SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS), COIMBATORE – 641 020
B.Sc. COMPUTER SCIENCE (UCS/USC)
Under Choice Based Credit System (CBCS) 2020– 2021 onwards
SCHEME OF EXAMINATION

SEMESTER – I									
S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UGC1TA1	I	Tamil– I Amutha Tamil	6	3	3	50	50	100
02	20UGC1EN1	II	English – I	6	3	3	50	50	100
03	20UCS/USC 1C01	III	Core -1 Fundamentals of IT	2	2	2	50		50
04	20UCS/USC 1CO2	III	Core – 2 Programming in C	4	4	3	50	50	100
05	20UCS/USC 1AL1	III	Allied-1: Mathematics – I	6	5	3	50	50	100
06	20UCS/USC 1CP1	III	Core Practical – 1 Programming Lab in C	6	3	3	50	50	100
TOTAL – 1				**30**	**20**		**190**	**360**	**550**

SEMESTER – II									
S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UGC2TA2	I	Tamil– II (Kappiya Tamil)	6	3	3	50	50	100
02	20AUG2EN2	II	English – II	6	3	3	50	50	100
03	20UCS/USC2 C03	III	Core – 3 Internet of Things	2	2	2	50	-	50
04	20UCSUSC2 CO4	III	Core –4 Object Oriented Programming with C++	4	4	3	50	50	100
05	20UCS/USC2 AL2	III	Allied-2: Mathematics– II	6	5	3	50	50	100
06	20UCS/USC2 CP2	III	Core Practical – 2 Programming Lab in C++	6	3	3	50	50	100
07	20UGC2ENS	IV	Environmental Studies		2	2	-	50	50
TOTAL – 2				**30**	**22**		**190**	**410**	**600**

SEMESTER – III									
S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UCS/USC3 CO5	III	Core– 5 Database Management System	4	4	3	50	50	100
02	20UCS/USC3 CO6	III	Core– 6 Data Structures and Algorithms	5	5	3	50	50	100
03	20UCS/USC3 CO7	III	Core – 7 Java Programming	5	4	3	50	50	100
04	20UCS/USC3 AL3	III	Allied- 3: Accounting and Business Management	6	5	3	50	50	100
05	20UCS/USC3 CP3	III	Core Practical – 3 Java Programming	4	3	3	50	50	100
06	20UCS/USC3 CP4	III	Core Practical – 4 RDBMS Lab	4	3	3	50	50	100
07	20UCS/USC3 NM1	IV	Non Major Elective -1 / Basic Tamil – I PC Hardware Fundamentals	2	2	2	-	50	50
TOTAL – 3				**30**	**26**		**180**	**470**	**650**

SEMESTER – IV

S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UCS/USC4 CO8	III	Core – 8 .NET Technology	5	4	3	50	50	100
02	20UCS/USC4 CO9	III	Core – 9 Computer Organization &Architecture	5	4	3	50	50	100
03	20UCS/USC4 C10	III	Core – 10 Android Programming	4	4	3	50	50	100
04	20UCS/USC4 AL4	III	Allied 4- Operations Research (Problems Only)	6	5	3	50	50	100
05	20UCS/USC4 CP5	III	Core Practical – 5 .NET Technology Lab(C#)	4	3	3	50	50	100
06	20UCS/USC4 CP6	III	Core Practical – 6 Android Programming Lab	4	3	3	50	50	100
07	20UCS/USC4 NM2	IV	Non Major Elective - 2: ---------/ Basic Tamil – II Web Programming lab	2	2	2	-	50	50
08	20UGC4NSS/ 4SPO	V	NSS / NCC / SPORTS		1	2	-	50	50
09	20UGC4VAE	IV	Value Education		2	2	-	50	50
TOTAL – 4				**30**	**28**		**180**	**570**	**750**

SEMESTER – V

S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UCS/USC5 C11	III	Core– 11 Operating System	5	5	3	50	50	100
02	2OUCS/USC 5C12	III	Core – 12 Web Technology	5	4	3	50	50	100
03	20UCS/USC5 C13	III	Core – 13 Object Oriented Modelling andDesign with UML andSOAD	5	4	3	50	50	100
05	20UCS/USC5 CP7	III	Core Practical – 7 Web Technology Lab	5	3	3	50	50	100
06	20UCS/USC5 EA1/EB1/EC 1/ED1	III	Elective – I (From Group A)	5	4	3	50	50	100
07	20UCS/USC6 CPR	III	PROJECT	5					
TOTAL – 5				**30**	**20**		**140**	**360**	**500**

SEMESTER – VI

S.No	COURSE CODE	PART	COURSE TITILE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UCS/USC6 C14	III	Core– 14 Software Engineering	5	5	3	50	50	100
02	20UCS/USC6 C15	III	Core – 15 PYTHON Programming	5	5	3	50	50	100
03	20UCS/USC6 C16	III	Core – 16 Computer Networks and Cyber-Security	5	5	3	50	50	100
04	20UCS/USC6EA2/EB2/EC2/ED2	III	Elective - II (From Group B)	5	5	3	50	50	100
05	20UCS/USC6CP8	III	Core Practical -8 PYTHON Lab	5	3	3	50	50	100
06	20UCS/USC6CPR	III	Project Work	5	5		50	50	100
TOTAL – 6				**30**	**28**		**180**	**420**	**600**

ELECTIVES

Group A

1. **Artificial Intelligence and SoftComputing.**
2. Distributed ComputingSystem
3. Management InformationSystem
4. TCP/IP ProtocolSuit

Group B

1. **Data Mining andWarehousing**
2. MultimediaApplications.
3. Software ProjectManagement
4. Data Science using R

NON MAJOR ELECTIVES

01	20UEC3NM1	IV	Non Major Elective – 1 Java Programming	2	2	2	-	50	50
02	20UEC4NM2	IV	Non Major Elective – 2 Web Programming Lab	2	2	2	-	50	50

ADD-ON COURSES

1) BIG DATA AND DATAANALYTICS

2) MULTIMEDIA LAB

COURSE	CREDITS	MARKS
Tamil	6	200
English	6	200
Part III: Core & Elective Allied	103 20	2600 400
Environmental Studies	2	50
Non major Elective	4	100
Value Education	2	50
NSS/NCC/Sports	1	50
Total	144	3650

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: FUNDAMENTALS OF IT**	**Course Code**	**:**	**20UCS/USC1C01**
Year	**:**	**I**	**Semester**	**:**	**I**
Hours/Week	**:**	**2**	**Credit**	**:**	**2**

COURSE OBJECTIVES

- To Understand the concept of Hardware Fundamentals.
- To Understand the concept of Operating Systems
- To Understand the concept of Fundamentals of Network

Course outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the basic components of computer and its functionality	K1
CO2	Know the concept of Windows operating systems	K1
CO3	Know the concept of networking and their techniques	K1
CO4	Know the basic concepts of Storage devices	K1

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	L	L	M	M	M	L	L	M	L
CO2	L	L	M	M	M	L	L	M	L
CO3	L	L	M	M	M	L	L	M	L
CO4	L	L	M	M	M	L	L	M	L

UNIT1:

About PC data: Introduction - The PC system board -Introduction to the PC - Boot process, system bus - I/O busses, ISA bus - Chip sets - RAM About CPU's: - CPU - CPU improvements - CPU 5th & 6th generation - Over clocking the CPU's

About drives and other storage media:-Drives - Hard disks - Optic storage media - MO and ZIP drives - Tape streamers

UNIT2:

About expansion cards and interfaces: - Adapters and expansion cards - About interfaces: EIDE, Ultra DMA and AGP - SCSI, FireWire and USB

About operating and file systems:-File systems - Running and maintaining Windows 2000, XP, Win7, Win8.1-Relationship between operating system and hardware (BIOS, driver programs, etc.)

UNIT3:

Fundamentals of Network: Introduction to Networking -Networking Fundamentals -Application layer functionality and Protocols-OSI Transport Layer-OSI Network Layer-Addressing the Network-IPv4-OSI Data link layer-OSI Physical Layer-Ethernet-Planning and Cabling Networks-Configuring and Testing Your Network

Books for Study:

1. Gordon Davies , Networking Fundamentals, Packet Publishing, December 2019

2. **Michael B. Karbo. A complete illustrated Guide to the PC Hardware,1998**

Books for Reference:

1. **Rajaraman V and Adabala N, Fundamentals of Computers, Prentice Hall India Learning Private Limited, 2014.**
2. **Pradeep K Sinha, Computer Fundamentals,BPB Publications,2019.**

E –Resources:

1. https://www.webopedia.com/reference/network-fundamentals-study-guide/
2. https://www.ibm.com/cloud/learn/networking-a-complete-guide
3. https://www.udemy.com/course/complete-networking-fundamentals-course-ccna-start/
4. https://www.cisco.com/c/dam/global/fi_fi/assets/docs/SMB_University_120307_Networking_Fundamentals.pdf

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: PROGRAMMING IN C**	**Course Code**	**:**	**20UCS/USC1C02**
Year	**:**	**I**	**Semester**	**:**	**I**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

- To make the students aware of the basic concepts of C.
- To make them understand the benefits and applications of C.
- To develop the program writing and logical thinking skills.

Course outcomes

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge level
CO1	Know the logics of solving the problems	K1
CO2	Understand the concepts of C programming	K2
CO3	Analyze and discover bugs in the program	K4
CO4	Apply the concepts and develop programs to solve real-time problems	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	M	S	M	S	M	S	S	M	L
CO2	M	S	M	S	M	S	S	M	L
CO3	S	S	M	S	M	S	S	S	S
CO4	S	S	M	S	M	S	S	S	S

Unit I

Overview of C – Introduction-Character set –C Tokens Keywords & identifiers - Constant –Variables - Data types- Declaration of Variables- Assigning values to variables-Defining Symbolic Constants. Operators and Expressions:-Arithmetic, Relational Logical, Assignment, Conditional Bitwise, Special, **Increment and Decrement operators**-Arithmetic Expressions-Evaluation of expression-Precedence of arithmetic operators-**Type conversion in expression**- operator precedence & associative – mathematical functions. Managing Input and Output Operations: - Reading & writing a character – formatted input and output.

Unit II

Decision making and Branching: – Decision making with IF Statement-simple IF Statement- The IF ELSE statement-Nesting of IF—ELSE statement-Else if Ladder-Switch Statement--Conditional operator. Decision Making and Looping:- The WHILE statement- **Do Statement**-FOR Statement.

Arrays: The One Dimensional Array-Declarations – Initialization-Two Dimensional Array-Initialization-Multidimensional arrays. Character Arrays and strings: Declaring and initializing string variables- Reading strings from terminals-writing strings to screen -**Arithmetic operation on character-putting strings together-**comparison of two strings- string handling functions- table of Strings

Unit III

User defined functions: –need for user Defined functions- A multifunction program – Elements of User defined functions-Definition of functions-–Return values and their types-Calling a function-Function declaration- Category of functions-No Arguments and no Return values- Arguments but no return values-Arguments with return values-No

Arguments but Return the value- **Functions that return multiple values**- nesting of functions- Recursion- Passing arrays to functions- **Passing strings to functions**- The scope,visibilityand lifetime of variables

Unit IV

Structure and Union: Defining a structure-Declaring the structure variables– Accessing structure members- Structures initialization- Copying and comparing structure variables-Arrays of Structures - Arrays with in Structures- **Structures within structures** – Structures and functions- unions- Size of structures. Pointers:- Understanding pointers-Accessing the Address of a Variable – Declaring and initializing pointers- Accessing a variable through its pointers- pointers expressions pointer increments and scale factor-pointers and arrays – pointers and character strings- pointers as functions arguments.

Unit V

File management in C:- Defining and opening a file- closing file-I/O operations on files- Error handling during I/O operations-Random Access to files- Command line arguments –The Preprocessor: Macro substitution- File inclusion- **Complier control directives.**

Books for Study:

1. Jogamohan Medak and ParthPratimGogoi, Basics of C Programming, Kindle Edition, 2018.
2. Kamthane, Programming in C, Kindle Edition, 2019.
3. Balagurusamy.E, Programming in ANSI C, McGraw Hill, 6th Edition, 2012.

Books for Reference:

1. YashavantKanetkar, Let us C, Tata McGraw Hill, 11nd Edition, 2011.
2. Mullesh Cooper, Spirit of C, Tata McGraw Hill, 28th impression, 2006.

E-Resources:

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
3. https://www.coursera.org/specializations/c-programming
4. http://spoken-tutorial.org/

Programme : B.Sc. Computer Science

Course Title : CORE PRACTICAL: PROGRAMMING LAB IN C **Course Code : 20UCS/USC1CP1**

Year : I **Semester : I**

Hours/Week : 6 **Credit : 3**

Course Objectives

- To make the students aware of the basic concepts of C.
- To make them understand the benefits and applications of C.
- To develop the program writing and logical thinking skills.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1	Understand the fundamental programming concepts	K2
CO2	Illustrate the programming technique to analyze software problems	K2
CO3	Apply the concepts to find solution for the problems	K3
CO4	Design and develop the simple application.	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	M	S	M	M	M	S	M	L	L
CO2	M	S	M	S	M	S	M	L	L
CO3	S	S	M	S	M	S	M	M	L
CO4	S	S	M	S	M	S	M	M	L

1. Write a C program to find the roots of a quadratic equation. (Use of Arithmetic operators)
2. Write a C program to find the biggest and smallest among three numbers. (Using conditional operator)
3. Write a C program to read and print the formatted integers and characters output and write the status of a character whether it is numeric / alphabet / lower case / upper case / special symbols.
4. Write a C program to accept the integers and print whether it is a palindrome number or not. (Using modulus operator)
5. Write a C program to calculate the salary of a sales representative based on his sales. Bonus and incentives to be offered to him will be based on his total sales. If his sales exceeds Rs. 1,00,000/- follow the particulars of table 1 otherwise table 2. (use of if-else statement)

Table 1		**Table 2**	
Basic	= Rs. 10,000/-	Basic	= Rs. 10,000/-
HRA	= 20% of Basic	HRA	= 20% of Basic
DA	= 110% of Basic	DA	= 110% of Basic
Conveyance	= Rs. 500/-	Conveyance	= Rs. 500/-
Incentive	= 10% of Sales	Incentive	= 10% of Sales
Bonus	= Rs. 2000/-	Bonus	= Rs. 1000/-

6. Write a C program to convert years into months, days, hours, minutes, and seconds. (Using switch-case statement)

7. Write a C program to calculate an Electricity bill by reading starting and ending meter reading. The changes are as follows:

Number of units consumed	**Rates in Rs.**
Less than 100	1.50
100 – 200	2.50
201 – 500	3.50
500 – 1000	5.00

8. Write a C program to find the given number is Prime or not. (Using while loop statement)
9. Write a C program to accept N integer numbers and sort them by using 1D Array.
10. Write a C program to print Matrix Multiplication. (Using 2D Array)
11. Write a C program to find NCR value using User-defined functions. (Function with argument with return values)
12. Write a C program to calculate interest for the given principal amount (P), number of years (N) and rate of interest (R) using User-defined function.
13. Write a C program for sorting of strings using pointers.
14. Write a C program for character oriented read/write operations on a file. (Using getc and putc)
    [Note: Enter the Input data via the keyboard character by character to the file "INPUT". The end of the data is indicated by entering an EOF character. Then read the content and display it on the screen]
15. Write a C Program for counting tabs, number of lines, characters and blank spaces in a file.

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Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE : INTERNET OF THINGS**	**Course Code**	**:**	**20UCS/USC2C03**
Year	**:**	**I**	**Semester**	**:**	**2**
Hours/Week	**:**	**2**	**Credit**	**:**	**2**

COURSE OBJECTIVES

- To Learn the basic concepts of IoT
- To Understand basic platforms in IoT
- To Understand the Sensing devices
- To Understand the basic tools in IoT

Course outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	Knowledge Level
CO1	Know the concepts of IoT	K1
CO2	Can work with Arduino Board	K2
CO3	Understand the various sensors	K2
CO4	Apply the tools in IoT	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	M	M	S	M	L	L
CO2	S	S	M	M	M	S	S	M	L
CO3	M	S	M	M	M	S	M	M	S
CO4	S	S	L	M	M	S	M	M	M

Unit – I

Introduction - Solution Patterns for the Internet of Things - Design Patterns and the IoT - Smart, Connected Products - Smart, Connected Operations - New and Innovative Experiences - The Edge of the IoT - Living on the Edge - Edge Architecture Examples

Unit -II

What is actually Arduino -Hardware and Software-Programming - Sensing Inputs Blinking LED-Alternately blinking LED-Fading LED -Light and sound-Push button and LED -RGB LED -Motion detector-Potentiometer

Outputs from sensing devices: Temperature measurement -Measurement of distance -Usage of an infrared remote - Control a servo -LCD Display -Relay shield -Stepper-Moisture sensor-Drop sensor -RFID Kit.

Unit -III

The Arduino Board - Get to know your tools - Spaceship interface - Love o Meter - Color Mixing lamp - Mood cup - Light Theremin - Keyboard instrument.

Books for Study:

1. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 1st Edition, 2016. (Unit-I)
2. "Funduino Tutorials for Arduino", Funduino Service Team,Edition 2016(Unit-II)
3. Scott Fitzgerald and Michael Shiloh,"The Arduino Projects Book",3rd Edition ,2015 (Unit-III)

Books for Reference:

1. ArsheepBahga, Vijay Madisetti, Internet Of Things: A Hands-On Approach, Orient Blackswan Private Limited, First edition2015
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley; 1st edition,2013

E-Resources:

1. https://fdocuments.in/document/foundational-elements-for-iot-1.html
2. http://www.funduino.de/Arduino-tutorials-08092014.pdf
3. http://arduino-tutorials.eu/

4.

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE : OBJECT ORIENTED PROGRAMMING WITH C++**	**Course Code**	**:**	**20UCS/USC2C04**
Year	**:**	**I**	**Semester**	**:**	**II**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

- To learn the basic concepts of OOPS.
- To develop programs in C++using the concepts of OOPS.
- To develop programs for error handling and generic programs

Course outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the OOPS concepts.	K2
CO2	Learn data types and control structures in C++	K1
CO3	Demonstrate the Reusability by applying the types of Inheritance and know Polymorphism	K3
CO4	Demonstrate the use of pointers in virtual functions.	K3
CO5	Analyse the features of C++ including templates, exceptions and file handling.	K4

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**L**	**M**	**S**	**S**	**S**	**M**	**L**
CO2	**S**	**S**	**L**	**M**	**L**	**S**	**S**	**M**	**L**
CO3	**M**	**S**	**L**	**M**	**M**	**S**	**S**	**M**	**L**
CO4	**S**	**S**	**L**	**M**	**M**	**S**	**S**	**L**	**L**
CO5	**S**	**S**	**M**	**M**	**M**	**S**	**S**	**S**	**L**

UNIT I

Object Oriented Programming Paradigm: Basic concepts — Benefits **— Application** — Structure of C++ program — Basic data types — User Defined Data types — Derived data types — Manipulators — Type cast operator — Conversions **— Control structures**

UNIT II

Functions: Function Prototyping — Call by reference — return by reference — Inline function — Default arguments. Class & Objects: Specifying a class — Define member function **— Arrays within a class - Memory allocation** — Arrays of Object — Objects as function Arguments — Constructors Parameterized constructor — Copy Constructor — Dynamic constructor — Destructors.

UNIT III

Function Overloading(Type 1 & Type 2) -- Operator Overloading & type conversion: Define Operators Overloading — Overloading unary operators — Binary operators — **Type conversion.**
Inheritance: Defining derived class — Single inheritance — Multi level inheritance — Multiple inheritance — Hierarchical inheritance **— Hybrid inheritance** — Constructors in derived class.

UNIT IV

Pointers, Virtual functions and polymorphism: Pointer to Objects — this pointer — virtual functions — **Pure Virtual Functions – Friend functions**.
Files: Opening and Closing a File — Detecting end of file — File pointers and their manipulations — Command — line arguments.

UNIT V

Templates: Class templates — **Function templates** — Overloading of template function — Member function templates.
Exception Handling: Basics — Exception handling mechanism — Throwing mechanism — Catching mechanism **— Specify Exceptions.**

Books for Study:

1. E. Balagurusamy, Object Oriented Programming with C++,Tata McGraw Hill Education Private Limited, 8th Edition,N.Delhi, 2020.
2. YashavantKanetkar, Let us C++, bpb Publications, 17th Edition, 2020.

Books for Reference:

1. Robert Lafore, Object Oriented Programming in C++,Pearson Education,4th Edition, 2020.
2. Herbert Schildt, The Complete Reference : C++, Tata McGraw Hill Education Private Limited, 4th Edition, 2017.

E-Resources:

1. **https://www3.ntu.edu.sg/home/ehchua/programming/cpp/cp3_OOP.html**
2. **https://www.udemy.com/course/c-programming-oops-concepts/?**
3. **https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/**

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE PRACTICAL : PROGRAMMING LAB IN C++**	**Course Code**	**:**	**20UCS/USC2CP2**
Year	**:**	**I**	**Semester**	**:**	**I**
Hours/Week	**:**	**6**	**Credit**	**:**	**3**

Course Objectives

- To make the students aware of the basic concepts of OOPS.
- To make them understand the benefits and applications of C++.
- To develop the program writing and logical thinking skills.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1	Developing programs for Mathematical problems	K3
CO2	Develop the programs to implement OOPS Concept	K4
CO3	Understand and implement File concepts	K1
CO4	Understand and implement Exception Handling features	K1

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	S	M	M
CO2	S	S	M	M	M	S	S	M	S
CO3	S	S	M	M	M	S	S	M	L
CO4	S	M	M	L	L	S	S	M	L

1) To implement MANIPULATORS using C++ program

2) To Illustrate a CLASS using C++ program

3) To implement CONSTRUCTOR using C++ program

4) To implement FUNCTION OVERLOADING – Type 1 using C++ program

5) To implement FUNCTION OVERLOADING – Type 2 using C++ program

6) To implement SIMPLE INHERITANCE using C++ program

7) To implement MULTILEVEL INHERITANCE using C++ program

8) To implement MULTIPLE INHERITANCE using C++ program

9) To implement OPERATOR OVERLOADING using C++ program

10) To implement VIRTUAL FUNCTIONS using C++ program

11) To implement: a). Writing an Object, to Disk, and
b). Reading an Object, from Disk using C++ program

12) To implement EXCEPTION HANDLING using C++ program

Course Title	**:**	**CORE: DATABASE MANAGEMENT SYSTEM**	**Course Code**	**:**	**20UCS/USC3C05**
Year	**:**	**II**	**Semester**	**:**	**III**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

Course Objectives

- To understand database systems and its structure
- To apply normalization techniques to normalize the database
- To understand the use of Structured Query Language (SQL).
- To understand and learn the PL/SQL programming language for database processing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	know and practice the data models and schemas in DBMS	K1
CO2	develop the database designs and apply normalization techniques to normalize the database	K4
CO3	use SQL to structure the database to handle data	K3
CO4	use PL/SQL to create, secure, populate, maintain, and query a database.	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	M	S	M	S	S	M	M	M
CO2	S	S	L	M	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	M
CO4	S	S	M	L	S	S	S	S	S

UNIT I

Introduction: – Database System Applications – purpose of database systems - View of Data – Data Models – Database Languages – Relational databases – data storage and querying – Database architecture - **Database Users and Administrators** – Structure of Relational databases – keys.

UNIT II

The Entity – Relationship model – Entity Relationship Diagram – Relational Database Design: Atomic Domains and First Normal Form – Decomposition using Functional Dependencies (Second Normal Form) – Boyce-Codd Normal Form – Third Normal Form – Decomposition using Multivalued Dependencies - Fourth Normal Form - **More Normal Forms.**

UNIT III

Interactive SQL: Table fundamentals: Oracle Data types – DDL,DML Commands-create table – viewing data

in the tables – Eliminating duplicate rows when using a select statement – Inserting data into a table from another table – **Delete operations** – Updating the contents of a table – Modifying the structure of tables – **Renaming tables – Truncating tables – Destroying tables**. Data constraints – types of data constraints - defining different constraints on a table

UNIT IV

Introduction to PL/SQL Data base objects: Advantages of PL/SQL – The generic PL/SQL block – the PL/SQL execution environment - **PL/SQL - The character set** – **Literals - PL/SQL data types – variables – constants –** LOB types – logical comparisons - displaying user messages on the VDU Screen – comments – Control structures – what is a cursor? – Types of Cursor- Implicit and Explicit cursor.

UNIT V

PL/SQL database objects: what are procedures/ functions? Advantages of using procedure or function- procedures versus function – deleting a stored procedures or functions – oracle packages – database triggers – **types of triggers.**

Books for study:

1. A.Silberschatz, H.Korth and S.Sudarsan, Database System Concepts, TATA McGraw Hill Inc, Seventh Edition, 2019.
2. Ivan Bayross, SQL, PL/SQL the programming language of ORACLE, BPB Publications, 4th revised edition, 2020

Books for reference:

1. RamezElmasri and ShamkantNavathe, Fundamentals Of Database Systems, Pearson India, 7th Edition, 2017
2. C.J.Date, An Introduction to Database Systems, Addition – Wesley, eighth edition, 2007.
3. Majumdar& Bhattacharya, Database Management System, TMH, 2007.
4. P.S. Deshpande, SQL & PL/SQL for Oracle 11g Black Book, Dreamtech Press, 2011

E-Resources:

1. https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.guru99.com/what-is-dbms.html
4. https://www.tutorialspoint.com/plsql/index.htm
5. https://www.w3schools.com/sql/

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: DATA STRUCTURES AND ALGORITHMS**	**Course Code**	**:**	**20UCS/USC3C06**
Year	**:**	**II**	**Semester**	**:**	**III**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives

1. To understand linear and non linear data structures
2. To understand the operation on Array,Stack, Queue, Linked list, Trees, Graphs
3. To aware of internal and external sorting techniques
4. To know about files, file organization and indexing techniques

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the characteristics of various data structure.	K1
CO2	Understand and develop applications using various data structures	K2
CO3	Apply appropriate internal sorting methods	K3
CO4	Analyze the concept of files and its various organization	K4

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	M	S	S	M	L
CO2	S	S	L	M	M	S	S	M	L
CO3	S	S	L	M	M	S	S	M	L
CO4	S	S	M	S	M	S	S	S	M

UNIT I

Introduction: Over view — Creation and analyses of programs — Arrays: Basics — Representation of arrays — Sparse Matrices — Stacks: Basics — Functions — Evaluation of expressions— Multiple Stacks — Queues: Basics — Functions — Circular Queues — **Multiple Queues.**

UNIT II

Linked Lists: Single Linked Lists — Linked Stacks and Queues — Storage Pool —Applications — Polynomial Addition — Equivalence Relations —Double Linked Lists: Dynamic Storage Management —. **Garbage collection and Compaction.**

UNIT III

Trees: Basic Terminology — Binary Trees — Representation and Traversals — Threaded Binary trees — In order traversal — **Binary tree representation of Trees** — Sets — Union, Find algorithms — Graphs: Transitive Closure — Warshall ‘s Algorithm — Shortest path problem: Djikstra’s algorithm — Minimum Spanning Trees:

Prim's algorithm.

UNIT IV

Searching Techniques: **Binary**, **Sequential** and Fibonacci searches — Sorting Techniques:Internal sorting with tapes and disks — balanced merge sort — Polyphase merge sort.

UNIT V

Symbol Tables: Static tree and dynamic tree implementations — Hash tables. **File Organizations — Sequential,** ISAM, Random - Linked File organizations: Multilists — Inverted Files — Cellular Partitions.

Books for Study:

1. Ellis Horowitz and SartajSahniSushan Anderson- Freed, Fundamentals of Data Structures, Silicon Press, Reprint 2019 (UNITS — I, II, III First Paragraph, IV, V).
2. Tanenbaum A. M. and Augestein M. J, Data Structures Using C, 2019 (UNIT — III Second Paragraph).

Books for Reference:

1. YashwantKanetkar, Data Structures through C, BPB publications, 2003.
2. TharejaReema, Data Structures through C, OUP India, 2nd Edition 2014
3. Mark Allen Weiss Data Structures & Algorithm Analysis in C, Addison Wesley, 4th Edition Reprint 2015.

E-Resources:

1. ttps://www.programiz.com/dsa/graph
2. https://www.tutorialspoint.com/data_structures_algorithms/dsa_quick_guide.htm

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: JAVA PROGRAMMING**	**Course Code**	**:**	**20UCS/USC3C07**
Year	**:**	**II**	**Semester**	**:**	**III**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

Course Objectives

- To understand and write programs for Packages and Interfaces
- To learn and write programs for Multithreaded Programming concepts
- To learn the Applets, AWT controls
- To learn the database connectivity using JDBC

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	Knowledge Level
CO1.	Understand the Packages and Multithreaded applications	K2
CO2.	Write Applet programs	K2
CO3.	apply AWT controls in the Applications	K3
CO4.	Demonstrate database applications using JDBC	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	M	M	M
CO2	S	S	M	M	M	S	S	M	L
CO3	S	M	M	M	M	S	M	M	M
CO4	S	S	L	M	M	S	M	M	M

UNIT I

Introduction to java – Overview of Java - Introduction to Classes- Inheritance Concepts- Packages and Interfaces: Packages – Access protection Importing packages – interfaces. Exception Handling: Fundamentals – **Exception types** – Using Try and Catch – **nested Try** – statements – throw, throws, finally.

UNIT II

Multithreaded programming: Thread model – Creating a thread, creating multiple threads – Using Alive ( ) and join ( ) – synchronization – Inter threaded communication. String Handling: String constructors – **string operations** – character extraction – **string comparison** – searching – modification.

UNIT III

Input/ Output: File – Stream classes – Byte streams – character streams – The Applet Class: Applet Basics - Applet Architecture - **Applet Skeleton**-Applet Initialization and Termination-**Applet Display Methods**-The HTML APPLET Tag-Passing Parameters to Applets.

UNIT IV

Introduction the AWT: AWT Classes-Window Fundamentals- Creating Frame Window in an Applet- Handling Event in a Frame Window- Working with Graphics-**Working with Color-Working with Fonts**-Using AWT Controls: Contro

Fundamentals.AWT Menus: Menu Bars and Menus -Dialog Boxes-Image Fundamentals:Creating, Loading, an Displaying.

UNIT V

JDBC: Environment- Driver Types- Connections-Statements Object - **Data Types** - Create Database-Select Database-Drop Database-Create Tables-**Drop Tables** – Insert Records-Update Records – Delete Records

Books for Study:

1. Herbert Schildt, The Complete Reference -java 2, TATAMcGraw Hill, 11th Edition, 2018. (Units I,II,III,&IV)
2. George Reese**,** Database Programming with JDBC and Java, 2ndEdition, 2000.

Books for Reference:

1. E.Balagurusamy , Programming with Java, , TATAMcGraw Hill, Third Edition,2018
2. Patrick Naughton, Herbert Schildt , Java 2: The Complete Reference, McGraw-Hill Osborne Media, 2001.

E – Resources:

1. https://www.tutorialspoint.com/jdbc/index.htm
2. https://nptel.ac.in/courses/106/105/106105191
3. https://gfgc.kar.nic.in/sirmv-science/GenericDocHandler/138-a2973dc6-c024-4d81-be6d-5c3344f232ce.pdf

Programme : B.Sc. Computer Science
Course title : CORE PRACTICAL: JAVA PROGRAMMING
Year : II Semester : III
Hours / Week: 4 Subject Code :20UCS/USC3CP3
Credits : 3

Course Objectives

- To gain the basic programming knowledge Java Applications
- To understand the concepts of exception handling and multithreading concepts
- To write the programming concepts in Applets and AWT Controls
- To learn the database connectivity using JDBC

Course outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	Knowledge Level
CO1	Develop program to implement packages and interfaces	K4
CO2	Apply the concepts in exception handling and multithreading	K3
CO3	Understand the window based applications using applet	K2
CO4	Develop the database program using JDBC	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	M	M	L
CO2	S	M	M	M	M	S	S	M	L
CO3	S	M	L	M	M	S	M	M	M
CO4	S	S	M	L	L	S	M	M	M

1. Write a Java program to find the area of rectangle using class.
2. Write a Java program to find area and volume of room using single inheritance.
3. Write a Java program to find area of rectangle and circle using interface,
4. Write a Java program to division by zero using exception handling,
5. Write a Java program to create a thread using runnable interface.
6. Write a Java program to create multithread and display the results.
7. Write a Java program to implement inter-threaded communication.
8. Write a Java program using to implement any eight string handling functions.
9. Write a Java program to display line, rectangle, circle, oval, round rectangle using graphics methods.
10. Write a Java program to implement any five AWT controls.
11. Write a Java program to display a human face using applet.

12. Write a Java program to create employee payslip details table and perform insert, delete, and select records using JDBC.

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE PRACTICAL: RDBMS LAB**	**Course Code**	**:**	20UCS/USC3CP4
Year	**:**	**II**	**Semester**	**:**	**III**
Hours/Week	**:**	**4**	**Credit**	**:**	**3**

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	design and implement databases for given problem domain	K4
CO2	Know to write programs for exception handling and indexes	K1
CO3	Develop programming using DDL, DML Statements	K4
CO4	Work with the PL/SQL for windows Applications including procedures and cursors.	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	S	M	M	L	S	S	M	L
CO2	S	S	M	M	L	S	S	M	L
CO3	S	S	S	M	L	S	S	S	L
CO4	S	S	S	M	L	S	S	S	S

LIST OF PRACTICALS

1. Write an Oracle query creating a table and inserting and updating data in a table.
2. Write an Oracle query delete single record, all records and structure
3. Write an Oracle query illustrate security features of oracle.
4. Write an Oracle query creation of multiple types of Indexes.
5. Write an Oracle query creating a sequence
6. Write a program to illustrate exception handling.
7. Write a program for creation of trigger.
8. Write a program to retrieve records from a table.
9. Write a program to demonstrate procedures.
10. Write a program to demonstrate cursors.
11. Write a program to display multiple tables using view.
12. Write a program to generate a report.

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: .NET TECHNOLOGY (C#)**	**Course Code**	**:**	**20UCS/USC4C08**
Year	**:**	**II**	**Semester**	**:**	**IV**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

Course Objectives

- To Learn the basic concepts of C# fundamentals
- To understand the concepts of controls and windows working environment
- To understand concepts of ADO.Net and its Applications
- To Understand the Working Environment in Web platform

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	Knowledge Level
CO1.	Learn the fundamental concepts in C#	K1
CO2.	Develop the Windows Applications using controls	K4
CO3.	Work with ADO.Net and its Applications	K3
CO4.	Develop Web Applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	L	M	S	M	M	L
CO2	S	M	M	M	M	S	S	M	L
CO3	S	S	M	M	M	S	S	M	L
CO4	S	S	M	L	M	S	S	S	M

Unit I

Console Application:

Introduction to C# (1-5) – Understanding .Net: The C# Environment (11-16) – Overview of C# – Adding Comments – Command Line Arguments (18-25) – Literals, **Variables and Data Types**(34-49) **-** Classes and Objects (212-233).

Unit II

Graphical User Interfaces with Windows Forms: Introduction – Windows Forms – Event Handling – Control Properties and Layout– Labels, Text Boxes and Buttons – Group Boxes and Panels – Check Boxes and **Radio Buttons** – Picture Boxes – Tooltips – Numeric Up Down Control – Mouse-Event Handling – **Keyboard-Event Handling**(399-440)

Unit III

Menus – Month Calendar Control – Date Time Picker Control – Link Label Control – List Box Control – Checked List Box Control – Combo Box Control –Tree View Control – **List View Control – Tab Control** – Multiple Document Interface (MDI) Windows – Visual Inheritance (441-501)

Unit IV

ADO.NET Overview (685-687) – Using Database Connections (688-692) – Fast Data Access: The Data Reader –

Managing Data and Relationships: The Data Set Class (701-714)-Populating a Data Set – **Persisting Data Set Changes** – Working with ADO.NET (721-733) –The DataGrid Control (735-749) - Data Binding – Visual Studio.Net and Data Access (750-769)

Unit V

Web Forms Programming: ASP.NET Introduction – ASP.Net WEB Forms: ASP.NET Sever Controls – ADO.NET and Data Binding: **Updating the Event** – Data Binding with Application. (871-901)

Text Books

1. E.Balagurusamy, Programming in C#, 4th Edition, Tata McGraw-Hill, 2017. (UNIT I)
2. Paul Deitel and Harvey Deitel, C# 2010 for Programmers, 4th Edition, Pearson, 2011.(UNIT II& III)
3. Simon Robinson, Christian Nagel, Karli Watson, Jay Glynn, Professional C#, 3rd Edition, Wrox Publisher, 2007. (UNIT IV&V)

Reference Books

1. Geetanjali Arora, BalasubramaniamAiswamy ,and Nitin Pandey, Microsoft C# Professional Projects,Prentice Hall of India Private Limited, 2002.
2. **Herbert Schildt, C# 4.0 Complete References, 1st Edition, Tata McGraw-Hill, 2010.**

WEB REFERENCE

1. https://www.microsoft.com/en-in/download/details.aspx?id=7029

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: COMPUTER ORGANIZATION AND ARCHITECTURE**	**Course Code**	**:**	**20UCS/USC4C09**
Year	**:**	**II**	**Semester**	**:**	**IV**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

Course objectives

- To understand number systems and basic logic gates
- To learn the concept of CPU organization, stack organization, instruction formats and addressing modes.
- To learn the I/O and Memory organization

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1.	know the number systems and basic logic gates	K1
CO2.	understand the CPU, I/O and Memory organizations	K2
CO3	Understand the input/output Organization Methods	K2
CO4	Understand the concepts of memory and its storing techniques	K2

WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	M	L	M	M	S	L	M	L
CO2	M	M	M	M	M	S	L	M	M
CO3	M	M	M	M	M	S	L	M	L
CO4	M	M	L	M	M	S	L	M	M

UNIT I

Number systems: Binary Number System –Octal Numbers – Hexadecimal Numbers – Number system Conversion from one to another - The Excess-3 Code – The Gray Code. Basic logic gates: AND, OR, NOT – **Universal logic gates: NOR, NAND**.

UNIT II

Boolean laws and theorems - Multiplexers – Demultiplexers – Decoder – Encoders – **Half-Adder** – Full-Adder – half subtractor – full subtractor - RS Flip flop - JK Flip-flop.

UNIT III

Central Processing Unit - Stack organization - Instruction formats — Addressing Modes - Data transfer and manipulation — **program control** – parallel processing — pipelining.

UNIT IV

Input/output Organization: I/O Bus and interface modules —i/o versus memory bus - isolated and memory mapped I/O - **asynchronous data transfer** – strobe control - handshaking - Direct memory access.

UNIT V

Memory Organization — memory hierarchy – **main memory** - auxiliary memory — Associative memory — Cache memory – Virtual memory.

Books for Study:

1. SmrutiRanjan Sarangi, Computer Organisation and Architecture, McGraw Hill Education, 2017

2. Donald P Leach, Albert Paul Malvino and GoutamSaha, Digital Principles and Applications, Special Indian edition, 7the Edition, 2011.
3. M. Morris Mano, Computer System Architecture, Pearson Education Inc, Third Edition, 2009.

Books for Reference:

1. Dorling Kindersley, Computer organization and architecture Designing for performance, Pearson Education, , 10th Edition, 2016
2. David A. Patterson and John L. Hennessy, Computer Organization and design: The hardware/ Software Interface, Morgan Kaufmann, 4th Edition, 2011.
3. Nicholas P. Carter, Computer Architecture and organization, McGrawHillindia, 2nd Edition, 2017.

E-Resources:

https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
https://www.javatpoint.com/computer-organization-and-architecture-tutorial
https://nptel.ac.in/courses/106/105/106105163/

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: ANDROID PROGRAMMING**	**Course Code**	**:**	**20UCS/USC4C10**
Year	**:**	**II**	**Semester**	**:**	**IV**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

Course objectives

- To learn configuring and developing applications for mobile devices
- To apply the tool(Eclipse) required to develop applications
- To understand the concept of activities, intents, menus and content provider in android
- To know the various application designs with animation, graphics

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	understand the concept of android development platform, and configuring and creating android applications.	K2
CO2	create an activity, intents, different event handling methods and menus	K4
CO3	know working with views, view groups and content provider	K1
CO4	apply the concept of graphics and animation in developing android application	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	S	M	L	L	S	L	L	L
CO2	S	S	M	S	M	S	M	S	L
CO3	M	S	S	S	M	S	S	M	M
CO4	M	S	S	M	M	S	M	S	S

UNIT I

Introducing android (listing the version history of android platform - discussing android APIs - Describing the android architecture - application framework - exploring the features of android) - The Manifest file.

Downloading and installing android (downloading and installing the android SDK - setting up android virtual device - setting up android physical device)

Developing and executing the first android application (using eclipse IDE to create an application - running your application - exploring the application - using command line tools)

UNIT II

Working with Activities: Creating an activity - starting an activity - managing the lifecycle of an activity - **applying themes and styles to an activity.**

Using intents: Exploring intent objects - linking the activities using intent - obtaining results from intent - passing data using an intent object.

UNIT III

Working with the user interface using Views and View Groups: Working with View Groups - The Linear

Layout layout - the Relative Layout layout - **the Scroll View layout - the Table Layout layout - the Frame Layout layout.**

Working with Views (Using the Text View - using Edit Text view - using the Button view - using the Radio Button view - using the Check Box view - using the Image Button view - using the Toggle Button view - using the Rating Bar view)

Creating menus - the option menu - the context menu - **the submenus**

UNIT IV

Notifying the user:- Creating the Toast notification - **Creating the status bar notification - creating the Dialog notification.**

Introducing the data storage options: Using Preference - using the internal storage: Exploring the methods used for internal storage- Using the SQLite database: Creating the database helper class.

UNIT V

Working with content providers:- Exploring the android provider package - creating user-defined content provider - consuming user-defined content provider.

Working with Animations:-The Property Animation - **View Animation - Drawable Animation.**

Books for study:

1. Pradeep Kothari, Android application development (with KitKat Support) Black Book, dreamtech press, 2018

Books for reference:

1. **S. Sydhani begum**, Mobile App Development - Android Programs Using Eclipse: Android Programs Using Eclipse Indigo, Notion Press, 2019
2. Wallace Jackson, Android Applications for Absolutes Beginners, Apress, 3rd Edition, 2014.
3. W. Frank Ableson, RobiSen, Chris King, "Android in Action", Manning Publications, 2nd Edition, 2011.
4. Shawn Van Every, 'Pro Android Media: Developing Graphics, Music, Video, and Rich Media Apps for Smartphones and Tablets ', Apress Publisher, 2016.

E-Resources:

1. https://www.javatpoint.com/how-to-setup-android-for-eclipse-ide
2. https://info448-s17.github.io/lecture-notes/resources-and-layouts.html
3. https://www.tutorialspoint.com/android/index.htm
4. https://www.codeproject.com/Articles/825700/Beginners-Guide-to-Android-Animation-Graphics
5. https://www.geeksforgeeks.org/android-app-development-fundamentals-for-beginners/

Programme: B.Sc Computer Science
Course title:CORE PRACTICAL: .NETTECHNOLOGY LAB (C#)
Year : II Semester : IV
Hours / Week : 4 Subject Code : 20UCS/USC4CP5
Credits : 3

Course Objectives

- To impart the basic concepts of c sharp Console Applications
- To understand concepts of Arrays and Strings functions in c sharp console application
- To understand basic concepts about c sharp windows application
- To understanding about ADO.Net using Database Connectivity Programs

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1	understand the basic concepts of C# console applications	**K2**
CO2	have knowledge about Array and String Function in C# console	**K1**
CO3	understand basic concepts about C# windows application with programs	**K2**
CO4	Develop programs using ADO.Net	**K4**

WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	S	M	M	L	S	S	M	L
CO2	S	S	M	M	L	S	M	L	L
CO3	S	S	M	M	L	S	M	M	L
CO4	S	S	M	S	M	M	M	M	S

LIST OF PRACTICALS

1. Write a C# program using switch statement
2. Write a C# program using Nested If statement
3. Write a C# program to implement string handling functions
4. Write a C# program to implement textbox, buttons and panel controls.
5. Write a C# program to create a menu and implement picture box and tooltips control
6. Write a C# program to handling mouse event and keyboard event
7. Write a C# program to implement date time picker, link label, checkbox, and list box controls.
8. Write a C# program to demonstrate tree view and list view controls
9. Write a C# program to implement multiple document interface(MDI)

10. Write a C# program to store and retrieve employee details in MS-access database
11. Write a ASP.Net program to store and retrieve student details in My-sql database
12 Write a ASP.Net program to implement server controls.

Programme: B.Sc Computer Science

Course title: CORE PRACTICAL: ANDROID PROGRAMMING LAB

Year : II **Semester : IV**

Hours / Week : 4 **Subject Code :** 20UCS/USC4CP6

Credits : 3

Course Objectives

- To impart the basic concepts of Android Programming
- To learn and create the Activities and various user interfaces such as textbox, labels, List Box, Combo Box, Checkbox and Radio Button with Toast messages.
- To create simple android application for arithmetic calculations
- To create an application for contact manager and working with SQLite database

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1	Learn the basic concepts of Android Programming	**K1**
CO2	know how to create various user interfaces with Toast messages and simple applications	**K2**
CO3	Develop programs using API controls	**K3**
CO4	knows working with SQLite database	**K2**

WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	S	M	M	L	S	M	M	L
CO2	M	S	M	M	L	S	M	M	L
CO3	S	S	M	M	S	S	S	M	S
CO4	S	S	L	M	S	L	S	M	S

LIST OF PRACTICALS

1. Write the steps for installation and configuration of android in Windows OS.
2. Write a program to demonstrate usage of two textbox (Edit Text), Label(Text view) and Button widgets in android and perform addition of two numbers.
3. Write a program and demonstrate the graphical layout orientation.
4. Write a program to demonstrate usage of List Box with Toast (Message Box).
5. Write a program to demonstrate usage of Combo Box with Toast (Message Box).
6. Write a program to demonstrate usage of Snippers with Toast (Message Box).
7. Write a program to demonstrate usage of Text Area, with Toast
8. Write a program to demonstrate usage of Checkbox with Toast,
9. Write a program to demonstrate usage of Radio Button with Toast
10. Write a program and calculate the simple interest and compound interest using its API controls.
11. Write a simple program to demonstrate the contact manager using Contacts Contract API (Insert, Delete, Edit, View).
12. Write a simple program to demonstrate working with SQLite Database

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: OPERATING SYSTEM**	**Course Code**	**:**	**20UCS/USC5C11**
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives

1. learn the basic concepts of operating system and its types
2. learn the various functions such as process management, storage management, file management and disk management
3. know the concepts of Windows2000 and Windows XP

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	know the usage of various operating systems	K1
CO2	Understand the functions of process management and file management to know the various file operations and how these files are processed	K2
CO3	Understand the concept and difference between storage management and disk management	K2
CO4	Apply the knowledge of the Windows2000 and Windows XP for utilizing other operating systems .	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	L	L	L	L	L	S	L	L	L
CO2	S	L	M	M	L	S	L	M	L
CO3	M	L	M	M	L	S	L	M	L
CO4	M	L	M	M	L	S	L	M	M

Unit I

INTRODUCTION: What is an Operating System?-Mainframe Systems-Desktop Systems-Multiprocessor Systems-Distributed Systems-Clustered System-Real-Time Systems-Handheld Systems. Operating-System Structures:-System Components-Operating-System Services-System Calls-System Programs-System Structure-Virtual Machines.(Pages 3-19, 55-80)

Unit II

PROCESS MANAGEMENT: Process Concept-Process Scheduling-Operations on Processes-Cooperating Processes-Inter process Communication. CPU Scheduling:-Basic Concepts-Scheduling Criteria- Scheduling Algorithms-Multiple-Processor Scheduling-Real-Time Scheduling. Deadlocks:-System Model-Deadlock Characterization-Methods for Handling Deadlocks-Deadlock Prevention- Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock. (Pages 95 – 109, 151-170, 243 - 264)

Unit III

STORAGE MANAGEMENT: Memory Management:-Background-Swapping-Contiguous Memory Allocation-Paging-Segmentation- Segmentation with Paging. Virtual Memory:-Background-Demand Paging-Process Creation-Page Replacement-Allocation of Frames-Thrashing. (Pages 273-309, 317 – 348)

Unit IV

File-System Implementation:-File-System Structure- File-System Implementation- Directory Implementation-Allocation Methods-Free-Space Management. Mass-Storage Structure:-Disk Structure-Disk Management-Swap-Space Management-RAID Structure-Disk Attachment-Stable-Storage Implementation-Tertiary-Storage Structure. (Pages 411 – 430, 491 – 516)

Unit V - CASE STUDIES:

The Linux system: History- Design Principles – kernel Modules –Process management- Scheduling – Memory Management- File system – Input and Output- Inter process Communication- Network Structure

Windows2000: History-Design Principles-System Components-Environmental Subsystems-File System-Networking-Programmer Interface. (Pages 695-739,743-787)

Books for study:

1. SILBERSCHATZ, GALVIN and GAGNE, OPERATING SYSTEM CONCEPTS, Wiley India Edition, tenth edition, 2018.

Books for reference:

1. Stuart E. Madnick, John J.Donovan, Operating Systems, Tata McGraw Hill, Eigth edition, 2017.
2. Deitel, Deitel and Choffnes, Operating Systems, Pearson Education, third edition, 2003.

E-Resources:

1. https://en.wikipedia.org/wiki/Operating_system
2. https://www.geeksforgeeks.org/types-of-operating-systems/
3. https://www.tutorialspoint.com/operating_system/os_overview.htm
4. https://nptel.ac.in/courses/106/108/106108101/

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: WEB TECHNOLOGY**	**Course Code**	**:**	**20UCS/USC5C12**
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1.	Know the basic concepts of HTML	K1
CO2.	Understanding form designing using HTML with CSS	K2
CO3	Apply various controls in PHP	K3
CO4	Develop Web Applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	M	S	M	M	M	S	L	L	L
CO2	M	S	S	S	M	M	L	S	M
CO3	S	S	S	S	M	M	S	S	M
CO4	S	S	S	S	S	M	S	S	S

HTML

Unit I

Overview of HTML5 – HTML5 and its Essentials – Exploring New Features of HTML5 – Fundamentals of HTML – Working with Text – Organizing Text in HTML – Working with Links and URLs – Creating Tables – Working with Forms – Working with Multimedia.

XML AND CSS

Unit II

XML Document: Hello XML- Creating, saving, loading XML document- Attributes –Empty Element tags- XSL. Document type definition: DTD files- Internal and External DTDs- Element Declaration.

CSS layouts: CSS units- The Display property- Box properties- Size – Positioning – CSS Text styles: Fonts- Color- Text- Backgrounds.

Web Services: WSDL, XML Schema and SOAP**.**

PHP

Unit III

Introduction to PHP: Creating first PHP page – variables- constants-types- Operators and Flow Control: Operators- Conditional Statements- Looping - arrays.

Unit IV

Reading Data in Web Pages: Handling Text Fields, Text Area, Checkboxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps, File Uploads, Buttons.

Unit V

Working with Databases: Creating MYSQL Database, New Table, Putting Data into the New Database, Accessing the Database in PHP, Inserting, Deleting, Updating the Data items into a database using PHP.

Books for Study:

1. Laura Lemay, Rafe Colburn and Jennifer Kyrnin, Mastering HTML, CSS &Javascript Web Publishing , BPB

Publications, 2016
2. RiteshKumar , Learn HTML in Easy Way, Ganpati Book Centre, 2019
3. Kogent Learning Solutions Inc., HTML5 Black Book Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, 2012 (Unit I)
4. Ellistte Rusty Harold, XML1.1. Bible, IDG Books Pvt Ltd, 3rd Edition, 2007. (Unit II)
5. Steven Holzner, The Complete Reference PHP, McGrawHill Education Private Limited, 2010. (Unit III,IV& V)

Books for Reference:

1. Heather Williamson, The Complete Reference XML, TATA McGraw Hill, Fifth Edition, 2002.
2. VikramVaswani, A Beginner's Guide PHP, Tata McGraw Hill, Fifth Edition, 2011.

E-Resources:

1. https://html.com/
2. https://www.w3schools.com/html/
3. https://www.khanacademy.org/computing/computer-programming/html-css
4. https://www.khanacademy.org/computing/computer-programming/html-css/html-tags-continued/pt/html-links
5. https://www.w3schools.com/php/DEFAULT.asp
6. https://www.tutorialspoint.com/php/index.htm
7. http://spoken-tutorial.org/
8. http://tutorialspoint.com – Bootstrap Tutorial

Programme: B.Sc Computer Science
Course title:CORE: OBJECT ORIENTED MODELLING AND DESIGN WITH UML AND SOAD
Year : III **Semester : V**
Hours / Week :5 **Subject Code :** 20UCS/USC5C13

Credits :4

Course Objectives

1. To understand the basic concepts of requirements modelling and package diagram.
2. To know the mapping from design to code and refine logical architecture into specific layouts.
3. To Identify the Service Oriented Architecture and associated technologies

Course Outcomes
On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge level
CO1	Learn design, document the requirements through usecase, state, and class driven approach.	**K1**
CO2	Analyze and modeling the structural and behavioral concepts of the system.	**K4**
CO3	Transform the SOAD conceptual model into various scenarios and applications.	**K2**
CO4	Understand the Cloud Technologies using SOA by REST and SOAP	**K2**

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	L	S	M	S	L
CO2	S	S	M	M	L	S	M	S	L
CO3	M	M	L	M	L	M	S	M	L
CO4	M	L	L	M	L	S	M	L	L

UNIT-I

Introduction-Objects and classes-Data Abstraction-Inheritance and Generalization-Disinheritance-Data Encapsulation-Aggregation-Abstract Classes-Polymorphism-Association and Links-Discrimininators-Metaclass-Metadata-Reification-Constraints-Container class-Generic function.(page nos: 2-58).

UNIT-II

Unified Modeling Language: Introduction - Object Relationships- UML Building Blocks-UML Diagrams. (Page nos:90-102)

Object-Oriented Analysis: Introduction-Object Modeling Technique(OMT)-Object diagram-State Diagram-Data flow Diagram-Analysis-Domain Class Model Analysis . (Page nos:136-154).

UNIT-III

Object Oriented Design: Introduction-Consolidating Three Models to get operations on Classes-Design Algorithms-Design Optimization-Implementation of control for External Interactions. Page nos (170-175).

Object-Oriented Databases: Introduction-Relation vs Object -Oriented Data bases-Advantages and disadvantages of Object -Oriented Data bases-Comparison between OODBMS and RDBMS-Architecture of Object -Oriented Data

bases-Usersof Oriented Data base Management Systems-Commercial object oriented Database Management Systems-Modeling a Logical Database Schema. (Pagenos: 227-240).

UNIT-IV

Design Patterns: Introduction- Design Pattern-Activities in Applying Design Patterns-Classification of Design patterns-Describing Design Pattern-Implementation of Design Patterns-Anti-patterns-Refactoring.

(Page nos:280-300).

Case Study: ATM Machine- Library Management System-Passport Automation system.

(Page nos:307-344)

UNIT-V

SOAD: Key Components of SOA-Service Oriented Enterprise Applications: Considerations, Patterns-Service Oriented Analysis & Design (SOAD):Principles, design of services: Activity, Data, Client, business process, CLOUD-Technologies for SOA:REST, SOAP.

Books for Study:

1. UgrasenSuman,Sanjeev Kumar Sharma, Maya Rathore, "Object-Oriented Analysis and Design using UML", Cengage Learning India Pvt.Ltd publications , 2019.
2. Shankar Kambhampaty,"SOA for Enterprise & Cloud Applications", Wiley India, 2nd Edition, 2012

Books for Reference:

1. Craig Larman, "Appying UML and Patterns-An Introduction to Object Oriented analysis and design and iterative development", Pearson Education, 3rd Edition, 2016.
2.Erich Gamma , Richard Helm, Ralph Johnson, John Ullissides, Design patterns:" Elements of Reusable object oriented Software Engineering, Pearson Education, 2016.
3. Alan Shaloway, James R.Trott, Design Patterns Explained: " A new perspective on Object oriented design, Pearson Education, 2010.

E-Resources:

https:// www.w3computing.com/systems analysis/object-oriented-sad-uml.
https://www.ibm.com/cloud/learn/soa
https://www.conceptdraw.com/examples/class-diagram-generalisation-inheritance
http://en.wikipedia.org/wiki/Object-modeling_technique

Programme: B.Sc Computer Science
Course title: **CORE PRACTICAL: WEB TECHNOLOGY LAB**
Year : III Semester : V
Hours / Week: 5 Subject Code :20UCS/USC5CP7

Credits :3

Course Objectives
1. To develop an ability to design and implement web site
2. Understand, analyze and create XML document
3. Understand, analyze and design web applications using PHP

Course Outcomes
On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge level**
CO1	Know the concepts of XML	K1
CO2	Apply various controls of PHP	K3
CO3	Connect PHP with MYSQL	K4
CO4	Ability to work with Web Applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	L	S	M	S	M	M	S	S	M
CO2	M	S	S	S	M	M	S	S	M
CO3	M	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	M	S	S	S

1. Write a XML program to create student information form to get the following details.
a. Regno
b. Student Name
c. Date of Birth
d. Age
e. Address
f. Favorite Color
2. Write a XML program to create employee information form with following details.
a. Employee No
b. Employee Name
c. Designation
d. Salary
e. Date of Joining
f. Experience
3. Write a XML program to create a student resume using CSS.
4. Write a XML program to create and display hotel information (catalog) using CSS.
5. Write a XML program to demonstrate the use of DTD.
6. Write a XML program to create a table and display it using XSL29
7. Write a XML program to create hotel breakfast menu information using XSL.

8. Write a program to perform arithmetic operations using HTML5 and PHP.
9. Write a PHP program to generate Fibonacci Series.
10. Write a program to find greatest of two numbers using HTML5 and PHP.
11. Write a PHP program to create and write some text in a file using file directory functions.
12. Write a PHP program to create and save staff information using MySql database.
13. Write a PHP program to view staff information from MySql database.

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: SOFTWARE ENGINEERING**	**Course Code**	**:**	**20UCS/USC6C14**
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives:

- To understand software engineering process framework
- To understand various software process models.
- To learn software requirements and different software architectural styles.
- To know the various software testing strategies.
- To understand software risks and software quality.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply software engineering techniques.	K3
CO2	Develop, maintain and evaluate software systems.	K4
CO3	Identify efficient, reliable, robust and cost-effective software solutions.	K1
CO4	Develop independent research and analysis and work with the software team	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	S	M	S	M	L	S	M	M	L
CO2	S	S	M	M	M	S	S	M	S
CO3	S	S	M	M	M	S	S	S	M
CO4	S	M	L	S	M	S	M	S	S

UNIT I

Defining Software - Software Application Domain - Legacy Software (3-9) Process Model - Waterfall Model - Incremental Process Models - Spiral Model - Specialized Process Models - The Unified Process(39-56)

UNIT II

Requirements Engineering: Establishing The Groundwork - Eliciting Requirements - Developing Use Cases - Building The Requirements Model - Negotiating Requirements - Validating Requirements(120-145)

UNIT III

Design Concepts: The Design Process - Design concepts - Design Model(215- 238) Architectural Design: Software Architecture - Architectural Genres - Architectural Styles - Architectural Design - Assessing

Alternative Architectural Designs - Architectural Mapping Using Data Flow (243- 273)

UNIT IV

Software Testing: Software Testing Fundamentals - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Graph based testing method- Equivalence Partitioning - Boundary value analysis - Orthogonal Array Testing.(482 - 502)

Web Application Testing: Testing Concepts for Web Apps - Content Testing - User Interface Testing - Configuration Testing - Component Level Testing - Navigation Testing - Performance Testing.(529 - 553)

UNIT V

Risk Management: Software Risks - Risk Identification - Risk Projection - Risk Refinement - RMMM (745-759).

Software Quality Assurance - Background Issues - Elements of SQA - SQA Tasks - Formal Approaches to SQA - Statistical Software Quality Assurance - Software Reliability -The SQA Plan(432 - 446).

Books for study:

1. **ROGER S.PRESSMAN, SOFTWARE ENGINEERING A practitioner's Approach, McGRAW-HILL, 7thEdition, 2014.**
2. **Ian Sommerville, Software Engineering,Tenth Edition, Pearson, 2017**

Books for reference:

1. Richard fairly, Software Engineering concepts, TATA McGRAW HILL, 2017.
2. Hans van Vliet , Software Engineering: Principles and Practice, Wiley, Edition 3, 2008
3. Robert E Beasley , Software Engineering: Principles and Practices, CreateSpace Independent Publishing Platform; 2nd edition 2015

E-Resources:

1. https://www.tutorialspoint.com/software_engineering/
2. https://en.wikipedia.org/wiki/Software_engineering
3. https://www.javatpoint.com/software-engineering-tutorial
4. https://www.geeksforgeeks.org/software-engineering/

Programme	**:**	**B.Sc. Computer Science**			
Course Title	**:**	**CORE: PYTHON PROGRAMMING**	**Course Code**	**:**	20UCS/USC6C15
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives:

1. To learn the concepts of Python
2. To understand the concept NumPy applications
3. To understand the Pandas and Sci-kit applications

Course Outcomes

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1	knows the various data types and control structures	K1
CO2	Apply the concepts of NumPy and Pandas	K3
CO3	Develop the Python program using Matplotlib	K4
CO4	Develop Sci-kit applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	M	M	S	M	M	L
CO2	S	M	L	M	L	S	S	M	L
CO3	S	M	M	M	M	S	M	M	M
CO4	S	M	M	M	M	S	M	M	M

Unit – I

Variables – Data Types: String, Numeric, Tuples, Sets, Dictionaries,
Control Structures: if, **while, for,** break and continue, lists.

Unit – II

NumPy: Introduction to NumPy – The Basics of NumPy arrays–Computation on NumPy Arrays–Aggregations: **Min. Max,** and Everything in Between – Computation on Arrays.

Unit – III

Pandas: Introduction to pandas - Data manipulation with pandas–Operating on null values, hierarchical indexing – Combining Datasets – Aggregation and **Grouping**.

Unit – IV

Matplotlib: Introduction to Matplotlib– Visualization with Matplotlib – Simple line plots – scatter plots – visualizing errors – Histograms, **binnings and density** – Customizing plots – Multiple sub plots – Text annotation.

Unit – V

Sci-kit Learn: Introduction to Scikit Learn: Data representation – Hyper parameters &Validation: Selecting the best model – Learning Curves. – Correlation - Linear Regression: **Simple Linear Regression**.

Books for Study:

1. Mark Summerfeld, "Programming in PYTHON 3: A Complete introduction to the Python language, Addison – Wesley, 2009.
2. Jake VanderPlas, "Python for Data Science Hand Book", 1st Edition, O'Reilly, 2016.

Books for References:

1. William McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython", 2nd Edition, Shroff/O'Reilly, 2017.

2. Prateek Gupta, “Data Science with Jupiter: Master Data Science skills with easy-to-follow Python examples”, 1st Edition, BPB Publications, 2019.

E-Resources:

1. https://static.realpython.com/python-basics-sample-chapters.pdf
2. https://www.guru99.com/python-tutorials.html
3. https://github.com/wesm/pydata-book

Programme :B.Sc Computer Science
Course title:**CORE: COMPUTER NETWORKS AND CYBER-SECURITY**
Year: III
Course Code: 20UCS/USC6C16 Semester: VI
5 Hours / week 5 Credits

COURSE OBJECTIVES:

1. To learn uses, structures and Models of Computer Networks
2. To understand Analog and Digital Transmissions and Switching techniques
3. To become aware of Cyber Crimes and Cyber laws

Course Outcomes
On completion of this Course, the student will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1.	Understand the various topologies and the importance of layers	K2
CO2.	Explore Analog and Digital Transmissions and Switching techniques	K4
CO3.	Apply the concepts of Routing and Congestion	K3
CO4.	Apply the concepts of Network Security	K3
CO5.	Know about Cyber Crimes and Cyber laws	K1

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	S	M	M	M	M	L
CO2	S	S	L	M	M	S	M	M	M
CO3	S	S	L	M	M	S	M	M	M
CO4	S	S	M	S	S	S	M	M	L
CO5	M	L	S	M	S	S	M	M	L

UNIT I

Uses of Computer Networks — Applications of networks —, network structure — network architectures — ISO reference model example networks.

UNIT II

Transmission and multiplexing — analog transmission — digital transmission — X.2 1 digital interface — circuit, packet switching — terminal. handling — telephone, wireless and satellite communication systems.

UNIT III

Data link layer: Elementary data link protocols — sliding window protocols protocols efficiency and verification. Network layer: Virtual circuits and datagram's — routing algorithms — congestion.

UNIT IV

Transport and Session layers: Transport protocol design issues — interconnection of packets switching networks —

session layer design issues teammate procedure call.

UNIT V

Introduction to cyber crime and law: Cyber crimes, Types of Cyber Crime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of terms, Traditional problems associated with Computer Crime, Introduction to incident response, Digital forensics, Computer language, Network language, Realms of the cyber world, A brief history of the internet, Recognizing and defining computer crime, Contemporary crimes, Computers as targets, Contaminants and destruction of data, Indian IT ACT 2000.

Books for Study:

1. Andrew S. Tanenbaum,"Computer networks" , Prentice Hall of India Pvt. Ltd, 5th Edition 2015.
2. Nina Godbole and SunitBelpure, Cyber security understanding cyber crimes, Computer forensics and legal perspectives, Wiley Publication India, 2nd Edition, 2011.

Books for Reference:

1. Behrouz Forouzan , Data communication and Networking.McGraw Hill, 4th Edition,2017
2. Mike Shema , Anti-Hacker Tool kit, Publication Mc Graw Hill, 4th Edition, 2014.

E-Resources:

1. **https://www.ibm.com/cloud/learn/networking-a-complete-guide**
2. **https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf**

Programme :B.Sc Computer Science
Course title: **CORE PRACTICAL: PYTHON LAB**
Year: III
Course Code: 20UCS/USC6CP8 Semester: VI
5 Hours / week Credits:3

Course Objectives

- To create program for solving mathematical problems
- To work with database programming
- To develop a few real world applications
- To develop the skill of designing GUI in python

Course outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	Knowledge Level
CO1	Understand the essentials of python programming	K2
CO2	Develop the simple applications using numpy and pandas	K4
CO3	Apply to create different types of charts using matplotlib	K3
CO4	Build simple applications using sci-kit learn	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	S	M	M	M
CO2	S	S	S	M	M	S	M	M	L
CO3	S	M	M	M	M	S	M	M	M
CO4	S	M	M	L	L	S	M	M	M

1) Write a python program to implement Sets, Lists, Tuples and Dictionary Data types.
2) Write a python program to perform various string handling functions.
3) Write a python program to create 1D,2D,3D arrays using numpy
4) Write a python program to implement aggregate function in numpy.
5) Write a python program to read CSV files and view the data using pandas..
6) Write a python program to create a multi Index frame using two columns and using an Index and a Column using pandas.
7) Write a python program to draw simple line plots and scatter plots using matplotlib.
8) Write a python program to draw Histograms and subplots function using matplotlib.
9) Write a python program to implement simple linear regression using sci-kit learn.

10) Write a python program to create student details table and perform insert, update, delete and select records in sqllite3 database.

Programme	**:**	**B.Sc. Computer Science**			
CourseTitle	**:**	**Artificial Intelligence and Soft Computing**	**CourseCode**	**:**	20UCS/USC5EA1
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

COURSE OBJECTIVES:

1. To understand the basic techniques of AI & SoftComputing.
2. To distinguish the various search techniques and knowledge representationtechniques
3. To become familiar with basics of Neural Networks and GeneticAlgorithms
4. To Learn Fuzzy Logic and various application domains of AI and Soft Computingtechniques.

COURSE OUTCOMES:

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the various characteristics of AI and Soft Computing	K1
CO2	Analyze the strength and weakness of AI approaches to knowledge representation, heuristic searching techniques and applications of AI.	K4
CO3	Choose the appropriate representation and appropriate reasoning algorithm, for the chosen AI problem/domain and assess the Soft Computing Components.	K2
CO4	Classify the Fuzzy logic control systems	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	M	S	M	M	M
CO2	S	M	L	M	L	S	S	M	M
CO3	S	M	M	M	L	S	M	M	M
CO4	M	M	M	M	M	S	M	M	S

UNIT I

Introduction — definition of AI, Task domains, underlying Assumption, Criteria for success, State space (Water Jug Problem), Production systems, problem characteristics, Production system characteristics.

UNIT II

Heuristic search techniques — Generate and Test, Hill — Climbing, Best — First search, Problem Reduction, Constraint satisfaction, Means — end analysis.

UNIT III

Knowledgerepresentation-NonFormalMethods:Productionrules,SemanticNets,Frames&Scripts-Formal Methods: Unification andResolution

UNIT IV

Neural Network-Supervised Network- Back propagation Network-Unsupervised Network: ART(Adaptive **Resonance Theory)-Simple Genetic Algorithm - Operators: Cross over and mutation.**

UNIT V

FUZZY LOGIC - Introduction-Membership functions-Type1 and **Type 2 systems.**

Applications:Expert systems, Vision, Natural Language Processing**, Learning.**

Books for Study:

1. Elaine Rich, Kevin knight,Shivashankar B. Nair, Artificial Intelligence, Tata McGraw Hill, 3rd Edition, 2017.(Unit I, II &III)
2. Freeman Skapura, Neural Networks Fundamentals, Pearson Education, 2011(Unit –IV)
3. Introduction to Genetic Algorithms, Goldberg, Pearson Education, 2008. (Unit – IV)
4. H.J. Zimmermann, Fuzzy set theory and its applications, 4th Edition, 2nd Reprint, Springer 2010. (Unit –V)

Books for Reference:

1. **Dan.W.Patterson, Introduction to Artificial Intelligence and Expert systems,pHI,1990**
2. **P.H.Winston, Artificial Intelligence, Second Edition AddisonWesley,1984**
   E.Charniak, D.McDermott, Introduction to Artificial Intelligence, Addison Wesley,1985

E-Resources:

1. http://aryacollegeludhiana.in/E_BOOK/computer/Artificial_Intelligence.pdf
2. http://www2.fiit.stuba.sk/~kvasnicka/Free%20books/Goldberg_Genetic_Algorithms_in_Search.pdf

CourseTitle	**:**	**Distributed Computing System**	**CourseCode**	**:**	**20UCS/USC 5EB1**
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

COURSE OBJECTIVES

1. To know the fundamental architecture of Distributedsystems
2. To understand the Data centric consistencymodels
3. To learn the Security management in distributed systems and Distributed web based systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Assimilate the workability of distributed systems	K1
CO2	Understand the basic communication fundamentals of distributed systems	K2
CO3	Analyze the knowledge of data centric consistency models and Security management in distributed systems	K4
CO4	Use the distributed environment in web based systems.	K3

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	L	L	S	S	S	L	L	L	L
CO2	M	L	M	M	S	S	L	L	L
CO3	M	M	M	M	S	S	M	M	L
CO4	M	M	M	M	M	S	M	M	S

UNIT I

Introduction: Goals – Types of Distributed systems – Architectu re styles – System Architecture.

ArchitecturesVersusMiddleware–SelfManagementindistributedsystems-Processes–Threads–Virtualization – Clients – Servers – CodeMigration.

UNIT II

Communication: Fundamentals - Remote Procedure Call – Stream oriented communication –

Message oriented communication – Multicast communication.Naming– Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute based Naming.

UNIT III

Synchronization:Clock Synchronization – Logical clocks - Mutual Exclusion – Globalpositioning of nodes - Election Algorithms. Consistency and Replication: Introduction – Data centric consistency models – Client centric consistency models – Replica management – Consistency protocols.

UNIT IV

Fault Tolerance: Introduction – Process resilience – Reliable client server communication – Reliable group communication – Distributed commit -Recovery Security – Introduction – Secure channels – Access control – Security management.

UNIT V

Distributed File Systems – Distributed web based systems – Distributed object based systems.

Books for study:

1. AndrewS.TanenbaumandMaartenVanSteen,"DistributedSystems–Principlesand Paradigms", Prentice- Hall of India, Pvt. Ltd, Third edition, 2017.
2. M.L. Liu, "Distributed Computing Principles and Applications", Pearson Education,2019.

Books for Reference:

1. Andrew S. Tanenbaum (Author), Maarten van Steen (Author), Distributed Systems: Principles and Paradigms, CreateSpace Independent Publishing Platform; 2nd Edition (February 26,2016)
2. Pradeep K Sinha, "Distributed Operating Systems, Prentice-Hall of India, NewDelhi,2009.
3. Jean Dollimore, Tim Kindberg, George Coulouris, "Distributed Systems -Concepts and Design", Pearson Education, fifth edition,2011.

E-Resources:

1. https://en.wikipedia.org/wiki/Distributed_computing
2. https://www.techopedia.com/definition/7/distributed-computing-system
3. https://www.tutorialspoint.com/Distributed-Systems
4. https://www.ionos.com/digitalguide/server/know-how/what-is-distributed-computing/

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CourseTitle	**:**	**Management Information System**	**Course Code**	**:**	**20UCS/USC 5EC1**
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

COURSE OBJECTIVES:

1. To Understand data, information, intelligence and role of systemanalyst
2. To become aware of DSS,EIS,KMS andGIS
3. To know about information security, Vulnerability, Computer Crimes and ethics inIT

COURSE OUTCOMES:

On completion of this course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Use Various design tools	K1
CO2	Apply the concept of DSS,EIS,KMS and GIS	K2
CO3	Analyse the issues of Vulnerability, Computer Crimes and ethics in IT	K4
CO4	Know the Concepts of E-Governance Techniques	K2

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	L	L	S	S	S	L	L	L	L
CO2	M	L	M	M	S	S	L	L	L
CO3	M	M	M	M	S	S	M	M	L
CO4	M	M	M	M	M	S	M	M	S

UNIT I

Introduction Data, Information, Intelligence, Information Technology, Information System, evolution, types based on functions and hierarchy, System Analyst – Role, Functions.

UNIT II

Systems Analysis And Design SDLC, SSLC, Systems Analysis and System Design, Tools – DFD – ER – Object modeling,DBMS – RDBMS – OODBMS.

UNIT III

Information System Financial, Marketing, Personnel, Production, Materials Information System, DSS, EIS,KMS,GIS, International Information System.

UNIT IV Security And Control

Security, Testing, Error detection, Controls, IS Vulnerability, Computer Crimes, Securing the Web, Intranets and Wireless Networks, Software Audit, Ethics inIT.

UNIT V

New It Initiatives

e- business, e-governance, ERP, SCM, e-CRM, Datawarehousing and Data Mining, Business Intelligence, Pervasive Computing,CMM.

Books for Study:

1. Robert Schultheis and Mary Summer, Management Information Systems – The Managers View, Tata McGraw Hill,2008.
2. Kenneth C. Laudon and Jane Price Laudon, Management Information Systems – Managing the digital firm, PHI Learning / Pearson Education, PHI, Asia,2002.

Books for References:

1. Gordon Davis, Management Information System : Conceptual Foundations, Structure and Development, Tata McGraw Hill,2000.
2. Haag, Cummings and McCubbrey, Management Information Systems for the Information Age, McGraw Hill,2005.
3. Turban, McLean and Wetherbe, Information Technology for Management – Transforming Organisations in the Digital Economy, John Wiley,2007.
4. Raymond McLeod and Jr. George P. Schell, Management Information Systems, Pearson Education,2007.

E-Resources:

https://www.tutorialspoint.com/management_information_system/management_information_system.htm

https://www.geektonight.com/management-information-system-notes-pdf/

CourseTitle	**:**	**TCP / IP Protocol Suit**	**CourseCode**	**:**	**20UCS/USC 5ED1**
Year	**:**	**III**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

COURSE OBJECTIVES:

1. Toknowthefundamentalconceptsofcomputernetworkingandinter-workingofvariouslayersof OSI.
2. To explain the issues and challenges of protocols design while developing TCP/IP protocolsuite.
3. To analyse the strengths and weaknesses of various routingalgorithms.

COURSE OUTCOMES:

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the concepts of data communication	**K1**
CO2	Understand ISO - OSI model and TCP/IP model.	**K2**
CO3	Apply the IP addressing and subnetting / supernetting schemes.	**K3**
CO4	Analyze various routing algorithms and protocols	**K4**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	M	M	L	S	M	S	L	M	L
CO2	M	M	L	M	M	S	L	L	L
CO3	S	S	M	M	M	M	L	M	M
CO4	S	S	M	S	S	M	L	M	M

Unit I:

IntroductionandOverview.ComparisonofOSIModelandTCP/IPmodel.NetworkingTechnologies : LANS, WANS, Connecting Devices. Internetworking concept and Architectural model. Internet Backbones, NAP, ISP's, RFC's, InternetStandards.

Unit II:

InternetAddresses:IPaddressclasses,subnetmask,CIDR,ARP,RARP,InternetProtocol,RoutingIP Datagrams, ICMP and IGMP.

Unit III:

UDP,TCP,SocketsandsocketProgramming,RoutinginInternet,Routingprotocols-RIP,OSPFand BGP. Introduction to Multicasting and Multicast routing.

Unit IV:

Host Configuration: BOOTP, DHCP; Services: Domain Name System, FTP, TFTP and Electronic Mail: SMTP, MIME, IMAP, POP.

Unit V:

Network Management: SNMP, WWW: HTTP, Mobile IP. Multimedia : RTP, RTCP.

Middlewares:RPC,RMI.IntroductiontoIPv6andICMPv6,InternetSecurity:IPSec,PGP,Firewalls, SSL.

Books for Study:

1. Douglas Comer, Internetworking and TCP/IP: Principles, Protocols and Architectures,, Pearson Education, 6th Edition,2014.
2. TCP/IP Protocol suite, Behrouz A. Forouzan, Third Edition,TMH.
3. Computer Networking – A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Pearson Education, Asia.
4. Computer Networks: A systems approach by Larry L. Peterson and Bruce S. Davie, 3 rd Edition, Morgan KaufmannPublishers

Books for References:

1. Stevens W. R. TCP/IP Illustrated, volume 1,2,3, Pearson education.

2. Book For Practical:•“Hands-On Networking with Internet Technologies” by Douglas E. Comer, Pearson Education, Asia,2002.

E-Resources:

https://www.studytonight.com/computer-networks/tcp-ip-reference-

modelhttps://searchnetworking.techtarget.com/definition/TCP-IP

CourseTitle	**:**	**Data mining and Warehousing**	**CourseCode**	**:**	**20UCS/USC 6EA2**
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

1. Course Objectives:
2. To understand the concepts of data warehousing architecture andimplementation
3. To learn the use of association rules for mining thedata
4. To understand the concept of Classification and clusteringtechniques.

5. Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge level**
CO1	Know the concepts of data mining applications	K1
CO2	Apply the association rules for mining the data	K3
CO3	Design and deploy appropriate Classification techniques	K4
CO4	Understanding various algorithms in Data Mining	K2

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS0O2	PSO3	PS04
CO1	M	M	M	S	M	S	L	L	L
CO2	M	S	M	S	M	S	S	M	L
CO3	S	S	M	S	M	S	S	M	S
CO4	S	S	M	S	M	S	S	M	S

Unit I

Expandinguniverseofdata–productionfactor–computersystemsthatcanlearn–datamining–data miningversusquerytools–datamininginmarketing–practicalapplication.(Chapter:1,PageNo.:1- 10). Learning – Self Learning Computer Systems – machine learning and the methodology ofscience – concept learning. (Chapter:2, Page :11-22)

Unit II

Data warehouse – need- designing decision support systems – integration with data mining-Client/Serveranddatawarehousing–multi-processingmachines–costjustification.(Chapter:3,Page No.:25-36)

Unit III

Knowledge discovery process – data selection – cleaning – enrichment – coding – data mining – preliminary analysis of the data set using traditional query tools – visualization techniques – likelihood and distance – OLAP tools – K-nearest neighbor – Decision trees – Association rules – Neural networks – Genetic algorithms – Reporting. (Chapter:4, Page No.:37-78)

Unit IV

Different forms of knowledge – Getting started – Data Selection – Cleaning – Enrichment – Coding – Data mining - Reporting – KDD environment – Ten golden rules. (Chapter:5, Page No.:79-93)

Unit V

CustomerProfiling–Predictingbidbehaviorofpilots–Discoveringforeignkeyrelationships-Results.(Chapter:6,PageNo.:95-110)Learningascompressionofdatasets–Theinformationcontent ofmessage–Noiseandredundancy–significanceofnoise–Fuzzydatabases–Thetraditionaltheory of the relational database – from relations to tables – from keys to statistical development Dependencies – Denormalization – Data Mining Primitives. (Chapter:7, PageNo.:111-126)

Books for Study:

1. Parteek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, Cambridge, 2019
2. Daniel T. Larose, Data Mining and Predictive Analytics (Wiley Series on Methods and Applications in Data Mining) Hardcover, April2015
3. PeterAdriansandDOLFZantinge,DataMining,AdditionWesley,FourthEdition(AllUnits), 2002

Books for References:

K.P.Soman and Shyam Divakar, V.Ajay, Insight into Data Mining (Theory and Practice), Prentice Hall of India, 2006, Second Edition

E-Resources:

1. https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining2.https://www.javatpoint.com/data-warehouse

CourseTitle	**:**	**Multimedia Applications**	**CourseCode**	**:**	**20UCS/USC 6EB2**
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Adobe Photoshop

Course objectives:

1 To learn and understand technical aspect of Multimedia Systems.

2. To Design and develop various Multimedia Systems applicable in realtime.

3. To learn various multimedia authoringsystems.

Course Outcomes:

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge level
CO1	Use basic tools of Photoshop.	**K1**
CO2	Analyze various file formats for audio, video and text media	**K4**
CO3	Understand basic methods of Flash Animation	**K2**
CO4	Develop interactive multimedia applications	**K3**

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	L	S	M	S	M	M	S	M	S
CO2	L	S	M	S	L	L	M	M	L
CO3	L	S	M	S	S	M	M	S	L
CO4	L	S	M	S	S	S	M	S	S

Unit - I

What is Photoshop(01-04) - The Tools(20-27) – Color Modes(172-188) – Basic techniques of painting & brushing(220-230) – Cloning & Healing(309-322) – Brush Size & Shape(320-239)
– How the Quick Mask mode works(430-434) - How Filters Works(473-476)v– How to Draw &Edit Paths(392-413) – Blurring an image(494-525) – CorrectiveFilters(470-471).

Unit - II

Adding Clouds & Spotlights (601-605) – Creating & Using Smart Objects (647-659) – Applying Transformations (660-666) – Advanced Blending Options (701-709) – Making Custom Brightness Adjustment(871-897).

Unit - III

Corel Draw Workspace (18-20) – Using the Color Palette (32-34) – Applying Mesh Fills(466-467) - Going 3D (81-83) – Using the Ruler (118-128) – Using group commands (276-277) – Creating Object Symbol (283-287)– Applying an Extrude Effect (670-671) – Text along a Curve (377-380).

Adobe Flash

Unit - IV

Properties Panel (237-238) – Floating and Docking Panels (67-68) – Tools Panel(71-75) – Document Window (76-84) – Drawing Tools (111-118) – Document Library(164-171) – Symbols – Basic Method of Flash Animation(329-333)

Unit - V

Onion Skinning (335-336) – Using tweens for animation (338-361) – Working withSpecial Layer Types (411-420) - Cartoon Animation Basics (329-333) - Cartoon Animation Techniques (431-436) – Vectors and Bitmaps (511-514) - Importing sound into Flash (478-480) – Exporting Video into Flash (557-574).

Books for Study:

1. Deke McClelland & Laurie Ulrich Fuller, Adobe Photoshop CS2 Bible,2006 (Unit I, UnitII).

2. Gary David Bouton, Corel Draw X4 Graphics suite, McGraw-Hill Education, 2021(UnitIII).

3. Gary David Bouton, Corel Draw X4 the Official Guide , McGraw-Hill Education ,2008(UnitIII).

4. Robert Reinhardt and Snow Dowd, Adobe Flash CS4 Professional Bible, Wiley IndiaPrivate Limited, 2009 (UnitIV,V).

Books for References:

1. Tom Mulligan -A Complete Beginner to Expert Tutorial Guide to Master the New Features of Photoshop, McGraw-Hill Education,2021.

2. Deke McClelland & Laurie Ulrich Fuller, Adobe Photoshop CS4 Bible, McGraw-Hill Education , 2021.

3. Gary David Bouton, Corel Draw X7 The Official Guide McGraw,-Hill Education,2014.

E-Resources:

https://www.photoshopessentials.com/https://www.codeandpixels.net/blog/multimedia-based-e-learning/

https://www.photoshopessentials.com/

https://www.guru99.com/photoshop-tutorials.html

Programme	**:**	**B.Sc. Computer Science**			
CourseTitle	**:**	**Software Project Management**	**CourseCode**	**:**	**20UCS/USC 6EC2**
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives:

1. To introduce the concepts and activities required for software project management and planning.
2. To understand project scheduling and sequencing, classify different types of risk and plan, controlrisk.
3. To have knowledge of organizational behaviour, working in groups and understand organizational structures, stress, health andsafety.

Course Outcomes:

On completion of this Course, the student will be able to

CourseOutcome:

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1.	Know the concept of project management and planning	K1
CO2.	Analyze and implement methods to plan and controlproject, have a control over risks.	K4
CO3.	Apply the required steps for the decision making.	K3
CO4.	Understand the process of Managing the People and member of software engineering team	K2

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	S	M	M
CO2	S	S	M	M	M	S	S	M	M
CO3	S	S	M	L	L	S	M	M	L
CO4	S	S	M	L	L	S	M	M	L

UNIT I Introduction to Software Project Management

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – **Stepwise ProjectPlanning.**

UNIT II Project Evaluation

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow -Forecasting – Cost Benefit Evaluation Techniques – **Risk Evaluation**.

UNIT III ActivityPlanning

Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – **Hazard Identification – Hazard Analysis** – Risk Planning And Control.

UNIT IV Monitoring and Control

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – **Contract Management – Acceptance**.

UNIT V Managing People and Organizing Teams

Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Old man – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – **Case Studies**.

BOOKS FORSTUDY

1. Bob Hughes, Mikecotterell, “Software Project Management”, Third Edition, Tata

McGraw Hill, Reprint2020.

2. Jalote, “Software Project Management in Practice”, Pearson Education,2017.

BOOKS FOR REFERENCE

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill,2017.

2. Royce, “Software Project Management”, Pearson Education,2015.

E- RESOURCES

1. https://www.udemy.com/course/software-project-management-the-complete-course/

2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm

3.https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/SOFTWARE%20PROJECT%20MANAGEMENT.pdf

Programme	**:**	**B.Sc. Computer Science**			
CourseTitle	**:**	**Data Science using R**	**CourseCode**	**:**	**20UCS/USC 6ED2**
Year	**:**	**III**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

Course Objectives:

1. To introduce the concepts of RProgramming
2. To understand Concept of R DataInterfaces
3. To have knowledge of time SeriesAnalysis

Course Outcomes:

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge level
CO1	To know the Basic Concepts of R Programming	**K1**
CO2	Analyze Concept of R Data Interfaces	**K4**
CO3	Apply the required steps for the time Series Analysis	**K3**
CO4	Understands various charts and graphs	**K1**

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	M	S	S	S	M	M
CO2	S	M	M	M	S	S	S	M	S
CO3	S	M	M	M	S	S	S	M	S
CO4	S	M	M	M	S	S	S	M	M

UNIT I

Overview of R- Local Environment Setup- Basic syntax- Data types- Variables- Operators- Decision making- Loops- Functions- Strings- Vectors- Lists- matrices- Arrays- Factors- Data frames- Packages – **Data Reshaping**

UNIT II

R Data Interface: Pie Charts- Excel File- Binary Files- XML Files- **JSON Files**- Web Data- Databases

UNITIII

Charts and Graphs: Pie Charts- Bar Charts- Boxplots- Histograms- Line Graphs- **Scatterplots- R Statistics**

UNITIV

Examples: Mean, Median and Mode- Linear Regression- Multiple Regression- Logistic Regression- Normal Distribution- Binomial Distribution- Poisson Regression- **Analysis ofCovariance**

UNIT V

Time Series Analysis – Nonlinear Least Square- Decision Tree- Random Forest- Survival Analysis- **Chi Square Test**

Books for Study:

Roger D. Peng, R programming for Data Science, Lean Publishing, 2015

Books for Reference:

1. Michael J.Crawley, The R book, John Wiley &Sons,2007.
2. HadleyWickhamandGerrettGrolemund,RforDataScience,OReallyMedia,4thRelease,2020.

E-Resources:

https://www.tutorialspoint.com/https://r4ds.had.co.nz

Programme	:B.ScComputer Science	Course Code: 20UCS/USC6CPR	
CourseTitle	: Core : Project Work		
YearHour/Week	:III	Semester	:VI
	:5	Credits	:5

COURSE OBJECTIVES

Enable the Students to

1. **Understand the importance of experimental analysis, scientific approach in solving problems of information Technology.**
2. **Educate and train the students on how to design the system and develop the system and prepare the reports.**

COURSEOUTCOMES

Afterlearningthecourse,thestudentswillbeableto

CO1	Identify a problem and select suitable software for implementation	K3 & K 4
CO2	Apply the problem-solving skill to solve the problem	K3 & K 4
CO3	Able to analyze and interpret the data to arrive at the expected results	K3 & K 4

K1–Remember;K2–Understand;K3–Apply;K4–Analyze

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S

S-Strong;M-Medium;L-Low

The Final Year Students are assigned to the project Supervisor and they are asked to submit an individual project report at the end semester.TheBroader areas of the project are website creation, order processing, Billing Software, Multimedia, Artificial Intelligence, and Machine Learning based projects.

The student has to approach the nearby companies to get approval from the company to undergo his project work for the period of 8 to 9 months.

The students have to submit the project Completion Letter from the organization.

The project work done by the student is periodically reviewed.

Programme: Computer Science Course Code: 20UCS/USC4AL4
Course: ALLIED:OPERATIONS RESEARCH Hours / week: 6
Year: II Semester: IV Credits: 5

COURSE OBJECTIVES

1. To understand the concepts of Linear Programming Problems.
2. To study and understand the concept of transportation and Assignment problems.
3. To use the knowledge of Inventory, Analyze to solve Replacement problems and real world problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	remembering the formulation of Business Problems.	K1
CO2	understanding the methods of problem solving	K2
CO3	applying the mathematical calculations in Industrial Problems.	K3
CO4	analyzing mathematical methods and applications.	K4

K1 – Recall, remember; K2 – Understand; K3 – Apply; K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L		L	L	L	L	L
CO2	M	M	M	L	L		M	M	L	L	L
CO3	M	M	M	M	L		L	L	L	L	L
CO4	M	M	M	M	L		L	L	L	L	L

S- Strong; M-Medium; L-Low

UNIT I (16 Hours)

Linear Programming Problem: Introduction – Mathematical formulation of L.P.P. - ***Graphical solution method*** – Simplex method – Method of penalties/ Big-M method – Two phase method. (Chapter 2,3& 4, Page No. 39 - 113)

UNIT II (14 Hours)

Transportation problem: Introduction - ***finding initial basic feasible solution*** – moving towards optimality – the transportation algorithm. (Chapter 10, Page No. 247-281)

Assignment problem: Method for solving an assignment problem –Variation of assignment problem – Traveling salesman problem – degeneracy. (Chapter 11, Page No. 295-324)

UNIT III **(16 Hours)**

Queueing theory: Introduction - Queueing system – Characteristics of the Queueing system – Operating characteristics of a Queueing system - Classification of queues – Poisson queues- (M/M/1) : (∞/FIFO) , (M/M/1) : (N/FIFO) , (M/M/C) : (∞/FIFO) , (M/M/C) : (N/FIFO). (Chapter 21, Page No. 589-621)

UNIT IV **(16 Hours)**

Inventory: Introduction – Inventory control– Cost associated with inventories – ***Economic lot size problem*** – Problems of EOQ with shortage allowed – Purchase inventory problem with price breaks. (Chapter 19, Page No. 507-538)

Replacement problem: replacement of items that deteriorates with time – replacement of items that fail completely. (Chapter 18, Page No. 477-494)

UNIT V **(13 Hours)**

Networking scheduling by PERT/CPM: Introduction – Basic concepts - Critical path method – pert calculations – ***pert algorithm*** – construction of network – critical path analysis - ***statistical considerations in PERT*** . (Chapter 25, Page No. 763-784)

Book for study:

KantiSwarup, P.K. Gupta, Man Mohan, Operations Research, Sultan Chand & Sons, 2007, Thirteen Edition.

Books for reference:

Prof V.Sundaresan, K.S. Ganapathy Subramanian, K.Ganesan, Resource Management Techniques, A.R.Publications, 2004, Second Edition.

Handy A.Taha, Operations Research,CollierMacmillan,Third Edition.

E-resources:

https://roughan.info/notes/oorii/06tutorials.html

https://nptel.ac.in/courses/110/106/110106062/

Programme : B.Sc., Mathematics.
Course Title : ELECTIVE: WEB PROGRAMMING Course Code : 20UMA5EL1
Year :ThirdYear **Semester :V**
Hours/Week:4 **Credits :4**

Course Objectives:

- To make the students aware of the basic concepts ofHTML.
- To know the various HTMLproperties
- To Know the concepts of XMLapplications

Course Outcomes:

On completion of this Course, the student will be able to

CO Number	**CO Statement**	**Knowledge level**
CO1	Know the basic concepts of HTML	K1
CO2	Know the various HTML properties	K1
CO3	Understanding the form designing using HTML	K2
CO4	Know the concepts of XML applications	K1

K1-Remember; K2-Understand; K3-Apply; K4 - Analyze

COS	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L	L	L	S	S	M	M	L
CO2	L	S	M	L	L	S	S	M	M	L
CO3	L	S	M	S	L	S	S	M	S	L
CO4	L	S	L	S	M	S	S	S	S	M

S–Strong; M–Medium; L -Low

HTML

Unit I

Introduction to HTML document – Text formatting – Using lists to organize data withtables – Table layout – Adding Images. Chapter 1 (Page Number : 83 – 193)

Unit II

Framesets – Hyperlinks and Anchors – Form Elements – Input Elements – ButtonElements – Label Elements – Select and option Element – Defining web page appearance

– Simple style sheets. Chapter 14 (Page Number : 250 –264)

Unit III

HTML properties- styles- HTML tags – Hypertext transfer protocol- Links and frames – HTML Elements- List and Links- Webpage Layout- Sample Programs.

XML

Unit IV

XML – Introduction to XML applications - Structuring data – XML Rules – XSLTransformation – XSL Templates – Rules XSL formatting objects.

Unit V

XML DTD – Internal DTD – External DTD– Xlinks – Xpointers –

Namespaces. Chapter 2 &14 (Page Number: 17-44 , 63-101,309-143)

Books for Study:

1. RiteshKumar , Learn HTML in Easy Way, Ganpati Book Centre,2019
2. Kogent Learning Solutions Inc., HTML5 Black Book Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, 2012 (UnitI)
3. Ellistte Rusty Harold, XML1.1. Bible, IDG Books Pvt Ltd, 3rd Edition,2007

Book for Reference:

Heather Williamson, The Complete Reference XML, TATA McGraw Hill, Fifth Edition, 2002.

E-Resources:

1. https://html.com/
2. https://www.w3schools.com/html/

Programme : B.Sc., Mathematics.
Course Title : ELECTIVE PRACTICAL: WEB PROGRAMMING AND C
Course Code : 20UMA6EP1
Year :ThirdYear Semester :VI
Hours/Week:2 Credits :2

Course Objectives:

- To make the students aware of the basic concepts ofC.
- To make them understand the benefits and applications ofC.
- To develop the program writing and logical thinkingskills.
- To Know the basic concepts ofHTML

Course outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge level**
CO1	Understand the fundamental programming concepts	K2
CO3	Apply the concepts to find solution for the problems	K3
CO4	Design and develop the simple application.	K4
CO4	Know the basic concepts of HTML	K1

K1-Remember; K2-Understand; K3-Apply; K4 - Analyze

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	PSO 5
CO1	M	L	M	M	L	L	M	M	M	L
CO2	M	L	M	S	L	M	M	S	M	L
CO3	M	L	M	S	L	M	M	S	S	M
CO4	M	L	M	M	L	M	M	M	M	M

S–Strong; M–Medium; L -Low

1. Solving Quadratic equation.
2. Matrix Multiplication.
3. Mean and Standard Deviation.
4. Alphabetical order ofnames.
5. Descending and Ascending ordernumbers.
6. Electricity BillPreparation.

7. Evaluation of Sin and CosSeries.

8. To Generate FibonacciSeries.

9. Calculation of NCR Values.

10. Biggest and Smallest number in theArray.

11. Write a HTML Program to format the text using all suitable HTMLtags

12. Write a HTML Program to include the image in the webpage using suitable HTMLtags

13. Write a HTML Program to include a picture as a background image with suitable HTML tags.

14. Write a HTML Program to demonstrate headingtags

15. Write a HTML Program to draw a table containing the semester marks of thestudent

16. Write a HTML Program to demonstrateframes

17. Write a HTML Program to demonstrateforms

Programme : B.Sc., Mathematics.
Course Title : ELECTIVE: INTRODUCTION TO C
Course Code : 20UMA6EA2
Year :ThirdYear **Semester : VI**
Hours/Week:4 **Credits :4**

Course Objectives:

- To make the students aware of the basic concepts ofC.
- To make them understand the benefits and applications of C.
- To make them understand the benefits and applications of C.
- To learn the various Decision making and branchingtechniques

Course outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge level
CO1	Understand the concepts of C programming	K2
CO2	Know the concepts of Operators and Expression	K1
CO3	Understand the various Decision making and branching techniques	K2
CO4	Know the Concepts of arrays and structures	K1

K1-Remember; K2-Understand; K3-Apply; K4 - Analyze

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO 2	PSO3	PSO 4	PSO 5
CO1	L	L	S	L	L	M	M	L	M	M
CO2	L	L	S	L	L	M	M	L	M	M
CO3	L	M	S	M	L	M	M	M	S	S
CO4	L	M	S	M	L	M	M	L	M	M

S–Strong; M–Medium; L -Low

Unit – I

Overview of C: Introduction – Importance of C – Sample C programs – Basicstructure of C programs – Programming style – Executing a 'C' program.

Constants, Variables and Data types: Introduction – Character set – C tokens –Keywords and Identifiers – Constant – Variables – Data types – Declaration ofvariables – Assigning values to variables – Defining symbolic constants.

Unit-II

Operators and Expression : Introduction – Arithmetic of operators – Relationaloperators

and Logical operators – Assignment operators – Increment and Decrementoperators – Special operators – Arithmetic expressions – Evaluation of expressions –Precedence of Arithmeticoperators – Some computational problems – Typeconversions in expressions – operator Precedence and Associativity – Mathematical functions.

Unit – III

Decision making and branching: Introduction to Decision making – Decisionmaking with IF statement – Simple IF statement – The IF ELSE statement – Nestingof IF….ELSE statements – The ELSE IF ladder – The Switch statement – The ?:operator – The GOTO statement.Decision making and looping: Introduction, the WHILE statement, the DOstatement, jumps in loops.

Unit – IV

Arrays: Introduction to arrays – One-dimensional arrays – Two-dimensional arrays – Multi- dimensional arrays.

User-Defined Functions: Introduction to User-defined functions – Need for userdefined functions – Recursion.

Unit –V

Structures and Unions: Introduction to Structures definition – Accessing structuremembers – Structure initialization – Unions – Size of structures.

Pointers: Introduction to Pointers.Problems: Standard Deviation – Mean and Median – Matrix multiplication – Solvingquadratic equations – Generating Fibonacci series – Preparing Electricity bill.

Books for Study:

1. Jogamohan Medak and ParthPratimGogoi, Basics of C Programming, Kindle Edition, 2018.
2. Kamthane, Programming in C, Kindle Edition,2019.
3. Balagurusamy.E, Programming in ANSI C, McGraw Hill, 6th Edition,2012.

Books for Reference:

1. YashavantKanetkar, Let us C, Tata McGraw Hill, 11nd Edition,2011.
2. Mullesh Cooper, Spirit of C, Tata McGraw Hill, 28th impression,2006.

E-Resources:

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
3. https://www.coursera.org/specializations/c-programming
4. http://spoken-tutorial.org/

Programme :B.ComCo-operation

Course Code : 20UCO5EP1

Course Title : ELECTIVE PRACTICAL : COMPUTER APPLICATIONS IN BUSINESS LABLab

Year :ThirdYear **Semester :V**

Hours /Week:5 **Credits :4**

Course Objectives:

· To understand the basic concepts ofMS-word.
· To learn the Mathematical formulas inMS-Excel.
· To know the basic table creation inMS-Access.
· To know the slide Creation in MS-PowerPoint and basic Internetconcepts.

Course Outcomes:

CO No.	CO Statement	Knowledgelevel
CO1	Create file,edit,save,cut,copy, paste and Print documents in the MS- word	K1
CO2	Preparation of Payroll and Invoice in MS-Excel	K3
CO3	Store, retrieve and sort data in tables in MS-Access.	K3
CO4	Create graphic to a presentation and slide shows for the Subject related topics in MS-PowerPoint.	K3
CO5	Learning the basic Internet concepts like E-mail creation and Ordering a product through Online.	K2

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	S	M	S	M
CO2	S	M	M	S	M	M	S	S	M
CO3	M	S	M	S	M	S	S	S	M
CO4	S	M	S	M	M	S	M	S	M

MS-WORD

1. Preparation ofBio-Data
2. Letters to various sectors (Banking, Insurance andetc.)
3. Preparation of Agenda, Minutes, Circularletters
4. MailMerge
5. Designing a Newspaper

MS-EXCEL

1. Preparation ofpayrolls
2. Preparation of Invoice
3. Preparation of Stockdetails
4. Business Analysis using variouscharts
5. Use of financialfunctions.

MS-ACCESS

1. Store data in atable
2. Retrieve data from atable
3. Sorting, searching atable
4. Viewing data usingforms
5. Using SQLcommands
6. Preparation of Businessreports

MS-POWER POINT

1. Preparation of theadvertisement
2. Introducing the product in themarket
3. Business preparation with animation and transitioneffects
4. DisplayBoard
5. Audio and VideoPresentation

INTERNET

1. E-mailCreation
2. Ordering a Product Through Online

Learning outcomes

- Create file, edit, save, cut, copy, paste and print documents in the MS word
- Prepare and create add bullets, numbering, header and footer to the document, news paper format and merging of multiple letter in the MS-excel
- Prepare and create insert or delete a worksheet, identify cells in a worksheet, format data with simple arithmetic calculation in MS-Access
- Create graphic to a presentation and slide shows in the MS-power point

- Create and practice email and ordering a product in the Internet.

Books Recommended:

1. R. Saravanakumar, R. Parameswaran, T. Jayalakshmi, "A text book of Information Technology" S. Chand & Company Ltd. 2003.
2. R.K. Taxali, "P.C software for Windows 98 Made Simple", Tata McGraw Hill, 2001.
3. Alexis Leon, Mathews Leon, "Introduction to Computers", Leon Tech. World.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE
COIMBATORE – 641 020

B.Sc Electronics and Communication Systems

NME: JAVA PROGRAMMING

Course Code:20UEC3NM1

Year :II **Semester :III**
Hours/Week:2 **Credits :2**

UNIT 1

Fundamentals of Object – Oriented Programming: Introduction – Object Oriented Paradigm – Basic Concepts of Object – oriented Programming – Constants, Variables and Data Types : Introduction – Constants – Variables – Data Types – Declaration of variables – Giving Values to Variables – Operators – Arithmetic operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operators – Bitwise Operators – Special Operators.

UNIT II

Decision Making and Branching – Introduction – Decision Making with if statement – simple if statement – the if …else statement – nesting of if …else statements – the else if ladder – the switch statement – the ?: operator – decision making and looping : Introduction – the while statement – the do statement – the for statement – jumps in loops – labeled loops.

UNIT III

Arrays : Introduction – One dimensional array – creating an array – Two dimensional arrays – Inheritance Basic concepts – packages basic concepts – Multithreaded programming.

Reference Book

1. E.Balagurusamy, Programming with Java: A primer , 2010, Fourth Edition.

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NME: WEB PROGRAMMING LAB

Course Code:20UCS/USC4NM2

Year :II **Semester :IV**

Hours/Week:2 **Credits :2**

1) Write a program in HTML
2) To illustrate text formatting features.
3) Print ordered and unordered list.
4) Illustrate Hyper link and Frame concepts.
5) Department Web site creation.
6) College Web site creation.
7) Illustration of style sheets.
8) Demonstrating Frame concepts.
9) Adding image to web document.
10) Preparation of class time table.
11) Using audio and video files in HTML.