

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
CBCS and OBE Pattern
(Those who join from 2023-24 onwards)

SEMESTER – I				
Part	Subject Code	Title of the paper	Hours	Credits
I	23UTAL11/ 23UHNL11/ 23USNL11	Tamil/ Hindi/French	06	04
II	23UENA11/ 23UENB11	English through Prose & Short Story – Stream- A English through Prose & Short Story – Stream- B	05	04
III	23UCSC11	Core: 1 Programming in C	05	04
	23UCSC21	Core: 2 PC Hardware and Troubleshooting	04	03
	23UCSP11	Core Lab: 1 Programming in C–Practical	05	03
	23UCSA11	Allied: 1 Digital Computer Fundamentals	03	03
IV	23UFCE11	FC – Personality Development	1	1
	23UCSH12	Communication Skill	1	-
	23UBRC11	Bridge Course	-	1
V	23UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB12	Extension Activities NCC/NSS/Phy.Edn./YRC/ ROTARACT/AICUF/Nature Club	---	---
Total			30	23
SEMESTER – II				
I	23UTAL22/ 23UHNL22/ 23USNL22	Tamil/ Hindi/ French	06	04
II	23UENA22/ 23UENB22	English through Prose & Poetry – Stream – A English through Prose & Poetry – Stream – B	05	04
III	23UCSC32	Core: 3 Object Oriented Programming with C++	05	04
	23UCSC42	Core: 4 Web Designing	04	03
	23UCSP22	Core Lab: 2 Object Oriented Programming with C++ - Practical	05	03
	23UCSA22	Allied: 2 Discrete Mathematics	03	03
IV	23UFCH22	FC – Social Responsibility and Global Citizenship	1	1
	23UCSH12	Communication Skill	1	1
V	23UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB12	Extension Activities NSS/NCC/Phy.Edn./YRC/ ROTARACT/AICUF/Nature Club	-	1
Total			30	24

SEMESTER – III				
I	23UTAL33/ 23UHNL33/ 23UFNL33	Tamil/ Hindi/ French	06	04
	23UCSC53	Core: 5 Programming in JAVA	04	04
	23UCSC63	Core: 6 Data Structures and Algorithms	04	03
	23UCSP33	Core Lab: 3 Programming in JAVA–Lab	05	03
	23UCSA33	Allied: 3 Computer Organization and Architecture	04	03
	23UCSN13	NME: 1 Web Designing (For Arts students)	03	02
	23UCSS13	SBE: 1 Quantitative Aptitude and Reasoning	03	02
	23UFCE33	FC – Environmental Studies	01	01
	23UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB24	Extension Activities NCC/NSS/Phy.Edn./ YRC/ROTARACT/AICUF/Nature Club	-	-
	23UARE14	ARISE	-	-
		Total	30	22
SEMESTER – IV				
	23UTAL33/ 23UHNL33/ 23USNL33	Tamil	06	04
	23UCSC74	Core: 7 Web Programming	05	04
	23UCSC84	Core: 8 Operating System	04	04
III	23UCSP44	Core Lab: 4 Web Programming – Lab	05	03
	23UCSA44	Allied: 4 Operation Research	03	03
IV	23UCSN24	NME: 2 Web Designing (For Science Students)	03	02
	23UCSS24	SBE: 2 Open Source Technology	03	02
	23UFCH44	FC – Religious Literacy and Peace Ethics	01	01
V	23UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB24	Extension Activities NCC/NSS/Phy.Edn./ YRC/ROTARACT/AICUF/Nature Club	-	01
	23UARE14	ARISE	-	01
		Total	30	25
SEMESTER – V				
III	23UCSC95	Core: 9 Big Data Analytics using R	05	05
	23UCSD05	Core: 10 Mobile Computing	05	05
	23UCSD15	Core: 11 Dot NET Programming	05	05
	23UCSD25	Core: 12 Network Security and Cryptography	05	04

	23UCSP55	Core Lab: 5 Dot NET Programming – Lab	05	03
	23UCSE15	Core Elective:1 1. Introduction to Data Science 2. Artificial Neural Networks 3. Linux Shell Programming	03	03
IV	23USSI16	Soft Skills	02	-
		Total	30	25
SEMESTER – VI				
III	23UCSD36	Core: 13 Software Engineering	05	04
	23UCSD46	Core: 14 Data Mining and Ware Housing	04	04
	23UCSD56	Core: 15 Mobile Application Development	05	04
	23UCSD66	Core: 16 Python Programming	05	03
	23UCSD76	Core: 17 Major Project	01	02
	23UCSP66	Core Lab: Python Programming – Lab	05	03
	23UCSE26	Core Elective: 2 1. Internet of Things (IoT) 2. Artificial Intelligence 3. Software Testing	03	03
IV	23USSI16	Soft Skills	02	02
		Total	30	25

Credits for each Semester

Semester	I	II	III	IV	V	VI	Total
Credits	23	24	22	25	25	25	144

Self-Learning Courses

S.No	Semester	Sub. Code	Title of the Paper	Credits
1.	III	23UCSSL3	Software Project Management	3
2.	IV	23UCSSL4	Cloud Computing	3
3.	V	23UCSSL5	System Administration and Maintenance	3
4.	VI	23UCSSL6	Ethical Hacking	3

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR

DEPARTMENT OF COMPUTER SCIENCE

(Outcome Based Syllabus under CBCS Structure for the students admitted from the Academic Year 2022 -2023)

Program Specific Outcome (PSO)

On successful completion of B.Sc Computer Science Programme, the students will be able to

PSO1: Apply fundamental principles and methods of Computer Science for analysing, designing, developing and testing the software solutions and products with creativity and sustainability

PSO2: Apply modern computing tools, skills and techniques necessary for critical problem solving and analyzing industrial and societal requirements

PSO3: Work as a member or leader in diverse teams in multidisciplinary environment.

PSO4: Employ modern computer languages, environments, and platforms for lifelong learning and a zest for higher studies

PSO5: Provide innovative approaches for solving problems in different domain.

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE& APPLICATIONS

Programming in C

Class : B. Sc.(Comp. Sci.)
Semester : I
Subject Code : 23UCSC11

Part III : Core - 1
Hours : 75
Credits: 04

Objectives:

The course enables the students to

- Write the programs for a given problem by using operators and basic statements.
- Demonstrate to use decision making and looping statements to solve the problems.
- Exercise user defined functions to solve real-time problems.
- Integrate pointers, static memory allocations and dynamic memory management functions.
- Implementing file operations in C programming for database programs.

UNIT - I

15 Hours

Overview of C - Introduction - Character set - C tokens - keywords & Identifiers - Constants - Variables - Data types - Declaration of variables - Defining Symbolic Constants - Operators - Arithmetic Expressions - Evaluation of expressions - Type conversion in expressions – operator precedence & associativity - Mathematical functions – Formatted/Unformatted input and output statement.

UNIT - II

15 Hours

Decision Making and Branching: Conditional and Control statements - One- and Two-Dimensional Array - Multidimensional arrays - Declaring and initializing string variables - Writing strings to Screen - Arithmetic operations on Character - String handling Functions.

UNIT - III

15 Hours

Functions: Definition of functions - Return values and their types - Function declaration & call - Category of functions - No Arguments and no return values - Arguments but no return values - Arguments with return values - No Arguments but Returns a value- Functions that return multiple values - Nesting of functions - Recursion.

UNIT - IV

15 Hours

Structure: Definition - Structure initialization - Copying & Comparing structure variables - Operations on individual members - Arrays of structures - Arrays within structures - Structures within structures - Structures and functions - unions - size of structures - Bit fields. Pointers - Understanding pointers - Accessing the Address of variable - Declaring and initializing pointers - accessing a variable through its pointers - Chain of pointers - pointer expressions.

UNIT - V

15 Hours

File management in C - Defining and opening a file - closing a file - I/O operations on files - Error handling during I/O operations - Random access to files - Command line arguments – preprocessor.

Book for Study

1. Balagurusamy. E, *Programming in ANSI C*, Tata McGraw Hill, Fifth Edition, 2011.

Books for Reference

1. Kamthane. N Ashok, *Programming with ANSI and Turbo C*, Pearson Edition Publication, 2002.

2. MullishHenry. L. Cooper L Hubert, *The Spirit of C*, Jaico Publication House, 1996.

Teaching Methods

- Lecturing
- Group Discussion
- Learning by Doing
- Video tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Apply the basic concepts of OOPs for writing the programs for a given problem (K3)

CO2: Understand decision making and looping statements to solve a problem. (K2)

CO3: Apply user defined functions to solve real-time problems. (K3)

CO4: Integrate pointers, static memory allocations and dynamic memory management functions. (K3)

CO5: Implementing file operations in C programming for database programs. (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
Outcome														
CO1	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO2	2	2	2	1	1	3	3	-	-	2	2	2	-	20
CO3	3	2	2	2	2	3	3	-	-	2	2	2	-	23
CO4	3	3	2	2	2	3	3	-	-	2	2	2	-	24
CO5	3	2	2	2	2	3	3	-	-	2	2	2	-	23
Grand Total of COs with POs PSOs														110
Grand total with PSOs and POs														
Mean value of COs with PSOs and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs \& POs}}$ = (110/50)														2.20

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.20
Observation	COs of Programming in C – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Programming in C – Lab

Class : B. Sc. (Comp. Sci.)

Part III : Core Lab-1

Semester : I

Hours : 75

Subject Code: 23UCSP11

Credits : 03

Objectives:

- Understand and trace the execution of programs written in C language.
- Develop C code for a given algorithm.
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
- Develop programs that perform operations using derived data types.
- Write diversified solutions to real-time problems using C language.

Lab Exercises

1. Program to check the prime number
2. Program to print Fibonacci series
3. Program to print factorial value
4. Program using Decision Control Structures
5. Program using Looping Control Structures
6. Program to reverse the given number
7. Program to find biggest of three numbers
8. Program for swapping of two numbers
9. Program using String Functions
10. Program using Arrays
11. Program using Functions
12. Program using Pointers
13. Program using Structure
14. Program using Union
15. Program using file concepts
16. Write a program to open a file
17. **Write a program to close a file**

Teaching Methods

- Learning by Doing
- Demonstration

Course Outcome (CO)

On successful completion of the course students will be able to

CO1: Understand and trace the execution of programs written in C language. (K1)

CO2: Write the C code for a given algorithm. (K3)

CO3: Apply arrays and perform pointer arithmetic, and use the pre-processor. (K3)

CO4: Develop programs that perform operations using derived data types. (K3)

CO5: Write diversified solutions to real-time problems using C language. (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	1	2	1	3	3	-	-	1	1	1	-	20
CO2	3	2	2	2	1	3	2	-	-	2	2	2	-	21
CO3	3	2	2	1	1	3	2	-	-	2	3	2	-	22
CO4	3	2	2	1	2	3	2	-	-	2	3	2	-	23
CO5	3	2	2	1	2	3	3	-	-	2	2	3	-	25
														11
	Grand total with PSOs and POs Mean value of COs with PSOs and POs = $\frac{111}{50}$ = (111/50) Number of COs relating with PSOs & POs													2.22

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.22
Observation	COs of Programming in C Lab – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

PC Hardware and Troubleshooting

Class : B. Sc.(Comp.Sci.)

Part III : Core - 2

Semester : I

Hours : 60

Subject Code : 23UCSC21

Credits : 03

Objectives:

The course enables the students to

- Gain knowledge about the PC components
- Gain knowledge about the Mother boards & Input Devices.
- To gain knowledge about the Output Devices
- Implement troubleshooting techniques to overcome the problems faced in it
- Understand maintenance techniques and tools

UNIT - I

(12 Hours)

CPU: Layout of a typical desktop – Types of computer – Generation of computer. Power supply: Connecting the power supply – AT style power connections – Drive power connections – Voltage tolerances. Parallel port – Serial port – Accelerated graphics port.

UNIT - II

(12 Hours)

Input Devices: Keyboard – Construction – Interfaces. Mouse: Construction – Mechanical and optical - Mechanical sensors – Trackball. Motherboard: structure of motherboard – Types of motherboard.

UNIT - III

(12 Hours)

Printers: Dot matrix printers – Ink jet printers – Laser/LED printers – Monitors – Types of monitor – CRT – Laser – LED – Graphics adapter – VGA – SGA – Digital Visual Interface (DVI) – Video In Video Out (VIVO). Modem: Basic modem construction and operation – Internal and external modem.

UNIT - IV

(12 Hours)

Troubleshooting: the CPU – Audio and Video – Monitor Display – Hard Disk Drive – Installation of Hardware - Power Supply Function and Operation. OS Installation and preventive maintenance – Troubleshooting tools and Techniques – Basic Data Recovery and Disaster Recovery.

UNIT - V

(12 Hours)

PC Maintenance: Creating Backup – Creating System Recovery – Removing unused File and Programs - Disk Cleanup – Disk Defragmenting – Maintenance Scheduling.

Books for Study:

1. Stephen J. Bieglow, *Troubleshooting, Maintaining and repairing PCs*, Tata Mc-Graw 5th Edition, 2013.

Books for Reference:

1. Craig Zacker & John Rourke, *PC Hardware: The complete reference*, Tata Mc - Graw hill, 1st Edition 2012.
2. Govindarajulu. B, *IBM PC and clones: Troubleshooting and maintenance*, Tata Mc - Graw Hill, 2nd Edition, 2012.

Course Outcome (CO)

On successful completion of the course students will be able to

CO1: Identify the main components of PC, power supplies and various ports (K2)

CO2: Explain the function of motherboard and working mechanisms of Keyboard and mouse. (K2)

CO3: Illustrate the types of Monitors, Printers, graphic adapters and their mechanisms (K2)

CO4: Categorize various modems, soundcards and their working. (K2)

CO5: Solve the problems faced in PC by applying the troubleshooting methods. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO	PSO	PSO	PSO	PSO	PO	PO	PO	PO	PO	PO	PO	PO	Sum of COs with PSOs & POs
	1	2	3	4	5	1	2	3	4	5	6	7	8	
CO1	2	1	2	1	1	3	2	-	-	2	1	1	-	16
CO2	2	2	2	1	1	3	2	-	-	2	2	2	-	19
CO3	3	3	2	1	2	3	3	-	-	2	3	3	-	25
CO4	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO5	3	3	3	1	2	3	3	-	-	2	2	2	-	24
Grand Total of COs with Pos PSOs														104
Grand total with PSOs and POs														2.08
Mean value of COs with PSO and POs = $\frac{104}{50}$ = (104/50) Number of COs relating with PSOs & Pos														

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.08
Observation	COs of PC Hardware and Troubleshooting – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514

DEPARTMENT OF COMPUTER SCIENCE& APPLICATIONS

Digital Computer Fundamentals

Class : B.Sc (Comp.Sci)

Part III : Allied -1

Semester : I

Hours : 45

Subject Code : 23UCSA11

Credit : 03

Objectives:

The course enables the students to

- Write a digital logic and apply it to solve real life problems.
- Understand the basic concepts combinational logic circuits.
- Identify the concept of ALU and Data processing model in various processors.
- Identify the basic working principles of flip-flops with different architecture.
- Design real-time circuits by using shift registers and counters.

UNIT – I

09 Hours

Number Systems and Codes: Number System – Base Conversion – Binary Codes – Code Conversion. Digital Logic: Logic Gates – Truth Tables – Universal Gates.

UNIT – II

09 Hours

Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification of Boolean Functions – Using Theorems, K-Map, Prime – Implicant Method – Binary Arithmetic: Binary Addition – Subtraction – Various Representations of Binary Numbers – Arithmetic Building Blocks – Adder – Subtractor.

UNIT – III

09 Hours

Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders – Code Converters – Parity Generators and Checkers.

UNIT – IV

09 Hours

Sequential Logic: RS, JK, D, and T Flip-Flops – Master-Slave Flip-Flops. Registers: Shift Registers – Types of Shift Registers.

UNIT – V

09 Hours

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-Down Counters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs – Types of RAMs.

Books for Study

1. V. Rajaraman and T. Radhakrishnan, Digital Computer Design, Prentice Hall of India, 2001.
2. D.P. Leach and A.P. Malvino, Digital Principles and Applications, TMH, 5th Edition, 2002.

Books for Reference

1. Mano Morris. M, *Digital Logic and Computer Design*, PHI, 2017.
2. T.C. Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill, 1991.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video Tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Analyze digital logic and apply it to solve real life problems. (K4)

CO2: Apply combinational logic circuits for a required circuit (K3)

CO3: Understand the concept of ALU and Data processing model in various processors. (K2)

CO4: Identify the basic working principles of flip-flops with different architecture. (K2)

CO5: Develop real-time circuits by using shift registers and counters. (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
Outcome														
CO1	3	3	2	2	1	3	3	-	-	2	1	1	-	21
CO2	2	2	2	2	1	3	2	-	-	2	2	2	-	20
CO3	3	3	2	2	2	3	3	-	-	2	3	3	-	26
CO4	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO5	3	3	3	1	2	3	3	-	-	2	2	2	-	24
	Grand Total of Cos with Pos PSOs													111
	Grand total with PSOs and POs													
	Mean value of COs with PSO and POs = $\frac{111}{50}$ = (111 / 50)													2.22
	Number of COs relating with PSOs & POs													

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.22
Observation	COs of Digital Principles – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Object Oriented Programming with C++

Class	: B.Sc (Comp.Sci)	Part II	: Core - 3
Semester	: II	Hours	: 75
Subject Code	: 23UCSC32	Credits	: 04

Objectives:

The course enables the student to

- Understand the need of object oriented design principles in problem solving.
- Understand the dynamic memory management techniques using pointers, constructors, destructors.
- Develop programs using the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Use various OOPs concepts with file stream classes.

UNIT I

15 Hours

Introduction to C++ - key concepts of Object - Oriented Programming - Advantages - Object Oriented Languages - I/O statement - declarations. Control Structures:-Decision Making and looping Statements - Functions: Inline functions - Function Overloading – string functions - Miscellaneous functions.

UNIT II

15 Hours

Classes and objects: Declaring Objects - Defining Member Functions - Static Member Variables and Functions - Array of objects - friend functions - Overloading member functions - Bit fields and classes - Constructor and destructor.

UNIT III

15 Hours

Operator overloading unary operators - overloading friend functions - type conversion - inheritance: types of inheritance - single, multilevel, multiple, hierarchal, hybrid inheritance - virtual base classes – abstract classes.

UNIT IV

15 Hours

Pointers - Declaration - Pointer to Class, Object - This pointer - Pointers to derived classes and Base classes - Arrays - Characteristics - Array of classes - Memory models - new and delete operators - dynamic object - binding , polymorphism and virtual functions.

UNIT V

15 Hours

Files - file stream classes - file modes - Sequential read / write operations - Binary and ASCII Files - Random Access Operation - Templates

Book for Study

1. Balagurusamy. E, *Objects Oriented Programming with C++*, Sixth Edition, Tata McGraw-Hill Publication, 2013.

Books for Reference

1. Kamthane N Ashok, *Object Oriented Programming with ANSI and Turbo C++*, Pearson Education Publication, 2003.
2. LitvinMaria, Gray, *C++ for You*, Vikas Publication, 2002.
3. Hubbard R. John, *Programming with C*, Second Edition, TMH Publication, 2002.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video Tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Understand the need of object oriented design principles in problem solving. (K2)

CO2: Understand dynamic memory management techniques using pointers, constructors, destructors (K2)

CO3: Develop programs using the concept of function overloading, operator overloading, virtual functions and polymorphism. (K3)

CO4: Develop programs using the concept of early and late binding, usage of exception handling, generic programming. (K3)

CO5: Apply various OOPs concepts with file stream classes. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	1	1	2	2	1	3	3	-	-	2	1	1	-	17
CO2	2	2	2	2	1	3	2	-	-	2	2	2	-	20
CO3	3	3	2	1	2	3	3	-	-	2	3	3	-	25
CO4	3	2	2	1	2	3	3	-	-	2	2	1	-	21
CO5	3	3	3	1	2	3	3	-	-	2	2	2	-	24
	Grand Total of COs with POs PSOs													107
	Grand total with PSOs and POs													
	Mean value of COs with PSOs and POs = $\frac{107}{50}$ = 2.14													
	Number of COs relating with PSOs & POs													

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.14
Observation	COs of Object Oriented Programming with C++ – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
Object Oriented Programming Lab

Class	: B.Sc (Comp. Sci)	Part III	: Core Lab - 2
Semester	: II	Hours	: 75
Subject Code	: 23UCSP22	Credits	: 03

Objectives:

The course enables the student to

- Apply C++ features to program design and implementation.
- Demonstrate practical experience in developing object-oriented solutions.
- Apply object oriented techniques to solve bigger computing problems.
- Develop programs using file concepts
- Implement file concepts to develop projects with real world problems.

Lab Exercises

1. Armstrong Number Generation
2. To print right angled pyramid of numbers
3. Printing the name randomly on screen with colored text
4. Generating N Random Numbers between two specified numbers
5. To find total number of days from given month of year
6. Program using inline function
7. To generate random numbers
8. Implementing the use of reference variables
9. Write a program for magic Number
10. Program using Classes and Objects
11. Program using *Constructor and destructor*
12. Program using *inheritance*
13. Program using operator overloading
14. Program using Files
15. Case Study

Course Outcomes:

On successful completion of the course students will be able to

CO1: Apply C++ features to program design and implementation. (K3)

CO2: Understand the OOPs concepts in developing solutions. (K2)

CO3: Apply object oriented concepts to solve computing problems. (K3)

CO4: Develop programs using file concepts. (K3)

CO5: Implement file concept to develop projects with real world problems. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	2	1	-	3	3	-	-	2	1	1	-	18
CO2	2	2	2	2	1	3	2	-	-	2	2	2	-	20
CO3	3	3	2	2	2	3	3	-	-	2	3	3	-	26
CO4	3	2	2	2	1	3	3	-	-	2	2	1	-	21
CO5	3	3	3	1	2	3	3	-	-	2	2	2	-	24
	Grand Total of Cos with Pos PSOs													109
	Grand total with PSOs and POs Mean value of COs with PSOs and POs = $\frac{109}{50}$ = (109/50) Number of COs relating with PSOs & POs													2.18

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.18
Observation	COs of Object Oriented Programming Lab Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

WEB DESIGNING

Class : B.Sc. (Comp. Sci.)

Part III : Core 4

Semester : II

Hours : 60

Subject Code : 23UCSC42

Credit : 03

Objectives:

The course enables the student to

- Apply basic HTML concepts in creating program.
- Understand the tags of creating tables, frames and forms.
- Apply CSS concept in design smart web site.
- Understand the usage of Photoshop tools.
- Understand the techniques for image enhancement

UNIT I

12 Hours

HTML: Introduction to HTML – title – document tags – fonts – background - heading level tags - creating paragraph and line break – Editing & Formatting.

UNIT II

12 Hours

Creating hypertext link and link list – using Inline images – relative URL – horizontal rules.- Tables - Rows – Columns – Cell columns – Centering table. – Frames – Creating two row frames – forms - Image map.

UNIT III

12 Hours

Dynamic HTML: CSS: Introduction – Inline styles – Creating styles sheets with the style element – Conflicting styles – Linking external style sheets – Positioning Elements – Backgrounds – Element Dimensions – Text flow and the Box model – user style sheets.

UNIT IV

12 Hours

PHOTOSHOP : Introduction – images basics – file formats – GIF, JPEG, PNG, PSG - color palette – layers – creating new images – brushes – grids and guides – scaling and positioning images – moving and merging layers – tool palette – screen capturing – grey styling – animation.

UNIT V

12 Hours

Scanning images – Adding text to the images – designing icons – creating background images – color models – color depths – color calibration – creating gradients – oil paint effect.

Book for Study

1. Schrand Richard, *Photoshop 6 Visual Jumbstrat*, Adobe Press, 2000.

Books for Reference

1. Deitel, *Internet and World Wide Web How to program*, Prentice Hall, Third Edition, 2003.

2. Reinhardt Robert, Lentz Warren John, *Flash 5 Bible*, Hungry Minds Inc, 2001.

3. Meenakshi GM, *Web Graphics*, SCITECH Publication, 2007.

Course Outcomes:

On successful completion of the course students will be able to

CO1: Develop static web pages using HTML program. (K3)

CO2: Develop web pages with table, frame and form tags. (K3)

CO3: Develop Web site using CSS Concepts. (K3)

CO4: Design invitation and flex for real time scenario(K3)

CO5: Understand the concept of Internet. (K2)

K1=RememberK2=UnderstandK3=ApplyK4=AnalysisK5=EvaluateK6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
Outcome														
CO1	1	1	2	2	-	3	3	-	-	2	2	2	-	18
CO2	2	2	2	2	1	3	3	-	-	2	2	2	-	21
CO3	3	3	2	2	2	3	3	-	-	3	3	3	-	27
CO4	3	2	2	2	1	3	3	-	-	2	3	1	-	22
CO5	3	3	3	2	2	3	3	-	-	2	3	2	-	26
	Grand Total of Cos with POs PSOs													114
	Grand total with PSOs and POs													
	Mean value of COs with PSOs and POs = $\frac{114}{50}$ = (114 / 50)													2.28
	Number of COs relating with PSOs & POs													

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.28
Observation	COs of Web Designing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
DISCRETE MATHEMATICS

Class	: B.Sc (Comp.Sci)	Part III : Allied- 2
Semester	: II	Hours : 45
Subject Code	: 23UCSA22	Credits : 03

Objectives:

The course enables the student to

- Understand the concept of Set Theory
- Understand the concept of Mathematical Logic
- Apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
- Solve mathematical properties formally via the formal language of propositional logic and predicate logic.
- Apply the concepts of tree and graph algorithms to solve problems.

UNIT I

09 Hours

Set theory: Introduction-set & its Elements - set Description - types of sets - Venn-Euler Diagrams - set operations & law of theory - fundamental products-partitions of sets min sets - Algebra of sets and Duality-inclusion and exclusion principle.

UNIT II

09 Hours

Mathematical logic: Introduction - prepositional calculus – Basic logical operations - Tautologies-Contradiction- Argument- method of proof- predicate calculus.

UNIT III

09 Hours

Relations: Binary Relations- set operation on relations-Type of Relations – Partial Order relation - Equivalence relation - Composition of relations-Functions: Types of functions - invertible functions -Composition of functions.

UNIT IV

09 Hours

Languages - Operations on languages - Regular Expressions and regular Languages – Grammar: Types of Grammars - Finite state machine - Finite-State automata.

UNIT V

09 Hours

Graph theory: Basic terminology-paths, Cycle & Connectivity- sub Graphs: Types Of graphs - Representation of graphs in compute memory- trees- properties of trees- Binary Trees - traversing Binary trees –Computer Representation of general trees.

Book for study

1. Sharma J.K, *Discrete Mathematics*, Macmillan India Ltd, Second Edition, 2005.

Books for Reference

1. Themblay J.P, Manohar R, *Discrete Mathematics Structures with Applications to Computer Science*, McGraw Hill International, 1987.
2. Venketaramen. M.K, Sridharan.N, Chadarasekaran. N, *Discrete Mathematics*, The National Publishing Company, Chennai.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Construct simple mathematical proofs and possess the ability to verify them. (K1)

CO2: Have substantial experience to comprehend formal logical arguments. (K2)

CO3: Apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction. (K3)

CO4: Solve mathematical properties formally via the formal language of propositional logic and predicate logic. (K4)

CO5: Use tree and graph algorithms to solve problems. (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	1	1	2	-	1	3	3	-	-	1	1	1	-	14
CO2	2	2	2	-	1	3	2	-	-	2	2	2	-	18
CO3	3	3	2	-	2	3	3	-	-	2	2	3	-	23
CO4	3	2	2	-	1	3	3	-	-	2	2	1	-	19
CO5	3	3	3	-	2	3	3	-	-	2	2	2	-	23
Grand Total of Cos with Pos PSOs														97
Grand total with PSOs and POs														
Mean value of Cos with PSOs and POs = $\frac{97}{45}$ = (97 / 45)														2.15
Number of COs relating with PSOs & POs														

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.15
Observation	COs of Discrete Maths– Strongly related with PSOs and POs		

**ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS**

PROGRAMMING IN JAVA

Class : B.Sc.(Comp. Science)
Semester : III
Subject Code : 23UCSC53

Part III : Core -5
Hours : 60
Credits : 4

Objectives:

The course enables the students to

- Understand Programming structure, Object oriented concepts, JVM and Datatypes
- Apply the fundamentals of programming such as conditional and iterative execution, classes & methods.
- Apply the unique features of java such as interfaces, multithreaded programming & packages.
- Design User Interface Components.
- Develop database and file management concepts

UNIT I

12 Hours

Fundamentals of objects-oriented programming: Basic concepts of object oriented programming. **Overview of java:** simple java program - structure - java tokens-statements - javavirtualmachine-Constants-Variables-DataTypes-Operator-Expressions.

UNIT II

12 Hours

Decision Making and Branching-Decision Making and Looping classes, objects and methods:Defining class-creating object-accessing class members-constructors-method overloading - static members - Nesting of methods – Inheritance - Overriding methods – Arrays -String-Vectors.

UNIT III

12 Hours

Interfaces: Multiple Inheritances - Defining Interface - Extending Interface –Implementing Interface - Accessing Interface variables - **Packages:** Java API Packages - user defined packages –**Multithreaded programming:**Introduction-Creating threads -Extending the thread class-Lifecycle of a thread –thread exceptions-thread priority -synchronization.

UNIT IV

12 Hours

Managing Errors and Exceptions: Types of Errors – Exceptions - syntax of Exception Handling. Swing - The MVC Architecture and Swing, Layout Manager and Layouts, The JComponent class, Components – JButton, JLabel, JText, JText Area, JCheck Box and JRadio Button, JList, JCombo Box, JMenu and JPopup Menu Class, JMenuItem and JCheck Box MenuItem, JRadio Button MenuItem, JScroll Bar, Dialogs (Message, confirmation, input), JFile Chooser, JColor Chooser, Event Handling: Event sources, Listeners, Mouse and Keyboard Event Handling, Adapters

UNIT V

12 Hours

Managing Input/output Files in Java: Concept of streams-Stream classes-bytestream Classes-character stream classes-Exception-creation of files-reading/writing character –Introduction to JDBC, Essential JDBC classes, Connecting to database, Inserting data in database, Retrieving data from database, deleting data in database, updating data in database, store image in the database, to retrieve image from database, to store file in database, retrieve file from database

Book for Study

1. Balagurusamy.E, Programming with Java-A Primer, Sixth Edition, 2019, TMH.

Books for Reference

1. Naughton Patrick, Schildt Hebert, *The Complete Reference Java 2*, Ninth Edition, 2014, TMH.
2. Hubbard R.John, *Programming with Java*, Second Edition, 2006, TMH.

Web References

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview
2. <https://www.geeksforgeeks.org/java/>
3. <https://docs.oracle.com/javaee/7/index.html>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

- CO1:** Understand the basic concepts to solve standalone applications (K2)
CO2: Apply Java control statements and methods for complex Programs (K3)
CO3: Design and develop applications using unique features (K6)
CO4: Ability to develop graphics applications (K6)
CO5 : Demonstrate JAVA using window components and JDBC. (K3)

K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	2	1	1	-	1	1	2	1	1	16
CO2	3	2	-	-	2	2	1	-	2	2	2	1	1	18
CO3	3	3	-	-	2	3	1	-	3	3	2	2	2	24

CO4	3	3	-	-	2	2	1	-	3	2	2	2	1	21
CO5	3	3	-	-	2	2	1	-	3	3	3	2	2	24
Grand total of COs with PSOs and POs													103	
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs/ Number of COs relating with PSOs and POs=(103/50)													2.06	

Strong-3, Medium-2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to1.0	1.01to2.0	2.01to3.0
Quality	Low	Medium	Strong
Mean Value of COs With PSOs and POs			2.06
Observation	COs of Programming in Java-Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
PROGRAMMING IN JAVA-LAB

Class : B. Sc. (Computer Science)

Part : Core Lab- 3

Semester : III

Hours : 75

Subject Code : 23UCSP33

Credits : 03

Objectives:

The course enables the students to

- Understand basics of JAVA programs and its execution.
- Develop applications on Arrays, Strings & Vectors & Patterns.
- Develop programs on Object Oriented Programming
- Design User Interface Elements
- Develop applications on JDBC.

List of Exercises

JAVA Programs on Decision Making/Looping

1. Calculating Batting Average.
2. Calculate average Marks
3. Factorial program in Java
4. Sum of N Numbers
5. Sum of Digits
6. Reverse String
7. HCF & LCM of Two Numbers
8. Food order & billing using Switch.
9. Prime Number Generation
10. Armstrong Number Generation

JAVA Programs on Arrays

11. Matrix Addition/Subtraction
12. Matrix Multiplication
13. Transpose of Matrix
14. Linear Search/Binary Search
15. Reverse a Number.

JAVA Programs on Patterns

16. Print Pyramid Star Pattern
17. Print Diamond star Pattern
18. Print Square Star Pattern
19. Hollow Inverted Right Triangle Star Pattern

JAVA Programs on Classes & Object

20. To implement stack and queue concept.
21. Dynamic polymorphism and interfaces.
22. Multithreaded producer and consumer application.
23. Customized exception and also make use of all the 5 exception keywords.
24. Program to implement Inheritance.

JAVA Programs on User Interface Elements

24. Develop a scientific calculator using swings.
25. Create a simple editor using swing.

Working on Database

26. Create Database and Tables, DDL, DML commands.
27. Working on Aggregate functions & Wild Cards.
28. Working on joins.
29. Working on Nested Queries.
30. JAVA Programs on Java Database Connectivity
31. Develop Java application to implement Insert, Update, Delete, and Search Options.

Outcomes:

On successful completion of the course the students able to

- CO1:** Apply Java compiler and eclipse platform to write and execute java program(K3)
- CO2:** Understand and Apply Object oriented features and Java concepts(K3)
- CO3:** Apply the concept of multithreading and implement exception handling (K3)
- CO4:** Access data from a Database with java program.(K3)
- CO5:** Develop applications using ConsoleI/O and File I/O, GUI applications (k6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	2	1	2	3	3	-	-	2	1	1	-	20
CO2	2	2	2	2	2	3	2	-	-	2	2	2	-	21
CO3	3	3	2	2	2	3	3	-	-	2	3	3	-	26
CO4	3	2	2	2	1	3	3	-	-	2	2	1	-	21
CO5	3	3	3	1	2	3	3	-	-	1	1	1	-	21
	Grand Total of COs wit PSOs and POs													109
	Mean Value of COs with PSOs and POs =Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(109/50)													2.18

Strong-3, Medium-2, Low - 1

Mapping Scale	1	2	3
Relation	0.01to1.0	1.01to2.0	2.01to3.0
Quality	Low	Medium	Strong
Mean Value of COs With PSOs and POs			2.18
Observation	COs of Programming in JAVA-Lab Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
DATA STRUCTURES AND ALGORITHMS

Class : B.Sc. (Comp. Science)
Semester : III
Subject Code : 23UCSC63

Part III : Core-6
Hours : 60
Credit : 3

Objectives:

The course enables the students to

- Understand and remember algorithms and its analysis procedure.
- Understand the concepts of data structures through Stack & Queue ADT
- Familiar with implementation of Linked List data structures
- Familiar with Searching and Sorting algorithms and its complexities
- Apply the concepts of advanced data structure such as binary tree, Hash and Symbol table.

UNIT I

12 Hours

Abstract Data Types – Algorithm – Algorithm Analysis – Goal of Analysis of Algorithm –Running Time Analysis – comparing Algorithms – Types of Analysis – Recursion and Back Tracking.

UNIT II

12 Hours

Stacks and Queues: Fundamentals-Stack- usage of Stack- Stack ADT- Applications-Queue- usage of Queue - Queue ADT-Operations-Applications.

UNIT III

12 Hours

Linked Lists: Linked List– Linked List ADT – Comparison of linked list with Arrays – Singly linked list – Doubly linked list –Circular linked list.

UNIT IV

12 Hours

Searching and Sorting: Types of Searching – Linear search types – Binary Search – Interpolation search – Sorting – Classification of sorting – Bubble sort- Insertion sort –Selection sort – shell sort –merge sort – heap sort –quick sort – Radix sort – Topological sort – External sorting.

UNIT V

12 Hours

Tree – Binary Tree – Binary tree traversal – Generic trees (N-ary trees) – Threaded Binary tree – Expression tree – Binary search tree - AVL tree – Symbol table – Hashing – Hash Functions – Hash tables – Collisions – Collision resolution techniques.

Book for Study:

1. Karumanchi Narasimha, *Data Structures and Algorithms Made Easy Data Structure and Algorithmic Puzzles*, Second Edition, 2011, Careermonk Publications.

Books for Reference:

1. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++*, 4th edition, 2013, Person Publications.
2. Horowitz Ellitz, Sahni Sartaj, *Data Structures*, Second Edition, 2012,Universities Press.

Web Reference:

1. <https://nptel.ac.in/courses/106106130>

2. https://w3.cs.jmu.edu/spragunr/CS240_F12/ConciseNotes.pdf
3. https://www.tutorialspoint.com/data_structures_algorithms/dsa_quick_guide.htm
4. <https://www.geektonight.com/data-structures-and-algorithms-notes/>
5. <https://www.javatpoint.com/data-structure-tutorial>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

CO1: Analyze the algorithm for the specific problem (K4)

CO2: Apply the functions of linear data structures. (K3)

CO3: Understand the advanced linear data structure (K2)

CO4: Implement appropriate sorting/searching technique for given problem. (K3)

CO5: Understand the hashing and function of collision (K2)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	2	2	-	-	1	2	2	-	3	2	1	1	1	17
CO2	3	3	-	-	1	2	1	-	2	1	1	1	1	16
CO3	3	2	-	-	1	1	1	-	2	1	2	1	1	15
CO4	3	3	-	-	1	1	1	-	3	2	1	1	2	18
CO5	3	3	-	-	1	1	1	-	3	2	1	1	2	18
Grand total of COs with PSOs and POs														84
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(84/50)														1.68

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs		1.68	
Observation	COs of Data Structures and Algorithms – Medium related with PSOs and Pos		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
COMPUTER ORGANIZATION AND ARCHITECTURE

Class : B.Sc. (Comp. Sci)
Semester : III
Subject Code : 23UCSA33

Part III : Allied - 3
Hours : 60
Credit : 03

Objectives:

The course enables the students to

- Gain knowledge of architectural development of computer system components
- Explore functional components of CPU and their roles
- Get exposure on computer instruction formats and types
- Classify memory components with respect to their storage capacity and speed
- Explore interfacing methods for both input and output devices with CPU

UNIT – I EVOLUTION AND CLASSIFICATION

12 Hours

Mechanical calculating Machines – Vacuum Tube computers – Transistorized Computers – Integrated Circuit Computers – VLSI computers – Computer level hierarchy – The Von-Neumann model – Parallel processors

UNIT – II CPU ARCHITECTURE

12 Hours

CPU Components – Registers – Accumulator Logic Unit – Control Unit – Bus Subsystem – Input and Output subsystem – Interrupts and Interrupt service routines

UNIT – III INSTRUCTION SET ARCHITECTURES

12 Hours

Instruction Processing – Instruction Cycle – Interrupt Cycle - Instruction Formats – Instruction types – Instruction Decoding - Instruction Pipelining – Addressing modes

UNIT – IV MEMORY ARCHITECTURE

12 Hours

Types of memory – Memory hierarchy – RAM – ROM – Cache memory – Associative Memory – Secondary Storages – Virtual memory – Paging – Page replacement algorithms

UNIT – V INPUT AND OUTPUT ARCHITECTURE

12 Hours

I/O and Performance – I/O Control methods – Programmed I/O – Interrupt-driven I/O – Memory mapped I/O – Direct Memory Access – Channel attached I/O – I/O Processor - Character I/O – Block I/O – Bus operation

Book for study

1. Linda Null & Julia Lobur, The Essentials of Computer Organization and Architecture, 2015, Jones and Bartlett Learning.

Books for Reference

1. Aharon Yadin, Computer Systems Architecture, 2016, CRC Press.
2. Stanley Warford, Computer Systems, 2017, Jones and Bartlett Learning.

Web References

1. Computer Architecture and Organization-<https://nptel.ac.in/courses/106105163>
2. Computer Architecture-<https://nptel.ac.in/courses/106102157>
3. Introduction to Computer Architecture-<https://nptel.ac.in/courses/106102062>

Teaching Methods

- Lectures with notes

- Group Discussions
- Visual aids
- Assignment and Tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Review the formal evolution of computer system architectures (K1)

CO2: Explore CPU components and their interconnections (K2)

CO3: Analyze instruction formats and decoding mechanism of an instruction (K4)

CO4: Classify memory with respect to its hierarchy of capacity and speed (K3)

CO5: Explore various I/O control methods and their functional characteristics (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO2	2	2	2	1	1	3	3	-	-	2	2	2	-	20
CO3	3	2	2	2	2	3	3	-	-	2	2	2	-	23
CO4	3	3	2	2	2	3	3	-	-	2	2	2	-	24
CO5	3	2	3	3	2	3	3	-	-	2	2	2	-	25
Grand Total of COs with POs PSOs														112
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(112/50)														2.24

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.24
Observation	COs of this course is strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
WEB DESIGNING

Class : B.Sc.(Comp. Sci.)

Part III : NME-1

Semester : III

Hours : 45

Subject Code : 23UCSN13

Credit : 02

Objectives:

The course enables the students to

- Understand and apply the basic HTML tags to create attractive web pages.
- Demonstrate to link web pages; create table and frames within the web page.
- Work with various image files and various transformation of images
- Apply various effects and making color correction with the scanned images.
- Perform simple animation in Flash environment.

UNIT I: HTML

(9 Hours)

Introduction of HTML - Writing my first HTML Page - Basic tags used in HTML: Heading Tags - Paragraph Tag - Line Break Tag - Centering Content - Horizontal Line - Preserve Formatting - Non Breaking Spaced - Elements In HTML: Elements in HTML – HTML Tag Vs Element - Formatting tags in HTML

UNIT II:

(9 Hours)

Images and incorporating images , working with Tables , Working with Lists , Working with hyperlinks - Frames and frame management - Forms and Form Management

UNIT III: PHOTOSHOP

(9 Hours)

Introduction - Getting started with Photoshop – The Photoshop Program Window: Menu bar – The Options bar – Image Window – Ruler – Palletes – The Toolbox - Working with images: Image Size – Image Resolution – Editing Images – Color Modes – Setting the Current Foreground and Background colors – File Formats

UNIT IV:

(9 Hours)

Painting Tools, Drawing Tools and Retouching Tools – Layers: Layers Palette – Working with Layers – New Layer via Cut and Copy – Hiding and Showing Layers – Flattening Images – Working with Adjustment Layers – Layer Effects - Type Tool: Changing the Type Settings – Type Masking

UNIT V: FLASH

(9 Hours)

Introduction to Flash – Flash Interface: Stage – Timeline – Library – Drawings and Symbols – Flash Project Properties – Timeline and Frames – Animation: Frame by Frame Animation – Tween Animation

Books for Study

1. C. Xavier, Web Technology and Design, 2007, New Age International publishers.
2. Schrand Richard, *Photoshop 6 visual Jumpstart*, 2000, Adobe Press. (Unit I, II&III).
3. Mohles L. James, *Flash 5.0 Graphics, Animation & Interaction*, Macromedia, 2000, World Press. (Unit IV & V).

Books for Reference

1. Deitel, *Internet and World Wide Web How to Program*, Third Edition, 2003, Prentice Hall.
2. Reinhardt Robert, Lentz Warren Jon, *Flash 5 Bible*, 2001, Hungry Minds Inc.
3. Meenakshi G M, *Web Graphics*, 2007, SCITECH Publication.

Web References

1. <https://www.geeksforgeeks.org/html-basics>

2. <https://www.educba.com/adobe-photoshop-tools>
3. <https://www.photoshopesentials.com/basics>
4. www.tutorialboneyard.com/simple-flash-animation/
5. <https://www.instructables.com/Flash-Animation-Basics>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

CO1: Understanding the HTML concepts. (K2)

CO2: Apply HTML tags to create static web pages including links and frames. (K6)

CO3: Analyze to work on image files using various Photoshop tools. (K4)

CO4: Apply various color effect for image manipulation (K3).

CO5: Understand the concepts of timeline motion to create simple Animation. (K4)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	1	2	2	-	3	2	2	2	2	22
CO2	3	3	-	-	1	2	2	-	3	2	2	2	2	22
CO3	3	3	-	-	1	3	2	-	3	1	2	2	2	22
CO4	3	3	-	-	1	3	2	-	3	1	2	2	2	22
CO5	3	3	-	-	1	3	1	-	2	1	2	1	1	18
Grand total of COs with PSOs and POs														106
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(106/50)														2.12

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.12
Observation	COs of Web Designing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514.
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
QUANTITATIVE APTITUDE AND REASONING

Class : B.Sc. (Comp. Sci.) **Part** : IV SBE - 1
Semester : III **Hours** : 45
Subject Code : 23UCSS13 **Credits**: 2

Objectives:

The course enables the students to

- Apply the various techniques to manipulate the numerical values.
- Understand the methods to solve the problems in percentage and Time.
- Understand the methods to solve the Problems in Ratio and Speed.
- Analyze the data from the graphical output.
- Understand the techniques to improve the Analytical and Reasoning skill.

Unit I (9 Hours)
Arithmetic: Numbers - Progressions (Sequences & Series) –Number Series- LCM and HCF Simplifications – Square roots, Cube roots, - Problems on Numbers - Average.

Unit II (9 Hours)
Percentages – Profit & Loss - Interest (Simple and Compound) – Partnership - Time and Distance -Time and Work – Surds and Indices.

Unit III (9 Hours)
Ratio & Proportion - Problems on Ages - Problems on Trains – Boats and Streams – Alligations or Mixture – Calendar.

Unit IV (9 Hours)
Data Interpretation: Tabulation - Pie Charts - Bar Graphs - Line Graphs -Venn Diagrams (Syllogism).

Unit V (9 Hours)
Reasoning: Letter and Symbols Series- Coding-Decoding- Seating Arrangement (circle) - Letter –Word Problems-Mathematical Operations (Inequality).

Books for Study

1. Aggarwal R. S, *Quantitative Aptitude for Competitive Examinations*, Seventh Revised Edition, S.Chand and Co Ltd, 2012, New Delhi.
2. Aggarwal .R. S, *Modern Approach to Verbal and Non Verbal Reasoning*”, [Revised Edition](#), S.Chand and Co Ltd., 2012, New Delhi.

Book for Reference

1. *Barron’s Guide for GMAT*, 2006, Galgotia Publication, New Delhi.

Web Reference

1. Arithmetic: <https://unacademy.com/course/course-on-quantitative-aptitude-arithmetic/MTXF8I8N>
2. Percentages: <https://www.javatpoint.com/aptitude/percentage>
3. Ratio & Proportion : <https://www.geeksforgeeks.org/ratio-and-proportion-gg/>
4. DataInterpretation(Charts):https://www.tutorialspoint.com/quantitative_aptitude/aptitude_bar_charts.htm
5. Reasoning : <https://www.javatpoint.com/aptitude/problem-on-ages-1>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course, Students able to

CO1: Apply the skills to solve numerical problems. (K3)

CO2: Understand the techniques to solve the problems based on Percentage and Time.(K2)

CO3: Understand the techniques to solve the problem in Ratio and Speed. (K2)

CO4: Analyze the data of the graphical output.(K4)

CO5: Understand and solve the Analytical problems. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

Objectives Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	1	2	1	-	2	1	1	1	1	16
CO2	3	3	-	-	2	2	1	-	2	1	1	1	1	17
CO3	3	3	-	-	2	2	1	-	1	2	1	2	1	18
CO4	3	3	-	-	2	1	1	-	1	2	1	2	1	17
CO5	3	3	-	-	1	3	1	-	2	2	1	1	1	18
Grand total of COs with PSOs and POs														86
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(86/50)														1.72

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs		1.72	
Observation	COs of Quantitative Aptitude and Reasoning– Medium related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE

Class : B.Sc (Comp.Sci)
Semester : III
Subject code : 23UCSSL3

Part : Self Learning Course
Hours :
Credit : 03

SOFTWARE PROJECT MANAGEMENT

Objectives:

On Successful completion of the course the students should have:

- Learnt to acquire a set of skills for planning and implementing a software projects.
- Learn to acquire a set of skills for managing Cost and Time.
- Learn to access the control risk in project management.

UNIT I

What is a project – Traditional Project Management – Scoping the project – identifying Project Activities.

UNIT II

Estimating duration, Resource Requirements and Cost – constructing and analyzing the project Network Diagram – Finalizing the Schedule and Cost Based on Resource Availability – Organizing and conducting the joint project planning session.

UNIT III

Recruiting Organizing and managing the project team – Monitoring and controlling progress – Closing out the projects – Critical Chain Project Management.

UNIT IV

Introduction to Adaptive Project Framework – version scope – Cycle Plan – Cycle Build – Client Checkpoint – Post – Version Review – Variations to APF

UNIT V:

Organizational Considerations – Project Portfolio Management – Project Support Office.

Book for Study

1. Robert K.Wyzocki, RuddMcGary, *Effective Project management*, WILEY – Dreamtech India pvt.Ltd., 2003.

Books for Reference

1. Pressman S. Roger, *Software Engineering A Practitioner's Approach*, Fourth Edition, McGraw Hill International,2000.
2. Somerville Ian, *Software Engineering*, Fifth Edition, Addison Wesley Publications, 1996.
3. Hughes Bob, Cotterell Mike, *Software and Project Management*, Tata McGraw - Hill Publishing Company Limited, Third Edition, 2004.
4. Royce Walker, *Software Project Management*, Addison - Wesley,1998.

Mapping

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of Cos with PSOs&Pos
Outcome														
CO1	1	1	2	-	-	3	3	-	1	2	2	2	-	17
CO2	2	2	2	-	1	3	3	-	2	2	2	2	-	21
CO3	3	3	2	-	2	3	3	-	1	3	3	3	-	26
CO4	3	2	2	-	1	3	3	-	2	2	3	1	-	22
CO5	3	3	3	-	2	3	3	-	1	2	3	2	-	25
	Grand Total of Cos with POs and PSOs													111
	<p style="text-align: center;">Grand total with PSOs and POSs</p> <p>Mean value of Cos with PSO and POs = $\frac{111}{49}$</p> <p style="text-align: center;">Number of Cos relating with PSOs& POs</p>													2.26

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.26
Observation	COs of Software Project Management – Strongly related with PSOs and POs		

**ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS**

WEB PROGRAMMING

Class : B. Sc. (Comp. Sci.)

Part III : Core - 7

Semester : IV

Hours : 75

Subject Code : 23UCSC74

Credits : 04

Objectives:

The course enables the students to

- explore HTML elements and hyper linked web documents
- explore CSS design patterns and templates
- explore the ways of incorporating external scripts and objects with web documents
- get exposure to develop PHP scripts and applications
- get exposure on database programming and web portal design by using PHP

UNIT – I: INTRODUCTION TO WEB PROGRAMMING

15 Hours

Creating web pages and web sites – Web page uploads – Web Hosting services - Example page designs – HTML elements – HTML Tags and attributes – Structural elements – Evolution of HTML – HTML governing bodies and forums – Compatibility issues of versions - Body elements – Block elements – coding conventions – comments – Content model categories – Creating hyperlinks – HTML Form elements

UNIT – II: WEB PAGE DESIGN WITH CSS

15 Hours

Overview – CSS rules – Syntax and Styles – Class selectors – ID selectors – Span and DIV elements – Cascading – Style attributes – Style container – External CSS files – CSS properties – Color properties – RGB Values – Opacity Values – Font properties – Text Properties – Border properties

UNIT – III: WEB PAGE DESIGN WITH JAVASCRIPT

15 Hours

Characteristics of Scripting languages - History of Javascript – functions – Variables and Identifiers – Statements and Objects – Document Object Model – Forms – Controls – Accessing form control values – Reset and Focus methods – Comments – Coding conventions – Event handler attributes – Conditional statements – Loop statements – External scripts

UNIT – IV: WEB PAGE DESIGN WITH PHP

15 Hours

Essential terminology – Structure of PHP scripts – Statements – blocks – comments – Data types – operators – Conditional execution – Loop Structures – Count controlled loops – Conditional loops – Arrays – Functions – user defined functions – built-in functions – String handling functions – Array related functions – Miscellaneous functions – PHP Graphics – Pie charts – Bar charts – Line graphs

UNIT – V: WEB PORTAL DESIGN

15 Hours

Characteristics of Web portals – Web pages Vs Web portals – MySQL data types – creating databases and Table objects – Import and export database contents – Administrative interfaces and credentials – Inserting new records – edit and deletion of existing records – Connecting Database with PHP – mysqli() connector interface – feeding data through forms – report generation from databases

Books for study

1. John Dean, Web Programming with HTML 5.0, CSS and Javascript, Jones and Bartlet Learning, 2019

- David R. Brooks, Programming in HTML and PHP, Springer 2017
- Adrian W. West, Steve Prettyman, Practical PHP 7, MYSQL 8, Maria DB website databases, A Press 2018

Books for Reference

- Jennifer Niderst Robbins, Learning Web Design, O'REILLY, 2018
- Frank M. Kromann, Beginning PHP and MySQL: From novice to professional, Fifth Edition, A Press 2018

Web References

- Internet Technology -<https://nptel.ac.in/courses/106/105/106105084/>
- Programming with CSS and Javascript -<https://www.w3schools.com/>
- PHP Programming with MySQL - <https://swayam.gov.in/nd2/aic20/sp32/>

Teaching Methods

- Lectures
- Group Discussion
- Assignment and Tutorials
- Visual aids

Course Outcomes:

On successful completion of the course students will be able to

CO1: Understand the concept of web pages and hyperlinked web documents (K2)

CO2: Explore various design patterns and to apply styles to static web documents (K3)

CO3: Incorporate external scripts and functional attributes to static web pages (K4)

CO4: Incorporate PHP scripts to static web pages (K4)

CO5: Develop dynamic web pages and portals (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO2	2	2	2	1	1	3	3	-	-	2	2	2	-	20
CO3	3	2	2	2	2	3	3	-	-	2	2	2	-	23
CO4	3	3	2	2	2	3	3	-	-	2	2	2	-	24
CO5	3	2	2	2	2	3	3	-	-	2	2	2	-	23
Grand total of COs with PSOs and POs														110
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(110/50)														2.2

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.2
Observation	COs of this course is strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
WEB PROGRAMMING LAB

Class : B. Sc. (Comp. Sci.)

Part III : Core Lab-4

Semester : IV

Hours : 75

Subject Code: 23UCSP44

Credits: 03

Objectives:

The course enables the students to

- Practice HTML elements for creating static web pages
- Practice CSS styles and attributes to incorporate in static web page design
- Develop scripts and functions to be incorporated with html documents
- Develop simple interactive forms and pre-processors to be incorporated in web documents
- Develop dynamic web pages and portals by using database objects

Lab Exercises

1. Create static web page (home page) for a reputed educational Institution
2. Design web pages for a business organization and integrate all pages using hyperlinks
3. Design a simple course registration form pattern and display profile summary of the form
4. Design a simple application form by using HTML and java scripts
5. Design a simple static page to display animated images or text within bounded area
6. Design simple login form and display error message on the usage of wrong credential used
7. Design simple arithmetic calculator interface with necessary functionality by using java script
8. Design an online invitation with necessary GUI widgets and containers.
9. Develop PHP script to display simple online feedback form with 5-point metrics
10. Develop PHP script to create CSV file on submission of a typical registration form
11. Develop PHP script to upload a document to a specified location and path
12. Create login form of a typical web portal by using database connectivity
13. Create web application to display all the records of existing database
14. Create web application to search for a specified record on the existing database
15. Create web application to delete a record on the existing database

Teaching Methods

- Hands on Training
- Visual Demonstration

Course Outcome (CO)

On successful completion of the course students will be able to

CO1: Understand HTML tags and their attributes (K2)

CO2: Explore the ways to incorporate CSS files into HTML document (K3)

CO3: Apply constructs and primitives of java script for creating web pages (K3)

CO4: Develop forms and user interfaces for online data processing (K4)

CO5: Develop interactive web pages and web portals by using connectors and APIs (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	1	2	1	3	3	-	-	1	2	2	-	20
CO2	3	2	2	2	1	3	2	-	-	2	2	2	-	21
CO3	3	2	2	1	2	3	2	-	-	2	3	2	-	22
CO4	3	2	2	1	2	3	2	-	-	2	3	2	-	22
CO5	3	2	2	1	2	3	3	-	-	2	2	3	-	23
														108
	Mean Value of COs with PSOs and POs =Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(108/50)													2.16

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.16
Observation	COs of this course is strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE
OPERATING SYSTEM

Class : B. Sc. (Comp. Sci.)

Semester : IV

Subject Code: 23UCSC84

Part III : Core 8

Hours : 60

Credits : 04

Objectives:

The course enables the students to

- To acquire the basic knowledge of operating systems architecture and components and to know the various operations performed by Operating System
- Understanding the importance of Process and Scheduling
- Providing a knowledge issues in Synchronization and Deadlocks
- Describe the concept of Various Memory Management Techniques
- To gain the importance of Files, Directories and Mass Storage

Unit I

(12 Hours)

Introduction: Operating System Definition – Computer System Organization – Types of Operating System – Operating System Structures - Operating System Operation. **System Structures:** Operating System Services – System Calls – System Programs – Operating System Design and Implementation - Operation System Generation - System Boot

Unit II

(12 Hours)

Process Concept: Process Concept - Process Scheduling – Operation on Processes - Inter Process Communication - Example of IPC System – Communication in Client – Server system. **Process Scheduling:** Basic concept - Scheduling criteria - Scheduling algorithm - Thread scheduling-Multiple Processor Scheduling - Real Time CPU Scheduling - Operating system example - Algorithm evaluation

Unit III

(12 Hours)

Synchronization: Background - The Critical section problem - Peterson’s solution - Semaphores – Classic problems of Synchronization. **Deadlock:** System models - Deadlock Characterization-Methods for handling deadlock - Deadlock Prevention - Deadlock Avoidance - Deadlock detection - Recovery from deadlock

Unit IV

(12 Hours)

Memory Management: Background – Swapping - Contiguous Memory allocation – Segmentation – paging. **Virtual Memory Management:** Background - Demand paging - Copy and Write-page replacement - Allocation of Frames - Thrashing

Unit V

(12 Hours)

File System: File Concept - Access Method - Directory and Structure - File Sharing - Protection. **Implementing File System:** File System Structure - File System implementation - Directory implementation - Allocation Methods - Free Space Management. **Mass Storage Structure:** Overview of Mass Storage Structure - Disk Structure - Disk Scheduling - Disk Management

Book for Study

1. Abraham Silberschatz, Peter B Galvin, Gerg Gagne, Operating System Concepts, Ninth Edition, 2018, Wiley India Private Limited.

Books for Reference

1. William Stallings, Operating System, Seventh Edition, 2010, Pearson Education.

- William Stallings, Operating System: Internals and Design Principles, Seventh Edition, 2012, Prentice Hall India Learning Private Limited.

Web References

- https://onlinecourses.nptel.ac.in/noc20_cs04/preview
- <https://www.udemy.com/topic/operating-system-creation>
- <https://in.coursera.org/learn/os-pku>
- <https://www.javatpoint.com/best-courses-for-the-operating-system>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

- CO1:** Understand the basic concepts in varies OS. (K1)
- CO2:** Understand the various scheduling techniques and its executions processes. (K2)
- CO3:** Analyze the working principles of deadlock. (K4)
- CO4:** Understand the memory management techniques. (K2)
- CO5:** Analyze files system and mass storage structure of OS. (K4)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	-	-	1	1	1	-	1	1	2	1	1	14
CO2	3	3	-	-	1	1	1	-	2	1	2	1	1	16
CO3	3	3	-	-	1	1	1	-	2	1	1	1	1	15
CO4	3	2	-	-	2	1	1	-	1	1	1	1	1	14
CO5	3	2	-	-	2	2	1	-	1	1	1	1	1	15
Grand total of COs with PSOs and POs														74
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(74/50)														1.48

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs	1.48		
Observation	COs of Operating System – Medium related with PSOs and POs		

ARUL ANANDAR COLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE
OPERATIONS RESEARCH

Class : B. Sc. (Comp. Sci.)
Semester : IV
Subject Code : 23UCSA44

Part : III Allied - 4
Hours : 45 Hours
Credits : 03

Objectives:

The course enables the students to

- Apply the Linear programming concepts.
- Analyze various Transportation problems.
- Solve mathematical formulation of assignment models.
- Analyze solutions for various Critical Path methods.
- Evaluate Queuing models.

UNIT I

9 Hours

Linear Programming Models: Mathematical formulation – graphical Solution of linear programming models – Simplex Method - Artificial Variable Techniques - Variants of Simplex method

UNIT II

9 Hours

Transportation and Mathematical formulation of transportation problem - methods for finding initial basic feasible solution – optimum solution - degeneracy.

UNIT III

9 Hours

Mathematical formulation of assignment models – Hungarian Algorithm - Variants of the Assignment problems - Integer Programming Models formulation.

UNIT IV

9 Hours

Scheduling by PERT and CPM Network Construction – Critical Path Method – Project Evaluation and Review Technique - Resource Analysis in Network Scheduling

UNIT V

9 Hours

Queuing Models: Characteristics of Queuing Models - Poison Queues - (M/M/C):(FIFO/), (M/M/C):(FIFO/), (M/M/1):(FIFO/):(M/M/2):(FIFO/) models.

Book for Study

1. Taha H.A, *Operations Research: An Introduction*, Seventh Edition, 2004, Pearson Education.

Books for Reference

1. Natrajan A.M, Balasubramani.P, Tamilarasi. A, *Operations Research*, 2005, Person Education.
2. Rath Rani Rina, *Operations Research*, 2019, First Edition.

Web Reference

1. Linear Programming Models
<https://www.cuemath.com/algebra/linear-programming/>
2. Transportation problems
<https://www.geeksforgeeks.org/transportation-problem-set-1-introduction/>
3. Hungarian algorithm

[https://www.brainkart.com/article/Solution-of-assignment-problems-\(Hungarian-Method\)_39044/](https://www.brainkart.com/article/Solution-of-assignment-problems-(Hungarian-Method)_39044/)

4. PERT and CPM

<https://www.britannica.com/topic/research-and-development/PERT-and-CPM>

5. Introduction to Operation Research: <https://nptel.ac.in/courses/110106062>

Teaching Methods:

- Lecturing
- PPTs and PDF
- Video Tutorials

Course Outcomes:

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

CO1: Apply various linear programming concepts. (K5)

CO2: Apply methods to get feasible solution. (K3)

CO3: Analyze various formats of Assignment problems. (K4)

CO4: Evaluate Critical Path. (K5)

CO5: Understand queuing process. (K2)

K1=Remember K2=Understand K3=Apply K4=Analyze K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	2	2	-	-	3	3	3	2	2	3	1	3	-	24
CO2	2	3	-	-	3	3	3	3	2	3	1	3	-	26
CO3	1	2	-	-	2	2	2	1	2	3	1	2	-	18
CO4	2	3	-	-	3	3	3	3	2	3	1	3	-	26
CO5	2	2	-	-	3	2	2	2	2	2	1	2	-	20
Grand total of COs with PSOs and POs														114
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(114/50)														2.28

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and Pos			2.28
Observation	COs of Operation Research – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
WEB DESIGNING

Class	: B.Sc.(Comp. Sci.)	Part III	: NME - 2
Semester	: IV	Hours	: 45
Subject Code	: 23UCSN24	Credit	: 02

Objectives:

The course enables the students to

- Understand and apply the basic HTML tags to create attractive web pages.
- Demonstrate to link web pages, create table and frames within the web page.
- Work with various image files and various transformation of images
- Apply various effects and making color correction with the scanned images.
- Perform simple animation in Flash environment.

UNIT I: HTML (9 Hours)

Introduction of HTML - Writing my first HTML Page - Basic tags used in HTML: Heading Tags - Paragraph Tag - Line Break Tag -Centering Content - Horizontal Line – Preserve Formatting - Non Breaking Spaced - Elements In HTML: Elements in HTML – HTML Tag Vs Element - Formatting tags in HTML

UNIT II: (9 Hours)

Images and incorporating images , working with Tables , Working with Lists , Working with hyperlinks - Frames and frame management - Forms and Form Management

UNIT III: PHOTOSHOP (9 Hours)

Introduction - Getting started with Photoshop – The Photoshop Program Window: Menu bar – The Options bar – Image Window – Ruler – Palletes – The Toolbox - Working with images: Image Size – Image Resolution – Editing Images – Color Modes – Setting the Current Foreground and Background colors – File Formats

UNIT IV: (9 Hours)

Painting Tools, Drawing Tools and Retouching Tools – Layers: Layers Palette – Working with Layers – New Layer via Cut and Copy – Hiding and Showing Layers – Flattening Images – Working with Adjustment Layers – Layer Effects - Type Tool: Changing the Type Settings – Type Masking

UNIT V: FLASH (9 Hours)

Introduction to Flash – Flash Interface: Stage – Timeline – Library – Drawings and Symbols – Flash Project Properties – Timeline and Frames – Animation: Frame by Frame Animation – Tween Animation

Books for Study

1. C. Xavier, *Web Technology and Design*, 2007, Blue Age International Publishers.
2. Schrand Richard, *Photoshop 6 visual Jumpstart*, 2000, Adobe Press.
3. Mohles L. James, *Flash 5.0 Graphics, Animation & Interaction*, Macromedia, 2000, World Press.

Books for Reference

1. Deitel, *Internet and World Wide Web How to Program*, Third Edition, 2003, Prentice Hall.
2. Reinhardt Robert, Lentz Warren Jon, *Flash 5 Bible*, 2001, Hungry Minds Inc.
3. Meenakshi G M, *Web Graphics*, 2007, SCITECH Publication.

Web References

1. <https://www.geeksforgeeks.org/html-basics>

2. <https://www.educba.com/adobe-photoshop-tools>
3. <https://www.photoshopesentials.com/basics>
4. www.tutorialboneyard.com/simple-flash-animation/
5. <https://www.instructables.com/Flash-Animation-Basics>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

CO1: Understanding the HTML concepts. (K2)

CO2: Apply HTML tags to create static web pages including links and frames. (K6)

CO3: Analyze to work on image files using various Photoshop tools. (K4)

CO4: Apply various color effect for image manipulation (K3).

CO5: Understand the concepts of timeline motion to create simple Animation. (K4)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	1	2	2	-	3	2	2	2	2	22
CO2	3	3	-	-	1	2	2	-	3	2	2	2	2	22
CO3	3	3	-	-	1	3	2	-	3	1	2	2	2	22
CO4	3	3	-	-	1	3	2	-	3	1	2	2	2	22
CO5	3	3	-	-	1	3	1	-	2	1	2	1	1	18
Grand total of COs with PSOs and POs														106
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(106/50)														2.12

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.12
Observation	COs of Web Designing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE
OPEN SOURCE TECHNOLOGY

Class : B. Sc. (Comp. Sci.)

Part : III SBE-2

Semester : IV

Hours : 45 Hours

Subject Code : 23UCSS24

Credits : 02

Objectives:

The course enables the students to

- Understand the basics of Open Source Technology
- Understand the Open-Source Principles and Methodology
- Understand the structure of Linux OS and Implement the installation of Linux
- Apply Linux commands for basic operations, folder navigation and editing files
- Work with Directories and Files in Linux

UNIT-I

9 Hours

Introduction to Open-Source: Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

UNIT-II

9 Hours

Open-Source Principles and Methodology: Open-Source History, Open- Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.

UNIT-III

9 Hours

Introduction to Linux - Distributions - Open Source - The Linux Shell - Root - Capitalization - Installing Linux Server Edition - Installing Linux Desktop Version

UNIT-IV

9 Hours

Basic Linux Tasks/Commands - Sudo - Man Pages - Taskset - Apt-get - Services - Top Basic Linux Navigation - Editing Linux Files with Vim - Starting Vim - Changing File Ownership - Editing and Navigating - Exiting and Saving

UNIT-V

9 Hours

Advanced Linux Navigation - Changing Directories and Finding Files - Listing/Displaying Files Making, Deleting, Moving, Copying, Renaming - Mounting Drives

Books for Study:

1. Kailash Vadera & Bhavyesh Gandhi, Open-Source Technology , First Edition 2009, University Science Press, Laxmi Publications.
2. Adam Vardy, Linux for Beginners The Ultimate Guide to the Linux Operating System & Linux Commands, First Edition, 2016.

Books for References:

1. Clay Shirky and Michael Cusumano, Perspectives on Free and Open-Source Software”, MIT press.
2. Andrew M. St. Laurent, Understanding Open Source and Free Software Licensing, , O’Reilly Media.
3. Dan Woods, Gautam Guliani, Open Source for the Enterpris, O’Reilly Media

Web References

1. Linux Basics: <https://nptel.ac.in/courses/117106113>
2. Linux kernel Home: <http://kernel.org4>
3. Open-Source Initiative: <https://opensource.org/5>
4. The Linux Foundation: <http://www.linuxfoundation.org/>

Teaching Methods:

- Lectures
- Group Discussions
- PPTs
- Hands on Training
- Projects work

Course Outcomes:

On the successful completion of the course students will able to

CO1: Explore the basics of open source (K2)

CO2: Understand the Open source principles and methodologies. (K2)

CO3: Explore the Linux Structure and install the Linux OS (K3)

CO4: Apply basic commands of Linux, navigation and editing Linux file. (K3)

CO5: Apply the directory commands in Linux (K5)

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	2	3	2	2	3	2	3	3	3	29
CO2	3	3	-	-	2	3	2	2	3	2	3	3	3	29
CO3	3	3	-	-	2	3	2	2	3	2	3	3	3	29
CO4	3	3	-	-	2	3	2	2	3	2	3	3	3	29
CO5	3	3	-	-	2	3	2	2	3	2	3	3	3	29
Grand total of COs with PSOs and POs														145
Mean Value of COs with PSOs and POs =Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(145/55)														2.63

Strong - 3, Medium - 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.63
Observation	COs of Open Source Technologies – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE

Class : B.Sc (Comp.Sci)

Part : Self Learning Course

Semester : IV

Hours :

Subject code : 23UCSSL4

Credit : 03

CLOUD COMPUTING

Objectives:

On Successful completion of the course the students should

- Know about the evolution of Cloud Computing
- insight into the basics of cloud computing
- Understand the Cloud Architecture
- Understand the storage management in Cloud
- Know about the Cloud Technologies

UNIT I INTRODUCTION

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing –Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD INSIGHTSS

Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability, simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

UNIT III CLOUD ARCHITECTURE

Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

UNIT IV CLOUD STORAGE MANAGEMENT

Concept of Virtualization and Load Balancing. Overview on Virtualization used for Enterprise Solutions. Key Challenges in managing Information. Identifying the problems of scale and management in big data

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack –Federation in the Cloud – Four Levels of Federation –Federated Services and Applications – Future of Federation.

Books for Study:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

Book for References:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
2. Halper, Wiley Publishing, Inc, 2010
3. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Course Outcomes

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

CO1: Understand the basics of Cloud (K2)

CO2: Understand the cloud architecture. (K2)

CO3: Apply the concept of virtualization. (K3)

CO4: Analyze the usage of cloud resources. (K4)

CO5: Evaluate different types of programming paradigms. (K5)

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	3	1	1	2	-	-	3	3	-	3	3	25
CO2	3	3	3	2	2	3	-	-	3	3	-	3	3	28
CO3	3	3	3	2	1	3	-	-	3	3	-	3	3	27
CO4	3	3	3	2	2	3	-	-	3	3	-	3	3	28
CO5	3	3	3	3	2	3	-	-	3	3	-	3	3	29
Grand total of COs with PSOs and POs														137

Grand total with PSOs and POs	
Mean value of COs with PSO and POs = $\frac{137}{50}$	= 2.74
Number of COs relating with PSOs& POs	

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value o f COs with PSOs and POs			2.74
Observation	COs of Cloud Computing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
CBCS and OBE Pattern
(Those who join from 2022-2023 onwards)

SEMESTER – I				
Part	Subject Code	Title of the paper	Hours	Credits
I	22UTAL11/ 22UHNL11/ 22USNL11	Tamil/ Hindi/French	06	04
II	22UENA11/ 22UENB11	English through Prose & Short Story – Stream- A English through Prose & Short Story – Stream- B	05	04
III	22UCSC11	Core: 1 Programming in C	05	04
	22UCSC21	Core: 2 PC Hardware and Troubleshooting	04	03
	22UCSP11	Core Lab: 1 Programming in C–Practical	05	03
	22UCSA11	Allied: 1 Digital Computer Fundamentals	03	03
IV	22UFCE11	FC – Personality Development	1	1
	22UCSH12	Communication Skill	1	-
	22UBRC11	Bridge Course	-	1
V	22UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB12	Extension Activities NCC/NSS/Phy.Edn./YRC/ ROTARACT/AICUF/Nature Club	---	---
Total			30	23
SEMESTER – II				
I	22UTAL22/ 22UHNL22/ 22USNL22	Tamil/ Hindi/ French	06	04
II	22UENA22/ 22UENB22	English through Prose & Poetry – Stream – A English through Prose & Poetry – Stream – B	05	04
III	22UCSC32	Core: 3 Object Oriented Programming with C++	05	04
	22UCSC42	Core: 4 Web Designing	04	03
	22UCSP22	Core Lab: 2 Object Oriented Programming with C++ - Practical	05	03
	22UCSA22	Allied: 2 Discrete Mathematics	03	03
IV	22UFCH22	FC – Social Responsibility and Global Citizenship	1	1
	22UCSH12	Communication Skill	1	1
V	22UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB12	Extension Activities NSS/NCC/Phy.Edn./YRC/ ROTARACT/AICUF/Nature Club	-	1

		Total	30	24
SEMESTER – III				
III	22UCSC53	Core: 5 Programming in JAVA	05	04
	22UCSC63	Core: 6 Data Structures and Algorithms	05	04
	22UCSC73	Core: 7 Operating System	04	03
	22UCSP33	Core Lab: 3 Programming in JAVA–Lab	05	03
	22UCSA33	Allied: 3 Computer Organization and Architecture	04	03
IV	22UCSN13	NME: 1 Web Designing (For Arts students)	03	02
	22UCSS13	SBE: 1 Quantitative Aptitude and Reasoning	03	02
	22UFCE33	FC – Environmental Studies	01	01
V	22UNCC/NSS/ PHY.EDU./YRC/ ROT/ACF/NCB24	Extension Activities NCC/NSS/Phy.Edn./ YRC/ROTARACT/AICUF/Nature Club	-	-
	22UARE14	ARISE		
		Total	30	22
SEMESTER – IV				
III	22UCSC84	Core: 8 Web Programming	05	04
	22UCSC94	Core: 9 Relational Data Base Management System	05	04
	22UCSD04	Core: 10 Computer Networks	05	04
	22UCSP44	Core Lab: 4 Web Programming – Lab	05	03
	22UCSA44	Allied: 4 Operation Research	03	03
IV	22UCSN24	NME: 2 Web Designing (For Science Students)	03	02
	22UCSS24	SBE: 2 Open Source Technology	03	02
	22UFCH44	FC – Religious Literacy and Peace Ethics	01	01
V	22UNCC/NSS/PHY. EDU./YRC/ ROT/ACF/NCB24	Extension Activities NCC/NSS/Phy.Edn./ YRC/ROTARACT/AICUF/Nature Club	-	01
	22UARE14	ARISE	-	01
		Total	30	25
SEMESTER – V				
III	22UCSD15	Core: 11 Big Data Analytics using R	05	05
	22UCSD25	Core: 12 Mobile Computing	05	05
	22UCSD35	Core: 13 Dot NET Programming	05	05
	22UCSD45	Core: 14 Network Security and Cryptography	05	04
	22UCSP55	Core Lab: 5 Dot NET Programming – Lab	05	03

	22UCSE15	Core Elective:1 1. Introduction to Data Science 2. Artificial Neural Networks 3. Linux Shell Programming	03	03
IV	22USSI16	Soft Skills	02	-
		Total	30	25
SEMESTER – VI				
III	22UCSD56	Core: 15 Software Engineering	05	04
	22UCSD66	Core: 16 Data Mining and Ware Housing	04	04
	22UCSD76	Core: 17 Mobile Application Development	05	04
	22UCSD86	Core: 18 Python Programming	05	03
	22UCSD96	Core: 19 Project	01	02
	22UCSP66	Core Lab: Python Programming – Lab	05	03
	22UCSE26	Core Elective: 2 1. Internet of Things (IoT) 2. Artificial Intelligence 3. Software Testing	03	03
IV	22USSI16	Soft Skills	02	02
		Total	30	25

Credits for each Semester

Semester	I	II	III	IV	V	VI	Total
Credits	23	24	22	25	25	25	144

Self-Learning Courses

S.No	Semester	Sub. Code	Title of the Paper	Credits
1.	III	22UCSSL3	Software Project Management	3
2.	IV	22UCSSL4	Cloud Computing	3
3.	V	22UCSSL5	System Administration and Maintenance	3
4.	VI	22UCSSL6	Ethical Hacking	3

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B. Sc. (Comp. Sci.)

Part : III – Core-11

Semester : V

Hours : 75 Hours

Subject Code : 22UCSD15

Credits : 05

BIG DATA ANALYTICS USING R

Course Objectives:

- Understand about the concept of Big Data
- Understand the challenges of Big Data
- Develop program using R Programming
- Create a program using the functions for data frame
- Create program for data analytics and data visualization

Unit – 1: Introduction to Big data

15 Hours

Data, classification Of Digital Data--structured, unstructured, semi-structured data, characteristics of data, evaluation of big data, definition and challenges of big data , what is big data and why to use big data, business intelligence Vs big data.

Unit – 2: Big data Analytics

15 Hours

What is and isn't big data analytics, Why hype around big data analytics, Classification of analytics, top challenges facing big data, importance of big data analytics, technologies needed to meet challenges of big data.

Unit – 3: Introduction to R and getting started with R

15 Hours

What is R, Why R , advantages of R over other programming languages, Data types in R-logical, numeric, integer, character, double, complex, raw, coercion, ls() command, expressions, variables and functions, control structures, Array, Matrix, Vectors, R packages.

Unit – 4: Exploring data in R

15 Hours

Data frames-data frame access, ordering data frames, R functions for data frames dim(), nrow(), ncol(), str(), summary(), names(), head(), tail(), edit() .Load data frames—reading from .CSV files, sub setting data frames, reading from tab separated value files, reading from tables.

Unit – 5: Data Visualization using R:

15 Hours

Reading and getting data into R (External Data): Excel files. **Working with R Charts and Graphs:** Histograms, Bar Charts, Line Graphs, Scatterplots, Pie Charts

Books for Study:

1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Second Edition, Wiley
2. Seema Acharya, Data Analytics using R, McGraw Hill Education (India) Private Limited.

Book for Reference:

1. Big Data Analytics, Introduction to Hadoop, Spark, and Machine-Learning, Raj Kamal, Preeti Saxena, McGraw Hill, 2018.
2. Big Data, Big Analytics: Emerging Business intelligence and Analytic trends for Today's Business, Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, John Wiley & Sons, 2013

3. An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

On successful completion of the course students will be able to

CO1: Ability to apply the concept of Big Data. (K4)

CO2: Ability to make decision using the concept in R programming (K3)

CO3: Apply R Programming concepts to create application decision making (K4)

CO4: Ability to apply statistical techniques using R Programming for data analytics (K4)

CO5: Students will be able to become data analyst (K5)

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Big Data Analytics using R – Strongly related with PSOs and POs		

ARUL ANANDARCOLEGE (AUTONOMOUS), KARUMATHUR - 625514
DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.)

Part : III – Core-12

Semester : V

Hours : 75 Hours

Subject Code : 22UCSD25

Credits: 05

MOBILE COMPUTING

Objectives:

The course enables the students to

- Understand the fundamentals of wireless and mobile communication
- Explore the functional components of Cellular and Telecommunication systems
- Explore Satellite systems and Digital Data Broadcast systems
- Understand Wireless Communication and their standard architectural models
- Identify suitable platform to deploy 5G systems for Mobile Communications

UNIT – I INTRODUCTION

15 Hours

History of Mobile Communication – Applications of wireless and mobile communication – Simplified Reference Model – wireless signal propagation – Multiplexing – Modulation – Spread Spectrum. **Medium Access Control:** Hidden and exposed terminals – Near and far terminals – Space Division Multiple Access – Frequency Division Multiple Access – Time Division Multiple Access – Code Division Multiple Access.

UNIT – II TELECOMMUNICATION SYSTEMS

15 Hours

GSM: Mobile Services – System Architecture – Radio Interface – Protocols – Localization Calling – Handover – Security **DECT:** System Architecture – Protocol Architecture – layers **TETRA:** Layers – Frame structures – Logical channels **UMTS:** UMTS System Architecture - UMTS Radio Interface – UTRAN – Core Network – Handover.

Unit – III SATELLITE SYSTEMS

15 Hours

History – Applications – typical system for global communications – basic system characteristics – Geostationary Earth Orbit – Medium Earth Orbit – Low Earth Orbit – High Elliptical Orbit – Localization – Handover. **Broadcast Systems:** Cyclical Repetition of Data – Digital Audio Broadcasting – Digital Video Broadcasting – Convergence of Broadcasting and Mobile Communication.

UNIT – IV WIRELESS LAN

15 Hours

Advantages – Disadvantages – Design Characteristics - **IEEE 802.11 family of WLANs:** System Architecture – Protocol Architecture **Bluetooth Systems:** Architecture – Radio layer – Base band layer – Link manager protocol **Mobile Network Layer:** DHCP – Mobile Ad-hoc Networks **Mobile Transport Layer:** Classical TCP improvements – TCP over 3G wireless networks.

UNIT – V 5G MOBILE NETWORKS

15 Hours

System Architecture: Functional Components – Supporting solutions – Control and User Plane Separation **Radio Networks:** Spectrum – Radio Access Technologies – Uplink and Downlink **Core Networks:** Network elements – Protocols and interfaces **Services and Applications:** 5G services – Vehicle Communications

Book for Study

1. Schiller Jochen, *Mobile Communications*, Second Edition, Pearson Education, 2008.
2. Jyrkit Penttinen, *5G Explained: Security and Deployment of Advanced Mobile Communications*, Wiley 2019.

Books for Reference

1. Mallick Martyn, *Mobile and Wireless Design Essentials*, Wiley Publishing, 2003

Teaching Methods

- Lecturing
- PPTs
- Learn by Debates
- Video Tutorials

Course Outcomes

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

CO1: Understand principles of Medium Access Control Management (K2)

CO2: Compare and analyze Cellular architectures and their protocol suits (K4)

CO3: Understand core ideas of broadcasting system based on Satellite Communication (K2)

CO4: Identify suitable generic architecture for wireless LANs (K4)

CO5: Explore tools and environment to practice 5G network systems (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs&POs
CO1	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO2	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO3	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO4	2	3	-	-	3	2	2	-	3	1	3	2	3	24
CO5	2	2	-	-	3	2	2	-	3	1	3	2	3	23
Grand total of COs with PSOs and Pos														119
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(119/50)														2.38

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.38
Observation	COs of Mobile Computing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B. Sc. (Comp. Sci.)

Part : III – Core-13

Semester : V

Hours : 75 Hours

Subject Code : 22UCSD35

Credits : 05

DOT NET PROGRAMMING

Objectives;

The course enables the students to

- Understand the HTML, CSS and ASP.NET Architecture.
- Build simple ASP.NET web applications.
- Apply server side controls to create webpage.
- Apply cookies and state management in web page.
- Apply ADO.Net to create dynamic web page.

UNIT-I

15 Hours

Introducing .NET: The Evolution of Web Development – HTML and HTML Forms, Server-Side Programming, Client-Side Programming - The .NET Framework- C#, and the .NET Languages, The Common Language Runtime, The .NET Class Library - The C# Language: C# Language Basics – Variables and Data Types – Variable Operations – Object-Based Manipulation - Conditional Logic – Loops –Methods.

UNIT-II

15 Hours

Types, Objects, and Namespaces: The Basics About Classes – Static Members, A Simple Class. Building a Basic Class – Creating an Object, Adding Properties, Automatic Properties, Adding a Method, Adding a Constructor, Adding an Event. Value Types and Reference Types – Understanding Namespaces and Assemblies – Advanced Class Programming. **Developing ASP.NET Applications:** The Promise of Visual Studio – Creating Websites – Designing a Web Page – The Anatomy of a Web Form – Writing Code – Visual Studio Debugging.

UNIT-III

15 Hours

Web Form Fundamentals: The Anatomy of an ASP.NET Application – Introducing Server Controls – HTML Server Controls, Converting an HTML Page to an ASP.NET Page, View State, The HTML Control Classes, Event Handling, Error Handling. The Page Class – Application Events – ASP.NET Configuration. **Web Controls:** Stepping Up to Web Controls – Web Control Classes – List Controls – Table Controls – Web Control Events and AutoPostBack – A Simple Web Page.

UNIT-IV

15 Hours

Error Handling: Exception Handling – Handling Exceptions. **State Management:** The Problem of State – View State – Transferring Information Between Pages – Cookies – Session State – Session State Configuration – Application State. **Validation:** Understanding Validation – The Validation Controls. **Rich Controls:** The Calendar – The AdRotator – Pages with Multiple Views.

UNIT-V

15 Hours

Data Access with ADO.NET:ADO.Net Architecture – Advantages - ADO.Net Objects. Handling Databases in code: Connection Class-Command Class – DataAdapter – DataSetClass – DataReader Class - DataTable Class - DataRow, DataColumn classes – Datarelation Class. Handling Data Manipulation in Code: Record Navigation - Record Updation - Inserting Record - Deleting Record.

Book for Study

1. Matthew, MacDonald, Beginning ASP.NET in C# 2010, Après, 2013.

Books for Reference

1. Dr. Sathiaselvan J.G.R., Sasikaladevi.N, Programming with c#.Net, Pearson Education Inc, 2009.
2. Matthew MacDonald, Freeman Adam, Pro ASP.NET 4 in C# 2010, Apress, 2010.
3. Walther Stephen, Hoffman Kevin and Dudek Nate, ASP.NET4 Unleashed, Pearson Education Inc, 2011.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

On successful completion of the course students will be able to

CO1: Apply HTML,CSS in web forms to create a simple application. (K3)

CO2: Apply C# concepts to create a solution in asp.net application. (K3)

CO3: Build web application using web server controls.(K6)

CO4: Apply state management and cookies (K3)

CO5: Apply database connectivity to build web solutions. (K3).

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Dot Net Programming – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B. Sc. (Comp. Sci.) Part : III Core Lab-5
Semester : V Hours : 75 Hours
Subject Code : 22UCSP55 Credits : 03

DOT NET PROGRAMMING LAB

Objectives:

The course enables the students to

- Create applications with HTML, CSS and ASP.NET Web controls.
- Develop programs with server controls and validation controls.
- Create applications with ADO.NET data controls.
- Apply data sources and working with data controls.

Create applications with Repeat layout property and directory property.

1. Write a program to display the following feedback form. The different options for the list box must be ASP-XML, Dot NET, Java Pro and Unix, C, C++. Submit Form button is clicked after entering the data.
2. Write a program that displays a button in green color and it should change into yellow when the mouse moves over it.
3. Write a program containing the following controls: • A List Box • A Button • An Image • A Label. The list box is used to list the items available in a store. When the user clicks on an item in the list box, its image is displayed in the image control. When the user clicks the button, the cost of the selected item is displayed in the control.
4. Extend the above program to add the following controls: • two labels • A Text Box • A Button One of the labels is displayed adjacent to the textbox, displaying the message "Enter the quantity:" When the user enters the quantity in the textbox and clicks the button, the total cost is evaluated and displayed in another label.
5. Write a program to get a user input such as the boiling point of water and test it to the appropriate value using Compare Validator.
6. Write a program that gets user input such as the user name, mode of payment, appropriate credit card. After the user enters the appropriate values the Validation button validates the values entered.
7. Create a Radio Button List that displays the names of some flowers in two columns. Bind a label to the Radio Button List so that when the user selects an option from the list and clicks on a button, the label displays the flower selected by the user.
8. Create table Employee in master database with the following columns and data types. Dept. Numeric Name Varchar(20) Doj Date time Sal Float Design Varchar(20) Write a program to connect to the master database in SQL Server, in the Page Load event. When the connection is established, the message "Connection has been established" should be displayed in a label in the form.
9. Select names from the employee table. Retrieve the result in a Dataset. Bind the Dataset to a Radio Button List and display the result in three different forms as follows: The Repeat Direction property of

the Radio Button List is set to horizontal and its Repeat Layout property is set to Table.ii) The Repeat Direction property of the Radio Button List is set to Vertical and its Repeat Layout property is set to Table.iii) The Repeat Layout property of the Radio Button List is set to flow.

10. Write a program to display the records and sorting of database.

11. Write a program to calculate EB Bill.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

On successful completion of the course students will be able to

CO1: Develop applications with effective web programming (K6)

CO2: Create applications with web controls in ASP.NET (K6)

CO3: Create a Data Base application using ADO.NET Classes. (K6)

CO4: Create solutions using data controls to display table records in web forms. (K6)

CO5: Develop projects using ASP.NET framework (K6).

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Dot Net Programming Lab – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR

DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.)

Part : III – Core-14

Semester : V

Hours : 75 Hours

Subject Code : 22UCSD45

Credits : 04

NETWORK SECURITY AND CRYPTOGRAPHY

Objectives:

The course enables the students to

- Understand the fundamental needs of Secure System Design
- Analyze critically about key concept and Techniques
- Understand the overview of the Algorithms
- Compare the Symmetric, Asymmetric and RSA Algorithm
- Identify and mitigate the various Internet Security Protocols.

UNIT I

15 Hours

Introduction to the Concept of Security: Introduction, the Need of Security, Security Approaches, Principal of Security, Types of Attacks

UNIT - II

15 Hours

Cryptographic Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks

UNIT – III

15 Hours

Computer-based Symmetric Key Cryptographic Algorithms: Introduction, Algorithm Types and Models, An Overview of Symmetric Key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC5, Blowfish, Advanced Encryption Standard (AES), Differential and Linear Cryptanalysis

UNIT – IV

15 Hours

Computer-based Asymmetric Key Cryptographic Algorithms: Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures.

Unit- V

15 Hours

Network Security: Brief Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), **Internet Security Protocols:** Basic Concepts, Security Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Time stamping Protocol (TSP), Secure Electronic Transaction (SET)

Book for Study

1. Kahate Atul, *Cryptography and Network Security*, Third Edition, Tata McGraw Hill Publication, New Delhi, 2006

Book for Reference

1. Forouzan Behrouz A., Mukhopadhyay Debdeep, *Cryptography & Network Security*, Second Edition, McGraw Hill, New Delhi, 2010
2. Stallings William, *Cryptography and Network Security: Principles and Practices*, Seventh Edition, Prentice Hall, 2014.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Understand Cryptography and Network Security concepts and applications. (K2) **CO2:** Demonstrate and APPLY the process of Basic Concepts of Secure system design. (K3) **CO3:** Identify and Analyse Network and Security Threat. (K4)

CO4: Understand the concepts of Asymmetric key cryptography (K2)

CO5: Evaluate the various Network Security protocols (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis

K5=Evaluate K6=Create Mapping Course outcome with POs and

	POs	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO	PSO	Sum of COs with PSOs&Pos
	1	2	3	4	5	6	7	8	1	2	3	4	5	
CO1	3	2	-	-	3	2	2	-	2	2	1	2	3	22
CO2	3	2	-	-	1	2	2	-	3	2	1	2	2	20
CO3	3	2	-	-	1	2	2	-	2	2	1	2	3	20
CO4	2	3	-	-	1	2	2	-	2	2	1	2	2	19
CO5	2	2	-	-	2	1	2	-	2	2	-	2	3	18
Grand total of COs with PSOs and POs														99
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(99/49)														2.05

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.05
Observation	COs of Network Security and Cryptography – Medium related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class	: B. Sc. (Comp. Sci.)	Part	: III Core Elective-1
Semester	: V	Hours	: 45
Subject Code	: 22UCSE15 (A)	Credits	: 03

INTRODUCTION TO DATA SCIENCE

Course Objectives:

The course enables the students to

- To understand the basic concepts of Data Science
- To understand the principles of algorithms, flowchart and source code
- To acquire a solid foundation in Python.
- To visualize data using plots in python
- To understand and handle database and visualize.

Unit – I

9 Hours

Introduction Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II

9 Hours

Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III

9 Hours

Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV

9 Hours

Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Unit – V

9 Hours

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

Books for Study:

1. Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.

Books for Reference:

1. Ljubomir Perkovic (2012), Introduction to Computing Using Python: An Application Development Focus, John Wiley & Sons.
2. John V Guttag (2013), Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press.
3. Kenneth A. Lambert (2012), Fundamentals of Python: First Programs, C engage Learning.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

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

CO1: Explain the basic concepts of data science and its application (K2)

CO2: Create Python Program using Functions (K3)

CO3: Create and illustrate Numpy Libraries (K3)

CO4: Perform Data Manipulation using Pandas.(K4)

CO5: Create Data Visualization using Mat plot lib (K3)

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Introduction to Data Science – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B. Sc. (Comp. Sci.)

Part : III Core Elective-2

Semester : V

Hours : 45

Subject Code : 22UCSE15 (B)

Credits : 03

ARTIFICIAL NEURAL NETWORKS

Course Objectives:

- To understand the biological neural network and to model equivalent neuron models.
- To understand the architecture, learning algorithms
- To understand the concept of Back Propagation
- To know the issues of various feed forward and feedback neural networks.
- To explore the Neuro dynamic models for various problems.

Unit-I

9 Hours

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks, Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process.

Unit-II

9 Hours

Single Layer Perceptron's: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment
Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

Unit-III

9 Hours

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

Unit – IV

9 Hours

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

Unit-V

9 Hours

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm
Hopfield Models – Hopfield Models, restricted boltzmen machine.

Books for Study

1. Neural Networks a Comprehensive Foundations, Simon S Haykin, PHI Ed.
2. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

Reference Book

1. Neural Networks in Computer Intelligence, Li Min Fu TMH 2013.

Course Outcomes

Upon completing this course, the student will be able to

CO1: Understand the similarity of Biological networks and Neural networks(K2)

CO2: Understanding the concepts of Neural network (K2)

CO3: Perform the training of neural networks using various learning rules.(K4)

CO4: Understanding the concepts of forward and backward propagations.(K2)

CO5: Understand and Construct the Hopfield models.(K4)

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Artificial Neural Networks– Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B. Sc. (Comp. Sci.)

Part : III Core Elective-3

Semester : V

Hours : 45

Subject Code: 22UCSE15 (C)

Credits : 03

LINUX SHELL PROGRAMMING

Course Outcomes:

The course enables the students to

- Understand Linux and its utilizes
- Gain understanding of important aspects related to SHELL and the process
- Develop the ability to formulate regular expressions and use them for pattern matching
- Provide a comprehensive introduction to SHELL programming, service and utilizes
- Write Shell Programming using Linux commands

Unit – I

9 Hours

INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text Processing utilities and backup utilities, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

Unit - II

9 Hours

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

Unit - III

9 Hours

Grep: Operation, grep Family. **UNIX FILE STRUCTURE:** Introduction to UNIX file system, inode (Index Node). File Management :File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

Unit - IV

9 Hours

PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals

functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets.

Unit - V

9 Hours

INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos. **INTRODUCTION TO SOCKETS:** Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.

Books for Study:

1. W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.
2. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson

Books for References:

1. Linux System Programming, Robert Love, O’Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX Network Programming, W.R. Stevens, PHI. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education

Course Outcomes:

CO1: Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator. (K3)

CO2: Ability to write Shell Programming using Linux commands. (K4)

CP3: Ability to design and write application to manipulate internal kernel level Linux File System. (K4)

CO4: Ability to develop IPC-API’s that can be used to control various processes for synchronization. (K5)

CO5: Ability to develop Network Programming that allows applications to make efficient use of resources available on different machines in a network. (K5)

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	-	-	3	3	3	-	3	3	3	3	3	30
CO2	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO3	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO4	3	3	-	-	3	2	3	-	3	3	3	3	3	29
CO5	3	3	-	-	3	3	3	-	3	3	3	3	3	30
Grand total of COs with PSOs and POs														147
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(147/50)														2.94

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.94
Observation	COs of Linux And Shell Programming– Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625 514
DEPARTMENT OF COMPUTER SCIENCE

Class : B.Sc (Comp. Sci) **Part** : Self Learning Course
Semester : V **Hours** :
Subject code : 22UCSSL5 **Credit** : 03

SYSTEM ADMINISTRATION AND MAINTENANCE

Objectives: The course enables the students to

- Gain knowledge about Operating System Installation and Configuration
- Understand the controlling processes of OS
- Gain knowledge about Operating System Maintenance
- To gain knowledge about the Output Devices
- Understand PC maintenance techniques and tools

Unit-I

Operating System Administration: Installation, Configuration, maintenance (service packs, patches, etc.) disk formatting/partitioning, installing Window/Linux, regular user vs super user

Unit-II

Controlling processes, user management, server administration and management, user and group management, backup management, security management

Unit – III

Operating System Maintenance: Linux distributions, Windows versions, PC hardware, BIOS, devices and drivers, system monitoring, Kernel configuration and building, applications installation, configuration, maintenance (Service packs, patches etc), server services (database, web, network services, etc, client services

Unit-IV

PC Maintenance: Creating Backup – Creating System Recovery – Removing unused File and Programs - Disk Cleanup – Disk Defragmenting – Maintenance Scheduling.

Unit-V

Network System Maintenance: Network configuration, network services, file printing on network, DHCP, DNS, FTP, HTTP, mail, SNMP, telnet

Books for Study

1. E. Siever, S. Figgins, Linux in a Nutshell, O'Reilly, Sixth Edition 2009
2. T. Bautts, T. Dawson, G.N. Purdy, Linux Network Administrator's Guide, O'Reilly, Third Edition

Books for Reference

1. A. Basta, W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India

Course Outcome (CO)

On successful completion of the course students will be able to

CO1: Install Window/Linux Operating System

CO2: Understand the controlling processes

CO3: Maintain the Operating System

CO4: Maintain the Personal Computer

CO5: Understand the Network Concepts

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
Outcome														
CO1	2	1	2	1	1	3	2	-	-	2	1	1	-	16
CO2	2	2	2	1	1	3	2	-	-	2	2	2	-	19
CO3	3	3	2	1	2	3	3	-	-	2	3	3	-	25
CO4	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO5	3	3	3	1	2	3	3	-	-	2	2	2	-	24
Grand Total of COs with POs PSOs														104
Grand total with PSOs and POs Mean value of COs with PSO and POs = $\frac{104}{50}$ = (104/50) Number of COs relating with PSOs & POs														2.08

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.08
Observation	COs of System Administration and Maintenance – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE

Class	: B. Sc. (Comp. Sci.)	Part	: III – Core-15
Semester	: VI	Hours	: 75 Hours
Subject Code	: 22UCSD56	Credits	: 04

SOFTWARE ENGINEERING

Objectives:

The course enables the students to

- Understand the basic software engineering design concepts and principles.
- Analyze various cost estimation techniques.
- Explore formal specification techniques and design concepts.
- Illustrate various design notations and project guidelines.
- Describe verification & validations and managerial techniques.

Unit I **15 Hours**

Introduction to software engineering: Definitions – Size Factors – Quality and productivity factors. Planning a software project: planning the Development process-planning an organizational structure.

Unit II **15 Hours**

Software cost Estimation: Software cost Factors - Software cost Estimation Techniques - Staffing-Level Estimation - Estimating Software Estimation Costs.

Unit III **15 Hours**

Software Requirements Specification: Definition – Formal Specification Techniques. Software Design: Fundamental Design Concepts – Modules and Modularization Criteria.

Unit IV **15 Hours**

Designing the System: Design Introduction – Decomposition and Modularity – Architectural styles and strategies – Characteristics of good design – Techniques for improving design – Design evaluation and validation – Documenting the design – Programming standards and procedures – Programming guidelines – Documentation.

Unit V **15 Hours**

Verification and Validation Techniques: Quality Assurance- Walkthroughs and Inspections - Unit Testing and Debugging - System Testing. Software Maintenance: Enhancing Maintainability during Development - Managerial Aspects of Software Maintenance - Configuration Management.

Book for Study

1. Richard Fairley, *Software Engineering Concepts*, Fifth Edition, 2017, TMH.

Books for Reference

1. Sommerville Ian, *Software Engineering*, Tenth Edition, 2018, PHI.
2. Mall Rajib, *Fundamentals of Software Engineering*, Third Edition, 2014, PHI.
3. Schach Stephen, *Software Engineering*, Seventh Edition, 2007, TMH.

Teaching Methods

- Lecturing
- PPTs and PDF
- Case Studies
- Video Tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Understand the basic project design concepts and principles. (K2)

CO2: Apply varies cost estimation techniques in real time projects. (K3)

CO3: Analyze varies formal specification techniques in projects. (K4)

CO4: Prepare the project using proper guidelines and design notations. (K5)

CO5: Generate test cases validation and verifications techniques. (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	2	2	-	-	2	3	2	1	3	2	3	1	3	24
CO2	2	2	-	-	2	2	1	2	3	3	2	2	3	24
CO3	3	2	-	-	2	3	1	1	3	3	2	2	3	25
CO4	2	2	-	-	1	2	2	-	2	3	2	1	2	19
CO5	2	2	-	-	2	3	2	1	3	2	3	1	3	24
Grand total of COs with PSOs and POs														116
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(116/54)														2.14

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.14
Observation	COs of Software Engineering – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS) - KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE

Class	: B. Sc. (Comp. Sci.)	Part	: III – Core-16
Semester	: VI	Hours	: 60 Hours
Subject Code	: 22UCSD66	Credits	: 04

DATA MINING AND WAREHOUSING

Objectives:

The course enables the students to

- Understand the basic concepts of data mining techniques and algorithms.
- Know about the decision tree and classification rules.
- Understand cluster analysis and its types.
- Know the web mining and ranking of web pages.
- Understand the data warehousing backend processes.

UNIT – I

12 Hours

What is Data Mining - The data mining process –software Development Approaches – The future of Data Mining-Data Collection and Pre-processing- Outliers- Mining Outliers-Missing Data- Types of Data.

UNIT – II

12 Hours

Introduction: Data mining application – data mining techniques - Association rules mining: Introduction basics- task and a naïve algorithm- Apriori algorithm - mining frequent pattern without candidate generation (FP-growth Classification : Introduction – decision tree – over fitting and pruning -- naïve Bayes method.

UNIT – III

12 Hours

Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods - partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods.

UNIT – IV

12 Hours

Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - Search engines: Search engines functionality- search engines architecture – ranking of web pages.

UNIT – V

12 Hours

Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.

Book for Study

1. G.K. Gupta, *Introduction to Data mining with case studies*, Third Edition, PHI Learning Pvt. Ltd., New Delhi, 2014

Books for Reference

1. PujariArun K , *Data Mining Techniques*, Universities Press, 2001.
2. Han Jiawei, KamberMicheline, Pei Jian, *Data Mining Concepts and Techniques*, Third Edition, Morgan Kuffman, 2011.

Teaching Methods

- Lectures
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes:

On successful completion of the course students will be able to

CO1: Understand the basic concepts of Data Mining Techniques and Algorithms (K2)

CO2: Identify appropriate data mining algorithms to solve real world problems (K3)

CO3: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining (K4)

CO4: Understand the Web Mining and ranking the web pages. (K2)

CO5: Understand Data Warehouse fundamentals and apply OLAP operations (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with PO and PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	2	-	-	2	3	2	1	3	2	3	1	3	25
CO2	3	2	-	-	2	2	1	2	3	3	2	2	3	25
CO3	3	2	-	-	2	3	1	1	3	3	2	2	3	25
CO4	3	2	-	-	1	2	2	-	2	3	2	1	2	20
CO5	3	2	-	-	2	3	2	1	3	2	3	1	3	25
Grand total of COs with PSOs and POs														
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(120/54)														2.22

Strong - 3, Medium - 2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.22
Observation	COs of Data Mining and Warehousing – Strongly related with PSOs and POs		

ARUL ANANDARCOLEGE (AUTONOMOUS), KARUMATHUR – 625514

DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.) Part : III – Core-17
Semester : VI Hours : 75 Hours
Subject Code : 22UCSD76 Credits : 04

MOBILE APPLICATION DEVELOPMENT

Objectives:

The course enables the students to

- Understand the basic concepts of JAVA Language for Mobile app Development
- Know about the mobile application development languages.
- Understand the Application models of mobile application frameworks
- Know the User-interface design for mobile applications
- Managing application data using database

Unit - I

15 Hours

Introduction to java – Introducing Java Dalvik Virtual Machine – Developing Simple Java Program – Working with java Tokens-Knowledge Check -1 –Explaining Data Types-Declaring Variables – Declaring Classes – Declaring Methods –Creating Objects –Explaining Access Specifiers- Interfaces – Inheritance –Implementing Flow control statements-Using Selection statements-using Iteration statements-Using jump statements.

Unit - II

15 Hours

What is Android, Android versions and its feature set The various Android devices on the market , The Android Market application store , Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

Unit - III

15 Hours

The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, DalvikVM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files.

Unit IV

15 Hours

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool, Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using views, Displaying Pictures - Gallery, ImageSwitcher, GridView, and ImageView views to display images, Creating Animation.

Unit V

15 Hours

Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers Intents and Intent Filters- Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers.

Books for Study

1. DarceyLauren, Conder Shane, *Android Wireless Application Development*, Second Edition, Pearson Education.
2. RogersRick, Lombardo John, MednieksZigurd, Meike Blake, *Android Application Development*, O'Reilly, Shroft Publishers & Distributors Pvt Ltd, New Delhi, 2010.
3. Pradeep Kothari, *Android Application Development (with Kit Kat support)* Black Book, Dreamtech Press, 2019.

Books for Reference

1. Meier Reto, *Professional Android 2 Application Development*, Wiley India Pvt Ltd
2. Murphy Mark L, *Beginning Android*, Wiley India Pvt Ltd
3. HashimiSayed Y, KomatineniSatya, MacLean Dave, *Pro Android*, Wiley India Pvt Ltd

Teaching Methods

- Lectures
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes:

On the successful completion of the course students will able to

CO1: Understand the programming concepts of java (K1)

CO2: Understand the characterization and architecture of mobile applications (K2)

CO3: Competent with understanding enterprise scale requirements of mobile applications (K2).

CO4: Designing and developing mobile applications using one application development framework (K3)

CO5: Manage data in the application operations and implementations. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	-	-	3	3	3	1	3	3	3	1	2	28
CO2	3	3	-	-	3	2	3	1	3	3	3	1	2	27
CO3	3	3	-	-	3	2	3	1	3	3	3	1	1	26
CO4	3	3	-	-	3	2	3	1	3	3	3	1	1	26
CO5	3	3	-	-	3	3	3	2	3	3	3	1	2	29
Grand total of COs with PSOs and POs														136
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(136/55)														2.47

Strong - 3, Medium - 2, Low - 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.47
Observation	COs of Mobile Application Development – Strongly related with PSOs and POs		

ARUL ANANDARCOLEGE (AUTONOMOUS), KARUMATHUR – 625514

DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.)

Part : III – Core-18

Semester : VI

Hours : 75 Hours

Subject Code : 22UCSD86

Credits : 03

PYTHON PROGRAMMING

Objectives:

The course enables the students to

- make students understand the concepts of Python programming
- provide solutions using control structures in Python programming
- apply the knowledge functions, strings and modules in Python based solutions
- learn the various element-based data types in Python programming
- work with file-based operations with Python

UNIT I: Fundamentals of Python

15 Hours

Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables – Identifiers – Keywords-Built-in Data Types – Output Statements – Input Statements – Comments – Indentation – Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.

UNIT II: Control Statements

15 Hours

Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. **Iterative Statements:** While loop, For loop, Else suite in loop and Nested loops. **Jump Statements:** Break, Continue and Pass statements.

UNIT III: Functions in Python

15 Hours

Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments:** Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments – Recursion. **Python Strings:** String operations-Immutable Strings – Built-in String Methods and Functions - String Comparison. **Modules:** import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.

UNIT IV: Lists and Dictionaries

15 Hours

Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. **Tuples:** Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.

UNIT V: File Handling

15 Hours

Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

Books for Study

1. Thareja, R. (2017). *Python programming using problem solving approach* (1st ed.). Oxford University Press.
2. Rao, N. R. (2017). *Core Python programming* (1st ed.). Dream Tech Publishers.

Books for Reference

1. Kurama, V. (2018). *Python programming: A modern approach*. Pearson Education.
2. Lambert, K. A. (2017). *Fundamentals of Python – First programs*. CENGAGE Publication.

Web Sources

1. <https://www.programiz.com/python-programming>
2. <https://www.guru99.com/python-tutorials.html>
3. https://www.w3schools.com/python/python_intro.asp
4. <https://www.geeksforgeeks.org/python-programming-language>
5. [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

Teaching Methods

- Lectures
- Demonstration
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Recall simple Python programs that solve basic problems (K1)

CO2: Explain the basic concepts of Python programming (K2)

CO3: Use Python to interact with the operating system and other external resources (K3)

CO4: Analyse and apply solutions to problems by using various Python techniques (K4)

CO5: Develop reusable and maintainable Python software (K5)

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping Course outcome with PO and PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO2	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO3	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO4	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO5	3	3	-	-	2	3	2	2	3	2	3	3	3	30
Grand total of COs with PSOs and POs														150
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(150/55)														2.72

Strong - 3, Medium - 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.72
Observation	COs of Open Source Technologies – Strongly related with PSOs and POs		

ARUL ANANDARCOLEGE (AUTONOMOUS), KARUMATHUR – 625514

DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.)

Part : III – Core Lab-6

Semester : VI

Hours : 75 Hours

Subject Code : 22UCSP66

Credits: 03

PYTHON PROGRAMMING LAB

Objectives:

The course enables the students to

- make students understand the concepts of Python programming
- provide solutions using control structures in Python programming
- apply the knowledge functions, strings and modules in Python based solutions
- learn the various element-based data types in Python programming
- work with file-based operations with Python

List of Exercises

1. Program to demonstrate basic operations
2. Program using control statement
3. Program using user defined functions
4. Program to demonstrate string manipulation
5. Program using lists
6. Program using tuples
7. Program using Dictionaries
8. Program using File Manipulations
9. Program to demonstrate exception handling
10. Programs using classes and objects
11. Program using databases
12. Program to implement Socket programming
13. Program to demonstrate GUI programming
14. Program to demonstrate web programming

Course Outcomes

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

CO1: Apply the basic concepts of programming using Python

CO2: Construct the program using built in functions of List and string

CO3: Test for mapping using Dictionary

CO4: Asses the execution speed of the program using recursion

CO5: Demonstrate Database and Networking Connectivity

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Teaching Methods

- Lectures
- Demonstration
- PPTs
- Learn by Doing
- Video Tutorials

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	3	3	3	2	2	-	-	3	3	-	3	3	28
CO2	3	2	3	3	2	3	-	-	3	2	-	3	3	27
CO3	3	2	2	3	2	3	-	-	3	2	-	3	3	26
CO4	3	2	2	3	2	3	-	-	3	2	-	3	3	26
CO5	3	2	2	3	2	3	-	-	3	2	-	3	3	26
Grand total of COs with PSOs and Pos														131
Grand total with PSOs and POs														
Mean value of COs with PSOs and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs \& POs}}$ = (131/50)														2.62

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.62
Observation	COs of Python Programming Lab – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS)-KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : B.Sc (Comp.Sci)
Semester : VI
Subject Code : 22UCSD96

Part : Core -19
Hours : 15
Credit : 2

PROJECT WORK

Objectives:

The course enables the students to

CEO1: Understand and Plan the real problem of the Project.

CEO2: Analyze the problem.

CEO3: Design the Project.

CEO4: Implement the Project.

CEO5: Configured and Test the Project.

Guidelines

- All the students are expected to choose project in IT Related Company/Industry/real project in schools/College/any authorized organization/Institutions.
- Each student will be allocated guide/supervisor by the department for smooth/best way to complete the project.
- All the students are expected to submit attendance and company undertaking and project completion certificate during the period of project allotted duration.
- Three copies of the thesis/record note book must be submitted to the department duly signed by guide/supervisor and Head of the Department.

Examination/ Evaluations

The thesis/record notebook will be evaluated by the internal examiner and external examiner who are appointed by the Office of the Controller of Examination. The candidate also will be evaluated based on viva-voce and presentation of the thesis/record notebook and will be graded as shown below.

Excellent	85% and above
Very Good	75% and above but below 85%
Good	60% and above but below 75%
Satisfactory	50% and above but below 60%
Rejected	Less than 50%

Course Outcomes (CO):

On successful completion of the course students will be able to

CO1: Identify and plan the real problem of the Project. (K2)

CO2: Analyze the problem of the Project. (K4)

CO3: Apply and Design the Project. (K3)

CO4: Implement the Project. (K5)

CO5: Create the Project. (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	2	-	1	3	1	-	3	3	2	3	3	26
CO2	3	2	2	-	2	3	1	-	3	3	2	3	3	27
CO3	3	2	3	-	2	3	1	-	3	3	2	3	2	27
CO4	2	3	3	-	2	3	1	-	2	2	2	2	3	25
CO5	3	3	3	-	2	2	1	-	3	3	2	3	2	27
Grand total of COs with PSOs and POs														132
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(132/55)														2.40

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.40
Observation	COs of Project Work – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS)- KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
INTERNET OF THINGS

Class : B. Sc. (Comp. Sci.)

Part : Core Elective -2

Semester : VI

Hours : 45

Subject Code : 22UCSE26 (A)

Credits: 03

Objectives:

The course enables the students to

- Understand the Basic concepts in IoT
- Analyze various IoT Devices
- Understand the Functions of Data and Human Interaction with IoT
- Understand the scope of IoT Applications
- Analyze various case studies in IoT Applications

Unit – I: Introduction to IOT

9 Hours

Definition of the Internet of Things - main assumptions and perspectives- Platform for IoT devices - Economics and Technology of the IoT –Issues in IoT and solutions-Architecture of IoT.

Unit - II IOT Devices

9 Hours

Temporary and Ad-hoc devices-Addressing issues-End devices in dedicated networks- Small data Building a web of things-Autonomy and co-ordination-Structuring a tree-Housekeeping message-Role of integrator function-Degrees of functionality.

Unit - III Data and Human Interaction:

9 Hours

Functions of IoT-Analysis and control-Neighborhood - Human interface and control points-Collaborative scheduling tools-Packaging and provisioning- Distributed integrator functions-Filtering the streams-IP Alternative-Protocol based on category classification.

Unit - IV IOT Applications:

9 Hours

Moore’s Law –Intelligence near the edge- Incorporating legacy devices- Staying in the loop - Social machines-Efficient process control-Factory application- Natural sciences- Living applications- Shared software and business process vocabularies.

Unit – V Case Studies Illustrating IOT Design

9 Hours

Home Automation - Cities - Environment - Agriculture - Productivity Applications

Books for Study:

1. Da Francis, Costa, *Rethinking the Internet of Things-A scalable approach to connecting everything*, 2013, Apress open publication.
2. WaherPeter, *Learning Internet of Things*, 2015, PACKT Publishing-Birmingham-Mumbai.

Books for Reference:

1. Bahga Arhdee, Madisetti Vijay, *Internet of Things: A Hands on Approach* (<http://www.internet-of-things-book.com/>). 2015.
2. PfisterCuno, *Getting started with the Internet of Things*, O’Rielly Publication.2011.

Web Reference:

1. Introduction to IoT: <https://www.javatpoint.com/iot-internet-of-things>
2. Architecture of IoT : <https://www.geeksforgeeks.org/architecture-of-internet-of-things-iot/>
3. IoT Devices : https://www.tutorialspoint.com/internet_of_things/index.htm
4. Advanced IoT Applications : <https://nptel.ac.in/courses/108108123>
5. IoT Human Interaction : <https://www.digimat.in/nptel/courses/video/106106177/L01.html>
6. IoT designs : <https://nlist.inflibnet.ac.in/search/Record/EBC5332124>

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Understand the basic concepts in IoT. (K2)

CO2: Analyze various IoT Devices. (K4)

CO3: Understand Data and Human Interaction concepts in IoT. (K3)

CO4: Develop IoT Applications for real time applications. (K3)

CO5: Analyze various case studies in IoT Applications. (K4)

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping Course Outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	2	1	-	3	-	-	2	3	-	3	2	22
CO2	3	3	2	1	-	2	-	-	3	2	-	3	3	22
CO3	2	3	2	2	-	3	-	-	2	3	-	2	2	21
CO4	3	2	3	1	-	3	-	-	3	3	-	3	3	24
CO5	3	3	2	1	-	3	-	-	3	2	-	2	2	21
Grand total of COs with PSOs and POs														110
Grand total with PSOs and POs														
Mean value of COs with PSO and POs = _____ = (110/45)														2.40
Number of COs relating with PSOs& POs														

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.40
Observation	COs of Internet of Things – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS)- KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
ARTIFICIAL INTELLIGENCE

Class : B. Sc. (Comp. Sci.)

Part : Core Elective - 2

Semester : VI

Hours : 45

Subject Code : 22UCSE26 (B)

Credits: 03

Objectives:

The course enables the students to

- Understand the Basic concepts in AI
- Analyze various Searching Techniques
- Understand the Knowledge Representation
- Understand the Various Logic in AI
- Analyze various case studies in AI Applications

Unit - 1

9 Hours

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Unit - II

9 Hours

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

Unit – III

9 Hours

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye’s probabilistic interferences and dempstershafer theory.

Unit - IV

9 Hours

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

Unit - V

9 Hours

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering.

Book for Study:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education

Reference Books:-

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem-solving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Understand the Basic concepts in AI. (K2)

CO2: Analyze various Searching Techniques. (K4)

CO3: Understand the Knowledge Representation. (K3)

CO4: Understand the Various Logic in AI. (K3)

CO5: Analyze various case studies in AI Applications. (K4)

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping Course Outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	2	1	-	3	-	-	2	3	-	3	2	22
CO2	3	3	2	1	-	2	-	-	3	2	-	3	3	22
CO3	2	3	2	2	-	3	-	-	2	3	-	2	2	21
CO4	3	2	3	1	-	3	-	-	3	3	-	3	3	24
CO5	3	3	2	1	-	3	-	-	3	2	-	2	2	21
Grand total of COs with PSOs and POs														110
Grand total with PSOs and POs														
Mean value of COs with PSO and POs = $\frac{110}{45}$ =														2.40
Number of COs relating with PSOs & POs														

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.40
Observation	COs of Internet of Things – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR – 625514

DEPARTMENT OF COMPUTER SCIENCE

Class : B. Sc. (Comp. Sci.)

Part : III Core Elective-2

Semester : VI

Hours : 45 Hours

Subject Code : 22UCSE26 (C)

Credits: 03

Software Testing

Objectives:

The course enables the students to

- Understand the software development models
- Understand the functionality, security, performance, and other aspects of an application
- Understand the methods for the software's stability and checks for flaw.
- Understand the testing functionality for speed, responsiveness and stability requirements
- Understand the testing functionality software's quality and performance

UNIT I : Software Development Life Cycle models: phases of software project – Quality, Quality Assurance, Quality control- Testing, verification and validation- process model to represent Different phases- Life cycle models. White-Box Testing: static testing- structural Testing –challenges in white-Box testing.

UNIT II: Black-Box Testing: Introduction to Black Box Testing - challenges in Black Box Testing – Integration Testing: Integration Testing as type of Testing- Integration Testing as a phase of Testing - Scenario Testing-Defect Bash.

UNIT III: System and Acceptance Testing: system testing overview- Why system testing is done? Functional versus Non-functional Testing- Nonfunctional Testing-Acceptance Testing-summary of Testing phases.

UNIT IV: Performance Testing: Factors governing performance Testing- Methodology of performance Testing- tools for performance testing-process for performance Testing-challenges. Regression Testing: What is Regression Testing?-types of Regression Testing-When to do Regression Testing- How to do Regression Testing-Best practices in regression testing.

UNIT V: Test planning, Management, Execution and Reporting: Test planning-Test Management- Test process-Test Reporting-Best practices. Test Metrics and Measurements: project metrics- progress Metrics- Release Metrics.

Text Book:

1. Boris Beizer, "Software Testing Technologies", Dreamtech Publication, Edition 2006.

Reference Books:

1. Glenford J.Myers," The Art of Software Testing", John Wesley & Sons, 1999.

2. Roger S.Pressman, "Software Engineering", Tata McGraw-Hill, 6th Edition 2005.

Teaching Methods:

- Lectures
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes:

On the successful completion of the course students will able to

CO1: Apply various software testing model for real time projects (K3)

CO2: Evaluate the functionality, security, performance, and other aspects of an application (K5)

CO3: Apply various methods for the software's stability and checks for flaw. (k3)

CO4: Apply testing functionality for speed, responsiveness and stability requirements (k3)

CO5: Understand the testing functionality software quality and performance

K1= Remember K2 = Understand K3= Apply K4=Analysis K5= Evaluate K6= Create

Mapping

Objectives	PSO	PSO	PSO	PSO	PSO	PO	PO	PO	PO	PO	PO	PO	PO	Sum of Cos with PSOs&Pos
	1	2	3	4	5	1	2	3	4	5	6	7	8	
Outcome														
CO1	1	1	2	-	-	3	3	-	1	2	2	2	-	17
CO2	2	2	2	-	1	3	3	-	2	2	2	2	-	21
CO3	3	3	2	-	2	3	3	-	1	3	3	3	-	26
CO4	3	2	2	-	1	3	3	-	2	2	3	1	-	22
CO5	3	3	3	-	2	3	3	-	1	2	3	2	-	25
Grand Total of Cos with POs and PSOs														111
Grand total with PSOs and POSs Mean value of Cos with PSO and POs = $\frac{111}{49}$ = (111/49) Number of Cos relating with PSOs& POs														2.26

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.26
Observation	COs of Software Testing – Strongly related with PSOs and POs		

Class : B.Sc (Comp.Sci)

Part : Self Learning Course

Semester : VI

Hours :

Subject code : 22UCSSL6

Credit : 03

ETHICAL HACKING

Objectives:

On Successful completion of the course the students should

- Know about hackers and their working style
- Learn about Email Hacking
- Learn about detection and removal of Trojans
- Learn about Mobile Hacking
- Understand the Penetration Testing

Unit -I Concept of Ethical Hacking

Introduction, What is hacking? Hackers, types of hackers, why hackers hack? Prevention from hacker, steps performed by hackers, working of ethical hacker

Unit – II Email Hacking

How email works? Email service protocol's, Email Security, email spoofing, Methods to send fake Emails, email spamming, phishing, prevention from phishing, email tracing, keystroke loggers

Unit -III Trojans

Introduction, types of Trojans, components of Trojan, mode of Transmission for Trojans, detection and Removal, Counter measures.

Unit IV Mobile Hacking

Introduction, Call Spoofing/forging, SMS Forging, Bluesnarfing. Sniffers What is Sniffers? Defeating Sniffers, Ant Sniff

Unit -V Penetration Testing

What is Penetration Testing? Introduction, Setting the Stage, Introduction to Kali and Backtrack Linux: Tools. Lots of Tools, Working with Your Attack Machine: Starting the Engine, The Use and Creation of a Hacking Lab, Phases of a Penetration Test

Books for Study

1. "Hacking for Beginners" by Manthan Desai, 2010
2. "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy" second Edition by Patrick Engebretson, ELSEVIER.

Books for Reference

1. Daniel G. Graham, Ethical Hacking: A Hands-on Introduction to Breaking In, No Starch Press, 2021

Course Outcomes

CO1: Gain knowledge about hackers (K2)

CO2: Understand various types of E-Mail Hacking (K2)

CO3: Apply methods to detect and removal of Trojans(K3)

CO4: Understand various types of Mobile Hacking(K2)

CO5: Apply penetration testing to find and exploit vulnerabilities in a computer system(K3)

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	-	-	3	2	2	-	2	2	1	2	3	22
CO2	3	2	-	-	1	2	2	-	3	2	1	2	2	20
CO3	3	2	-	-	1	2	2	-	2	2	1	2	3	20
CO4	2	3	-	-	1	2	2	-	2	2	1	2	2	19
CO5	2	2	-	-	2	1	2	-	2	2	-	2	3	18
Grand total of COs with PSOs and POs														99
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs=(99/49)														2.05

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.05
Observation	COs of Ethical Hacking – Medium related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
M.Sc. Computer Science (2 Years)
CBCS & OBE PATTERN (From 2024 onwards)

Nature of the paper	Sub.Code	Title	Hr	Cr
FIRST YEAR – FIRST SEMESTER				
Core	24PCSC11	Core – 1 : Data Structures and Algorithms	05	05
	24PCSC21	Core – 2 : Advanced Java Programming	05	05
	24PCSC31	Core – 3 : Distributed Operating System	05	04
Core Elective	24PCSE11	Core Elective – 1: Advanced Computer Networks / Computer Graphics and Multimedia Systems	05	04
Core Practical	24PCSP11	Core Lab – 1: Data Structures Algorithms – Lab	05	03
	24PCSP21	Core Lab – 2: Advanced Java Programming Lab	05	03
Total			30	24
FIRST YEAR – SECOND SEMESTER				
Core	24PCSC42	Core – 4: Python Programming	05	05
	24PCSC52	Core – 5: Advanced Web Technologies	05	04
Core Elective	24PCSE22	Core Elective – 2: Cryptography and Network Security / Mobile Computing	04	04
Core Practical	24PCSP32	Core Lab – 3: Advanced Web Technology Lab	05	03
	24PCSP42	Core Lab – 4 : Python Programming Lab	05	03
Non Major Elective	24PCSN12	NME Software License Management	04	04
	24PLFS12	Life Skills	2+2*	02
Total			30	25

SECOND YEAR – THIRD SEMESTER				
Core	24PCSC63	Core – 6: Internet of Things	05	04
	24PCSC73	Core – 7: R programming	05	04
	24PCSC83	Core –8: Machine Learning	05	04
Core Elective	24PCSE33	Core Elective – 3: Cloud Computing / Open Source Technologies	05	04
Core Practicals	24PCSP53	Core Lab – 5: R Programming Lab	05	04
	24PCSP63	Core Lab – 6: Machine Learning Lab	05	04
Total			30	24
SECOND YEAR – FOURTH SEMESTER				
Core Electives (Online mode)	24PCSE44	Core Elective – 4: Software Project Management / Artificial Intelligence	05	05
	24PCSE54	Core Elective – 5: Data Science / Big Data Analytics	05	05
		Project	20	09
Total			30	19

Semester Credits	I	II	III	IV	Total
	24	25	24	19	92

Self-Learning Courses 2

The students can undertake any online courses offered by SWAYAM during any of the semesters and can earn extra credit.

Credit	2 per course
Maximum	4 credits

**ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS**

Class : M.Sc., Computer Science

Part : Core – 1

Semester : I

Hours : 75

Subject Code : 24PCSC11

Credit : 5

DATA STRUCTURES AND ALGORITHMS

Objectives:

The course enables the students to

- Understand and remember algorithms and its analysis procedure.
- Understand the concepts of data structures through ADT including Stack & Queues
- Familiar with implementation of dynamic data structures
- Familiar with internal and external sorting algorithms and its complexities
- Apply the concepts of advanced data structure such as binary tree, Hash table & Symbol table.

UNIT I

15 Hours

Abstract Data Types – Algorithm – Algorithm Analysis – Goal of Analysis of Algorithm –Running Time Analysis – How to compare Algorithms – Types of Analysis – Recursion and Back Tracking.

UNIT II

15 Hours

Stacks and Queues - Fundamentals- Stack and Queue ADT-Operations- Exceptions- Applications.

UNIT III

15 Hours

Linked Lists- Linked List ADT – Why Linked List – Comparison of linked list with Arrays – singly linked list – Doubly linked list –Circular linked list –A Memory efficient Doubly Linked list –Unrolled Linked List.

UNIT IV

15 Hours

Searching and Sorting: Types of Searching – Linear search types – Binary Search – Interpolation search – Sorting – Classification of sorting – Bubble sort- Insertion sort – Selection sort – shell sort –merge sort – heap sort –quick sort – Radix sort – Topological sort – External sorting.

UNIT V

15 Hours

Tree – Binary Tree – Binary tree traversal – Generic trees (N-ary trees) – Threaded Binary tree – Expression tree – Binary search tree - AVL tree – symbol table –Hashing – Hash Functions – Hash tables – Collisions – Collision resolution techniques.

Book for Study

1. Karumanchi Narasimha, *Data Structures and Algorithms Made Easy by JAVA*, Second Edition, Careermonk Publications.

Books for Reference

1. Weiss Allen Mark, *Data Structures and Algorithms in C*, 1997, Addison-Wesley.

2. Horowitz Ellitz, Sahni Sartaj, *Data Structures*, Second Edition, Universities Press.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes:

On Successful completion of the course the students able to

CO1: Analyze the algorithm to be applied for specific problem (K4)

CO2: Understand the functions of linear data structures. (K3)

CO3: Understand the advanced linear data structure (K2)

CO4: Implement appropriate sorting/searching technique for given problem. (K3)

CO5: Understand the functions of compiler/interpreter (K2)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course Outcome with POs and PSOs

Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of Cos with PSOs& POs
CO1	3	3	2	1	1	3	-	-	3	3	-	3	3	25
CO2	3	3	2	1	2	3	-	-	3	3	-	3	3	26
CO3	3	3	3	1	2	3	-	-	3	3	-	3	3	27
CO4	3	3	3	2	2	3	-	-	3	3	-	3	3	28
CO5	3	3	3	2	2	3	-	-	3	3	-	3	3	28
Grand total of COs with PSOs and POs														134
Grand total with PSOs and POs														
Mean value of COs with PSOs and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs \& POs}} = (134 / 50)$														2.68

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and Pos			2.68
Observation	COs of Data Structures and Algorithms – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science **Part** : Core – 2
Semester : I **Hours** : 75
Subject Code : 24PCSC21 **Credit** : 5

ADVANCED JAVA PROGRAMMING

Objectives:

The course enables the students to

- Understand the Classes and methods, utility classes, multithreading
- Understand advanced concepts of generics, collection interface and mapping
- Apply JFC to develop we applications using controls
- Apply servlet to create server side scripting applications
- Understand and develop Transaction applications

Unit I **(15 Hours)**

Introduction -Genesis of Java- Types of Java applications – Data types, variables and arrays – Operators – Utility Classes – String Handling- Control statements – Classes and Methods – Inheritance – Packages and Interfaces –Exception Handling- Multithreaded Programming.

Unit II **(15 Hours)**

Introduction about generics - boxing and unboxing - for each generics methods and variable arguments- sub typing and wildcards - data declaration – collection interfaces - sets – queue - lists- maps.

UNIT III **(15 Hours)**

Java Foundation classes(JFC) /Swings –JButtons, JLabels, JCheck boxes, JRadio Buttons, JChoices, Lists, JText Fields and JText areas – JScrollbars – Canvases – Event Delegation model – Exceptions – Event classes – Listener Interfaces – Containers and Layout Managers– Adding tool tips and icons – Popup menus – Tabbed panes – sliders –progress bars – Tables.

UNIT IV **(15 Hours)**

Servlet basics-the servlet life cycle- retrieving information- sending HTML information- the session tracking- database connectivity. **JSP**: Introducing Java server pages – basics- beneath JSP -JSP session - JSP architecture – security.

UNIT V **(15 Hours)**

EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB- Variable in perl- perl control structures and operators – functions and scope

Books for Study

1. J. McGovern,R. Adatia,Y. Fain, *J2EE 1.4 Bible*, Wiley- Dream Tech India Pvt. Ltd, New Delhi, 2003

2. H. Schildt, *Java 2 Complete Reference*, Fifth Edition, Tata McGraw-Hill, New Delhi, 2017

Books for Reference

1. Sierra Kathy, *Head First Java*, Second Edition, O'Reilly Media, 2009
2. Holzner Steve, *Java 2 Black Book*, Second Edition, Paraglyph Press, 2005

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

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

CO1: Understand the classes and object, multithreading and interface of java (K2)

CO2: Understand the generic of java for the advanced programming (K2)

CO3: Create GUI form using swing concepts (K6)

CO4: Develop server applications using servlet & JDBC (K6)

CO5: Design and develop EJB for transaction in business services (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	3	1	2	3	-	-	3	3	-	3	3	26
CO2	3	2	3	1	2	2	-	-	3	3	-	3	2	24
CO3	3	2	3	1	2	3	-	-	3	3	-	2	3	25
CO4	3	1	2	1	2	3	-	-	3	3	-	3	3	24
CO5	3	1	2	1	1	3	-	-	3	3	-	3	3	23
Grand total of COs with PSOs and POs														122
Mean Value of COs with PSOs and POs=122/50 (MV= Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs)														2.44

Strong -3, Medium -2, Low -1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.44
Observation	COs of Advanced Java Programming – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class	: M.Sc., Computer Science	Part : Core – 3
Semester	: I	Hours : 75
Subject Code	: 24PCSC31	Credit : 4

DISTRIBUTED OPERATING SYSTEMS

Objectives:

The course enables the students to

- explore concepts of operating system components and layers
- understand inter-process communication and distributed dead lock detection algorithms
- Analyze the techniques and methods of distributed resource management
- understand J2EE architecture and APIs for database programming
- understand JEE containers and secured orchestration of containers in the Cloud

Unit I (15 Hours)

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources, Reusable Resources

Unit II (15 Hours)

Issues – Communication Primitives – Inherent Limitations –Lamport’s Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport’s Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

Unit III (15 Hours)

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms

Unit IV (15 Hours)

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols

Unit V (15 Hours)

Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems

Text Books

1. Mukesh Singhal N.G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

Reference Books

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating Concepts", 6th Edition Addison Wesley publications 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 2nd Edition Addison Wesley 2001

Web References

1. <https://www.udemy.com>
2. <https://www.edureka.co>
3. <https://archive.nptel.ac.in>

Teaching Methods

- Lecturing
- PPTs
- Group Discussion
- Learning by Assignments
- Video tutorials

Course Outcomes

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

CO1: list and employ services and functionalities of operating systems (K4)

CO2: identify distributed resources and resource management (K2)

CO3: understand distributed dead lock prevention and avoidance algorithms (K4)

CO4: explore issues and challenges in the design of distributed operating systems (K6)

CO5: explore modern file systems and portable operating systems (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	2	1	1	2	-	-	3	1	-	2	2	19
CO2	3	3	2	1	1	2	-	-	3	1	-	2	2	20
CO3	3	3	3	2	1	2	-	-	3	1	-	2	2	31
CO4	3	3	2	2	1	2	-	-	3	1	-	2	2	21
CO5	3	2	2	1	1	2	-	-	3	1	-	2	2	19
Grand total of COs with PSOs and POs														110

Grand total with PSOs and POs Mean value of COs with PSO and POs = $(110/50)$ Number of COs relating with PSOs& POs	2.2
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Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.2
Observation	COs of Distributed Operating System – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class	: M.Sc., Computer Science	Part : Core Elective – 1
Semester	: I	Hours : 75
Subject Code	: 24PCSE11 (A)	Credit : 4

ADVANCED COMPUTER NETWORKS

Objectives:

The course enables the students to

- Understand how computer networks are organized with the concept of layered approach.
- Understand various types of Transmission Media.
- Understand the mechanism for error detection and correction methods.
- Understand the routing algorithms and its execution process.
- Understand the functions of Application Layer Protocols and its uses.

Unit I **(15 Hours)**

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

Unit II **(15 Hours)**

Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction

Unit III **(15 Hours)**

Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols

Unit IV **(15 Hours)**

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol

Unit V **(15 Hours)**

Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography

Text Book

1. S. Tanenbaum, Computer Networks, 5th Edition, Tata McGraw Hill, 2011

Reference Books

1. B. Forouzan, Introduction to Data Communications in Networking, TMH, 2012.
2. F. Halsall, Data Communications, Computer Networks and Open Systems, Addison Wesley.
3. D. Bertsekas and R. Gallager, Data Networks, Prentice hall of India, 1992.
4. Lamarca, Communication Networks, Tata McGraw Hill, New Delhi,2002.

E-learning resources

1. <https://peasonhighered.com/tanenbaum>

Teaching Methods

- Lecturing
- PPTs
- Group Discussion
- Learning by Assignments
- Video tutorials

Course Outcomes

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

CO1: Understand the basic concepts of computer networks and its architecture. (K2)

CO2: Analyze various transmission mediums by comparing its properties. (K4)

CO3: Understand the contents in a given data packet, based on the layer concept (K2)

CO4: Implement suitable routing and congestion control algorithms. (K3)

CO5: Understand the various Application Layer Protocols. (K2)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of Cos with PSOs & POs
CO1	2	2	1	1	1	3	-	-	3	2	-	2	3	23
CO2	2	2	2	1	-	3	-	-	3	1	-	3	2	22
CO3	3	2	2	2	1	3	-	-	3	2	-	2	3	27
CO4	2	2	2	1	-	3	-	-	3	2	-	2	3	22
CO5	2	2	2	1	1	2	-	-	3	2	-	2	2	23
Grand total of Cos with PSOs and Pos														117
Grand total with PSOs and POs														
Mean value of Cos with PSO and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs\& POs}} = (117/59)$														1.98

Strong – 3, Medium -2, Low - 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs		1.98	
Observation	COs of Advanced Computer Network – Medium related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc (CS)
Semester : I
Subject Code : 24PCSE11 (B)

Part : Core Elective -I
Hours : 75
Credit : 4

COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS

Objectives:

The course enables the students to

- Understand the graphics system and output primitive algorithms
- Apply 2D transformation techniques and clipping operations
- Understand the 3D concepts and color models
- Apply multimedia concepts in flash software
- Understand the timeline effects, multimedia database systems

Unit: I INTRODUCTION (15 Hours)

Overview of Graphics System – Working principles of CRT- Random scan Method - Raster Scan Method - Line Drawing and Circle Drawing Algorithms - DDA – Bresenham’s technique.

Unit: II 2D TRANSFORMATION (15 Hours)

Two dimensional transformations –translation-Scaling and Rotations –Composite transformation-Interactive Input methods- Polygons - Splines - Bezier Curves - Window to view port mapping transformations-Clipping Operations.

UNIT: III 3D TRANSFORMATION (15 Hours)

3D Concepts : 3D transformations -3D composite transformation -Projections - Parallel Projection - Perspective Projection - Visualization and polygon rendering - Color models - XYZ-RGB-YIQ-CMY-HSV Models . Animation - Key Frame systems - General animation functions - morphing.

UNIT IV: OVERVIEW OF MULTIMEDIA (15 Hours)

Multimedia hardware & software - Components of multimedia - Text, Image - Graphics - Audio - Video - Animation - Authoring. **Flash:** Overview of Flash- Introduction to the flash interface- Setting stage dimensions, working with panels, panel layouts- Introduction to drawing and tools in Flash- Layers –Key Frames-Motion Tween.

UNIT V: MULTIMEDIA SYSTEMS AND APPLICATIONS (15 Hours)

Animation – Working with timeline effects – Using the frame by-frame animation technique- Animating with movie clips - multimedia communication systems - Data base systems - Synchronization Issues - Presentation requirements - Applications - Video conferencing - Virtual reality - Interactive video - video on demand.

BOOKS FOR STUDY

1. Hearn D , Baker M.P, *Computer Graphics - C Version*, Second Edition, Pearson Education, 2004
2. Steinmetz Ralf, SteinmetzKlara, *Multimedia Computing, Communications and Applications*, Pearson Education, 2004

BOOKS FOR REFERENCE

1. Angel, E., *Interactive Computer Graphics: A Top-Down Approach with OpenGL*, Fourth Edition, Addison Wesley, 2005
2. Rebenschied Shane, *Macromedia Flash MX*, First Edition, Peachpit Press, 2004

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

On successful completion of the course students will be able to

CO1: Apply the output primitive algorithms to create application for drawing shapes. (K3)

CO2: Apply the techniques of 2D operations and clipping to develop image synthesis applications. (K3)

CO3: Understand the 3D projections and RGB,CMY color models.(K2)

CO4: Create video using flash software.(K6)

CO5:Understand frame by frame animation, non-linear movie and multimedia communication system.(K2)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	2	2	3	1	2	2	-	-	3	1	-	3	3	22
CO2	1	2	3	1	2	2	-	-	3	1	-	3	2	20
CO3	3	2	3	1	2	3	-	-	3	1	-	2	3	23
CO4	1	1	2	1	2	3	-	-	3	1	-	3	3	20
CO5	1	1	2	1	2	3	-	-	3	1	-	3	3	20
Grand total of COs with PSOs and POs														105
Grand total with PSOs and POs														
Mean value of COs with PSOs and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs\& POs}}$ = (105 / 50)														2.10

Strong -3 , Medium -2 , Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.10
Observation	COs of Computer Graphics and Multimedia Systems– Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science

Part : Core Lab - 1

Semester : I

Hours : 75

Subject Code : 24PCSP11

Credit : 3

DATA STRUCTURES AND ALGORITHMS LAB

Objectives:

The course enables the students to

- Develop skills in design and implementation of data structures and their applications.
- Learn and implement Linear, non Linear and Tree data structures
- Learn ADT and Graph data structures and its applications.
- Study and analyze different sorting techniques.
- Design the applications for Searching techniques.

LIST OF EXPERIMENTS

1. Write a program to check whether the number provided is even or odd.
2. Write a program to print the largest number among three numbers given by the user.
3. Write a C++ program to print table of a number using do while loop.
4. Write a program that take a string as input and print it.
5. Write a program define a class to represent a bank account profile
6. Write a C+ + program to create a person class and find the total, average and grade of each student and count the grade of I, II, & III, display the report
7. Write a program to demonstrate the use of class and object.
8. Write a program to demonstrate the use of constructor and destructor in a class.
9. Write a program to demonstrate the use of static variable and static function.
10. Write a program to get and print student data using inheritance.
11. Write a program to overload a sum function.
12. Write a program to create a virtual function demonstration using run Time binding.
13. a)Write a program for static binding (accessing member function using pointers)
b)Write a program for dynamic binding (accessing member function using pointers)
14. Write a program for pure virtual function.
15. Write program to display Sum and Average of Array Elements Using for Loop
16. Write a Program to implement Stack using Array.
17. Write a program to implement stack using linked list.
18. Write a program to implement queue using linked list.
19. Write a program for binary tree insertion and in-order traversal
20. Write a program to search a given value in an array using sequential search.
21. Write a program to search an element in the array using binary search.
22. Write a program to sort an array using selection sort.
23. Write a C++ program to sort an array using insertion sort.
24. Write a C++ program to sort an array using quick sort.

25. Write a program to implement merge sort.

Course Outcomes

On successful completion of the course students will be able to

CO1: Apply with basic data structures that are suitable for the problems to be solved efficiently.(K3)

CO2: Design and implement linear, and tree and its applications. (K3)

CO3: Work with ADT with its applications. (K3)

CO4: Design sorting technique, its algorithm design and analysis. (K3)

CO5: Implement the problem in the Searching techniques. (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	3	2	1	3	-	-	3	3	-	3	3	27
CO2	3	3	3	2	1	3	-	-	3	3	-	3	3	27
CO3	3	3	3	2	1	3	-	-	3	3	-	3	3	27
CO4	3	3	3	2	1	3	-	-	3	3	-	3	3	27
CO5	3	3	3	2	1	3	-	-	3	3	-	3	3	27
Grand total of COs with PSOs and POs														135
Grand total with PSOs and POs														
Mean value of COs with PSOs and POs = $\frac{135}{50}$ = (135/50)														2.70
Number of COs relating with PSOs & POs														

Strong – 3, Medium -2, Low - 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.70
Observation	COs Data Structures and algorithms- Lab– Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class	: M.Sc., Computer Science	Part : Core Lab - 2
Semester	: I	Hours : 75
Subject Code	: 24PCSP21	Credit : 3

ADVANCED JAVA PROGRAMMING LAB

Objectives:

The course enables the students to

- Apply CMS Concepts to create blog or websites.
- Apply JSP to develop web applications
- Apply and design servlet applications
- Develop programs using JDBC technique
- Develop programs using generic classes

JSP

1. Display Employee Table
2. Display Department Faculty Details
3. Exam Result
4. Course Registration System
5. Alumni Website
6. Display College Course List
7. News and Events Block using DB
8. User Registration Page using Session
9. User Login Page using Session

SERVLET

1. HTTP Servlet Communication
2. Generic Servlet Communication
3. User Registration and Login Process using session

EJB with JDBC

4. Display Employee Table using JDBC
5. Insert a Record in Employee Table using JDBC
6. Servlet Chaining
7. Bean Validation
8. Session and Cookie Management

Teaching Methods

- Lecturing
- PPTs
- Learning by Doing
- Demonstrate method

Course Outcomes

On successful completion of course the students will be able to

CO1: Develop blog or websites using content management systems.

CO2: Design and develop their own web applications by JSP concepts (K6)

CO3: Develop server side programming by servlet and session management (K6)

CO4: Develop applications using JDBC concepts (K6)

CO5: Apply generic classes in advanced java applications (K3)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

Objectives	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
Outcome														
CO1	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO2	2	2	2	1	1	3	3	-	-	2	2	2	-	20
CO3	3	2	2	2	2	3	3	-	-	2	2	2	-	23
CO4	3	3	2	2	2	3	3	-	-	2	2	2	-	24
CO5	3	2	2	2	2	3	3	-	-	2	2	2	-	23
Grand Total of COs with POs PSOs														110
Grand total with PSOs and POs Mean value of COs with PSOs and POs = $\frac{\text{Grand total with PSOs and POs}}{\text{Number of COs relating with PSOs \& POs}} = \frac{110}{50}$ = (110/50)														2.20

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.20
Observation	COs of Advanced Java Programming – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class	: M.Sc., Computer Science	Part	: Core -4
Semester	: II	Hours	: 75
Subject Code	: 24PCSC42	Credit	: 5

PYTHON PROGRAMMING

Objectives:

The course enables the students to

- Understand the basic features of Python
- Develop Python programs with conditionals and loops and data structures
- Build composite data types in Python
- Design and write efficient application using OOPs concepts
- Design and program Python applications with database.

UNIT- I: INTRODUCTION TO PYTHON (15 HOURS)

Overview – History of Python – Python features – Data types-Arithmetic Operators-Expressions - Comments in the Program-Understanding the error Messages Python interpreter and interactive mode-values and types- variables, expressions, statements, precedence of operators

UNIT II: CONTROL FLOW (15 HOURS)

Conditionals: Boolean values and operators- conditional - Iteration: functions: return values- parameters- local and global scope- function composition- recursion; arrays-Traversal with a for Loop- String Slices- Strings Are Immutable- Searching- Looping and Counting- String Methods- The in Operator- String Comparison- String Operations

UNIT- III: COLLECTION DATA TYPESLES (15 HOURS)

Lists: list operations- list slices- list methods- list loop- mutability- aliasing- cloning lists- list parameters; Tuples: tuple assignment- tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension - Files - errors and exceptions- handling exceptions

UNIT IV: OBJECT ORIENTATION (15 HOURS)

Regular Expressions – Concept of regular expression- various types of regular expressions- using match function. Classes and Objects: Overview of OOP (Object Oriented Programming)- Class Definition- Creating Objects- Instances as Arguments- Instances as return values- Built-in Class Attributes- Inheritance- Method Overriding- Data Encapsulation- Data Hiding

UNIT V: GUI PROGRAMMING (15 HOURS)

Widgets: Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menubutton, Menu, Message, Radiobutton, Scale, Scrollbar, text, Toplevel, Spinbox, PanedWindow, LabelFrame, Messagebox. Handling Standard attributes and Properties of Widgets - Connecting to a MySQL database from Python

Books for Study

1. Downey Allen. B, *Think Python: How to Think Like a Computer Scientist*, Second Edition, O'Reilly Publishers, 2016,
2. Rossum VanGuido, Jr Drake Fred. L, *An Introduction to Python Revised and updated for Python 3.2*, Network Theory Ltd., 2011.

- GoldwasserMichael. Letscher H, David, *Object-oriented Programming in Python*, Pearson Prentice Hall, 2008

Books for Reference

- Dierbach Charles, *Introduction to Computer Science using Python: A Computational Problem- Solving Focus*, Wiley India Edition, 2013
- GutttagJohn. V,*Introduction to Computation and Programming Using Python*, Revised and expanded Edition, MIT Press, 2013
- Budd Timothy A, *Exploring Python*, Mc-Graw Hill Education (India) Private Ltd, 2015

COURSE OUTCOMES

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

CO1: Develop simple Python programs for solving problems.(K3)

CO2: Write simple Python programs and decompose a Python program into functions.(K2)

CO3: Understand complex data types and files in Python Programs. (K3)

CO4: Develop programming using OOPs concepts in python. (K3)

CO5: Create the GUI Form and Adding Widgets and design GUI database. (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	2	3	2	2	-	-	3	3	-	3	3	27
CO2	3	2	2	2	2	3	-	-	3	2	-	3	3	25
CO3	3	2	3	3	2	3	-	-	3	2	-	3	3	27
CO4	3	2	3	3	2	3	-	-	3	2	-	3	3	27
CO5	3	2	3	3	2	3	-	-	3	2	-	3	3	27
Grand total of COs with PSOs and POs														133
Grand total with PSOs and POs														
Mean value of COs with PSO and POs=												(133/50)	2.6	
Number of COs relating with PSOs& POs														6

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.66
Observation	COs of Python Programming– Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science

Part : Core – 5

Semester : II

Hours : 75

Subject Code : 24PCSC52

Credit : 4

ADVANCED WEB TECHNOLOGIES

Objectives:

The course enables the students to

- Understand the basics of internet and web programming
- Understand and analyze the concept of Dynamic and interactive web application design
- Explore the idea of XML code and data management
- Explore programming constructs of Javascript and interface design
- Explore PHP code constructs and database programming with MySQL

Unit I: Web Basics and HTML

(15 Hours)

Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser. Introduction, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Cascading Style Sheet-HTML 4 style sheet features, Creating Forms, Frames and Tables.

Unit II: Dynamic HTML

(15 Hours)

Introduction of DHTML- HTML vs. DHTML, Advantages of DHTML, CSS of DHTML, Event Handling, Data Binding, Browser Object Models.

Unit III: XML

(15 Hours)

Introduction of XML- Some current applications of XML, Features of XML, Anatomy of XML document, The XML Declaration, Element Tags- Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, DTD - types.

Unit IV: Javascript

(15 Hours)

JAVA SCRIPT – Introduction – Usage of variables – operations – control structures – looping structures – predefined keywords – arrays – predefined functions – user defined functions – arrays and functions – mathematical functions – string functions –Exception Handling – Built-in objects –Date Object – Events and Event Handling – Window – Confirmation, alert message.

Unit V: PHP and MySQL

(15 Hours)

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP – Database Programming – Implementing SQL statements using PHP

Books for Study

1. *HTML5 Black Book: Covers CSS3, JavaScript, XML, XHTML, Ajax, PHP and JQuery*, Kogent Learning Solutions 2016.

Books for Reference

1. McCoy, *Mastering Web Design*, Third Edition, BPB Publications, New Delhi.
2. Weiss Aaron, *The Complete Idiot's guide to JavaScript*, Second Edition, PHI.
3. Ecky Putrady, —Practical Web Development with Haskell: Master the essential skills to build fast and scalable web applications||, 1st edition , A press, 2018
4. Peter Moulding, *PHP Black Book*, Dreamtech Press Ltd, 2001

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learning by Doing
- Video tutorials

Course Outcomes

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

CO1: Review internet basics, HTML tags, attributes and write simple web pages (K1)

CO2: Apply DHTML to web pages and make it dynamic (K3)

CO3: Compare XML with HTML and develop xml documents. (K4)

CO4: Build interactive web pages using Java Script (K6)

CO5: Explore PHP constructs and their APIs for web application development (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	2	1	1	3	3	-	-	2	2	1	-	20
CO2	2	2	2	1	1	3	3	-	-	2	2	2	-	20
CO3	3	2	2	2	2	3	3	-	-	2	2	2	-	23
CO4	3	3	2	2	2	3	3	-	-	2	2	2	-	24
CO5	3	2	2	2	2	3	3	-	-	2	2	2	-	23
Grand total of COs with PSOs and POs														110
Mean Value of COs with PSOs and POs = Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(110/50)														2.2

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.2
Observation	COs of Advanced Web Technology is strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science **Part** : Core Elective-2
Semester : II **Hours** : 60
Subject Code : 24PCSE22 (A) **Credit** : 4

CRYPTOGRAPHY AND NETWORK SECURITY

Objectives:

The course enables the students to

- Understand the fundamental needs of Secure System Design
- Analyze critically about key concept and Techniques
- Understand the overview of the Algorithms
- Compare the Symmetric, Asymmetric and RSA Algorithm
- Identify and mitigate the various Internet Security Protocols.

UNIT I

12 Hours

Introduction to the Concept of Security: Introduction, the Need of Security, Security Approaches, Principal of Security, Types of Attacks

UNIT - II

12 Hours

Cryptographic Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks

UNIT – III

12 Hours

Computer-based Symmetric Key Cryptographic Algorithms: Introduction, Algorithm Types and Models, An Overview of Symmetric Key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC5, Blowfish, Advanced Encryption Standard (AES), Differential and Linear Cryptanalysis

UNIT – IV

12 Hours

Computer-based Asymmetric Key Cryptographic Algorithms: Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures.

Unit- V

12 Hours

Network Security: Brief Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), **Internet Security Protocols:** Basic Concepts, Security Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Time stamping Protocol (TSP), Secure Electronic Transaction (SET)

Book for Study

1. Kahate Atul, *Cryptography and Network Security*, Third Edition, Tata McGraw Hill Publication, New Delhi, 2006.

Book for Reference

1. Forouzan Behrouz A., Mukhopadhyay Debdeep, *Cryptography & Network Security*, Second Edition, McGraw Hill, New Delhi, 2010
2. Stallings William, *Cryptography and Network Security: Principles and Practices*, Seventh Edition, Prentice Hall, 2014.

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Understand Cryptography and Network Security concepts and applications. (K2)

CO2: Demonstrate and APPLY the process of Basic Concepts of Secure system design. (K3)

CO3: Identify and Analyse Network and Security Threat. (K4)

CO4: Understand the concepts of Asymmetric key cryptography (K2)

CO5: Evaluate the various Network Security protocols (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	-	-	3	2	2	-	2	2	1	2	3	22
CO2	3	2	-	-	1	2	2	-	3	2	1	2	2	20
CO3	3	2	-	-	1	2	2	-	2	2	1	2	3	20
CO4	2	3	-	-	1	2	2	-	2	2	1	2	2	19
CO5	2	2	-	-	2	1	2	-	2	2	-	2	3	18
Grand total of COs with PSOs and POs														99
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(99/49)														2.05

Strong – 3, Medium -2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.05
Observation	COs of Cryptography and Network Security – Medium related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science **Part** : Core Elective – 2
Semester : II **Hours** : 60
Subject Code : 24PCSE22 (B) **Credit** : 4

MOBILE COMPUTING

Objectives:

The course enables the students to

- Understand the fundamentals of the concepts and principles of mobile computing
- Analyze both theoretical and practical issues of mobile computing
- Develop solutions and building software for mobile computing applications
- Recognize the concept of Wireless Transmission
- Understand the concepts of Mobile Network Layer

UNIT – I

12 Hours

Introduction: Applications – A Simplified Reference Model. Wireless Transmission: Cellular System. Medium Access Control: Motivation for a Specialized MAC: Hidden and exposed terminals – Near and far terminals – SDMA – FDMA – TDMA - CDMA

UNIT – II

12 Hours

Telecommunication Systems: GSM: Mobile Services – System Architecture – Radio Interface – Protocols - Localization And Calling – Handover – Security – New Data Services. DECT: System Architecture – Protocol Architecture – TETRA – UMTS

Unit – III

12 Hours

Satellite System: History – Applications – Basics: GEO – LEO – MEO .Routing – Localization – Handover. Broadcast Systems: Overview – Cyclical Repetition Of Data – Digital Audio Broadcasting – Digital Video Broadcasting – Convergence of Broadcasting and Mobile Communication.

UNIT – IV

12 Hours

Wireless LAN:Infra-Red Vs. Radio Transmission – Infrastructure and Ad-Hoc Network – IEEE 802.11: System Architecture – Protocol Architecture – MAC Management - WATM – Bluetooth: Architecture – Radio layer – Base band layer – Link manager protocol.

UNIT – V

12 Hours

Mobile Network Layer: Mobile IP – Dynamic Host Configuration Protocol – Mobile AdHoc Networks. Mobile Transport Layer: Traditional TCP-Classical TCP Improvement-TCP Over 2.5/3G Wireless Networks – Performance Enhancing Proxies.

Book for Study

3. Schiller Jochen, *Mobile Communications*, Second Edition, Pearson Education, 2008

Books for Reference

2. Mallick Martyn, *Mobile and Wireless Design Essentials*, Wiley Publishing, 2003

Teaching Methods

- Lecturing
- Group Discussions
- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

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

CO1: Understand and identify the cellular systems for mobile computing. (K2)

CO2: Explore Medium access control strategies and techniques (K6)

CO3: Understand satellite communication and broadcast systems (K2)

CO4: Explore Wireless ATM architecture and their design standards (K4)

CO5: Create and build software for mobile computing applications (K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs & POs
CO1	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO2	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO3	3	2	-	-	3	2	2	-	3	1	3	2	3	24
CO4	2	3	-	-	3	2	2	-	3	1	3	2	3	24
CO5	2	2	-	-	3	2	2	-	3	1	3	2	3	23
Grand total of COs with PSOs and Pos														119
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(119/50)														2.38

Strong -3 , Medium -2 , Low -1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.38
Observation	COs of Mobile Computing – Strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science

Part : Core Lab - 3

Semester : II

Hours : 75

Subject Code : 24PCSSP32

Credit : 3

Advanced Web Technology Lab

Objectives:

The course enables the students to

- Understand the salient attributes of mark-up language such as HTML.
- Learn the concepts of CSS and its applications in Internet Programming
- Learn the fundamentals of Scripting and querying
- Explore server-side programming and web Application development
- Create trivial and simple Database oriented web Application

HTML

1. Types Of List
2. Class Time Table
3. Advertisement Using Frame Set
4. School Website Using Frames
5. College Website Using Div Tag
6. Application Form Using Form Elements

STYLE SHEET (CSS)

7. Including CSS In Head
8. Linking External CSS
9. Importing External CSS
10. Inline Style Sheet
11. Applying Classes In CSS
12. Positioning Images Using Img And Div Tags

JAVA SCRIPT and JQUERY

13. Timely Wishes
14. Biggest And Smallest
15. Area And Perimeter
16. Simple And Compound Interest
17. Calculator
18. Digital Clock
19. Online Exam
20. History Object
21. All Collection
22. Style Sheet Collection

PHP& MYSQL

23. Create Table
24. Insert Records
25. Select Records
26. Update And Delete Records
27. Prepare Statements
28. Exam Result Publishing

COURSE OUTCOMES

On successful completion of the course students will be able to

CO1: Design and Development of simple HTML static forms (K3)

CO2: Create CSS-based simple interactive forms (K6)

CO3: Create simple web page script using Java script (K6)

CO4: Design and develop simple server-side application (K3)

CO5: Incorporate AJAX and its related attributes to web application (K5)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Sum of COs with PSOs & POs
CO1	3	2	1	2	1	3	3	-	-	1	2	2	-	20
CO2	3	2	2	2	1	3	2	-	-	2	2	2	-	21
CO3	3	2	2	1	2	3	2	-	-	2	3	2	-	22
CO4	3	2	2	1	2	3	2	-	-	2	3	2	-	22
CO5	3	2	2	1	2	3	3	-	-	2	2	3	-	23
														108
	Mean Value of COs with PSOs and POs =Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(108/50)													2.16

Strong – 3, Medium – 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.16
Observation	COs of Advanced Web Technology is strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science

Part : Core Lab - 4

Semester : II

Hours : 75

Subject Code : 24PCSP42

Credit : 3

Python Programming Lab

Objectives:

The course enables the students to

- Understand the basic concepts in Python Data Types and Control Flow
- Develop Python programs with conditionals and loops and data structures
- Build list, tuple, dictionaries
- Develop program using OOPs concepts in Python
- Design and program Python applications with database.

Program List

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format Sun May 29 02:26:23 IST 2017
5. Write a python program to find largest of three numbers.
6. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : $c/5 = f-32/9$]
7. Write a Python program to construct the loop pattern by using special symbol
8. Write a program to create, append, and remove lists in python.
9. Write a Python program to clone or copy a list
10. Write a program to demonstrate working with tuples in python.
11. Write a program to demonstrate working with dictionaries in python.
12. Write a Python script to sort (ascending and descending) a dictionary by value
13. Write a python program to define a module and import a specific function in that module to another program.
14. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
15. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
16. Write a Python class to implement $\text{pow}(x, n)$
17. Write a Python class to reverse a string word by word.
18. Design a simple database application that stores the records and retrieve the same.
19. Design a database application to search the specified record from the database.
20. Design a database application to that allows the user to add, delete and modify the records.

COURSE OUTCOMES

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

CO1: Write simple Python programs for solving problems.(K3)

CO2: Decompose a Python program into functions.(K3)

CO3: Manipulate compound data types and files in Python Programs.(K4)

CO4: Write programming using OOPs concepts in python.(K3)

CO5: Create the Python application for real world problems.(K6)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	2	3	1	2	3	-	-	3	3	-	3	3	26
CO2	3	2	3	1	2	2	-	-	3	3	-	3	2	24
CO3	3	2	3	1	2	3	-	-	3	3	-	2	3	25
CO4	3	1	2	1	2	3	-	-	3	3	-	3	3	24
CO5	3	1	2	1	1	3	-	-	3	3	-	3	3	23
Grand total of COs with PSOs and POs														122
Mean Value of COs with PSOs and POs=122/50 (MV= Grand total of COs with PSOs and POs /Number of COs relating with PSOs and POs)														2.44

Strong -3, Medium -2 , Low -1

Mapping Scale	1	2	3
Relation	0.01 to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.44
Observation	COs strongly related with PSOs and POs		

ARUL ANANDAR COLLEGE (AUTONOMOUS), KARUMATHUR
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Class : M.Sc., Computer Science **Part** : NME
Semester : II **Hours** : 60
Subject Code : 24PCSN12 **Credit** : 4

SOFTWARE LICENSE MANAGEMENT

Objectives:

On completion of this course, students able to

- Understand open source technology for development of web applications
- Understand the Principles and methodologies in open source software
- Identify and study the problems with traditional commercial software
- Develop the open source project and its design
- Compare the open source and closed source

UNIT I **(12 HOURS)**

Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean any cost. History : BSD, The Free Software Foundation and the GNU Project.

UNIT II **(12 HOURS)**

Open Source History, Initiatives, Principle and methodologies. Philosophy : Software Freedom, Open Source Development Model Licenses and Patents: What Is A License, Important FOSS Licenses (Apache, BSD, GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization

UNIT III **(12 HOURS)**

Case Studies: Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office.

UNIT IV **(12 HOURS)**

Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. and Open source media.

UNIT V **(12 HOURS)**

Open source vs. closed source Open source government, Open source ethics, Social and Financial impacts of open source technology, Shared software, Shared source.

Book for Study:

1. Vadera Kailash, Gandhi Bhavyesh, *Open Source Technology*, Laxmi Publications, 2018

Book for Reference:

1. Ambawade Dayanand, Shah Deven, *Linux Labs and Open Source Technologies*, Kindle Edition, 2016

Teaching Methods

- Lecturing
- Group Discussions

- PPTs
- Learn by Doing
- Video Tutorials

Course Outcomes

CO1: Implement various applications using build systems (K3)

CO2: Understand the installation of various packages in open source operating systems (K2)

CO3: Identify and evaluate the problems with traditional commercial software (K4)

CO4: Understand various version of control systems and the open source projects (K2)

CO5: Analysis the need of open source technology, open source development model, application of open sources, aspects of open source movement (K4)

K1=Remember K2=Understand K3=Apply K4=Analysis K5=Evaluate K6=Create

Mapping Course outcome with PO and PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	Sum of COs with PSOs& POs
CO1	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO2	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO3	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO4	3	3	-	-	2	3	2	2	3	2	3	3	3	30
CO5	3	3	-	-	2	3	2	2	3	2	3	3	3	30
Grand total of COs with PSOs and POs														150
Mean Value of COs with PSOs and POs=Grand total of COs with PSOs and POs / Number of COs relating with PSOs and POs=(150/55)														2.72

Strong - 3, Medium - 2, Low – 1

Mapping Scale	1	2	3
Relation	0.01to 1.0	1.01 to 2.0	2.01 to 3.0
Quality	Low	Medium	Strong
Mean Value of COs with PSOs and POs			2.72
Observation	COs of Software License Management – Strongly related with PSOs and POs		