SEMESTER– III										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23CPT305D	MICROCONTROLLER	MJD	4	0	0	4	25	75	100
2	A23CPT306C	PROGRAMMING IN C++	MJD	4	0	0	4	25	75	100
3	A23MAD308C	NUMARICAL METHODS	MID	3	1	0	4	25	75	100
4	A23ENM305C	CONTENT WRITING	MLD	3	0	0	3	25	75	100
5	A23CPL305D	MICROCONTROLLER LAB	SEC	0	0	4	2	50	50	100
6	A23CPL306C	PROGRAMMING IN C++ LAB	SEC	0	0	4	2	50	50	100
7	A23VAC303C	HEALTH AND WELLNESS, YOGA EDUCATION, SPORTS AND FITNESS	VAC	2	0	0	2	100	0	100
8	A23CPC303C	JAVA	EEC	0	0	0	0	100	0	100
							21	**400**	**400**	**800**

Department	**Computational Studies**	Programme: **B.Sc COMPUTER SCIENCE**						
Semester	**Third**	CourseCategoryCode: **MJD**			*End SemesterExamType:**TE**			
Course Code	**A23CPT305D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**MICROCONTROLLER**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge about Microcontroller							
Course Objectives	• To understand and learn the architecture and assembly language program of 8085. • To understand and learn the architecture and assembly language program of 8086. • To explore the interfacing the peripherals and other chips to 8085. • To explore the architecture of 8086. • To understand the interfacing the peripherals and other chips to 8086.							

Course Outcome	*After the completion of this course, the students will be able to:*		BT Mapping (Highest Level)
	CO1	Explain the basic architecture of 8085 microprocessors.	**K2**
	CO2	Articulate the knowledge of Communication based Interfacing with 8085.	**K3**
	CO3	Summarize the interfacing of various program-based peripherals to 8085.	**K3**
	CO4	Illustrate the architecture of the 8086 microprocessors.	**K4**
	CO5	Summarize the interfacing of various peripherals with 8086.	**K4**

UNIT-I	**INTEL 8085 MICROPROCESSORS**	**Periods:12**
Introduction – Need for Microprocessor – Evolution – 8085 Architecture – Pin diagram - Timing Diagram – Addressing Modes – Instruction Formats – Instruction Set.		**CO1**
UNIT-II	**COMMUNICATION BASED INTERFACING TO 8085**	**Periods:12**
Parallel Communication Interface (8255) – Serial Communication interface (8251) – D/A and A/D Interface.		**CO2**
UNIT-III	**PROGRAM BASED INTERFACING TO 8085**	**Periods:12**
Programmable Timer Controller (8254) – Keyboard/display controller (8279) – Programmable Interrupt Controller (8259) – DMA controller (8237).		**CO3**
UNIT-IV	**INTEL 8086 MICROPROCESSORS**	**Periods:12**
Introduction to 8086 Microprocessor – 8086 Architecture – Pin diagram – Addressing Modes – Instruction Format – Instruction Set – Interrupts – Assembler Directives – Assembly Language Programming.		**CO4**
UNIT-V	**INTERFACING 8086 MICROPROCESSORS**	**Periods:12**
8086 Functional Units – I/O Interfacing - D/A and A/D Interface – Stepper Motor interfacing - Serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing		**CO5**

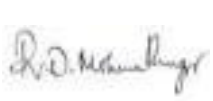
Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods: -**	**TotalPeriods:60**

Text Books

1. "ARM Microcontroller Interfacing: Hardware and Software" by Warwick A. Smith (Second Edition, 2022).
2. "Microcontrollers: From Assembly Language to C Using the PIC24 Family" by Robert B. Reese (Third Edition, 2021).

Reference Books

1. "Programming 16-Bit PIC Microcontrollers in C: Learning to Fly the PIC 24" by Lucio Di Jasio (Second Edition, 2019).



2. "Microcontroller Technology: The 68HC11" by Peter Spasov (Fourth Edition, 2020).

Web References

1. https://swayam.gov.in/nd1_noc20_ee42/microprocessors-and-microcontrollers/
2. https://www.classcentral.com/course/swayam
3. https://freevideolectures.com/course/3018/microprocessors
4. https://www.arduino.cc/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. COMPUTER SCIENCE**						
Semester	**Third**	CourseCategoryCode: **MJD**			*End SemesterExamType:**TE**			
Course Code	**A23CPT306C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Programming in C++**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
(Common to B.Sc. (CS) & BCA)								
Prerequisite	Basic knowledge about information Technology							
Course Objectives	• Define Encapsulation, Inheritance and Polymorphism. • Solve the problem with object-oriented approach. • Analyze the problem statement and build object-oriented system model. • Describe the characters and behavior of the objects that comprise a system. • Explain function overloading, operator overloading and virtual functions							
Course Outcome	*After the completion of this course, the students will be able to:*							BT Mapping (Highest Level)
	CO1	Learn programming of C++						**K2**
	CO2	Understand Object oriented approach for finding Solutions.						**K3**
	CO3	Create C++ based solutions to Inheritance concept						**K3**
	CO4	Learn various concepts Files and Exception Handling techniques						**K4**
	CO5	Develop the applications using object-oriented programming with C++						**K4**
UNIT-I	**INTRODUCTION TO C++ AND BASICS OF OOPS**				**Periods:12**			
Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program – Basic Concepts of Object-Oriented Programming: Benefits of OOP – Object Oriented Languages – Applications of OOP.								**CO1**
UNIT-II	**PRINCIPLES OF OBJECT-ORIENTED PROGRAMMING**				**Periods:12**			
Classes objects - data members - member functions –Access Specifiers- this Pointer - Friends - Friend Functions - Friend Classes - Friend Scope - Static Functions - Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Overloading Unary Operators - Overloading binary operators.								**CO2**
UNIT-III	**INHERITANCE**				**Periods:12**			
Inheritance in C++ - Types of Inheritance - Multiple Inheritance. Virtual Functions - Polymorphism - Abstract classes. Real time examples in OOPS.								**CO3**
UNIT-IV	**POINTERS, EXCEPTION HANDLING AND FILES**				**Periods:12**			
Pointers - Objects and Pointers - Exception Handling: Exception – Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Re-throwing Exception. Standard input and output operations: C++ IOstream hierarchy - File input and output: Reading a File - Managing I/O Streams - Opening a File – Different Methods - Checking for Failure with File Commands - Checking the I/O Status Flags - Dealing with Binary Files - Useful Functions.								**CO4**
UNIT-V	**TEMPLATES**				**Periods:12**			
Class templates: Implementing a class template - Implementing class template member functions - Using a class template - Function templates - Implementing function templates - Using template functions.								**CO5**

Lecture Periods:60	Tutorial Periods: -	Practical Periods: -	TotalPeriods:60

Text Books

1. E. Balagurusamy, “Object Oriented Programming with C++”, McGraw Hill, 7th Edition, 2018.
2. Herbert Schildt, “C++ - The Complete Reference”, McGraw Hill Education, 4th Edition, 2017.

Reference Books

1. Herbert Schildt, “C++ - From the Ground Up”, McGraw Hill Education, 2nd Edition, 2018.
2. Thomas L. Floyd, “Electronic Devices”, 9thEdition, Pearson Education, 2019.
3. Stanley B. Lippman, Stanley Lippman, Barbara Moo, “C++ Primer”, Addison-Wesley Professional, 5thEdition 2020.

Web References

1. https://www.tutorialspoint.com/cplusplus/index.htm
2. http://www.cplusplus.com/doc/tutorial/
3. https://www.w3schools.com/cpp/
4. https://www.javatpoint.com/cpp-tutorial
5. https://www.geeksforgeeks.org/cpp-tutorial/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Computer Science**						
Semester	**Third**	Course Category Code: **SEC**			*End Semester Exam Type: **LE**			
Course Code	**A23CPL305D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	IM	ESE	TM
Course Name	**MICROCONTROLLER LAB**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	**Basic Knowledge in Microcontroller**							

Course Outcome	*After completion of the course, the students will be able to*	BT Mapping (Highest Level)
CO1	Demonstrate simple programs with 8085.	**K3**
CO2	Implement the interfacing with 8085.	**K3**
CO3	Implement assembly language program using 8086 MASM.	**K3**
CO4	Execute the interfacing with 8086.	**K4**

List of Experiment

1. 8-bit Addition & Subtraction using 8085.
2. 8-bit Multiplication & Division using 8085.
3. Searching operation using 8085.
4. 16-bit Addition & Subtraction using 8085.
5. 16-bit Multiplication & Division using 8085.
6. Code conversions using 8085.
7. DAC and ADC interfacing using 8085.
8. 16-bit addition and subtraction using 8086.
9. 16-bit multiplication and division using 8086.
10. Interfacing stepper motor with 8086.
11. Interfacing ADC and DAC with 8086.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods:30**	**Total Periods:30**

Reference Books

1. Krishna Kant, “Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096”, PHI, 2019.

2. Ramesh S.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, Penram International publishing, 2018.

3. A.K. Ray, K.M. Bhurchandi, “Advanced Microprocessor and Peripherals”, Tata McGraw-hill, Second edition, 2019.

Web References

1. https://nptel.ac.in/courses/108/103/108103157/
2. https://www.geeksforgeeks.org/microprocessor-tutorials/
3. https://swayam.gov.in/nd1_noc20_ee42/microprocessors-and-microcontrollers/
4. https://www.classcentral.com/course/swayam
5. https://freevideolectures.com/course/3018/microprocessors

COs/POs/PSOs Mapping

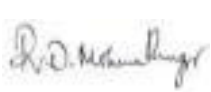
COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus



Department	**Computational Studies**		Programme **BCA COMPUTER APPLICATIONS**					
Semester	**Third**		Course Category Code: **SEC**			*End Semester Exam Type: **LE**		
Course Code	**A23CPL306C**		Periods/Week			Credit	Maximum Marks	
			L	T	P	C	IM	ESE	TM
Course Name	**PROGRAMMING IN C++ LAB**		**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in C++ Program							
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)
	CO1	Understand the Object-Oriented concepts.						**K3**
	CO2	Understand the Functions and Arrays.						**K3**
	CO3	Construct the Classes and Objects.						**K3**
	CO4	Explain the Operator overloading and Inheritance concepts.						**K4**
	CO5	Describe Files and Exception Handling Methods.						**K4**

List of Experiment

Write C++ Programs for the followings:

1. Class Declarations, Definition, and Accessing Class Members.
2. Constructor, parameterized constructor and copy constructors.
3. Friend Function and Friend Class.
4. Function Overloading and Constructor Overloading.
5. Operator Overloading.
6. Inheritances.
7. Virtual Classes and Abstract Classes.
8. Exception Handling.
9. IOStream, IStream, Ostream classes and their usages.
10. File Stream Operations.
11. Template Based Program to Sort the Given List of Elements.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods:30**	**TotalPeriods:30**

Reference Books

1. Herbert Schildt, “C++ - From the Ground Up”, McGraw Hill Education, 2nd Edition, 2018.

2. Stanley B. Lippman, Stanley Lippman, Barbara Moo, “C++ Primer”, Addison-Wesley Professional, 5th Edition2019.

COs/POs/PSOs Mapping

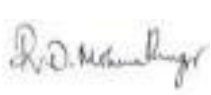
COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

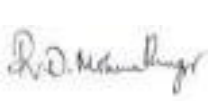
Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus



SEMESTER – IV										
S. No	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	A23CPT406C	PROBLEM SOLVING USING JAVA	MJD	4	0	0	4	25	75	100
2	A23CPT407C	DATABASE MANAGEMENT SYSTEMS	MJD	4	0	0	4	25	75	100
48	A23CPT408C	COMPUTER ORGANIZATION AND ARCHITECTURE	MJD	4	0	0	4	25	75	100
3	A23MAD410C	STATISTICS AND PROBABILITY	MID	3	1	0	4	25	75	100
Skill Enhancement Course										
6	A23CPL406C	PROGRAMMING IN JAVA LAB	SEC	0	0	4	2	50	50	100
7	A23CPL407C	DBMS LAB	SEC	0	0	4	2	50	50	100
PROJECT										
8	A23CPP401C	COMMUNITY ENGAGEMENT AND SERVICE	PROJECT	2	0	0	2	*25*	*75*	*100*
Employment Enhancement Course										
9	A23CPC404D	EXPLORING JAVA	EEC	0	0	4	0	100	0	100
							23	**425**	**475**	**900**

Department	**Computational Studies**		Programme: **B.SC COMPUTER SCIENCE & BCA**					
Semester	**Four**		Course Category Code: **MJD**			*End Semester Exam Type: **TE**		
Course Code	**A23CPT406C**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**PROBLEM SOLVING USING JAVA**		**4**	**0**	**0**	**4**	**25**	**75**	**100**
(Common to B.Sc(CS) & BCA)									
Prerequisite	Basic knowledge about JAVA								
Course Objectives	• To explore the knowledge of fundamental concepts of java programming • To Gain Knowledge about the basic java language syntax and semantics • To know the principles of inheritances, packages, interfaces • To get familiarized to generic programming, multithreading concepts. • To Gain and explore the advanced concepts in Java							
Course Outcome	*After the completion of this course, the students will be able to:*							BT Mapping (Highest Level)
	CO1	Write a maintainable Java Program for a given algorithm and implement the same.						**K2**
	CO2	Demonstrate the use of inheritance, interface and package in relevant applications.						**K3**
	CO3	Create java applications using exception handling, thread and generic programming						**K3**
	CO4	Build java distributed applications using Collections and IO streams.						**K4**
	CO5	Develop simple graphical user interfaces using GUI components.						**K4**
UNIT-I	**INTRODUCTION TO OBJECT ORIENTED PROGRAMMING**					**Periods: 12**		
Introduction to classes and objects: Basic Concepts of OOPs – Platform Independence – The History and Evolution of Java - byte code – data types – variables – arrays – operators – control statements – type conversion and casting - garbage collection – String class.								**CO1**
UNIT-II	**INHERITANCE, PACKAGES AND INTERFACES**					**Periods: 12**		
Inheritance: Basic concepts and its types - access control - constructors- static keyword- final - this and super keyword – method overriding, abstract classes- Packages - Interfaces								**CO2**
UNIT-III	**EXCEPTION HANDLING, MULTITHREADING**					**Periods: 12**		
Concepts of Exception handling, types of exceptions, creating own exception - Concepts of Multithreading - creating multiple threads.								**CO3**
UNIT-IV	**COLLECTIONS, I/O STREAMS**					**Periods: 12**		
Collections: List - Vector - Stack - Queue. Input /Output Basics - Streams - Byte streams and Character streams - Reading and Writing Console - Reading and Writing Files.								**CO4**
UNIT-V	**EVENT DRIVEN PROGRAMMING AND JDBC**					**Periods: 12**		
Events - Delegation event model - Event handling - Adapter classes. AWT: Concepts of components SWING- Swing Components. Java Database Connectivity - Programming Example.								**CO5**
Lecture Periods: 60		**Tutorial Periods: -**		**Practical Periods: -**			**Total Periods: 60**	
Text Books								
1. "Core Java Volume I--Fundamentals" by Cay S. Horstmann (Twelfth Edition, 2021). 2. "Java Performance: The Definitive Guide" by Scott Oaks (Second Edition, 2021).								
Web References								



1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.

3. IBM"s tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog
5. https://www.geeksforgeeks.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.SC COMPUTER SCIENCE & BCA**		
Semester	**Four**	Course Category Code: **MJD**	*End Semester Exam Type: **TE**	
Course Code	**A23CPT407C**	Periods / Week	Credit	Maximum Marks

		L	T	P	C	CAM	ESE	TM
Course Name	**DATABASE MANAGEMENT SYSTEM CONCEPTS**	**4**	**0**	**0**	**4**	**25**	**75**	**100**

(Common to B.Sc(CS) & BCA)

Prerequisite	Basic knowledge about Python
Course Objectives	• To learn about Database Structure. • To study about data modelling and relational database • To study about normalization techniques • To understand the concept of SQL commands • To understand the concept of PL/SQL language.

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Exploring the overall concept regarding Database.	**K2**
	CO2 Design conceptual and relational database.	**K3**
	CO3 Normalize relational database design of an application.	**K3**
	CO4 Know about basic SQL Commands.	**K4**
	CO5 Understand the concept of PL/SQL queries.	**K4**

UNIT-I	**INTRODUCTION**	**Periods: 12**
Database System Application – Purpose of Database Systems – Types of Databases - View of Data – DBMS vs RDBMS-Data Models – Data Independence – System Structure – Database Architecture.		**CO1**
UNIT-II	**DATA MODELLING AND RELATIONAL**	**Periods: 12**
ER Model concept – Notation for ER Diagram – ER Design Issues – Mapping Constraints – Schema Relation - Keys – Generalization – Specialization – Aggregation – Relationships of Higher Degree – Relational Model Concept – Relational Algebra – Join Operations – Integrity Constraints.		**CO2**
UNIT-III	**NORMALIZATION**	**Periods: 12**
Functional Dependency - 1 Normal Form – 2 Normal Form – 3 Normal Form – BCNF – 4 Normal Form – 5 Normal Form-Relational Decomposition – Multivalued Dependency – Join Dependency.		**CO3**
UNIT-IV	**SQL**	**Periods: 12**
SQL Syntax – SQL Data Types – SQL Operators – DDL – DML – TCL – DCL – SQL Database – SQL Table – SQL Select – SQL Clause – SQL Order By – SQL Insert – SQL Update – SQL Delete – SQL Join – SQL Keys – SQL Built In Functions.		**CO4**
UNIT-V	**PL/SQL**	**Periods: 12**
Introduction – Basic Syntax – Data Types – Variables – Constants and Literals – Operators – Conditions – Loops – Strings – Arrays – Procedures – Functions – Cursors – Records – Exceptions – Triggers – Package – Collections – Transactions.		**CO5**

Lecture Periods: 60	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1 .Abraham Silberschatz, Henry F Korth, S Sudharshan, “Database System Concepts”, McGraw-Hill, 7th Edition, 2019.

2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, “Fundamentals of Database Systems”, Pearson Education, 2018.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/

3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf
4. https://nptel.ac.in/courses/106/106/106106095/
5. https://www.tutorialspoint.com/dbms/index.htm

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**COMPUTATIONAL STUDIES**	Programmes**: B.Sc(CS), BCA**						
Semester	**Four**	Course Category Code: **MID**			*End Semester Exam Type: **TE**			
Course Code	**A23MAD410C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**STATISTICS AND PROBABILITY**	**3**	**1**	**0**	**4**	**25**	**75**	**100**
(Common to B.Sc. (CS) and BCA								

Prerequisite	Basic Statistics Knowledge		
Course Objectives	To study the basic probability concepts		
	To understand the concept of theorems on probability		
	To understand various measures of central tendency		
	To be familiar with the measures of dispersion		
	To understand the importance of correlation and regression values		
Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Understand the Concept of Random experiment	**K3**
	CO2	Demonstrate the applications of Bayes Theorem	**K3**
	CO3	Demonstrate the ability to compute the measures of central tendency	**K3**
	CO4	Compute various measures of dispersion and interpret the results.	**K3**
	CO5	Conduct Correlation and Regression Analysis.	**K3**

UNIT-I	**MEASURES OF CENTRAL TENDENCY**	**Periods: 12**	
Measures of central Tendency: Arithmetic Mean – Median – Mode – Empirical relation between the three averages-Harmonic Mean-Geometric Mean Practical Problems.			**CO1**
UNIT-II	**MEASURES OF DISPERSION**	**Periods: 12**	
Measure of Dispersion: Range – Quartile Deviation – Mean Deviation – Standard Deviation – Co- efficient of variation- Skewness - concept, measures of skewness – Karl Pearson's and Bowley's coefficient of skewness. - Practical Problems			**CO2**
UNIT-III	**CORRELATION AND REGRESSION ANALYSIS**	**Periods: 12**	
Correlation: Definition – Types of Correlation – Computation of Correlation Coefficient – Karl Pearson'sco-efficient of correlation, Spearman's rank correlation coefficient. Regression – Meaning and Importance – Simple regression equations. Practical Problems.			**CO3**
UNIT-IV	**INTRODUCTION TO PROBABILITY**	**Periods: 12**	
Concept of Random experiment – trial – sample point – sample space event, algebra of events, mutually exclusive – exhaustive events. Definition of probability, classical, statistical and axiomatic approach – Properties of probability-simple problems			**CO4**
UNIT-V	**THEOREMS ON PROBABILITY**	**Periods: 12**	
Theorems on probability – Addition theorem of probability – Conditional probability – Multiplication theorem – Bayes' theorem – simple problems			**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. S.C. Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics- Sultan Chand and Sons,12th Edition ,2022
2. S.P. Gupta, Statistical methods- Sultan Chand and Sons, 45th Edition 2017
3. R.S.N.Pillai & V. Bagavathi, Statistics –S.Chand & company LTD, Reprint 2014

Reference Books

1. Aliaga, Gunderson, “Interactive Statistics”, 2nd Edition – Pearson/Prentice Hall
2. Hamilton, “Statistics with STATA”, 8th Edition, Duxbury 2004.
3. P.R.Vittal, “Mathematical Statistics ll”, Margham Publications -2002- Reprint 2012.
4. Weisberg, S, “Applied Linear Regression”, John Wiley and Sons, New York - 1980.
5. Kokoska, “Introductory Statistics: A Problem-Solving Approach”, Review copy, Freeman2011.

Web References

1. https://nios.ac.in/media/documents/SecMathcour/Eng/Chapter-26.pdf
2. https://ncert.nic.in/pdf/publication/exemplarproblem/classXII/mathematics/leep213.pdf
3. https://ncert.nic.in/textbook/pdf/kest105.pdf
4. https://nios.ac.in/media/documents/SrSec318NEW/318_Economics_Eng/318_Economics_Eng_Lesson9.pdf
5. https://www.cimt.org.uk/projects/mepres/alevel/stats_ch12.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	2	3	2	1
2	3	2	3	2	1	3	2	1
3	3	2	3	3	2	2	3	1
4	2	3	3	3	3	3	2	2
5	3	2	3	3	2	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **BCA Computer Application**

Semester	**Fourth**	Course Category Code: **SEC**			*End Semester Exam Type: **LE**			
Course Code	**A23CAL408D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	I M	ESE	TM
Course Name	**PROGRAMMING IN JAVA LAB**	**0**	**0**	**4**	**3**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in Java programming							

Course Outcome		*After completion of the course, the students will be able to*	BT Mapping (Highest Level)
	CO1	Apply and practice logical formulations to solve simple problems leading to specific applications.	**K3**
	CO2	Demonstrate the use of inheritance, interface and package in relevant applications.	**K3**
	CO3	Create java applications using exception handling, multithread.	**K3**
	CO4	Build java distributed applications using Collections and IO streams	**K4**
	CO5	Develop simple graphical user interfaces using GUI components.	**K4**

List of Experiment

1. Develop simple programs using java syntax and semantics.
2. Develop a java program that implements the interface.
3. Develop a java program that implements the Packages.
4. Write a java program to demonstrate inheritance.
5. Develop a program to illustrate the use of Multi Threads.
6. Create java applications using Exception Handling.
7. Write programs in Java to demonstrate the use of following components Text fields, buttons, Scrollbar, Choice,List and Check box
8. Write Java programs to demonstrate the use of various Layouts like Flow Layout, Border Layout, Grid layout, Gridbag layout and card layout
9. Design an application using event-driven programming and JDBC to connect a back-end database using Java.

LecturePeriods:-	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

Reference Books

1. Herbert Schildt, “C++ - From the Ground Up”, McGraw Hill Education, 2nd Edition, 2018.

2. Stanley B. Lippman, Stanley Lippman, Barbara Moo, “C++ Primer”, Addison-Wesley Professional, 5th Edition2019.

COs/POs/PSOs Mapping

COs	**Program Outcomes (POs)**					**Program Specific Outcomes (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	**50**	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**		Programme: **B.Sc Data Science and Analytics**					
Semester	**Fourth**		Course Category Code: **SEC**			*End Semester Exam Type: **LE**		
Course Code	**A23DAL407D**		Periods/Week			Credit	Maximum Marks	
			L	T	P	C	I M	ESE	TM
Course Name	**DBMS LAB**		**0**	**0**	**4**	**3**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in database							
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)
	CO1	Implement SQL commands.						**K3**
	CO2	Implement SQL commands.						**K3**
	CO3	Implement DDL and DML programs.						**K3**
	CO4	Understand PL/SQL programs.						**K4**
	CO5	Understand PL/SQL programs						**K4**

List of Experiment

1. Perform the following: Viewing all databases, Creating a Database, Viewing all Tables in aDatabase, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
2. Implement the concept of Keys.
3. Perform the following: Altering a Table, Dropping/Truncating/Renaming Tables, Backing up /Restoring a Database.
4. For a given set of relation schemes, create tables and perform the following Simple Queries,Aggregate functions, Queries with group by and having clause,
5. Create a table and perform Date Functions, String Functions and Math Functions.
6. Create a table and perform Join Queries- Inner Join, Outer Join Subqueries- With IN clause,With EXISTS clause.
7. Implement the concept of Procedure in PL/SQL.
8. Implement the concept of Functions in PL/SQL.
9. Implement the concept of Cursor in PL/SQL.
10. Implement the concept of Trigger in PL/SQL.

LecturePeriods:-	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

Reference Books

1. Ramez Elmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentalsof Database Systems, Pearson Education, 7thEdition, 2016.
2. Raghu Ramakrishna, Johannes Gehrke, Database Management Systems, McGraw Hill,3rdEdition,2014.
3. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts", McGraw-HillIndian Edition, 7th Edition, 2013.
4. Kuhn,"RMAN Recipes for Oracle Database", Apress, 2nd Edition,2013.
5. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, Pearson Education,8thEdition, 2006.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus