

*Placed at the meeting of
Academic Council
held on 05.08.2022*

APPENDIX – D
MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)
Accredited by NAAC with 'A++' Grade in the 4th Cycle

Syllabus for
B.Sc. Computer Science (Cloud Computing and Cyber Security)
CBCS- Semester Pattern
(for those who joined in the academic year 2022-23 and after)
Regulation, Scheme of Examination and Syllabus

1. Course Objectives:

- To prepare the students to manage the software components in a computer independently and to be a Programmer.
- To motivate the students to take up higher studies in Computer Science and other streams.

2. Eligibility for Admission:

A candidate should have studied +2 level Mathematics with Physics/ Computer Science as one of the subjects in the 10 +2 stream.

3. Duration of the Course:

The students shall undergo the prescribed course of study for a period of not less than three academic years (Six semesters).

4. Medium of Instruction: English

5. Subjects/ Structure of Course Study: See Page No.2.

6. Scheme of Examinations/ Structure of Question Paper: See Page No.5.

7. Detailed Syllabus: See Page No.10.

8. Eligibility for the Degree:

- i. A Candidate shall be eligible for the award of the degree on completion of the prescribed course of study and passing all the prescribed external examinations.
- ii. Attendance progress, internal examinations, conduct certificate from the Head of the Institution shall be required for taking the external examination.
- iii. The passing minimum and the ranking are as per the existing rule of the Choice Based Credit System for the affiliated college of the University.

(Subject/Structure of Course Study)

Sem.	Subjects							Total Hours	Total Credits
I	T1(6) [3]	E1(6) [3]	CS1(4) [4]	CS2(6) [4]	AS1(4) [4]	SBS1(2) [2]	VE(2) [2]	30	22
II	T2(6) [3]	E2(6) [3]	CS3(4) [4]	CS4(6) [4]	AS2(4) [4]	SBS2(2) [2]	EVS(2) [2]	30	22
III	T3(6) [3]	E3(6) [3]	CS5(4) [4]	CS6(4) [3]	CS7(4) [4]	AS3(4) [4]	SBS3(2) [2]	30	23
IV	T4(6) [3]	E4(6) [3]	CS8(4) [4]	CS9(4) [4]	CS10(4) [3]	AS4(4) [4]	SBS4(2) [2]	30	23
V	CS11(5) [4]	CS12(5) [4]	CS13(5) [4]	CS14(6) [4]	ES1(5) [4]	NME(2) [2]	SBS5(2) [2]	30	24
VI	CS15(5) [4]	CS16(5) [4]	CS17(6) [4]	ES2(5) [4]	ES3(5) [5]	NME(2) [2]	SBS6(2) [2]	30	25
Extension Activity									1
TOTAL CREDITS									140

() –Number of Hours

T - Tamil
CS - Core Subject
ES - Elective Subject
AS - Allied Subject
VE - Value Education

[] – Number of Credits

E - English
SBS - Skill Based Subject
EVS - Environmental Studies
NME - Non Major Elective
EA - Extension Activities

I SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
T1	Tamil	6	3	25	75	100
E1	English	6	3	25	75	100
CS1	Programming in C	4	4	25	75	100
CS2	Lab1: Programming in C	6	4	40	60	100
AS1	Mathematical Foundation I	4	4	25	75	100
SBS1	Lab 2: PC Assembling, Trouble Shooting and System Management	2	2	40	60	100
VE	Value Education	2	2	25	75	100
	Total	30	22			

II SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
T2	Tamil	6	3	25	75	100
E2	English	6	3	25	75	100
CS3	Java Programming	4	4	25	75	100
CS4	Lab3: Java Programming	6	4	40	60	100
AS2	Mathematical Foundation II	4	4	25	75	100
SBS2	Lab 4: Linux and Shell Programming	2	2	40	60	100
EVS	Environmental Studies	2	2	25	75	100
	Total	30	22			

III SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
T3	Tamil	6	3	25	75	100
E3	English	6	3	25	75	100
CS5	Data Structures and Computer Algorithm	4	4	25	75	100
CS6	Lab 5: Data Structures And Computer Algorithm	4	3	40	60	100
CS7	Data Communication and Computer Networks	4	4	25	75	100
AS3	Resource Management Techniques	4	4	25	75	100
SBS3	Lab 6: Python Programming	2	2	40	60	100
	Total	30	23			

I V SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
T4	Tamil	6	3	25	75	100
E4	English	6	3	25	75	100
CS8	Operating System	4	4	25	75	100
CS9	Cloud Computing	4	4	25	75	100
CS10	Lab 7: Advanced Java Programming	4	3	40	60	100
AS4	Numerical Methods	4	4	25	75	100
SBS4	Lab 8: Cloud Computing	2	2	40	60	100
EA	Extension Activities		1	100		
	Total	30	24			

V SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
CS11	Relational Database Management Systems	5	4	25	75	100
CS12	Network Security	5	4	25	75	100
CS13	Biometric Systems	5	4	25	75	100
CS14	Lab 9: Relational Database Management Systems	6	4	40	60	100
ES1	1.Block Chain 2.System Administration and Maintenance 3.Wireless Network	5	4	25	75	100
NME1	Introduction to Computers and Office Automation	2	2	25	75	100
SBS5	Lab 10: Cryptography and Network Security	2	2	40	60	100
	Total	30	24			

VI SEMESTER						
CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
CS15	Software Engineering	5	4	25	75	100
CS16	Web Technology	5	4	25	75	100
CS17	Lab 11: Cyber Security	6	4	40	60	100
ES2	1.Internet of Things 2.Ethical Hacking 3.Data Warehousing and Data Mining	5	4	25	75	100
ES3	Project work / Viva – Voce	5	5	25	75	100
NME2	Introduction to Internet	2	2	25	75	100
SBS6	Quantitative Aptitude	2	2	25	75	100
	Total	30	25			
	Total Credit	180	140			

Non-Major Elective Courses to be offered by the Department of Computer Science to the students other than B.Sc. Computer Science

1. **NME1** - Introduction to Computers and Office Automation
2. **NME2** - Introduction to Internet

**Scheme of Examination /Question Paper
Pattern Scheme of Evaluation**

Theory Subjects

Internal Evaluation

Parameters

Internal Test - 10 Marks

Assignment - 5 Marks

Quiz - 5 Marks

**Peer- Peer /
Seminar/Group Discussion – 5 Marks**

Total - 25 Marks

External Evaluation Pattern

Question paper Pattern

Time: 3 hours

Max. Marks:75

Part – A

Answer all the Questions (10*1=10)

Ten Questions, two questions from each Unit: *Multiple Choice Questions*

Part – B

Answer all the Questions (5*7=35)

Five Questions, one question set from each Unit: *Either ...Or...type*

Part – C

Answer any three Questions(3*10=30)

Five Questions, one question from each Unit

Practical Subjects:

A candidate has to prepare Algorithm / Procedure for both the questions covering both the parts. The following list of parameters is taken into account for the evaluation of practical examination.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

Parameters

For Internal Marks:

I.	Average of two tests:	25
ii.	Record Work:	10
iii.	Seminar / Quiz / Viva:	5
	Total:	40

For External Marks:

i.	Aim, Procedure / Algorithm and Program:	15
ii.	Coding and Compilation :	10

For Project Work:

The combined project shall be undertaken by the students as a team of two. The project should be done in the college lab. The Following list of parameters is taken into account for the evaluation of Project work and Viva-voce.

Total Marks: 100 (Internal: 25 marks, External: 75 Marks)

Parameters:

For Internal Marks:

Two review meetings: $2 \times 7.5 = 15$ Marks

Overall Performance: = 10 Marks

For External Marks:

Project Report: = 25 Marks

Project Demo & Presentation: = 30 Marks

Viva-Voce: = 20 Marks

iii. Debugging :	15
iv. Results :	10
v. Viva:	10
Total:	60

Note: The External Examiner can fix other exercises also other than those found in the list (*Syllabus*) in consultation with the Internal Examiner without violating the scope of the prescribed syllabus

Model Question Paper

Answer All Questions

(10X1=10)

1. Which of the following service provider provides the least amount of built in security?

- a) SaaS b) PaaS c) IaaS d) All of the mentioned above

2. Which of the following area of cloud computing is uniquely troublesome?

- a) Auditing b) Data integrity c) e-Discovery for legal compliance d) All of the mentioned

3. Which of the following is the operational domain of CSA?

- a) Scalability b) Portability and interoperability c) Flexibility d) None of the mentioned

4. Which of the following is application and infrastructure management software for hybrid multi-clouds?
 a) VMware Hyperic b) Webmetrics c) Univa UD d) Tapin systems
5. Point out the correct statement.
- Different types of cloud computing service models provide different levels of security services.
 - Adapting your on-premises systems to a cloud model requires that you determine what security mechanisms are required and mapping those to controls that exist in your chosen cloud service provider.
 - Data should be transferred and stored in an encrypted format for security purpose
 - All of the mentioned
6. Which of the following services that need to be negotiated in Service Level Agreements?
 a) Logging b) Auditing c) Regulatory compliance d) All of the mentioned
7. Point out the wrong statement.
- You can use proxy and brokerage services to separate clients from direct access to shared cloud storage
 - Any distributed application has a much greater attack surface than an application that is closely held on a Local Area Network
 - Cloud computing doesn't have vulnerabilities associated with Internet applications
 - All of the mentioned
8. Which of the following is considered an essential element in cloud computing by CSA?
 a) Multi-tenancy b) Identity and access management c) Virtualization d) All of the mentioned
9. Which of the following is used for Web performance management and load testing?
 a) VMware Hyperic b) Webmetrics c) Univa UD d) Tapin systems
10. CLC Stands for _____
- Cloud Controller (CLC) b) Storage Controller (SC)
 - Node Controller (NC) d) Cluster Controller

Answer any Five Questions (5X7=35)

11. a) What are some open challenges in cloud security at SaaS and IaaS?
OR
b) Define Distributed Systems. List and Explain the 3 major milestones of distributed systems that led to the evolution of Cloud Computing.
12. a) Compare between Cloud and On-premise Computing.
OR
b) Web is the primary interface through which cloud computing delivers its services. Justify.
13. a) Mention the layers of PaaS architecture.
OR
b) With neat diagram explain the Machine Reference Model. Also explain Security Rings.
14. a) What are the components of Windows Azure?
OR
b) Mention the reliability and availability of Cloud Computing.
15. a) Which agent is equivalent of Nova Compute?
OR
b) What are the differences occurred in distributed operations?

Answer any Three Questions

(3X10=30)

16. Detail about Symmetric Encryption
17. Explain in detail of Block Cipher Modes of Operation.
18. Discuss the types of malicious software
19. Describe Diffie-hellman key exchange.
20. Explain in detail about SaaS

(Detailed Syllabus)
CS1: Programming in C
(4 Hours - 4 Credits)

UNIT I : Overview of C: History of C – Importance of C – Basic Structure of C Programs – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant – overflow and underflow of data – Operators and Expressions: Arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – Arithmetic Expressions- Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical functions.

UNIT II : Managing I/O Operations: Reading and Writing a Character – Formatted Input, Output – Decision Making & Branching: if statement - if else statement - nesting of if else statements - else if ladder – switch statement – the ?: operator – goto statement – the while statement – do statement – the for statement – jumps in loops.

UNIT III : Arrays: One-Dimensional Arrays – Declaration, Initialization – Two-Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. Strings: Declaration, Initialization of string variables – reading and writing strings – string handling functions.

UNIT IV : User-defined functions: Need – multi-function programs – elements of user defined functions – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables. Structures and Unions: Defining a structure – declaring a structure variable – accessing structure members – initialization – copying and comparing – operation on individual members – array of structures – arrays within structures – structures within structures – structures and functions – unions – size of structures – bit fields.

UNIT V : Pointers : Understanding Pointers, Accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer increments and scale factors – pointers and character strings – pointers as function arguments – pointers and structures. Files: Defining, opening, closing a file – IO Operations on files – Error handling during IO operations – command line arguments.

Text Books:

1. Programming in ANSI C, E.Balagurusamy, 8th Edition, Tata McGraw Hill Publishing Company, 2019.
Unit I : Chapters 2 (Except 2.3-2.7, 2.10-2.12), 3 (Except 3.9, 3.13), 4 (Except 4.13)

- Unit II : Chapters 5 – 7
- Unit III : Chapters 8, 9 (Except 9.5, 9.6, 9.7, 9.9, 9.10)
- Unit IV : Chapters 10 (Except 10.20), 11
- Unit V : Chapters 12 (Except 12.8, 12.10, 12.12, 12.14, 12.15, 12.17), 13 (Except 13.6)

Reference Books:

1. Programming with C, Schaum’s Outline Series, Gottfried, Tata McGraw Hill, 2006.
2. C Programming Language by Brian W Kernighan, Dennis M Ritchie (Author), Pearson Education Limited (Publisher), edition 2, 2017.
3. Stephen G. Kochan, Programming in C, 4th Ed., Pearson Education, 2015.
4. Kalavathi.P, C – A Text for Beginners, Bonfring Publications, Tamil Nadu, 2014.
5. Programming with ANSI and Turbo C , Ashok N.Kamthane , Pearson Education, 2006
6. H. Schildt, C: The Complete Reference, 4th Edition, TMH Edition, 2000.

CS2: Lab 1: Programming in C
(6 Hours - 4 Credits)

Section A

1. Write a C Program to find the sum of digits
- Write a C Program to check whether a given number is Armstrong or not
 Write a C Program to check whether a given number is Prime or not
 Write a C Program to generate the Fibonacci series
 Write a C Program to display the given number is Adam number or not
 Write a C Program to print reverse of the given number and string
 Write a C Program to find minimum and maximum of ‘n’ numbers using array
 Write a C Program to arrange the given number in ascending order
 Write a C Program to add, subtract and multiply two matrices
 Write a C Program to calculate NCR and NPR

Section B

1. Write a C Program to find the grade of a student using else if ladder
- Write a C Program to implement the various string handling functions
 Write a C Program to create an integer file and display the even numbers only
 Write a C Program to calculate quadratic equation using switch-case
 Write a C Program to implement the various string handling function
 Write a C Program to generate student mark list using array of structures
 Write a C Program to create and process the student mark list using file
 Write a C Program to create and process pay bill using file
 Write a C Program to create and process inventory control using file
 Write a C Program to create and process electricity bill using file

AS1: MATHEMATICAL FOUNDATIONS - I

(4 Hours – 4 Credits)

UNIT I : The Foundations: Logic and Proofs: Propositional logic–Applications of Propositional logic–Propositional equivalences – (Exclude Propositional satisfiability, Applications of satisfiability, Solving satisfiability problems, and its related problems) – Predicates and Quantifiers – Rules of inference.

UNIT II : Relations: Relations and their properties–Representing relations–Closures of relations–Partial orderings (Theorems statement only; Exclude lexicographic ordering - Exclude Lattices)

UNIT III : Counting: The basic of counting - The pigeonhole principle–Permutation and Combinations–Applications of recurrence relations – Solving recurrence relations – Divide and Conquer algorithms and recurrence relations. (All theorems and Results statement only)

UNIT IV : Graphs: Graphs and Graphs models, (Excluding Biological networks; Tournaments; all its related examples and problems) – Graph terminology and special types of graphs – Representing graphs and Graph isomorphism – Connectivity (paths – connectedness in undirected graphs – paths and isomorphism – counting paths between vertices) – shortest path problems.

UNIT V : Matrices: Introduction –operations–inverse–Rank of a matrix, solution of simultaneous linear equations – Eigen values and Eigen Vectors.

Text Books:

1. Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, McGraw Hill Publishing Company, 2012.

Discrete Mathematics, M. Venkataraman, N.Sridharan and N.Chandrasekaran, The National Publishing Company, 2009.

Unit I: Textbook 1 Chapter 1: Sections: 1.1, 1.2, 1.3, 1.4, 1.6

Unit II: Textbook 1 Chapter 9: Sections: 9.1, 9.3, 9.4, 9.5, 9.6

Unit III: Textbook 1 Chapter 6: Sections: 6.1, 6.2, 6.3 Chapter 8: Sections: 8.1, 8.2, 8.3 (Pages: -529 only) (Exclude algorithms and relations, on page 507 and its related problems)

Unit IV: Textbook 1 Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4, 10.6)

Unit V: Textbook 2 Chapter 6: Sections: 6.1 to 6.5, and 6.7)

Reference Books:

1. Modern Algebra - S.Arumugam and A. Thangapandi Isaac, SciTech publications 2005.

Invitation to Graph Theory-S.Arumugam and S.Ramachandran, SciTech Publications, 2005, Chennai.

Discrete Mathematical Structures with applications to Computer Science - Tremblay and Manohar, McGraw Hill, 1997.

SBS1: Lab 2:PC Assembling, Troubleshooting and System Management

(2 Hours -2 Credits)

PC Assembling

1. Installing the motherboard.
Installing the CPU and heat sink.
Installing the RAM.
Installing the power supply.
Installing the hard disk and optical drive.
Connecting various cables (ATX power connector, cabinet cables for power, reset button, front USB/audio panel cable).
BIOS settings – setting time, changing boot sequence, system password setting
Changing CMOS battery
Connecting extra cabinet fan

PC Troubleshooting

1. Booting with CD/DVD, pen drive, LAN & hard disk with different OS
Formatting hard drive.
Installing the OS and drivers.
Troubleshooting BSOD (blue screen of death)
Installation of service packs, applications such as MS Office, Anti-virus software.
Creating restore point and backup a drive.
Using hard disk tools (sfc, disk checker, defragmenter, data recovery).
Windows update, registry fix, msconfig, gpedit.
Using repair tools like ccleaner, system mechanic, malware bytes.

System Management

1. Familiarization with configuring and installing a LAN (Assign IP addresses)
Internet connection sharing over LAN
File transfer over LAN
Installing and using web browser and firewall
Using search engines like Google
CD/DVD burning – image burning – data/audio/video CD/DVD making with Nero
Playing audio and video with VLC media player – creating play list

Reference Books:

1. Mueller, Scott, “Upgrading & Repairing PCs”, 14th Edition, Que Publishing, 2003.
Moulton, Pete, “A+ Certification and PC repair Guide”, 2nd Edition, Prentice Hall PTR, 2002.
Loukides, Mike, Musumeci, G., “System Performance Tuning”, 2nd Edition, O’Reilly, 2002.
Bigelow, Stephen, “Troubleshooting, Maintaining & Repairing PCs”, 5th Edition, Osborne, 2002.

CS3: Java Programming (4 Hours – 4 Credits)

UNIT I:

FUNDAMENTALS OF OBJECT – ORIENTED PROGRAMMING: Introduction, Object Oriented paradigm, Basic Concepts of OOP, Benefits of OOP, Applications of OOP, Java features: **OVERVIEW OF JAVA LANGUAGE:** Introduction, Simple Java program structure, Java tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments. **CONSTANTS, VARIABLES & DATA TYPES:** Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of variables, Symbolic Constants, Type casting, Getting Value of Variables, Standard Default values; **OPERATORS & EXPRESSIONS.**

UNIT II:

DECISION MAKING & BRANCHING: Introduction, Decision making with if statement, Simple if statement, if. Else statement, Nesting of if. else statements, the else if ladder, the switch statement, the conditional operator. **DECISION MAKING & LOOPING:** Introduction, The While statement, the do-while statement, the for statement, Jumps in loops.

CLASSES, OBJECTS & METHODS: Introduction, Defining a class, Adding variables, Adding methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of methods;

UNIT III:

INHERITANCE: Extending a class, Overloading methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes; **ARRAYS, STRINGS AND VECTORS:** Arrays, One-dimensional arrays, Creating an array, Two-dimensional arrays, Strings, Vectors, Wrapper classes

INTERFACES: MULTIPLE INHERITANCE: Introduction, Defining interfaces, Extending interfaces, Implementing interfaces, Assessing interface variables;

UNIT IV:

MULTITHREADED PROGRAMMING: Introduction, Creating Threads, Extending the Threads, Stopping and Blocking a Thread, Lifecycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. **MANAGING ERRORS AND EXCEPTIONS:** Types of errors : Compile-time errors, Runtime errors, Exceptions, Exception handling, Multiple Catch Statements, Using finally statement.

UNIT V:

PACKAGES: Introduction, Java API Packages, Using System Packages, Naming conventions, Creating Packages, Accessing a Package, using a Package.

MANAGING INPUT/OUTPUT FILES IN JAVA: Introduction, Concept of Streams, Stream classes, Byte Stream Classes, Input Stream Classes, Output Stream Classes, Character Stream classes: Reader stream classes, Writer Stream classes, Using Streams, Reading and writing files.

Text Books:

1. Programming with JAVA, A Primer, E.Balagurusamy, 5th Edition, McGraw-Hill Company, 2015.

Unit I	: Chapters 1 – 5
Unit II	: Chapters 6 ,7 and 8.1-8.10
Unit III	: Chapter 8.11-8.18, Chapters 9 and 10
Unit IV	: Chapter 12 and 13
Unit V	: Chapter 14,11.1-11.7 and 16

Reference Books:

1. Introduction to JAVA Programming, K. Somasundaram, Jaico Publishing House, New Delhi, 2013.
2. K.Somasundaram, Do,n " Learn JAVA – APractical Approach, Anuradha Publications, Chennai,2013.
3. Programming in Java, SachinMalhotra, Oxford University Press
4. Programming with Java : based on Schaums'soutline of programming with Java, Tata John R. Hubbard, Second Edition,McGraw-Hill Company,2001.

CS4: Lab 3: Java Programming
(6 Hours – 4 Credits)

Write Programs in Java for the following:

1. To implement a simple temperature conversion program.
2. To perform addition and subtraction of complex numbers using class and objects.
3. To perform volume calculation using method overloading.
4. Using command line arguments, test if the given string is palindrome or not.
5. String manipulation using String Methods (Use of any five String methods are preferred).
6. Write a program to fill names into a list .Also, copy them in reverse order into another list. If the name contains any numeric value throw an exception Invalid Name
7. Program to demonstrate the use of any two built-in exceptions in Java.
8. To perform multiplication of matrices using class and objects.
9. Using multilevel inheritance process student marks.
10. Implement multiple inheritance for payroll processing.

11. Implement interface for area calculation for different shapes.
12. Create a package called Arithmetic that contains methods to deal with all arithmetic operators. Also write a program to use the package
13. Create two threads such that one of the thread generate Fibonacci series and another generate perfect numbers between two given limits.
14. Define an exception called :Marks Out of bound: Exception, that is thrown if the entered marks are greater than 100.
15. Program to demonstrate the use of Wrapper class methods.
16. File Processing using Byte stream.
17. File Processing using Character Stream.
18. Write applets to draw the following Shapes:
 (a). Cone (b). Cylinder (c). Square inside a Circle (d). Circle inside a Square
19. Write an applet Program to design a simple calculator.
20. Write an Applet Program to animate a ball across the Screen.

AS2: MATHEMATICAL FOUNDATIONS II

(4 Hours -4 Credits)

UNIT I:

Introduction to statistics: primary and secondary data–classification, tabulation and Diagrammatic Representation of statistical data – Bar-charts, Pie-diagrams’ – Graphical Representation of data – Histograms, Frequency polygon, Ogives.

UNIT II:

Measures of dispersion: characteristics–coefficient of dispersion - Coefficient of variation–Moments – skewness and kurtosis – Pearson’s coefficient of skewness - Bowley’s coefficient of Skewness – Coefficient of skewness based upon moments.

UNIT III:

Simple correlation: Karl Pearson’s coefficient of correlation –correlation coefficient for Abivariate frequency distribution – Rank correlation – Regression – lines of regression – Properties of regression coefficient.

UNIT IV:

Events and sets: sample space–concept of probability–addition and multiplications Theorem on probability – conditional probability and independence of evens – Baye’s Theorem – concept of random variable – Mathematical Expectation.

UNIT V:

Concept of sampling distributions: standard error–Tests of significance based on t, Chi-square and F distributions with respect to mean, variance.

Text Books:

1. Statistical Methods, S.P.Gupta, Sultan chand and sons, 2004.
Unit I : Chapters 1, 2.2, 2.2.1, 2.2.2, 2.2.3 – 2.2.5
Unit II : Chapters 7 and 8
Unit III: Chapters 9, 9.1, 9.2, 9.3, 10, 10.1, 10.2, 10.2.1, 10.2.2, 10.2.3, 10.3
Unit IV: Chapter 16
Unit V : Chapters 18.3, 18.4, 18.7.1, 18.7.2, 19

Reference Books:

1. Statistics, Dr. S.Arumugam and A.Thangapandi Issac, New Gamma Publication house, 2002.

KishorS. Trivedi - Probability and statistics with reliability queuing and Computer Science Applications - Prentice Hall of India (P) Ltd., New Delhi - 1997.

Discrete Mathematics - Seymour Lipschutz, Marc Lars Lipson Schaum's Outlines- by, 3rd Edition., Tata McGraw Hill, Education Pvt. Ltd., New Delhi. 5th Reprint 2012.

SBS2: Lab 4: Linux and Shell Programming
(2 Hours – 2 Credits)

Section A

1. Write a Linux script to find the number of users who have logged in.
Write a Linux script to see the current date, user name and current directory.
Write a Linux script to print the numbers 5,4,3,2,1 using Whileloop.
Write a Linux script to set the attributes of a file.
Write a Linux script to convert lowercase to uppercase using trutility.
Write a Linux script to copy and rename a file.
Write a Linux script to add 5 numbers and find the average.
Write a Linux script to convert a decimal number to hexadecimal conversion.
Write a Linux script to find the factorial of a number.
Write a Linux script to check for palindrome.

Section B

1. Write a Linux script to display Hello World in Bold, Blink effect and in different colors like red, green etc.
Write a Linux script to display a multiplication table.
Write a Linux script to perform arithmetic operations using case.
Write a Linux script to add two real numbers.
Write a Linux script to display the following pattern:

```
1
22
333
4444
```

55555

Write a Linux script to find the sum of digits and reversing of a given number.

Write a Linux script to display the student mark details.

Write a Linux script to prepare electricity bill.

Write a Linux script to sort the numbers in ascending order.

Write a Linux script

(i) To create and append a file

(ii) To compare two files.

CS5: Data Structures and Computer Algorithms

(4 Hours - 4 Credits)

UNIT I:

Introduction and Overview –Introduction–Basic Terminology; Elementary Data Organization – Data Structure Operations – Complexity of Algorithms – Other Asymptotic Notations for Complexity of Algorithms.

Arrays –Introduction–Linear Arrays–Representation–on Linear Arrays inMemory – Traversing Linear Arrays – Inserting and Deleting – Sorting: Bubble Sort – Searching; Linear Search – Binary Search – Multidimensional Arrays. **Linked List** – Introduction – Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Memory Allocation; Garbage Collection – Insertion into a Linked List – Deletion from a Linked list.

UNIT II:

Stack: Introduction–Stacks–Array Representation of Stacks–Linked Representation of Stacks – Recursion - Tower of Hanoi - Implementation of Recursive Procedures by Stacks - Queue –Linked Representation of Queues – D – Queue

UNIT III:

Trees –Introduction–Binary Trees–Representing Binary Trees in memory–Traversal Binary Tree – Traversal algorithms using Stacks – Header Nodes; **Threads** – Binary Search Trees – Searching and Inserting in Binary Search Trees– Deleting in a Binary Search Trees.

Graphs –Introduction–Graph Theory - Terminology–Sequential Representations of Graph– Adjacency Matrix; Path Matrix – Warshall’s Algorithm; Shortest Paths.

UNIT IV:

Algorithms: Introduction: What is an Algorithm?–Algorithm Specification–Performance Analysis – Divide and Conquer: General method – Binary Search – Finding the maximum and minimum – Merge Sort – Quick Sort – Selection – Strassen’s Matrix Multiplication.

UNIT V:

The Greedy Method: General Method–Knapsack problem–Job Sequencing with deadlines – Minimum cost spanning trees: Prim’s Algorithm – Kruskal Algorithm – Optimal Storage on tapes – Optimal merge patterns – single source shortest path.

Text Books:

1. Seymour Lipschutz, Data Structures, Revised First Edition, Schaum’s Outlines, McGraw Hill Education, 2017.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Galgotia Publications Pvt. Ltd, New Delhi, Second Edition, 2008.

Unit I	: Textbook 1	Chapter 1 (1.1 to 1.4), Chapter 2 (2.5, 2.6), Chapter (4.1 to 4.9), Chapter 5 (5.1 to 5.8)
Unit II	: Textbook 1	Chapter 6 (6.1 to 6.4, 6.7 to 6.12)
Unit III	: Textbook 1	Chapter 7 (7.1 to 7.9)
Unit IV	: Textbook 2	Chapter 1 (Except 1.4), Chapter 3 (Except 3.2, 3.9)
Unit V	: Textbook 2	Chapter 4 (Except 4.2, 4.6.3)

Reference Books:

1. C and C++ Programming Concepts and Data Structures -S.Subramanyam - BS Publications, 2013.
2. Algorithm and Data Structures, M.M.Raghuwanshi, Narosha Publishing House, 2016.
3. Data Structures and Algorithms- Alfred V.Aho, John E.Hopcraft and Jeffrey D.Ullman - Pearson Education - Fourteenth Impression - 2013.
4. Data Structure and Algorithm Analysis in C – Mark Allen Weiss – Second Edition, Addison Wesley publishing company, 1997.

SBS3: Lab 5: Data Structures and Computer Algorithms (4 Hours – 3Credits)

Section A

(Programs from Data Structures Using C)

1. Write a program in 'C' to implement Stack as an array.

Write a program in 'C' to implement Stack as a linked list.

Write a program in 'C' to convert the Infix expression to Postfix expression using stack.

Write a program in 'C' to convert Infix expression to Prefix expression using Stack.

Write a program in 'C' to implement Queue as an Array.

Write a program in 'C' to implement Queue as a linked list.

Write a program in 'C' to implement Binary tree traversals.

Write a program in 'C' to implement Binary Search Tree.

Section B

Write a program in 'C++' to perform Bubble Sort

Write a program in 'C++' to perform Insertion Sort

Write a program in 'C++' to perform Merge Sort

Write a program in 'C++' to perform Quick Sort

Write a program in 'C++' to perform Selection Sort

Write a program in 'C++' to perform Linear Search

Write a program in 'C++' to perform Binary Search

Write a menu driven program in 'C++' to insert data in circular queue and display the queue

Write a program in 'C++' to insert data in a binary search tree and display as in order, preorder and post order

Reference Book:

1. C and C++ Programming concepts and Data Structures, P.S.Subramanyam, BS Publications, 2013.

Note: The above are sample problems; Instructor can add more exercises based on their requirements and the current technology.

CS7: Data Communication and Computer Networks (4 Hours – 4 Credits)

UNIT I:

Introduction: A Brief History–Applications–Computer Networks–Categories of Networks – Standards and Standards Organizations – Network Architecture – Open Systems and OSI Model – TCP/IP Architecture. **Communication Media and Data Transmission:** Fourier Analysis–Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing– Multiplexing. **Error Detection and Correction:** Types of Errors – Error Detection – Error Correction.

Data Link Control and Protocol Concepts: Flow Control–Error Control–Asynchronous Protocols – Synchronous Protocols – High-Level Data Link Control (HDLC).

UNIT II:

Local Area Networks: Types of Networks and Topology–LAN Transmission Equipment – LAN Installation and Performance.

Ethernet: IEEE Standard 802.3 **Token Bus:** IEEE Standard 802.4 **Token Ring:** IEEE Standard 802.5 – Fiber Distributed Data Interface (FDDI) – **Distributed Queue Dual Bus (DQDB):** IEEE Standard 802.6–LAN Operating Systems and Protocols – Ethernet Technologies.

Wide Area Networks: WAN Transmission Methods–WAN Carrier Types–WAN Transmission Equipments – WAN Design and Multicast Considerations – WAN Protocols.

UNIT III:

Integrated Services and Routing Protocols: Integrating Services–ISDN Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN, ATM and Frame Relay.

Wireless LANS: WLAN Applications–Wireless LAN Requirements–Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Services.

UNIT IV:

Internet Working: Principles of Internet Working–Routing Principles–Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation.

TCP Reliable Transport Service: Transport Protocols–The Service TCP Provides to Applications – End –to-End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol.

UNIT V:

Network Applications: Client-Server Model–Domain Name System (DNS)–Telnet – File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW)

Network Management: Goal of Network Management–Network Management Standards – Network Management Model – Infrastructure for Network Management – Simple Network Management Protocol (SNMP).

Text Book:

1. Data Communications and Computer Networks, Brijendra Singh,Third Edition, PHI,

2011.

Unit I	: Chapters 1,2,3,5
Unit II	: Chapters 6, 7
Unit III	: Chapters 8, 9
Unit IV	: Chapters 10,11
Unit V	: Chapter 12

Reference Books:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
 2. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
 3. Computer Networks, Andrew S Tanenbaum, 4th Ed, Prentice Hall of India, 2006.
- Data Communications and Computer Networks ,Prakash C. Gupta, Prentice Hall of India, 2005.
- Data and Computer Communications, William Stallings, PHI, 2007.

**AS3 :Resource Management Techniques
(4 Hours -4 Credits)**

UNIT I:

Development of OR: Definition of OR–Modeling - Characteristics and Phases - Tools, Techniques & Methods - scope of OR.

UNIT II:

Linear Programming Problem: Formulation - Slack & surplus variables - Graphical solution of LPP.

UNIT III:

Simplex Method: Computational Procedure - Big-M method - Concept of duality in LPP -Definition of primal dual problems - General rules for converting any primal into its dual.

UNIT IV:

Duality Theorems: (without proof) Primal dual correspondence - Duality and Simplex method - Mathematical formulation of assignment problem - Method for solving assignment problem.

UNIT V:

Mathematical formulation of Transportation Problem: Methods for finding IBFS for the Transportation Problems.

Text Books:

1. Operations Research, S.D.Sharma, Publisher KedarNath, Ram Nath& Co.
 Unit I: Chapter-1(1.1, 1.2, 1.4, 1.5, 1.8, 1.9, 1.10, 1.11)
 Unit II: Chapter-3 (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4, 3.5)
 Unit III: Chapter-5 (5.1, 5.2, 5.2.1, 5.3, 5.4, 5.5.4) Chapter- 7 (7.1, 7.2, 7.3, 7.4)
 Unit IV: Chapter-7 (7.5) (Statements only); 7.6, 7.7 Chapter 11(11.2, 11.3, 11.4)
 Unit V: Chapter-12 (12.2 to 12.8)

Reference Books:

1. Operation Research, Nita H.Shah, Ravi M.Gor and Hardiksoni, Prentice Hall of India Pvt. Ltd., New Delhi 2008.
2. Operation Research, R.Sivarethinamohan, Tata McGraw Hill, 2005.
3. Operations Research – An Introduction by Hamdy A.Taha. Ninth Edition, Dorling Kindersley Pvt. Ltd., Noida, India, 2012.

**SBS3: Lab: 6 PYTHON PROGRAMMING
(2 Hours -2Credits)**

LIST OF EXERCISES:

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
 Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
 Grade A: Percentage ≥ 80 Grade B: Percentage ≥ 70 and < 80 Grade C: Percentage ≥ 60 and < 70 Grade D: Percentage ≥ 40 and < 60 Grade E: Percentage < 40
 Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user
 Program to display the first n terms of Fibonacci series.
 Program to find factorial of the given number using recursive function.
 Write a Python program to count the number of even and odd numbers from array of N numbers.
 Python function that accepts a string and calculate the number of upper case letters and lower case letters
 Python program to reverse a given string and check whether the give string is palindrome or not.
 Write a program to find sum of all items in a dictionary.
 Write a Python program to construct the following pattern, using a nested loop

1
22
333

4444
55555
666666
7777777
88888888
999999999

Read a file content and copy only the contents at odd lines into a new file.

Create a Turtle graphics window with specific size.

Write a Python program for Towers of Hanoi using recursion

Create a menu driven Python program with a dictionary for words and their meanings.

Devise a Python program to implement the Hangman Game.

A website requires the users to input username and password to register. Write a program to check the validity of password input by users.

Following are the criteria for checking the password:

- a. At least 1 letter between [a-z]
- b. At least 1 number between [0-9]
- c. At least 1 letter between [A-Z]
- d. At least 1 character from [!@#]
- e. Minimum length of transaction password: 6
- f. Maximum length of transaction password: 12

Your program should accept a sequence of comma separated passwords and will check them according to the above criteria. Passwords that match the criteria are to be printed, each separated by a comma.

Reference Books:

1. Python Programming a Modular Approach with Graphics, Database, Mobile, and Web Applications – Sheetal Taneja, Naveen Kumar – Pearson Publication, 2018.
2. Problem solving and Python Programming – S.A.Kulkarni, Yesdee Publisher, 2017.
3. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.

Note: The above are sample problems; Instructor can add more exercises based on their requirements and the current technology.

CS8: Operating System
(4 Hours- 4 Credits)

UNIT I:

Introduction to Operating Systems: Introduction, What is an Operating systems, Operating system components and goals, Operating systems architecture. Process Concepts: Introduction, Process States, Process Management, Interrupts, Inter process Communication.

UNIT II:

Asynchronous Concurrent Execution: Introduction, Mutual Exclusion, Implementing Mutual Exclusion Primitives, Software solutions to the Mutual Exclusion Problem, Hardware solution to the Mutual Exclusion Problem, Semaphores. Concurrent Programming: Introduction, Monitors.

UNIT III:

Deadlock and Indefinite Postponement: Introduction, Examples of Deadlock, Related Problem Indefinite Postponement, Resource concepts, Four Necessary conditions for Deadlock, Deadlock solution, Deadlock Prevention, Deadlock Avoidance with Dijkstra's Banker's algorithm, Deadlock Detection, Deadlock Recovery.

Processor Scheduling: Introduction, Scheduling levels, Preemptive Vs. Non-Preemptive Scheduling Priorities, Scheduling objective, Scheduling criteria, Scheduling algorithms.

UNIT IV:

Real Memory Organization and Management: Introduction, Memory organization, Memory Management, Memory Hierarchy, Memory Management Strategies, Contiguous vs. Non-Contiguous Memory allocation, Fixed Partition Multi programming, Variable Partition multiprogramming.

Virtual Memory Management: Introduction, Page Replacement, Page Replacement Strategies, Page Fault Frequency (PFF) Page replacement, Page Release, Page Size.

UNIT V:

Disk Performance Optimization: Introduction, Why Disk Scheduling is necessary, Disk Scheduling strategies, Rotational optimization.

File and Database Systems: Introduction, Data Hierarchy, Files, File Systems, File Organization, File Allocation, Free Space Management, File Access control.

Text Books:

1. Operating Systems, Deitel & Deitel Choffnes, Pearson education, Third edition, 2008.

Unit I:	Chapter 1: 1.1, 1.2, 1.12, 1.13 & Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5
Unit II :	Chapter 5: 5.1, 5.2, 5.3, 5.4(up to 5.4.2), 5.5, 5.6 & Chapter 6: 6.1, 6.2
Unit III :	Chapter 7: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10 Chapter 8: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7
Unit IV :	Chapter 9: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 9.9 Chapter 11: 11.1, 11.5, 11.6, 11.8, 11.9, 11.10
Unit V :	Chapter 12: 12.1, 12.4, 12.5, 12.6 Chapter 13: 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8

Reference Books:

1. An introduction to Operating systems concepts and Practice, Pramod Chandra P. Bhatt, PHI, Second Edition, 2008.
2. Operating System Concepts, Abraham Silberschatz Peter Galvin Greg Gagne, 6th edition Windows XP Update, Wiley India edition, 2007.
3. Operating Systems Principles and Design, Pal Choudhury, PHI Learning, 2011.
4. Operating Systems, A Concept Based Approach Dhananjay M.Dhamdhare Tata McGraw- Hill.

CS9 : Cloud Computing
(4 Hours -4 Credits)

UNIT I:

Cloud Computing Foundation: Introduction to Cloud Computing–Move to Cloud Computing–Types of Cloud –Working of Cloud Computing

UNIT II:

Cloud Computing Architecture: Cloud Computing Technology–Cloud Architecture–Cloud Modeling and Design -Virtualization: Foundation –Grid, Cloud and Virtualization – Virtualization and Cloud Computing

UNIT III:

Data Storage and Cloud Computing: Data Storage–Cloud Storage–Cloud Storage from LANs to WANs –Cloud Computing Services: Cloud Services –Cloud Computing at Work

UNIT IV:

Cloud Computing and Security: Risks in Cloud Computing–Data Security in Cloud–Cloud Security Services –Cloud Computing Tools: Tools and Technologies for Cloud –Cloud Mashups–Apache Hadoop –Cloud Tools

UNIT V:

Cloud Applications: Moving Applications to the Cloud –Microsoft Cloud Services –Google Cloud Applications –Amazon Cloud Services –Cloud Applications

Text Books:

A.Srinivasan and J.Suresh, “Cloud Computing –A Practical Approach for Learning and Implementation”, Pearson India Publications 2014.

Reference Books:

1. Rajkumar Buyya, James Broberg, Andrzej, “Cloud Computing: Principles and Paradigms”, Wiley India Publications 2011.
2. Arshdeep Bahga and Vijay Madisetti, “Cloud Computing –A Hands on Approach”, Universities Press (India) Pvt Ltd. 2014.

CS10: Lab 7: Advanced Java Programming (4 Hours -3 Credits)

1. Program to display life cycle of an applet
2. Program to display digital clock using applet
3. Program to display different graphical shapes in applet
4. Program to display graphical bar chart by passing parameters in applet
5. Write an Applet which will play two sound notes in a sequence continuously use the play () methods available in the applet class and the methods in the Audio clip interface.
6. Program to find factorial value of N using AWT high level event handling
7. Program to illustrate window closing using AWT low level event handling
8. Program to illustrate TCP based network communication
9. Program to illustrate UDP based network communication
10. Program to find sum of digits using RMI
11. Program to find length of the given string using RMI
12. Write a program in Java to implement a Client/Server application using RMI.
13. Program using HTML/Java script to find length of the given string
14. Program using HTML/Java script to find biggest element of an array
15. Program to compute factorial value of N using Generic Servlet
16. Program to compute factorial value of N using HTTP Servlet
17. Use JDBC connectivity and create Table, insert and update data.
18. Write a program in Java to create a Cookie and set the expiry time of the same.
19. Write a program in Java to create Servlet to count the number of visitors to a web page.

20. Write a program in Java to create a form and validate a password using Servlet.
21. Develop a Java Bean to demonstrate the use of the same.
22. Write a program in Java to convert an image in RGB to a Grayscale image.
23. Develop Chat Server using Java.

Reference Books:

1. Java The Complete Reference - Herbert Schildt, McGraw Hill Education, 10th Edition, New York, 2017
2. Programming in Java – Sachin Malhotra, SaurbhChoudhary, Oxford University Press, Revised Second Edition.
3. Note: The above are sample problems; Instructor can add more exercises based on their requirements and the current technology.

**AS4: NUMERICAL METHODS
(4 Hours -4 Credits)**

UNIT I:

Algebraic and Transcendental Equations: Errors in numerical computation-Iteration method-Bisection method-Regula-Falsi method-Newton-Raphson method-Horner's method.

UNIT II:

Simultaneous Equations: Introduction-Simultaneous equations-Back substitution-Gauss Elimination method-Gauss –Jordan Elimination method-Calculation of Inverse of a matrix-Crout's method-Iterative methods-Gauss-Jacobi Iteration method-Gauss seidal Iteration method-Newton Raphson's method for simultaneous equations.

UNIT III:

Interpolation & Introduction: Newton's interpolation Formulae-Central difference Interpolation formulae-Gauss forward, Gauss backward, Lagrange's interpolation formulae-Divided differences-Newton's divided difference formula-Inverse Interpolation.

UNIT IV:

Numerical Differentiation and Integration: Introduction-Derivates using Newton's forward difference formula-Derivates using Newton's backward difference formula-Numerical Integration-Newton-cotes quadrature formula-Trapezoidal Rule-Simpson's one third rule-Simpson's 3/8 th rule.

UNIT V:

Numerical Solution of Ordinary Differential Equations: Introduction-Taylor series method-Picard's method-Euler's method-Runge-kutta method of second, third, fourth order- Predictor & corrector methods-Mile's method.

Text Books:

1. Numerical Methods, Second Edition, S.Arumugam, A.ThangapandiIssac, A.Somasundaram, SCITECH publications, 2009.

Unit I : Chapter-3

Unit II: Chapter-4 (excluding Relation method and its related problems)

Unit III: Chapter-7 (Sections: 7.0, 7.1, 7.2((i), (ii) and related problems);
7.3, 7.4, 7.5,7.6

Unit IV : Chapter-8 (Sections: 8.0,8.1,8.2 related problems, 8.5 (excluding Weddles rule, Booles rule, Romberg's method and related problems))

Unit V : Chapter-10 (Sections : 10.0,10.1,10.2,10.3(excluding modified Euler's method & its related problems) 10.4,10.5,10.6)

Reference Books:

1. Mathews J.H. Numerical Method for Maths, Science and Engineering; PHI, New Delhi, 2001.
2. Iqbal H. Khan & Q. Hassan Numerical Methods for Engineers and Scientist - Galgotia Publications (P) Ltd., New Delhi - 1997.
3. M.K. Jain, S.R.K. Iyengar&R.K.Jain - Numerical Methods for Scientific and Engineering Computation - New Age International(P) Ltd., New Delhi - 1996

SBS4: Lab 8: Cloud Computing (2 Hours -2 Credits)

Section A

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.

Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result

Write a Java program to perform encryption and decryption using the following algorithms: a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher

Write a Java program to implement the DES algorithm logic
Write a C/JAVA program to implement the BlowFish algorithm logic
Write a C/JAVA program to implement the Rijndael algorithm logic.
Using Java Cryptography, encrypt the text “Hello world” using BlowFish. Create your own key using Java keytool.
Write a Java program to implement RSA Algorithm
Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

Section B

1. Install Virtual box/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
Install Google App Engine. Create hello world app and other simple web applications using python/java.
Use GAE launcher to launch the web applications.
Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in Cloud Sim.
Find a procedure to transfer the files from one virtual machine to another virtual machine.
Find a procedure to launch virtual machine using try stack (Online Open stack Demo Version)
Install Ha doop single node cluster and run simple applications like word count.

Reference Books:

1. A.Srinivasan and J.Suresh, “Cloud Computing –A Practical Approach for Learning and Implementation”, Pearson India Publications 2014.

CS11:Relational Database Management Systems (5 Hours – 4 Credits)

UNIT I:

OVERVIEW OF DATABASE SYSTEMS: Managing Data – A Historical Perspective – File Systems Versus a DBMS – Advantages of a DBMS – Describing and Storing Data in a DBMS – Queries in a DBMS – Transaction Management – Structure of a DBMS – People Who Work with Databases. INTRODUCTION TO DATABASE DESIGN: Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of ER Model – Conceptual Design With the ER Model.

UNIT II:

THE RELATIONAL MODEL: Introduction to the Relational Model – Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data – Logical Database Design: ER to Relational – Introduction to Views – Destroying / Altering Tables and Views. RELATIONAL ALGEBRA AND CALCULUS: Preliminaries – Relational Algebra: Selection and Projection – Set Operations – Renaming – Joins - Division Relational Calculus: Tuple Relational Calculus – Domain Relational Calculus

UNIT III:

SQL: QUERIES, CONSTRAINTS, TRIGGERS: The Form of a Basic SQL Query - UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Databases

UNIT IV:

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to Schema Refinement – Functional Dependencies – Reasoning about FD's – Normal Forms – Properties of Decompositions – Normalization – Schema Refinement in Database Design – Other Kinds of Dependencies

UNIT V:

OVERVIEW OF TRANSACTION MANAGEMENT: The ACID Properties – Transactions and Schedules – Concurrent Execution of transactions – Lock Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery. SECURITY AND AUTHORIZATION: Introduction to Database Security - Access Control – Discretionary Access Control – Mandatory Access Control – Security for Internet Applications – Additional Issues Related to Security.

Text Books:

1. Database Management Systems – Raghu Ramakrishnan & Johannes Gehrke, McGraw Hill International Edition – Third Edition – 2003.

UNIT I : 1.1 – 1.9 , 2.1 – 2.5

UNIT II : 3.1 – 3.7, 4.1 – 4.3

UNIT III : 5.2 – 5.9

UNIT IV : 19.1 – 19.8

UNIT V : 16.1 – 16.7, 21.1 – 21.6

Reference Books:

1. Database Management Systems - Alexis Leon & Mathews Leon, “Leon Vikas Publishing, Chennai, 2002.

2. Modern Database Management - Frad R. McFadden, Jeffrey A.Hoffer& Mary. B. Prescott, 5th Edition, Pearson Education Asia, 2001.
3. Database System Concepts – Abraham Silberschatz, Henry F.Korth,S.Sudarshan, McGraw Hill, 2006.

CS12: Network Security
(5 Hours -4 Credits)

UNIT I:

Introduction: Security Goals – Attacks – Services and Mechanism – 642 Techniques. Mathematics of Cryptography: Integer Arithmetic – Modular Arithmetic – Matrices – Linear Congruence - Traditional Symmetric Key Ciphers: Instruction – Substitution Ciphers – Transposition Ciphers – Stream and Block Ciphers. Introduction to Modern Symmetric Key Ciphers: Modern Block Ciphers – Modern Stream Ciphers.

UNIT II:

Data Encryption Standard (DES): Introduction – DES Structure – DES Analysis – Multiple DES – Security of DES. Advanced Encryption Standard (AES): Introduction – Transformations – Key Expansion – Ciphers – Examples – Analysis of AES.

UNIT III :

Asymmetric Key Cryptography: Introduction – RSA Crypto System. Message Integrity and Message Authentication: Message Integrity – Random Oracle Model – Message Authentication.

UNIT IV:

Cryptographic Hash Functions: Introduction – SHA – 512 – WHIRLPOOL. Digital Signature: Comparison – Process – Services – Attacks on Digital Signature – Digital Signature Schemes. Unit V: Entity Authentication: Introduction – Passwords – Challenge Response – Zero Knowledge – Bio Metrics. Key Management: Symmetric Key Distribution – Kerberos – Symmetric Key Agreement – Public Key Distribution.

Text Books:

1. Cryptography and Network Security – Behrouz A. Forouzan, TheMcGraw Hill, 2011.
Unit I : Chapters 1,2,3 and 5
Unit II : Chapters 6 and 7
Unit III : Chapters10 and 11
Unit IV : Chapters 12 and 13
Unit V : Chapters 14 and 15

Reference Books:

1. Cryptography and Network Security – William Stallings, PHI, 2008.
2. Cryptography and Network Security – Atul Kahate, McGraw Hill Education, 2013.
3. Network Security The Complete Reference – Roberta Bragg, Mark Rhodes Ousley and Strassberg – McGraw Hill Education, 2003.

CS13: BIOMETRIC SYSTEMS**(5 Hours- 4 Credits)****UNIT I:**

Introduction: Benefits of biometric versus traditional techniques – Key biometric terms and processes – Verification and identification – Enrollment and template creation

UNIT II:

Biometric matching. Accuracy in biometric systems: False match rate – False non-match rate – Failure-to-enroll rate – Derived metrics – Equal error rate – Ability-to-verify rate

UNIT III:

Physiological biometrics: Finger scan – Facial scan – Iris scan – Components – Working principles – Competing technologies – Strengths and weaknesses – Automated fingerprint Identification systems.

UNIT IV:

Behavioural biometrics signature scan – Keystroke scan – Components – Working principles – Strengths and weaknesses. Biometric applications: Categorizing biometric applications – Criminal identification – Citizen identification – Surveillance .

UNIT V:

PC/network access – Physical access/time and attendance – Customer facing applications – E-commerce/telephony – Retail/ ATM/point of sale applications. Biometric markets: Law enforcement – government sector – Financial sector – Healthcare – travel and immigration – Biometric standards.

Text Books:

1. Samir Nanavati, Michael Thieme, Raj Nanavati, “Biometrics – Identity Verification in a Networked World”, Wiley-dreamtech India Pvt Ltd, New Delhi, 2003.

Reference Books:

1. James Wayman, Anil Jain, David Maltoni, Dario Maio (Eds), “Biometric Systems”, Springer International Edition, 2004.

2. Anil K Jain, Patrick Flynn, Arun A Ross, “Handbook of Biometrics”, Springer, 2008.
3. John R Vacca, “Biometric Technologies and Verification Systems”, Elsevier Inc, 2007.
4. Ruud M. Bolle, Sharath Pankanti, Nalini K. Ratha, Andrew W.Senior, Jonathan H. Connell, “Guide to Biometrics”, Springer, 2009.

CS14: Lab 9: Relational Database Management Systems

(6 Hours - 4 Credits)

The following concepts must be introduced to the students:

DDL Commands

Create table, alter table, drop table

DML Commands

1. Select, update, delete and insert statements
 2. Condition specification using Boolean, Arithmetic operators and comparison operators (and, or, not,=,<>,>,<,>=,<=)
 3. Aggregate functions (Count, Sum, Avg, Min, Max)
 4. Multiple table queries (join on different and same tables)
 5. Nested select statements
 6. Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
 7. Categorization using group by.....having
 8. Arranging using order by
1. Create a table Student-master with the following fields client_no,name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - (i) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - (ii) Insert data into client_master
 - (iii)Insert data into supplier_master from client_master.
 - (iv)Delete the selected row in the client_master.
 2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date,order status.
 - (i) Add a new column for storing salesman number using ALTER Command.
 - (ii) Set the s_order_no as foreign key as column constraints.

- (iii) Set the s_order_no as foreign key as table constraints.
 - (iv) Enforce the integrity rules using CHECK.
3. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
- (i) Select the student's name column.
 - (ii) Eliminate the duplicate entry in table.
 - (iii) Sort the table in alphabetical order.
 - (iv) Select all the Students of a particular department.
4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
- (i) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - (ii) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - (iii) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - (iv) Select the supplier name and product_no where supplier name has 'r' or 'h' as second character.
- 5 Create and use the following database schema to answer the given queries

EMPLOYEE			
DEFAULT			
Field	Type	Null	Key
Eno	Char(3)	No	Primary
Ename	Varchar(50)	No	
Job_type	Varchar(50)	No	
Manager	Char(3)	Yes	Foreign
Hiredate	Date	No	
Dno	Integer	Yes	Foreign
Commission	Decimal(10,2)	Yes	
Salary	Decimal(7,2)	No	

DEPARTMENT			
DEFAULT			
Field	Type	Null	Key

Dno	Integer	No	Primary
Dname	Varchar(50)	Yes	

Perform the following queries:

- a. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
- b. Query to display unique Jobs from the Employee Table.
- c. Query to display the Employee Name concatenated by a Job separated by a comma.
- d. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
- e. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
- f. Query to display Employee Name and Department Number for the Employee No= 7900.
- g. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.
- h. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
- i. Query to display Name and Hire Date of every Employee who was hired in 1981.
- j. Query to display Name and Job of all employees who don't have a current Manager.
- k. Query to display the Name, Salary and Commission for all the employees who earn commission.
- l. Sort the data in descending order of Salary and Commission.
- m. Query to display Name of all the employees where the third letter of their name is A.
- n. Query to display Name of all employees either have two R's or have two A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
- o. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
- p. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.

- q. Query to display Name and calculate the number of months between today and the date each employee was hired.
 - r. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with `__J`, `'A'` and `__M`.
 - s. Query to display Name, Department Name and Department No for all the employees.
 - t. Query to display Unique Listing of all Jobs that are in Department # 30.
 - u. Query to display Name, Job, Department No. And Department Name for all the employees working at the Mumbai location.
 - v. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. and the salary of any employee who earns a commission.
 - w. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
 - x. Query to display the Employee No. And Name for all employees who earn more than the average salary.
 - y. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a `__T`.
5. Create a table master, book to contain the information of magazine code, magazine name and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update and delete operations on the above table.
 6. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
 7. Create a table stock to contain the item-code, item-name, current stock, date of last purchase. Write a stored procedure to seek for an item using item-code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
 8. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary. Use Cursor to update the employee salaries.
 9. Create a table to contain the information about the voters in a particular constituency.

Write a proper trigger to update or delete a row in the table.

ES1 : 1.BLOCKCHAIN

(5 Hours-4 Credits)

UNIT I:

Introduction To Blockchain -History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.

UNIT II:

Design Primitives of Blockchain:-Protocols -Security -Consensus -Permissions - Privacy-Cryptographic Primitive:-Hash –Signature -Hashchain to Blockchain -Basic consensus –mechanisms. Bitcoin mechanics:-Bitcoin Nuts and Bolts -Wallets: managing and protecting crypto assets

UNIT III:

Ethereum -The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

UNIT IV:

Privacy on a Public Block chain -Privacy on a public block chain- De-anonymizing the block chain and mixing -zk-SNARKs description and how it is used.Scalability in Block chain-Scalability in Block chain -Payment channels and state channels. - Optimistic Rollup, ZK-Rollup, and Validium -Recursive SNARKs. –Block chain and its Future-Block chain interoperability, miner extractable value (MEV), and governance-
The future of block chains

UNIT V:

Alternative Blockchains and Next Emerging Trends-Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.

Text Books:

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.

Reference Books:

1. Arshdeep Bahga, Vijay Madiseti, “Blockchain Applications: A Hands On Approach”, VPT, 2017.
Andreas Antonopoulos, Satoshi Nakamoto, “Mastering Bitcoin”, O’Reilly, 2014.
Roger Wattenhofer, “The Science of the Blockchain” CreateSpace Independent Publishing, 2016.

Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.

Alex Leverington, "Ethereum Programming" Packt Publishing, 2017.

**ES1 : 2.System Administration and Maintenance
(5 Hours -4 Credits)**

UNIT I:

System Start up and Operation Disk Partitioning - File system Installation - File system – Device 8 Manipulation Process

UNIT II:

User/Group Security and Permissions Log Analysis - Start-up Scripts - Configuration Files Print- 8 Spooling File Formats

UNIT III:

Firewalls 8 Security - Privacy - Backup - Scheduling Maintenance Functions

UNIT IV:

Media Access DNS Service: Concepts - DNS Service: Configuration.

UNIT V:

DNS 8 Service: Client Resolver - File Service.

Text Book:

1. Jan Bergstra and Mark Burgess, Handbook of Network and System Administration, 2008

Reference Book:

2. Eleen Frisch, Essential System Administration, 3rd Edition, O'Reilly Media, Inc., 2002.

ES1 : 3.Wireless Networks
(5 Hours - 4 Credits)

UNIT I:

Basics of Wireless Networks-Wireless Network Architecture, Classifications, Switching Technology, Communication Problems, Reference Models, Networking Issues, Networking Standards -Wireless Body Area Networks: Properties, Network Architecture, Network Components, Applications.

UNIT II:

Mobile Network Layer:-Introduction – Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol – mobile ad-hoc network: Routing: Destination Sequence distance vector, IoT: CoAP

UNIT III:

3G Overview-Overview of UTRAN Terrestrial Radio access network-UMTS Core network Architecture: 3GPP Architecture, User equipment,-CDMA2000 overview- Radio and Network components, Network structure, Radio Network, TD-CDMA, TD – SCDMA.

UNIT IV:

Wireless propagation mechanism, free space propagation model, ground reflection model, knife edge diffraction model, path loss prediction in hilly terrain, introduction to fading and diversity techniques,

UNIT V:

4G and Beyond Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, IMS Architecture, LTE, Advanced Broadband Wireless Access and Services, MVNO.

Text Books:

1. Jochen Schiller, Mobile Communications, Second Edition, Pearson Education 2012.(Unit I, II, III)
2. Vijay Garg, Wireless Communications and networking, First Edition, Elsevier 2007. (Unit IV, V)

Reference Books:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, “3G Evolution HSPA and LTE for Mobile Broadband, Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, Wireless Networking, First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, Modern Wireless Communications, First Edition, Pearson Education 2013

NME1:Introduction to Computers and Office Automation
(2 Hours – 2 Credits)

UNIT I:

Introduction to Computer and Information Technology: History, Computer system concepts-Computer system characteristics- Capabilities and limitations-Types of computers- Generations. Computer organization and working: Introduction-The Control Unit ALU- Memory-Read only memory (ROM).

UNIT II:

Input Devices: Introduction- Keyboards-Mouse-Joysticks-Optical Recognition input-Scanners-Bar coders-Digital camera-MICR-Card reader-Web Cameras-Light pens-Trackball- Touch screens-Touch pad-Digitizer-Voice input-Voice recognizers. Output Devices: Introduction-Monitors and Displays- Multimedia Projector-Printers-Graphics Output Devices-Plotters-Flatbed Plotters-Drum Plotters. Storage Devices: Introduction-Hard Disk Drives –CD-ROMs and DVDs – Magnetic tape –Erasable disks.

UNIT III:

Microsoft Office 2007 and Word Processing: Introduction to Microsoft Office2007 - Microsoft Word Screen. Microsoft Word: Working with Document in Word 2007 – Introduction – saving the file – Formatting, Alignment of text, Applying fonts-Spell checking- Borders and shading – Closing of the file, Editing document, Autocorrect-Auto format-Find and Replace, Page numbering, header and footer- Footnotes and endnotes- splitting panes-Tiling of the documents-using mail merge in Word 2007.

UNIT IV:

Microsoft Office Excel 2007: Understanding Spreadsheets-Creating a Worksheet in Microsoft Excel 2007- Copying formula – Styles –functions in Excel – Using Auto calculate–References –Sum, Average functions.

UNIT V:

Creating Charts in Excel 2007-Auditing a workbook – Comments Inserting –Function wizard-Goal seeking- Typing with Auto fill- Formatting numbers and Labels – changing the size of Rows and columns- Add or Remove a sheet –Protect a worksheet-Applying themes.

Text Books:

1. Learning computer fundamentals, MS Office and Internet & Web
2. Technology, Dinesh Maidasani, Firewall Media, Third Edition, 2014.

Unit I : Section A-1, 2
Unit II : Section A- 3, 4, 5
Unit III : Section B- 2, 3

- Unit IV : Section B- 4 (up to Functions in Excel)
Unit V - : Section B- 4(From Creating Charts in Excel)

Reference Books:

1. A Beginners Guide to Computers – Alexis Leon & Mathews Leon-Vikas Publishing House Pvt. Ltd., 2001.
2. Fundamentals of Computers, P. Mohan, Himalaya Publishing House, Revised Edition, 2010.
3. Fundamentals of Computers, V. Rajaraman, PHI Publication, Fifth Edition, 2010.

**SBS5 : Lab 10: Cryptography and Network Security
(2 Hours - 2 credits)**

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using Ceaser Cipher algorithms.
4. Write a Java program to perform encryption and decryption using Substitution Cipher algorithms.
5. Write a Java program to perform encryption and decryption using Hill Cipher algorithms
6. Write a Java program to implement the DES algorithm logic.
7. Write a C/JAVA program to implement the BlowFish algorithm logic.
8. Write a C/JAVA program to implement the Rijndael algorithm logic.
9. Using Java Cryptography, encrypt the text “Hello world” using BlowFish. Create your ownkey using Java key tool.
10. Write a Java program to implement RSA Algorithm.
11. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
12. Calculate the message digest of a text using the MD5 algorithm in JAVA.

CS15: Software Engineering
(5 Hours - 4 Credits)

UNIT I:

Introduction to Software Engineering: Some Definitions–Some Size factors–Quality and Productivity Factors – Managerial Issues. **Planning a Software Project:** Defining the Problem–Developing a Solution Strategy–Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

UNIT II:

Software Cost Estimation: Software Cost Factors–Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs.

UNIT III:

Requirements Definitions: The Software Requirements Specification–Formal Specification Techniques – Languages and Processors for Requirements Specification.

UNIT IV:

Software Design: Fundamental Design Concepts–Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections - Design Guidelines.

UNIT V:

Verification and Validation Techniques: Quality Assurance–Static Analysis–Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification. **Software Maintenance:** Enhancing Maintainability During Development–Managerial Aspects of Software Maintenance – Configuration Management – Source-Code Metrics – Other Maintenance Tools and Techniques.

Text Books:

1. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

Unit I	:	Chapters: 1.1 – 1.4, 2.1-2.5
Unit II	:	Chapters: 3.1 - 3.4
Unit III	:	Chapters: 4.1 – 4.3
Unit IV	:	Chapters: 5.1 – 5.9
Unit V	:	Chapters: 8.1, 8.3 – 8.7, 9.1 – 9.5

Reference Books:

1. R.S. Pressman, “Software Engineering – A practitioners approach”, Eighth Edition, McGraw Hill International editions, 2014.
2. Ian Somerville, “Software Engineering”, Tenth Edition, Pearson Education, 2015.
3. Managing and leading software projects , Richard E.(Dick) Fairley, IEEE Computer Society, John Wiley & Sons Publications, 2009.
4. Hans van Vliet, “Software Engineering: Principles and Practice”, Third Edition, John Wiley & Sons, 2008.
5. Rajib Mall, “Fundamentals of Software Engineering”, Fourth Edition, Prentice-Hall of India Pvt. Ltd., 2014.

CS16 : WEB TECHNOLOGY**(5 Hours -4 Credits)****UNIT I:**

Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT II:

Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT III:

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

UNIT IV:

Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files- Writing Files-Processing Directories.

UNIT V:

Working with Database and SQL : Introducing Database and SQL- Using My SQL- Adding and modifying Data- Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML - Simple XML and DOM Extension.

Text Book: Vikram Vaswani, “PHP A Beginner's Guide”, Tata McGraw Hill 2008.

Reference Books:

1. Steven Holzner, “The PHP Complete Reference”, Tata McGraw Hill, 2007.
2. Steven Holzner, “Spring into PHP”, Tata McGraw Hill 2011, 5th Edition.

Web References:

<https://www.w3schools.com/php/>
<https://www.phptpoint.com/php-tutorial-pdf/>
<http://www.xmlsoftware.com/>

CS17:Lab11: Cyber Security

(6 Hours - 4 Credits)

1. To implement a program for encrypting a plain text and decrypting a Cipher text using Caesar Cipher(Shift Cipher) substitution technique in 'C'
2. Write a program in 'C' to implement the Hill cipher substitution algorithm.
3. Write a program in 'C' to implement the Vigenere Cipher substitution algorithm.
4. Write a program in 'C' to implement the Rail Fence transposition technique.
5. Write a program in 'C' to implement the Data Encryption Standard (DES) algorithm
6. Write a program in 'C' to implement the International Encryption Algorithm (IDEA-Symmetric key Block)
7. Write a program in 'C' to implement the Advanced Encryption Standard (AES) technique
8. Write a program in 'C' to implement the RSA Algorithm.
9. Write a program in 'C' to implement the Diffie-Hellman Key Exchange algorithm.
10. Write a program in 'C' to implement the Message Authentication Codes.
11. Write a program in 'C' to implement the Hash functions.
12. Write a program in 'C' to implement the Digital Signature Standards technique.
13. Write a program in 'C' to implement the Hiding Confidential Information within Image.
14. Write a program in 'C' to implement FOSS based security mechanisms.
15. Write a program in 'C' to implement Hash Table using open addressing
16. Write a program in 'C' to implement own Hash Table with open addressing linear probing
17. Write a program in C or JAVA to implement own Hash Table with separate chaining

Note: The above are sample problems; Instructor can add more exercises based on their requirements and the current technology.

ES2 : 1. INTERNET OF THINGS

(5 Hours - 4 Credits)

UNIT I:

Fundamentals OF Iot -Evolution of Internet of Things -Enabling Technologies–IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack –Fog, Edge and Cloud in IoT –Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II:

IoT Protocols - IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks –Application Transport Methods: Supervisory Control and Data Acquisition –Application Layer Protocols: CoAP and MQTT

UNIT III:

Design And Development -Design Methodology -Embedded computing logic -Micro controller, System on Chips -IoT system building blocks -Arduino -Board details, IDE programming - Raspberry Pi -Interfaces and Raspberry Pi with Python Programming.

UNIT IV:

Data Analytics And Supporting Services-Structured Vs Unstructured Data and Data in Motion Vs Data in Rest –Role of Machine Learning –No SQL Databases –Hadoop Ecosystem –Apache Kafka, Apache Spark –Edge Streaming Analytics and Network Analytics –Xively Cloud for IoT, Python Web Application Framework –Django –AWS for IoT –System Management with NETCONF-YANG106

UNIT V:

Case Studies/Industrial Applications- Cisco IoT system -IBM Watson IoT platform– Manufacturing -Converged Plant wide Ethernet Model (CPwE) –Power Utility Industry –Grid Blocks Reference Model -Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Text Books:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

Reference Books:

1. ArshdeepB ahga, Vijay Madiseti, —Internet of Things –A hands-on approachll , Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocolsll , Wiley, 2012 (for Unit 2).
3. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatias, Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.

ES2 : 2. ETHICAL HACKING**(5 Hours - 4 Credits)****UNIT I:**

Introduction To Hacking : Introduction to Hacking – Important Terminologies – Penetration Test – Vulnerability Assessments versus Penetration Test – Pre-Engagement – Rules of Engagement -Penetration Testing Methodologies – OSSTMM – NIST – OWASP – Categories of Penetration Test – Types of Penetration Tests – Vulnerability Assessment Summary -Reports.

UNIT II:

Network Attacks: Vulnerability Data Resources – Exploit Databases – Network Sniffing – Types of Sniffing -Promiscuous versus Nonpromiscuous Mode – MITM Attacks – ARP Attacks – Denial of Service Attacks -Hijacking Session with MITM Attack .

UNIT III:

SSL Strip: Stripping HTTPS Traffic -DNS Spoofing – ARP Spoofing Attack Manipulating the DNS Records – DHCP Spoofing -Remote Exploitation – Attacking Network Remote Services – Overview of Brute Force Attacks – Traditional Brute Force – Attacking SMTP – Attacking SQL Servers – Testing for Weak Authentication.

UNIT IV:

Wireless and Web Hacking-Wireless Hacking – Introducing Aircrack- Cracking the WEP – Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng – Evil Twin Attack – Causing Denial of Service on the Original AP – Web Hacking .

UNIT V:

Attacking the Authentication – Brute Force and Dictionary Attacks – Types of Authentication – Log-In Protection Mechanisms – Captcha Validation Flaw – Captcha RESET Flaw – Manipulating User-Agents to Bypass Captcha and Other Protection – Authentication Bypass Attacks – Testing for the Vulnerability – Automating It with Burp Suite – Session Attacks – SQL Injection Attacks – XSS (Cross-Site Scripting) - Types of Cross-Site Scripting – Cross-Site Request Forgery (CSRF) – SSRF Attacks.

Text Books:

1. Rafay Baloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2014.

Reference Books:

1. Kevin Beaver, “Ethical Hacking for Dummies”, Sixth Edition, Wiley, 2018.
2. Jon Erickson , “Hacking: The Art of Exploitation”, Second Edition, Rogunix, 2007.

ES2 : 3. DATA WARE HOUSING AND DATA MINING (5 Hours - 4 Credits)

UNIT I:

Introduction: Data mining application–data mining techniques–data mining case studies the future of data mining – data mining software. **Association rules mining:** Introduction -Basics-task and a Naive algorithm- Apriori algorithm – improve the efficiency of the Apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.

UNIT II:

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.

UNIT III:

Classification: Introduction–decision tree–over fitting and pruning - DT rules–Naïve Bayesmethod- estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software.

UNIT IV:

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–cluster analysis software.

UNIT V:

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.

Text Books:

1. Introduction to Data mining with case studies, G.K. Gupta, PHI Private limited, New Delhi, 2014.

Unit I : Chapters 1 & 2
Unit II : Chapters 7 & 8
Unit III : Chapter 3
Unit IV : Chapter 4
Unit V : Chapters 5 & 6

Reference Books:

1. Data Warehousing, Data Mining & OLAP, Alex Berson and Stephen J. Smith, Tata McGraw Hill Edition, Tenth Reprint 2007
2. Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, Second Edition, Elsevier, 2007
3. Insights into Data Mining K.P. Soman, Shyam Diwakar, V. Ajay, Theory and Practice, PHI Publications Eastern Economy Edition 6th Printing, 2012

NME2: Introduction to Internet

(2 Hours – 2 Credits)

UNIT I:

Introduction to internet: Internet- Growth of Internet and ARPA Net–Owners of the Internet -Anatomy of Internet – History of WWW - Basic Internet Terminologies – Net etiquette - Internet Applications - Commerce on the Internet– Governance on the Internet - Impact of Internet on Society.TCP/IP Internet Technology and Protocols: Packet Switching Technology - Internet Protocols -TCP/IP – Router - Internet Addressing Scheme- Machine Addressing - E-mail Addresses – Resource Addresses.

UNIT II:

Interconnectivity: Connectivity types - Setting up a connection – Hardware requirements- Selection of a modem - Software requirements – Internet accounts by ISP-ISDN-Protocol options-Service options. Internet Network: Network Definition-Common terminologies – Node - Host- Workstation –Network Administrator - Network security - Network Components – Servers-client Server-Communication Media - Types of Networks - Addressing in Internet – DNS -Network topologies – Ethernet – FDDI - ATM.

UNIT III:

Browsers and Search engines: Browsers - What is a browser? – Parts of a browser Window-Running a browser - working with a Browser. Search engines: What is search engine? - Types of search engines - Search and meta search engines.

UNIT IV:

E-mail: E-mail - E-mail Networks and Servers - E-mail Protocols - Structure of E-mail - Attachments – E-mail Clients - E-mail Clients - web based E-mail-Address book – Signature File.

UNIT V:

HTML Programming Basics: Introduction to HTML – HTML browsers -Different versions of HTML-HTML tags - Document overview – Header elements - Section headings - Block headings - Lists-Inline elements – Images -working with Tables, Forms, Frames.

Text Books:

1. Internet Technology and Web design, Ramesh Bangia, Firewall Media, (An imprint of Lakshmi Publications Pvt. Ltd.), Third Edition, 2011.

Unit I : Chapters 1 and 2

Unit II : Chapters 3 and 4

Unit III : Chapter 5(5.6), Chapter 8(8.11 & 8.13)

Unit IV : Chapter 5 (5.1) & Chapter 6

Unit V : Chapter 9

Reference Books:

1. The Internet Book, Douglas E. Comer, Fourth Edition, PHI Learning Pvt. Ltd. , New Delhi, 2009.
2. Using the Internet the Easy Way, Young Kai Seng, Minerva Publications, First Edition, 2000.
3. Fundamentals of Information Technology By Alexis Leon and Mathews Leon, Vikas Publishing House Pvt. Ltd., Revised Edition.

SBS 6: Quantitative Aptitude

(2 Hours - 2 Credits)

UNIT I: Numbers - HCF & LCM of numbers – Decimal Fractions

UNIT II: Square roots and Cube roots- Average – Problems on ages.

UNIT III: Percentage – Profit and Loss – Ratio and Proportion.

UNIT IV: Time and Work – Time and Distance.

UNIT V: Simple Interest – Compound Interest.

Note: Example problems –Minimum 70% & Exercise problems – Maximum 30% to be set in question paper

Text Books:

1. Quantitative Aptitude, R.S. Aggarwal, S. Chand & Company Ltd, New Delhi, Reprint 2021.

Unit I	:	Page nos. 3-29, 30-45, 46-66
Unit II	:	Page nos. 117-138, 139-160, 182-194
Unit III	:	Page nos. 208-250, 251-293, 294-310
Unit IV	:	Page nos. 341-370, 384-404
Unit V	:	Page nos. 445-465, 466-486

Reference Books:

1. Quantitative Aptitude and reasoning, R.V. Praveen, PHI Learning, 2nd Edition 2013.
2. Magical book on Quicker Maths, M.Tyra, BSC Publishing Co. Pvt. Ltd, Delhi. Reprint, 2011.
3. Quantitative Aptitude for Competitive Exams, Abhijit Guha, 4th Edition, Tata McGraw Hill Company, New Delhi.

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