprocessors?
3. What are all the input and output devices?
4. What is a Touch Screen?
5. Define Primary storage.
6. What is meant by Magnetic Tapes?
7. What is an Operating System?
8. Define Assembly Language.
9. Define Compilers.
10. What is meant by batch processing?

**Part B**

(5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the Characteristics of Computer.

Or

- (b) Write short notes on Block diagram of a Computer.

12. (a) Describe the Terminals and its types.

Or

- (b) Write briefly about Voice Recognition Systems.

13. (a) Explain the Primary storage in detail.

Or

- (b) Write short notes on Magnetic Disks.

14. (a) Describe the software and its needs.

Or

- (b) Discuss the types of software in detail.

15. (a) Explain about Batch processing in detail.

Or

- (b) Describe about Multiprogramming in detail.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about the Generations of Computer.

17. Discuss in detail about Input Units.

18. State and Explain RAM, ROM, EPROM, EEPROM in detail.
  19. Describe in detail about Application S/W and Its types.
  20. Explain in detail about Functions.
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**S-0783**

**Sub. Code**

**23BDS1FC**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**First Semester**

**Data Science**

**QUANTITATIVE APTITUDE**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Find the LCM of 24 and 36.
2. What is the HCF of 56 and 98?
3. A person bought an article for Rs. 500 and sold it for Rs. 600. Find the profit percentage.
4. Solve: If A's age is twice that of B's age and their total age is 30 years, find their ages.
5. The perimeter of a rectangular field is 80 meters, and its length is twice its breadth. Find the breadth.
6. A loan of Rs. 5000 is taken at 10% simple interest per annum for 3 years. Find the total interest.
7. A dice is rolled once. What is the probability of getting an odd number?
8. Find the number of ways to select 3 people from a group of 6.

9. A bar graph shows that Company A's revenue was Rs. 5 crores in 2020 and Rs. 7 crores in 2021. What is the percentage increase?
10. If a pie chart represents a company's expenses as follows : Salaries (40%), Rent (20%), Utilities (10%), and Other (30%), how much percentage is spent on non-salary expenses?

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Find the LCM and HCF of 48, 72, and 108 using the prime factorization method.

Or

- (b) The average of 5 numbers is 36. If four of the numbers are 32, 40, 35, and 38, find the fifth number.

12. (a) A man invested Rs. 10,000 at 10% per annum simple interest. Find the amount after 5 years.

Or

- (b) Two numbers are in the ratio 3 : 5. If their sum is 64, find the two numbers.

13. (a) A train 200 m long is moving at a speed of 72 km/hr. Find the time taken by the train to cross a platform of length 400 m.

Or

- (b) Two pipes can fill a tank in 10 hours and 15 hours, respectively. A third pipe can empty the tank in 20 hours. How long will it take to fill the tank if all three pipes are open?

14. (a) A committee of 4 members is to be selected from a group of 6 men and 5 women. In how many ways can this be done if at least one woman is included?

Or

- (b) A bag contains 5 red, 7 blue, and 8 green balls. A ball is drawn at random. Find the probability that the ball drawn is (i) red, (ii) not blue.
15. (a) The hands of a clock show 3 : 15. Find the angle between the hour hand and the minute hand.

Or

- (b) The following table shows the monthly sales (in lakhs) of a company :

Month	Sales (Rs. in lakhs)
Jan	50
Feb	65
Mar	80
Apr	95

Represent this data using a bar graph.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. The average weight of 10 students is 55 kg. Two students with weights 45 kg and 65 kg leave the group, and two new students replace them. If the new average remains the same, find the total weight of the two new students.
17. A trader marks an item at 25% above the cost price and offers a 10% discount. Find his actual gain percentage.

18. Two trains, one 120m long and the other 150m long, are moving in opposite directions at speeds of 45 km/hr and 55 km/hr. Find the time taken by the trains to cross each other.
19. In how many ways can a committee of 5 members be formed from 7 men and 6 women, including at least 2 women?
20. The table below shows the number of vehicles sold by a company over four months :

Month	Cars	Bikes	Trucks
Jan	200	400	150
Feb	220	450	170
Mar	250	500	190
Apri	300	600	200

Draw a line graph to represent the data and analyze the trend in sales.

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**S-0784**

**Sub. Code**

**23BDSA1**

**U.G. DEGREE EXAMINATION, NOVEMBER 2025**

**Data Science**

**Allied – DATABASE MANAGEMENT SYSTEM**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define Instances and schemas of database?
2. List the advantages of DBMS.
3. Define Data Model List categories.
4. What is Entity? Give an Example.
5. Define the term Normalization.
6. Name the built-in functions of SQL.
7. Define JOIN operation in Relational algebra.
8. List the aggregate functions supported by SQL?
9. What is procedure in PL/SQL?
10. What is an Exception? Mention major types of Exceptions.

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Differentiate between Data and Information.

Or

- (b) Write short notes on File system with example.

12. (a) Describe the three levels of database architecture.

Or

- (b) What are the different types of database users?

13. (a) Define DDL, DML, DCL, and TCL with examples.

Or

- (b) Explain Joins in SQL with examples.

14. (a) What is the difference between WHERE and HAVING clauses?

Or

- (b) Explain Numeric and string function with example.

15. (a) Explain PL/SQL Block Structure with an example.

Or

- (b) What are Cursors in PL/SQL? Explain their types.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail about Data model with neat diagram.
  17. Explain Codd's 12 rules for relational database systems. Discuss their significance in modern DBMS.
  18. Explain the different types of Normalization (1NF, 2NF, 3NF, BCNF) with examples.
  19. What are Joins in SQL? Explain different types of joins with examples.
  20. Write a PL/SQL program to find the factorial of a number using a function.
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**S-0785**

**Sub. Code**

**23BDSA2**

**U.G. DEGREE EXAMINATION, NOVEMBER 2025**

**Data Science**

**Allied – OFFICE AUTOMATION**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. What is a proper usage of grammar and spelling?
2. How do I locate and swap out text in Word?
3. In word, write the table list?
4. How do I create the right file format for a document in Ms-Word?
5. What makes it a workbook, exactly?
6. How are the many kinds of data tables created?
7. How can a new database be created in Access?
8. What does saving a database mean?
9. In Power Point, how are text boxes connected?
10. Giving a presentation, what is it?

**Part B**

(5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) How should documentation be prepared using examples?

Or

- (b) What distinguishes Microsoft Word's LOCATE TEXT and REPLACE TEXT functions?

12. (a) Describe in detail the various TEXT and PARAGRAPH formatting options.

Or

- (b) Write a note about the method used to perform calculations in a table.

13. (a) Describe in detail about ways of ENTERING and EDITING data with example.

Or

- (b) Explain the name a group of data and data types in excel.

14. (a) Explain about relationship in access database with example.

Or

- (b) Briefly explain the queries and types of queries in Ms Access with example.

15. (a) Describe in explain about rearranging slides in a presentation with example.

Or

- (b) Write a layout and change the layout of a slide in power point.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain in details about OUTLINE and OUTLINE LEVEL on a word document.
17. Explain in details about create a tabular format listing with examples.
18. Elaborate the error calculation and error formula with few example.
19. Briefly explain about create a database and save data.
20. How to create starting a new presentation and working with slide Text with example.
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**S-0786**

**Sub. Code**

**23BDS2C1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**Second Semester**

**Data Science**

**PYTHON PROGRAMMING**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. What are features of python?
2. What is use of two quotes?
3. What is decision making in python?
4. List out the four types of functions.
5. Define - Modules.
6. Write any four python libraries.
7. Write the four types of oop.
8. List out the three types of methods in python.
9. What is the description of Syntax Error and System Error exceptions?
10. What is regular expression search?

**Part B**

(5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Describe about identifiers and variables in python.

Or

- (b) Describe sets in python with suitable program.

12. (a) Describe function with more than one return value.

Or

- (b) Discuss nested loops in python with suitable program.

13. (a) What are the uses of packages and describe the reload () function with suitable example.

Or

- (b) Write short note on date and time modules.

14. (a) Define class and how to create objects describe both of them with suitable example.

Or

- (b) What is inheritance? How it is used in python with suitable program?

15. (a) Discuss repetition cases with suitable examples.

Or

- (b) What is user - defined exception? How it is used in python?

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain briefly about the operators and data types in python.
  17. Write a python program to calculate the 2 by 2 matrix addition using functions.
  18. Write short notes on the following
    - (a) Name spaces and scope
    - (b) Packages
    - (c) Directories
  19. Explain about destructors in python with suitable program.
  20. Explain the following with a suitable examples.
    - (a) The match () function
    - (b) The search () function
    - (c) Find all () method
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**S-0787**

**Sub. Code**

**23BDS2S1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**Second Semester**

**Data Science**

**OPEN SOURCE SOFTWARE TECHNOLOGIES**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. What is Linux kernel?
2. Write any four common type of shell.
3. Write any two file management commands in Linux.
4. Write any two file editing commands in Linux.
5. Define - Apache software foundation.
6. What are the lock files generated by Apache.
7. Define - Table in MySQL.
8. What are the components of table.
9. Define - Method parameter.
10. How to you establish a connection in MySQL.

**Part B**

(5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Write short notes on Linux distribution.

Or

- (b) Discuss the benefits of free software.

12. (a) Write any four standard file types and the specific purpose.

Or

- (b) What is FOpen library function? Write its syntax and their file name parameters.

13. (a) Describe the key components and benefits of Apache.

Or

- (b) Discuss the default Apache directive containers.

14. (a) Discuss the common table operations and constraints.

Or

- (b) How data base is created in MySQL with suitable example.

15. (a) Discuss any five aggregate functions in MySQL with example.

Or

- (b) Write any five date and time functions with example.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Comparison between open source and commercial source and their key differences in detail.
  17. Discuss the classification of UNIX files, file attributes and file operations.
  18. Explain the best practices to secure Apache web server.
  19. Explain the following commands with example.
    - (a) The USE
    - (b) DESCRIBE
    - (c) SELECT
    - (d) UPDATE
  20. Write the syndax of the following with suitable code.
    - (a) Subqueries
    - (b) Joins
    - (c) Delete multiple records
    - (d) Update multiple records
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**S-0788**

**Sub. Code**

**23BDS2S2**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**Second Semester**

**Data Science**

**INTRODUCTION TO HTML**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define Internet.
2. Mention the Different Internet Address Class and It's Range.
3. What is meant by Relative URL?
4. Write the Format of Html Program
5. How do you change the color of background or text in HTML?
6. What Do You Mean by Column Spanning and Row Spanning?
7. Mention some Text Formatting Tags
8. Mention the Various Form Elements.

9. Explain about <table> & <frame> tags in detail.
10. How do you make text show as bold?

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain Webpages in detail.

Or

- (b) Recall in detail about World Wide Web.

12. (a) Explain about Head and Body Tags in detail.

Or

- (b) Write about the Block level text elements in detail.

13. (a) Discuss about Creating Hyperlinks in HTML.

Or

- (b) Examine about HR and BR tags in detail.

14. (a) Write notes on Cell Alignment in HTML.

Or

- (b) Discuss about Cell Padding.

15. (a) Discuss briefly about Frames with an example.

Or

- (b) Define Targeted Links and explain in detail.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. List and explain HTML elements in detail.
  17. Discuss about Font style elements tags in detail.
  18. Define List Tag with an example.
  19. Define Table tag and their attributes with an example.
  20. Define Form tag. Design a Registration page by using all Form controls.
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**S-0789**

**Sub. Code**

**23BDSA3**

**U.G. DEGREE EXAMINATION, NOVEMBER 2025**

**Data Science**

**Allied – OPERATIONS RESEARCH**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is the Meaning of Operations Research?
2. What is the Characteristic of Operations Research?
3. Define Duality in LPP.
4. What are the Requirements of LPP?
5. With an example, describe how to convert the minimization problem into maximization problem in Simplex method?
6. Distinguish simplex and Graphical method
7. What do you mean by Least cost method (LCM)?
8. Compare Assignment and transportation Problem.
9. What is the meaning of Game theory?
10. What is Pure Strategy?

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the Origin and History of operations research.

Or

- (b) Discuss about the Steps of operations research

12. (a) Explain the Assumptions of Linear Programming Problem (LPP).

Or

- (b) Discuss about Advantages LPP.

13. (a) Solve the following LPP by graphical method.

$$\text{Max } Z = 3X_1 + 2X_2$$

Subjected to

$$2X_1 + X_2 \leq 2$$

$$3X_1 + 4X_2 \geq 12$$

$$\text{and } X_1, X_2 \geq 0.$$

Or

- (b) Explain about Maximization Function.

14. (a) Write about North–West Corner Method.

Or

- (b) Write down the steps involved in solving Assignment problems.

15. (a) Discuss about Basic Assumptions of Game theory.

Or

(b) Explain about Mixed Strategy.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write the steps involved in operations research? And also write the applications of operations research.

17. Explain the limitations for Formulating LPP model.

18. Solve the following LPP by simplex method.

$$\text{Maximize } Z = 3X_1 + 2X_2$$

Subjected to

$$X_1 + X_2 < 4,$$

$$X_1 - X_2 \leq 2$$

and  $X_1, X_2 \geq 0$ .

19. From the Transportation Model solve the IBFS with the Least cost method.

	D1	D2	D3	Availability
O1	2	3	5	60
O2	4	6	7	70
O3	3	5	2	20
O4	1	4	6	40
Requirement	50	40	100	

20. Discuss the following

(a) Saddle point

(b) Pure and mixed strategies

(c) Indeterminate Matrix and Average Method.

**S-0790**

**Sub. Code**

**23BDSA4**

**U.G. DEGREE EXAMINATION, NOVEMBER 2025**

**Data Science**

**Allied – INTERNET AND WEB DESIGN**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is Browser?
2. Define Anchor tag with an example.
3. What is tabindex attribute? Write its syntax.
4. How do you make a new paragraph in HTML?
5. Define Row and Column Spanning.
6. What is the use of caption tag?
7. Why do we use a style sheet in HTML?
8. When do you use frames in HTML?
9. What is the role of the action attribute in HTML forms?
10. What are forms, and how to create forms in HTML?

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the function of Web Browser? Name any five popular Web Browsers?

Or

- (b) Explain general structure of HTML document.

12. (a) Explain the difference between `<h1>` to `<h6>` tags in HTML.

Or

- (b) Write an HTML code to create a webpage with a heading, a paragraph, and an image.

13. (a) Explain how to create an Unordered List and an Ordered List in HTML with examples.

Or

- (b) Write an HTML code to create a table with 3 rows and 2 columns. The first row should have headers, and the other rows should have data.

14. (a) Discuss in-line styles with example.

Or

- (b) Discuss the various tags that are used to create frames in HTML.

15. (a) Explain enctype Attribute with an example.

Or

- (b) What is the use of the `<form>` tag in HTML? Write the syntax to create a form with a text field and a submit button.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Describe Remote Login.
  17. Discuss HTML body tag with an example.
  18. Discuss various tags that used to create a Table.
  19. Explain types of Style sheets with example.
  20. Explain with example any five input types in HTML form.
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**S-0791**

**Sub. Code**

**23BDS3C1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**Third Semester**

**Data Science**

**DATA SCIENCE**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define Big Data.
2. Mention the role of Business Intelligence in Data Science with example.
3. What are identifiers in Python?
4. Define tuple in Python.
5. Give the usage of recursive function in Python?
6. What is the purpose of the import statement?
7. What is the difference between read ( ) and readlines ( ) in Python?
8. Define data hiding in object-oriented programming.

9. What is the role of primary key in a database table?
10. Name any two types of data visualizations with explanation.

**Part B**

(5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the skill sets required for a Data Scientist.

Or

- (b) Explain the difference between Data Science and Machine Learning.

12. (a) Explain the difference between lists and dictionaries in Python.

Or

- (b) Describe the input and output functions in Python with examples

13. (a) Exemplify function arguments.

Or

- (b) Explain the difference between global and local variables in Python.

14. (a) Explain the process of reading and writing files in Python with an example.

Or

- (b) Illustrate method overriding with a Python example.

15. (a) Explain the steps for creating and deleting tables in a database.

Or

- (b) Write short notes on GUI programming.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the Data Analytics Life Cycle and explain its phases with examples.
17. Write a Python program demonstrating the use of control statements (if-else, loops) and comprehensions.
18. Explain the concept of functions in Python. Discuss the differences between anonymous, recursive, and built-in functions with suitable examples.
19. Describe the principles of Object-Oriented Programming (OOP). Discuss encapsulation, inheritance, and polymorphism with relevant Python examples.
20. Write a Python program to connect to a database, insert data, retrieve it, and visualize it using a line chart in Matplotlib

**S-0792**

**Sub. Code**

**23BDS3S1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025**

**Third Semester**

**Data Science**

**E-COMMERCE**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. List out the various categories of E-Commerce.
2. What is E-Commerce?
3. Expand the term NSFNET.
4. What is national level ISPs.
5. What is HTTP?
6. What is Decryption?
7. Define digital token.
8. What is electronic data interchange?
9. Summarize the term information filtering.
10. Point out the E-Commerce catalogs.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe the anatomy of E-Commerce applications.

Or

- (b) Discuss about what do consumers really desire and what are they willing to expend in e-commerce.

12. (a) Describe the architecture and components of Internet.

Or

- (b) Summarize the concept national independent ISPs.

13. (a) Elucidate the architecture of WWW.

Or

- (b) Describe the various security issues related to E-Commerce.

14. (a) Explain the various types of electronic payment systems.

Or

- (b) Write notes on  
(i) legal issues  
(ii) security issues

15. (a) Discuss about the emerging tools in software agents.

Or

- (b) Explain the characteristics and properties of software agents.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain the framework of E-Commerce
  17. Examine the architecture and components of Internet.
  18. Explain the security concepts to conduct business on public network.
  19. Discuss about EDI with detail.
  20. Write notes on
    - (a) applets
    - (b) software agents
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**S-0793**

**Sub. Code**

**23BDS3S2**

**B.SC. DEGREE EXAMINATION, NOVEMBER 2025.**

**Third Semester**

**Data Science**

**ENTERPRISE RESOURCE PLANNING**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What does ERP stand for?
2. What are the key components of an ERP system?
3. What is the role of a shared enterprise database in ERP?
4. Mention one benefit and one limitation of system integration.
5. Name any two functional modules in ERP.
6. What is the significance of supply chain integration in ERP?
7. What is the role of consultants in ERP implementation?
8. Define SDLC in the context of ERP
9. What is the role of the Internet in ERP systems?
10. What is the importance of organizational culture in ERP implementation?

**Part B**

(5 × 5 = 25)

Answer **all** questions. Choosing either (a) or (b).

11. (a) Explain the conceptual model of ERP and its importance in modern businesses.

Or

- (b) Discuss the evolution of ERP and the key components of an ERP system.

12. (a) Explain the need for enterprise integration and the role of a shared enterprise database.

Or

- (b) Differentiate between logical and physical system integration with examples.

13. (a) Describe the changing dynamics of the ERP marketplace and its impact on businesses.

Or

- (b) Explain the integration of ERP functional modules and their role in supply chain management.

14. (a) Describe the ERP implementation life cycle and the key phases involved.

Or

- (b) Discuss the role of consultants, vendors, and employees in ERP implementation.

15. (a) Explain how ERP integrates with e-commerce and its future trends.

Or

- (b) Discuss the critical success and failure factors in ERP implementation.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain the structure of an ERP system with a detailed diagram and examples.
  17. Compare the different types of system integration methods used in ERP.
  18. Explain in detail the different ERP implementation strategies used by organizations.
  19. Analyze the importance of user training and support in ERP adoption
  20. Explain how EMP facilitates e-commerce integration with real-world examples.
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**S-0794**

**Sub. Code**

**23BDS4C1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fourth Semester**

**Data Science**

**OBJECT ORIENTED PROGRAMMING WITH JAVA**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is a class in Java, and how does it differ from an object?
2. What is encapsulation in Java, and how does it enhance data security?
3. How do you import a class from a package in Java? Provide an example.
4. How do you create a thread in Java using the Thread class?
5. What is the difference between ArrayList and LinkedList in Java's Collection API?
6. What is the purpose of the Iterator interface in Java Collections?
7. What is the purpose of the Socket class in Java's networking API?

8. How does the ServerSocket class differ from the Socket class in Java?
9. What is the role of the ActionListener interface in Java Swing?
10. What is the purpose of the JLabel class in Java Swing?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about overloading method.

Or

- (b) Discuss about inheritance.

12. (a) Explain the concept of packages in Java, including their purpose and benefits.

Or

- (b) Discuss the different ways to create a thread in Java.

13. (a) Explain the difference between byte streams and character streams in Java I/O.

Or

- (b) Explain in detail about enumeration.

14. (a) Explain how to establish a basic client-server communication in Java.

Or

- (b) Discuss the difference between TCP and UDP in Java networking.

15. (a) Explain about AWT controls.

Or

(b) Discuss about Applets.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. What is method overriding? Explain with a program example.
  17. Describe the lifecycle of a thread in Java.
  18. Discuss in detail about I/O streams.
  19. Explain the concept of network programming in Java and how it is facilitated by Java's networking API. Discuss the role of key classes such as Socket, ServerSocket, Datagram Socket, and DatagramPacket.
  20. Explain in detail about CRUD operations.
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**S-0795**

**Sub. Code**

**23BDS4S1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fourth Semester**

**Data Science**

**ADVANCED EXCEL**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define absolute and relative cells.
2. How to protecting worksheets and cells?
3. Define data validation.
4. What is the purpose of the SUMIF function in Excel?
5. Define slicers and how to create slicers?
6. Discuss the use of power functions in Excel.
7. What is the purpose of WhatIf analysis?
8. What does the function SUBTOTAL do in Excel, and how is it different from SUM?
9. How can you change the chart type of an existing chart in Excel?
10. What is a sparklines chart, and where is it commonly used in Excel?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the use of the VLOOKUP with exact and approximate match in Excel.

Or

- (b) Define functions and conditional expressions in excel.

12. (a) Discuss about Templates for standardization of worksheets.

Or

- (b) Explain about sorting and filtering data with example.

13. (a) How to create pivot tables and consolidate data from multiple sheets?

Or

- (b) What is a pivot chart and what is it used for?

14. (a) Discuss about text and database functions in excel.

Or

- (b) Explain Auto formatting and conditional formatting option for worksheets.

15. (a) Discuss the advantages and limitations of using a line chart for displaying data.

Or

- (b) Explain the process of creating a bar chart and customizing the chart elements.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain VLOOKUP and Nested VLOOKUP functions with example.
  17. Explain in detail, data validation specifying a valid range of values and custom validation based on formula
  18. Discuss about data consolidation features with example.
  19. Explain the different functions used in Excel with example,
  20. Discuss about charts and different types of charts in excel.
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**S-0796**

**Sub. Code**

**23BDS4S2**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fourth Semester**

**Data Science**

**PHP PROGRAMMING**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. How did PHP evolve from a procedural language to supporting object-oriented programming (OOP)?
2. What are PHP's scalar data types? List them.
3. Why does "5"==5 return true in PHP, but "5"===5 returns false?
4. What is the difference between parameters and arguments?
5. What is the use of array\_keys() in associative arrays?
6. What is the purpose of the \_construct method?
7. What is the purpose of the htmlspecialchars() function in form processing?
8. What is a dynamic button in PHP?
9. What is the use of mysqli\_fetch\_assoc() in PHP?
10. What is error reporting in PHP?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is the lexical structure of PHP? Explain its key components.

Or

- (b) Explain operator precedence in PHP with an example.

12. (a) Explain the use of default parameter values when calling a function in PHP.

Or

- (b) What is character encoding in PHP? Why is it important?

13. (a) Explain the difference between a two-dimensional and a three-dimensional array.

Or

- (b) Explain the difference between `array_merge()` and `array_combine()` functions with examples.

14. (a) Explain the use of the `header()` function in PHP with an example.

Or

- (b) Explain the difference between `imagecolorallocate()` and `imagecolorallocatealpha()`.

15. (a) Differentiate between primary key, foreign key, and unique key in MySQL.

Or

- (b) Name some popular PHP libraries and their use cases.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write a PHP script embedded in an HTML form that accepts user input (e.g., name and email) and displays it on the same page.
  17. Describe string searching functions (strpos( ), strrpos( ), strpos( )) with examples.
  18. Explain different ways to traverse an array in PHP, such as for each, for, and while loops.
  19. Discuss common PHP security threats and how to prevent them.
  20. Explain how you can manipulate file permissions in PHP. How can you set, change, and check file permissions using PHP functions?
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**S-0797**

**Sub. Code**

**23BDS5C1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fifth Semester**

**Data Science**

**RELATIONAL DATABASE MANAGEMENT SYSTEM**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define data independence.
2. List any two disadvantages of the file-based approach.
3. What is a candidate key?
4. Define domain constraint.
5. Expand DCL.
6. Give two examples of aggregate functions in SQL.
7. What is a serial schedule?
8. Define deadlock in databases.
9. What is shadow paging?
10. List any two types of database failures.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss the levels of data abstraction in a DBMS.

Or

- (b) Explain the functions of a DBMS with examples.

12. (a) Describe the purpose of a composite key.

Or

- (b) Explain the referential integrity constraint with an example.

13. (a) Explain the DELETE and UPDATE statements in SQL.

Or

- (b) Describe the GROUP BY and HAVING clauses with examples.

14. (a) Write short notes on two-phase locking protocol.

Or

- (b) Explain the concept of timestamp ordering in concurrency control.

15. (a) Discuss the concept of log-based recovery.

Or

- (b) Explain the role of database checkpoints in recovery.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain the advantages and disadvantages of the relational database model.
  17. Discuss entity-relationship (E-R) modeling and its components with examples.
  18. Explain SQL joins (INNER, OUTER, CROSS) with syntax and examples.
  19. Describe in detail deadlock detection, prevention, and recovery in DBMS.
  20. Discuss in detail recovery techniques for different types of database failures.
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**S-0798**

**Sub. Code**

**23BDS5C2**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fifth Semester**

**Data Science**

**MACHINE LEARNING**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define machine learning.
2. List two applications of machine learning.
3. What is supervised learning?
4. State the difference between classification and regression.
5. Define a decision tree.
6. What is entropy in decision tree learning?
7. What is K-means clustering?
8. List two limitations of K-means.
9. Define reinforcement learning.
10. List two examples of reinforcement learning applications.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the different types of machine learning.

Or

- (b) Discuss the challenges in applying machine learning to real-world problems.

12. (a) Explain the working of the k-nearest neighbor (KNN) algorithm.

Or

- (b) Write short notes on the bias-variance trade-off.

13. (a) Explain the ID3 algorithm for decision tree construction.

Or

- (b) Discuss pruning techniques in decision trees.

14. (a) Explain the steps in the K-means clustering algorithm.

Or

- (b) Discuss the evaluation of clustering results.

15. (a) Explain the exploration vs. exploitation dilemma in reinforcement learning.

Or

- (b) Write short notes on Q-learning.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail the machine learning process and its stages.
  17. Describe supervised learning techniques with suitable examples.
  18. Explain decision tree algorithms and discuss attribute selection measures.
  19. Explain clustering techniques with emphasis on K-means and hierarchical clustering.
  20. Describe reinforcement learning models with examples and applications.
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**S-0799**

**Sub. Code**

**23BDS5E1**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fifth Semester**

**Data Science**

**Elective — BIG DATA ANALYTICS**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define Big Data.
2. List any two characteristics of Big Data.
3. What is MapReduce?
4. State two advantages of distributed computing.
5. Define HDFS.
6. Mention any two components of Hadoop ecosystem.
7. What is a NoSQL database?
8. Give two examples of NoSQL databases.
9. Define data visualization.
10. Name any two tools used for Big Data analytics.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the 5 V's of Big Data with examples.

Or

- (b) Describe the evolution of Big Data technologies.

12. (a) Explain the working of MapReduce with an example.

Or

- (b) Discuss the advantages and disadvantages of Hadoop.

13. (a) Explain the architecture of HDFS.

Or

- (b) Discuss the role of YARN in Hadoop ecosystem.

14. (a) Compare SQL and NoSQL databases.

Or

- (b) Explain document-based and column-based NoSQL.

15. (a) Explain the process of data visualization in Big Data analytics.

Or

- (b) Discuss the benefits of using Tableau for visualization.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail the Big Data life cycle with suitable examples.
  17. Explain in detail the architecture and execution flow of MapReduce.
  18. Discuss the Hadoop ecosystem in detail with its components and workflow.
  19. Explain in detail the different types of NoSQL databases with examples.
  20. Describe the role of Big Data analytics in business decision-making with a case study.
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**S-0800**

**Sub. Code**

**23BDS5E2**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.**

**Fifth Semester**

**Data Science**

**Elective — ARTIFICIAL NEURAL NETWORKS**

**(CBCS – 2023 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is the role of activation functions in an artificial neural network?
2. Define feed forward and feedback in the context of neural networks.
3. What is error correction learning in neural networks?
4. Define Hebbian learning. State Hebb's rule.
5. State the Perception Learning Algorithm in brief.
6. What is an Adaptive Linear Combiner?
7. How many layers does an MLP with 2 hidden layers have in total?
8. What is the function of a single (simple) layer in a Multi-Layer Perception?

9. Who proposed the Neo-Cognition and what is its significance?
10. Define a Recurrent Neural Network (RNN) in one or two sentences.

**Part B**

(5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the error correction learning algorithm and derive the gradient descent learning rule.

Or

- (b) What is meant by a non-linearly separable problem? How do multi layer networks help solve such problems?

12. (a) What is the credit assignment problem? Why is it important in neural network training?

Or

- (b) Write a short note on competitive learning. How is it applied in neural networks?

13. (a) What is an Adaptive Linear Combiner? How does it relate to the perception model?

Or

- (b) What is the Modified Perception Learning Algorithm? How does it improve upon the simple perception learning method?

14. (a) Explain the structure and working of an MLP with two hidden layers. What are the advantages of using multiple hidden layers?

Or

- (b) Explain the concept of a multilayer feed forward neural network with continuous perceptions. How does it differ from networks using step functions?

15. (a) What is Deep Learning? Describe the basic building blocks of deep learning architectures.

Or

- (b) List some common applications of Deep Neural Networks (DNNs). What are the main challenges faced during DNN training?

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain convex sets, convex hull, and linear separability with suitable diagrams. Why is linear separability important in neural networks?
17. Describe various learning tasks in neural networks. How are they categorized and what is their significance in real-world applications?
18. Explain the architecture and working of a Single Layer Perception. How is it used for pattern recognition?
19. What is the function of a simple layer in an MLP? Explain its role in learning and data transformation.
20. Explain the architecture of Deep Convolution Neural Networks (CNNs). How do CNNs perform feature extraction and classification?
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