Exam Code: 117903 **Paper Code: 3261**

Programme: Bachelor of Computer Applications

Semester: III

Course Title: Advanced Database Management System

Course Code: BCAL - 3112

Time Allowed: 3 Hours **Max Marks: 80**

Note: Attempt five questions in all, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 16 marks.

Section A

1. a) Explain the purpose of the UNION, INTERSECT, and MINUS operators in SQL with examples. (10)
   b) What is the role of indexes in SQL databases? Describe how indexes can affect database performance. (6)

2. a) Define transaction management and explain the importance of concurrency control in maintaining data consistency. (10)
   b) Describe the security features in SQL that help protect data among users. Provide examples of GRANT and REVOKE commands. (6)

Section B

3. What are the different types of control statements in PL/SQL? Write a PL/SQL program using conditional and looping statements. (16)

4. a) Define Big Data and discuss its benefits for businesses. (8)
   b) What is the CAP theorem? Explain how it applies to distributed systems and database design. (8)

Section C

5. Explain the need for NoSQL databases in the modern data environment. What are the different types of NoSQL databases? (16)

6. a) Provide an overview of MongoDB and discuss the main features that distinguish it from relational databases. (12)

b) Write MongoDB commands to create a database and a collection. (4)

Section D

7. a) How can sorting, limiting, and counting records be achieved in MongoDB? Write commands for each operation. (12)

b) Describe the process of creating and dropping indexes in MongoDB. (4)

8. a) Explain the concept of replication and its significance in MongoDB. How does Sharding enhance database performance? (12)

b) What is MapReduce function in MongoDB? (4)

Exam Code: 117903 **Paper Code: 3260-R**

Programme: Bachelor of Computer Applications

Semester: III

Course Title: Foundation of Data Science

Course Code: BCAL - 3111

Time Allowed: 3 Hours **Max Marks: 80**

Note: Attempt five questions in all, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 16 marks.

Section-A

Q1. What do you mean by Data Science? What is the evolution and future of data science? 16

Q2. Define the usage and challenges in data science process 16

Section-B

Q3. What are the data collection methods? Explain 16

Q4. Explain different data collection tools 16

Section-C

Q5. What is exploratory data analysis (EDA)? Why EDA is important? 16

Q6. What is the role of Data Scientist and Data Analyst in data science? Explain 16

Section-D

Q7. What is storytelling? What are the characteristics of good story? How to create data stories? 16

Q8. What is the use of Power BI in data science? Why do we need power BI? 16

Exam Code: 117903 **Paper Code: 3260**
(50)

Programme: Bachelor of Computer Applications
Semester-III

Course Title: Foundation of Data Science

Course Code: BCAL-3111

Time Allowed: 3 Hours **Max Marks: 80**

Note: Attempt five questions selecting at least one question from each section, fifth question may be attempted from any section. All questions carry equal marks (16).

SECTION A

1. What is Data Science? Explain the Evolution and Need of data science. 16
2. Explain the Similarities and Differences between Data Science and Business Intelligence. 16

SECTION B

3. What are various Methods used for Data Collection? Explain. 16
4. Discuss the term Data Analytics, its Process and types. 16

SECTION C

5. "Data Science is Everywhere", explain through applications of Data Science. 16
6. What are the desirable Skills that a Data Scientist must have? 16

SECTION D

7. What is Data Story Telling? Explain different Techniques for data Visualization Story telling. 16
8. What is Power BI? Explain Components of Power BI Architecture. 16

Retest 24-1-2025

Exam Code: 117903 **Paper Code: 3261-R**

Programme: Bachelor of Computer Applications

Semester: III

Course Title: Advanced Database Management System

Course Code: BCAL - 3112

Time Allowed: 3 Hours **Max Marks: 80**

Note: Attempt five questions in all, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 16 marks.

Section A

1. Explain the concept of SQL joins with examples of different join types. (16)

2. a) Define ACID properties in the context of transaction management and explain their importance in database systems. (12)
   b) Describe the concept of views in SQL. (4)

Section B

3. Explain the structure of a PL/SQL block with an example. Discuss the benefits and limitations of PL/SQL. (16)

4. a) Define Big Data and discuss its main characteristics. Explain the CAP theorem in the context of distributed databases. (12)

b) Explain the concept of triggers in PL/SQL. (4)

Section C

5. a) Describe the differences between structured and unstructured data. Why is NoSQL suitable for handling unstructured data? (10)
   b) Compare ACID properties with BASE properties in NoSQL databases. (6)

6. a) Explain the features of MongoDB. (6)
   b) Describe CRUD operations in MongoDB. Write MongoDB commands to add, update, delete, and retrieve documents from a collection. (10)

Section D

7. a) Describe the concept of indexing in MongoDB. How can indexes improve query performance? Provide an example of creating an index in MongoDB. (10)
   b) What is projection in MongoDB? Explain with example. (6)

8. a) What is replication in MongoDB, and why is it important? Discuss the process of setting up Sharding in MongoDB. (10)
   b) Explain the MapReduce function in MongoDB. (6)

Exam Code: 117903 **Paper Code: 3262**

Programme: Bachelor of Computer Applications

Semester: III

Course Title: Computational Problem Solving

Course Code: BCAL - 3113

Time Allowed: 3 Hours **Max Marks: 80**

Note: Attempt five questions in all, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 16 marks.

Section A

1. Explain the process of computational problem-solving, discuss the features of Python that make it suitable for beginners. 16
2. Define literals, variables, and identifiers in Python, illustrate the use of different data types with examples, explain the difference between expressions and statements, and provide a Python code snippet to swap two variables. 16

Section B

3. What are lists in Python, and what are their properties and methods? What are the advantages of using lists over arrays, and how can you handle exceptions when accessing list elements? 16
4. Discuss advanced text parsing techniques using dictionaries, and compare iteration and recursion with examples. 16

Section C

5. Define Boolean expressions and logical operators and their significance in control structures. Explain nested conditions with a sample code. 16
6. What are the fundamental concepts of functions in Python and write a Python function to calculate the factorial of a number using recursion. 16

Section D

7. How do you open and read from files in Python? Explain exception handling with an example of file handling, and write a program that reads a file and counts the number of words. 16
8. Introduce the concept of Object-Oriented Programming (OOP) in Python and describe the basics of databases and SQL with a simple example of data modelling. 16

Exam Code: 117903 Paper Code: 3263

Bachelor of Computer Applications - Semester III

Course Title: Numerical Methods and Statistical Techniques

Course Code: BCAL-3114

Time: 3 Hours **Max. Marks: 80**

Note: Attempt five questions, selecting one question from each section. The fifth question can be attempted from any section. Each question carries 16 marks. Students are allowed to use non-storage and non-programmable type scientific calculators.

SECTION A

1. a) How can an error be defined? What are the types of errors in numerical calculations? What are the commonly used measures of errors?

b) Let X = 0.00789321. Find the relative error, absolute error and percentage error if X is rounded off to four decimal places.

2. a) Find the root of the equation $x^4 + 2x^2 - 16x = -5$ using the bisection method correct to three decimal places.

b) Solve the following equations using the Gauss Jordan method:

$$2x - 2y + 5z = 13$$
$$2x + 3y + 4z = 20$$
$$3x - y + 3z = 10$$

SECTION B

3. Using Trapezoidal and Simpson's rule to numerically integrate $f(x) = x^2 + 3x + 5 = 0$ from a = 1 to b = 2 with h = 0.25.

4. a) Apply Newton's Forward difference formula, obtain a polynomial of degree 4 in x:

x	1	2	3	4	5
Y	1	-1	1	-1	1

b). Given the values, evaluate the value of f (15):

X	5	7	11	13	17
Y	150	392	1452	2366	5202

SECTION C

5. a. In a factory employing 3000 persons in a day, 5% work less than 3 hours, 580 work from 3.01 to 4.50 hours, 30% work from 4.51 to 6.00 hours, 500 work from 6.01 to 7.50 hours, 20 % work from 7.51 to 9.00 hours and the rest work 9.01 or more hours. What is the median hours of work?

b. Calculate the mean, median, mode and quartile deviation from the following given data of workers family monthly income:

Income Below	50	45	40	35	30	25	20	15
No. of Families	97	95	90	80	60	30	12	4

6. a. Calculate mean and Standard Deviation from the following data:

Data (Below)	10	20	30	40	50	60
Frequency	15	32	51	78	98	109

b. The following table gives the mean and variance of the heights of males and females working in a company.

	Males	Females
Number	400	100
Average Height	68 inches	65 inches
Variance	9 inches	4 inches

(i) What is the mean of the height of males and females taken together?
(ii) Which group has more variability in heights?
(iii) What is the combined standard deviation?

SECTION D

7. a. Compute rank correlation coefficient between marks obtained in mathematics and marks obtained in statistics from the following scores:

Marks in Statistics	30	20	40	50	30	20	30	50	10	0
Marks in Mathematics	15	40	40	45	20	30	15	50	20	10

b. Determine both the regression lines and coefficients from the following data:-

X	15	27	27	30	34	38	46
Y	12	14	15	17	18	20	25

8. Fit an exponential curve from the given data below:

X	1	2	3	4	5	6
Y	0.5	2.1	4.5	7.5	12.6	19.8

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