Bhavan's Vivekananda College

Department of Computer Science Sainikpuri, Secunderabad

Autonomous College – Affiliated to Osmania University M.Sc. [Computer Science] I Year

CBCS (Choice Based Credit System) w.e.f. 2019-2020

Scheme of Instruction and Examination

SEMESTER – I									
Paper	Code	Paper Title	PPW		Max. Marks		Max. Marks		Credits
			ТН	PR	TH	TH- CIA	PR	PR- CIA	
I	CS101	Advanced Java Programming	4		70	30			4
II	CS102	Operating Systems	4		70	30			4
III	CS103	Software Engineering	4		70	30			4
IV	CS104	Discrete Mathematics	4		70	30			4
V	CS105P (AECC)	Personality Development and Soft Skills		2			25		1
VI	CS101P	Advanced Java Programming Lab	en e	6			75		3
VII	CS102P	Operating Systems Lab		4			50		2
VIII	CS103P	Software Engineering Lab		4			50		2
Total			16	14	280	120	175		24

		SEMESTER	R – II							
Paper	Code	Code Paper Title	PPW		Max. Marks		Max. Marks		Credits	
			ТН	PR	TH	TH- CIA	PR	PR- CIA	ТН	
I	CS201	Programming Using Python	4		70	30			4	
II	CS202	Computer Networks	4		70	30			4	
III	CS203	Design and Analysis of Algorithms	4		70	30			4	
IV	CS204	Automata Language and Computation	4		70	30			4	
V	CS205A	Robotics & Artificial Intelligence	2	2		0.5				2
VI	CS205B	Internet of Things				35	15			2
VIII	CS201P	Programming Using Python Lab		6			75		3	
IX	CS202P	Computer Networks Lab		4			50		2	
Х	CS203P	Design and Analysis of Algorithms Lab		4			50		2	
Total		18	12	315	135	150	,	25		

Head of the Department
Department of Computers
Bharatiya Vidya Bhavan's Vivakananda College
Sainikpuri, Secunderabad - 500 094.



Bhavan's Vivekananda College

Of Science, Commerce and Humanities
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Autonomous College – Affiliated to Osmania University
M.Sc. COMPUTER SCIENCE
(CBCS)

(w.e.f. the academic year 2019 - 2020)

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BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
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Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f. 2019-20)

COURSE NAME: ADVANCED JAVA PROGRAMMING

PAPER CODE: CS101

YEAR/SEMESTER: I/I

PPW: 4

NO. OF CREDITS: 4

COURSE OBJECTIVE: To enable students with the concepts of programming to develop client/server web applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To inculcate knowledge in connecting database through java programming. COb2: To describe the process of developing web applications using java servlets. COb3: To describe the process of developing web applications using java server pages.

COb4: To explain the usage of JSTL tags and JSF tags.

<u>UNIT-I</u> 15Hrs

Introducing JDBC: Describing Components of JDBC, Features of JDBC, JDBC Architecture: Types of Drivers, Advantages and Disadvantages of Drivers, Use of Drivers, JDBC Statement and Methods: Statement, PreparedStatement, CallableStatement, Working with ResultSet Interface.

UNIT-II 15Hrs

Introducing CGI, Introducing Java Servlet, Advantages of Servlet over CGI, Features of Servlet, Introducing Servlet API - Javax.servlet package, Javax.servlet.http package, Servlet Lifecycle, Working with GenericServlet class methods, HttpServlet, Understanding Request Dispatching, Dispatching the Request. Session in Servlet - Introducing Session Tracking, Describing URL Rewriting, Exploring Hidden Form Field, Describing Cookies, HttpSession.

<u>UNIT-III</u> 15Hrs

Introduction to JSP - Advantages of JSP over Servlet , JSP architecture , JSP Life Cycle , Exploring Scripting Tags, Exploring Implicit Objects in JSP, Exploring Directive Tags. Java Bean- Advantages & Disadvantages, Action Tags, Describing the useBean Tag - setProperty and getProperty.

UNIT-IV 15Hrs

JSTL Core Tags - General-Purpose Tags, Conditional and Looping Tags, Networking Tags, JSTL SQL Tags, JSTL XML Tags.

Working with JSF - Features of JSF, JSF Architecture, Describing JSF Elements, JSF Request Processing Life cycle, JSF Tag Libraries, JSF HTML Tags.

Suggested Book:

Santosh Kumar K, "JDBC, Servlets and JSP Black Book", New Edition, Dreamtech Publication, 2008.

Reference Books:

- 1. Brayan Basham, Kathy Sierra, Bert Bates, Head First Servlets and JSP, O'Reilly Media, Latest Edition, 2005.
- 2. Jitendra Patel, "Advanced Java" Kindle Edition, 2016.

COURSE OUTCOMES:

At the end of the course students will be able to:

CS101 CO1: Develop programs using JDBC.

CS101 CO2: Develop programs using Java Servlets.

CS101 CO3: Develop programs using Java Server Pages.

Associate Professor
Dept of Maths Q.U CS101 CO4: Develop programs using JSTL and JSF Tags.

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OF SCIENCE, HUMANITIES AND COMMERCE (Accredited with 'A' Grade by NAAC) Autonomous College - Affiliated to Osmania University Department of Computer Science PROGRAM NAME: M.Sc Computer Science (w.e.f 2019-20)

COURSE NAME: Operating Systems

PAPER CODE: CS102

PPW: 4

YEAR/SEMESTER: I/I

NO. OF

CREDITS: 4

COURSE OBJECTIVE: To make the students familiarize with the concepts of Operating Systems, Process Management and Memory Management.

UNIT-WISE COURSE OBJECTIVES:

COb1: To explain Kernel Data Structures, System Structures and System Calls.

COb2: To discuss Multithreaded programming, Process Synchronization Concepts and Deadlock handling methods.

COb3: To summarize Memory-File Management through various Access Methods.

COb4: To discuss File System Implementation methods, System Security and System Protection.

Unit - I -15 Hrs.

Introduction: Computer-System Architecture: Single-Processor Systems, Multiprocessor Systems, Clustered Systems, Kernel Data Structures: Lists, Stacks and Oueues, Trees, Hash functions and Maps, Bitmaps. Computing Environments: Traditional Computing, Mobile Computing, Distributed Systems, Client-Server Computing, Peer-to-Peer Computing, Virtualization, Cloud Computing. System Structures: Operating System Services, User and Operating-System Interface: Command Interpreters, Graphical User Interfaces, Choice of Interface. System Calls, Types of System Calls: Process Control, File Management, Device Management, Information Maintenance, Communication, Protection. System Programs, Operating System Structure: Simple Structure, Layered Approach, Micro-kernels, Modules, Hybrid Systems (Mac OS X, iOS, Android). Process Concept: Process Concept: The Process, Process State, Process Control Block, Threads. Process Scheduling: Scheduling queues, Schedulers, Context Switch, Operations on Processes: Process Creation, Process Termination. Inter-process Communication: Shared-Memory Systems, Message-Passing Systems (Naming, Synchronization, Buffering). (Ch-1,2,3)

-16 Hrs. Unit - II Multithreaded Programming: Overview: Motivation, Benefits. Multithreading Models: Many-to-one Model, One-to-One Model, Many-to-Many Model. Processes Scheduling: Basic Concepts: CPU-I/O Burst Cycle, CPU Scheduler, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms: First-Come, First-Served Scheduling, Shortest-Job-First Scheduling, Priority Scheduling, Round-Robin Scheduling, Multilevel Queue Multilevel Feedback Queue Scheduling. Process Synchronization: The Associate Professor
Dept of Maths Q.U Critical-Section Problem, Peterson's Solution, Semaphores: Semaphore Usage, Semaphore

Implementation, Deadlocks and Starvation, priority Inversion. Classic problems of Synchronization: The Bounded-Buffer Problem, The Readers-Writers Problem, The Dining-Philosophers Problem. Monitors: Monitor Usage, Dining-Philosophers Solution using Monitors, Implementing a Monitor using Semaphore. Deadlocks: Deadlock Characterization: Necessary Conditions, Resource-Allocation Graph. Methods for Handling Deadlocks, Deadlock Prevention: Mutual Exclusion, Hold and Wait, No Preemption, Circular Wait. Deadlock Avoidance: Safe State, Resource-Allocation Graph Algorithm, Banker's Algorithm (Safety Algorithm, Resource Request Algorithm, an illustration example). Deadlock Detection: Single Instance of each Resource Type, Several Instances of a Resource

Deadlock Detection: Single Instance of each Resource Type, Several Instances of a Resource Type, Detection-Algorithm Usage. **Recovery from Deadlock:** Process Termination, Resource Preemption. (Ch - 4, 5, 6, 7)

Unit – III -16 Hrs.

Memory Management Strategies: Background: Basic Hardware, Addressing Binding, Logical Versus Physical Address Space, Dynamic Linking and Shared Libraries. Swapping: Standard Swapping, Contiguous Memory Allocation: Memory Protection, Memory allocation, Fragmentation. Segmentation: Basic Method, Segmentation Hardware, Paging: Basic Method, Virtual Memory Management: Background, Demand Paging, Basic Concepts, Performance of Demand Paging. Page Replacement: Basic Page Replacement, FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement. Thrashing: Cause of Thrashing, Page-Fault Frequency. File System: File Concept: File Attributes, File Operations, File Types, File Structures, Internal File Structures. Access Methods: Sequential Access, Direct Access, Other Access Methods. Directory and Disk Structure: Directory Overview, Single-Level Directory, Two-Level Directory, Tree Structured Directories, Acyclic Graph Directories, General Graph Directory. Mass-Storage Structure: Disk Scheduling: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, LOOK Scheduling. Disk Management: Disk Formatting, Boot Block, Bad Blocks. Swap-Space Management: Swap-Space use, Swap-Space Location, Swap-Space Management RAID Structure: RAID Levels. (Ch – 8, 9, 10, 12)

Unit – IV

File- System Implementation:

Allocation Methods: Contiguous Allocation, Linked Allocation, Indexed Allocation, Performance Allocation. Free-Space Management: Bit Vector, Linked Lists, Grouping, Counting, Space Maps. NFS: Overview, The Mount Protocol, the NFS Protocol, Path-Name Translation, Remote Operation. System Protection: Goals of Protection, Principles of Protection, Access Matrix, Access Control, Revocation of Access Rights. System Security: The Security Problem, Program Threats: Trojan Horse, Trap Door, Logic Bomb, Stack and Buffer Overflow, Viruses. System and Network Threats: Worms, Port Scanning, Denial of Service. User Authentication: Passwords, Password Vulnerabilities, Securing Passwords, One-time Passwords, Biometrics. Firewalling to Protect Systems and Networks, Computer-Security Classifications. (Ch – 11, 14, 15)

Prescribed Book

Abraham Silberschatz, Peter Baer Galvin, Gerg Gagne, Operating System Concepts (9e)

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Dept of Maths O.U.

Reference Books

1. Dhananjay M. Dhandhere, Operating Systems-A Concept Based Approach

2. Andrew S. Tanenbaum, Modern Operating Systems

3. William Stallings, Operating Systems-Internals and Design Principles

4. Thomas W. Doeppner, Operating systems in depth

Course Outcomes: Student will be able to:

CS102 CO1: Paraphrase different Operating System structures and the various System Calls.

CS102 CO2: Determine CPU Scheduling and Deadlock handling methods.

CS102 CO3: Correlate Main Memory and Mass Storage File Management.

CS102 CO4: Analyze the system protection methods from System and Network threats by using Security tools Associate Professor
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OF SCIENCE, HUMANITIES AND COMMERCE
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Autonomous College – Affiliated to Osmania University
Department of Computer Science
PROGRAM NAME: M.Sc.(CS) (w.e.f 2019-20)

COURSE NAME: SOFTWARE ENGINEERING

PAPER CODE: CS103

PPW: 4 NO. OF

YEAR/SEMESTER: I/I CREDITS: 4

COURSE OBJECTIVE: To impart the knowledge of software concepts, importance of software development within time and budget.

UNIT-WISE COURSE OBJECTIVES:

COb1: To enable students learn the basics of software, its process and types of process models.

COb2: To enable students learn about Requirements Engineering, design concepts and Architectural styles of Software Engineering.

COb3: To enable students learn about Software Quality and software testing strategies.

COb4: To enable students learn about Software Configuration Management process, software risks and reverse engineering.

Unit – I 15 Hrs

Software Engineering: The Nature of Software, Software Process, Software Engineering Practice. The Software Process: A Generic Process Model, Defining a Framework Activity, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, Unified Process, Personal and Team Process Models. Defining Agility, Agile Process, Extreme Programming. (Chapter 1 pg Nos: 1-9,12-20; Chapter 2 pg Nos: 30-33,37-58; Chapter 3 pg Nos: 65-78)

Unit – II 15 Hrs

Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Requirements Analysis, UML Models that Supplement the Use Case, Class-Responsibility-Collaborator Modeling, Associations and Dependencies, Analysis Packages. **Design Concepts:** Design within the Context of SE, Design Process, Design Concepts, Design Model, Software Architecture, Architectural Styles, Architectural Design. Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Based Development, User Interface Design Rules.

(Chapter 5 pg Nos: 119-142; Chapter 6 pg Nos: 148-153,161-163,167-182, Chapter 8 pg Nos: 215-238; Chapter 9 pg Nos: 242-246,249-260; Chapter 10 pg Nos: 276-295, 303-308, 312-316).

Unit – III 15 Hrs

Quality Management: Quality, Software Quality, Software Quality Dilemma, Achieving Software Quality, Defect Amplification and Removal, Reviews, Informal Reviews, Formal Technical Reviews, Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics, Software Reliability, A Strategic Approach to Software Testing, Validation Testing, System Testing, Debugging, Software Testing Fundamentals, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Object-Oriented Testing Strategies& Methods.

Head of the Reviews, Formal Technical Reviews, Formal Technical Reviews, Formal Technical Reviews, Elements of Software Reliability, A Strategic Approach to Software Testing, Validation Testing, System Testing, Debugging, Software Testing Fundamentals, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Object-Oriented Testing Strategies& Methods.

(Chapter 14 pg Nos: 398-412; Chapter 15 pg Nos: 418-419, 423-430; Chapter 16 pg Nos: 434-437, 442-443; Chapter 17 pg Nos: 449-455, 467-477; Chapter 18 pg Nos: 482-483, 485-501, Chapter 19 pg Nos: 516-522)

15 Hrs Unit - IV

Software Configuration Management, SCM Process, Product Metrics for Requirements Model, Design Model, Source Code, Testing and Maintenance. Managing Software Projects: The Project Management Spectrum, W5HH Principle, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics within the Software Process, Software Project Estimation, Decomposition Techniques, Project Scheduling - basics, scheduling, Software Risks, Risk Mitigation, Monitoring, and Management, Software Maintenance, Software Reengineering, Reverse Engineering, Forward Engineering.

(Chapter 22 pg Nos: 584-590, 593-600; Chapter 23 pg Nos: 619-635,638-642; Chapter 24 pg Nos: 646-648, 661; Chapter 25 pg Nos: 666-684; Chapter 26 pg Nos: 697-707; Chapter 27 pg Nos: 721-723, 732-738; Chapter 28 pg Nos: 745-746,755-756; Chapter 29 pg Nos: 761-762, 768-775,778-780)

Prescribed Book:

Roger S Pressman, B R Maxim, Software Engineering-A Practitioner's Approach (7e)

References Books:

- 1. Ian Sommerville, Software Engineering 9e
- 2. Hans Van Vliet, Software Engineering.

COURSE OUTCOMES:

At the end of the course students will be able to:

CS103 CO1: Understand the basics of software, its process and types of process models

CS103 CO2: Interpret about Requirements Engineering, design concepts and

Architectural styles of Software Engineering.

CS103 CO3: Analyze about Software Quality and software testing strategies. CS103 CO4: about Software Configuration Management process, software

risks and reverse engineering.

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OF SCIENCE, HUMANITIES AND COMMERCE (Accredited with 'A' grade by NAAC) Autonomous College

Affiliated to Osmania University
PROGRAM NAME M.Sc.(CS) I SEMESTER
COURSE NAME :DISCRETE MATHEMATICS

PAPER CODE CS104 YEAR/SEMESTER: I/ I

NPW :4 No. of Credits : 4

Course Objectives: To get hands on experience in Mathematical Logic and Proofs, Graph theory, Elementary combinations, Binomial coefficients, and Recurrence relation.

Unit-wise Course Objectives:

COb1:To help students acquire a range of mathematical skills and understand logic, circuits and their working.

COb2:To help students evaluate the patterns in numbers

COb3:To analyze various situations and acquire an insight into counting principles

COb4:To analyze concepts in graph theory

UNIT-I -15Hrs

Mathematical Logic: propositional logic, propositional equivalences, rule of inference, direct proofs, proof by contraposition, proof by contradiction. Boolean **Algebra**: Boolean functions and its representation, logic gates, minimizations of Boolean expressions by using Boolean identities and K-map. **(Text Book 2**: Chap 1.5,1.6,1.7,1.8,6.1,6.2,6.3,6.5)

UNIT-II -15Hrs

Basic Structures: Sets representations, set operations, functions, sequences and summations (no question to be given in the exam). Division algorithm, modular arithmetic, solving congruences, applications of congruences. Recursion: Proofs by mathematical induction, recursive definitions, structural induction, generalized induction,

(Text Book 1 : Chap.2.1,2.2,2.3,2.4,3.4,3.5,3.7,4.1,4.2,4.3)

UNIT-III -15Hrs

Counting: Basic counting principle, inclusion-exclusion for two-sets, pigeonhole principle, permutations and combinations, Binomial coefficient and identities, generalized permutations and combinations. **Recurrence Relations:** introduction, solving linear recurrence relations, generating functions, principle of inclusion-exclusion, applications of inclusion-exclusion.

Associate Professor

Relations: relations and their properties. representing relations, closures of relations, equivalence relations, partial orderings (no question to be asked from relations). (**Text Book 1**: Chap. 5.1 - 5.5, 6.1, 6.2, 6.4-6.6, 7.1, 7.2)

-15Hrs **UNIT-IV**

Graphs: Graphs definitions, graph terminology, types of graphs, representing graphs, graph isomorphism, connectivity of graphs, Euler and Hamilton paths and circuits, Dijkstra's algorithm to find shortest path, planar graphs-Euler's formula and its applications, graph coloring and its applications. Trees: Trees definitions-properties of trees. Haffman Coding. tree traversals. prefix, infix, postfix notations, spanning tress–DFS, BFS.

(Text Book 1 : Chap. 8.1-8.8, 9.1-9.5)

Prescribed Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, (7e)

2.Joe L. Mott, Abraham Kandel, Theoder P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians.

Reference Books

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics

2. Stein, Drysdale, Bogart, Discrete Mathematics for Computer Scientists

3. J.P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science

Course Outcomes: At the end of the course students will be able to

CS104 CO1: Write an argument using logical notation and determine if the argument is or not valid.

CS104 CO2: Prove basic set equalities

CS104 CO3: Apply counting principles to real life situations

CS104 CO4: Model problems in computer science using graphs and trees Associate Professolu Dept of Maths O.U

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Department of Computers Bharathya Vidya Bhavan's Vivekananda College

Sainikpuri, Secunderabad 500 094.



OF SCIENCE, HUMANITIES AND COMMERCE
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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f. 2019-20)

COURSE NAME: PERSONALITY DEVELOPMENT and SOFT SKILLS

PAPER CODE: CS105P(AECC)

No. of Credits: 1

Unit I Communication Skills

YEAR/SEMESTER: I/I

PPW:2

Process & Types of Communication

Intrapersonal Communication

- SWOT analysis
- Building self-confidence and self-esteem
- Body Language
- Self-introduction
- Impromptu

interpersonal Communication

- Team Building
- Negotiation
- Leadership Styles
- Group Discussion

Unit II Presentation Skills

- Cover Letter & Resume writing
- Email writing
- Interview Skills
- Mock interview sessions
- Oral Presentation Skills
- Power Point Presentations by students

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Page 1

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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f 2019-20)

COURSE NAME: ADVANCED JAVA PROGRAMMING LAB

PAPER CODE: CS101P

No. of Credits: 3

YEAR/SEMESTER: I/I

PPW: 6

Week 1:

1. Jdbc program to connect the Oracle database.

2. Create a new database table using JDBC.

Week 2:

3. Jdbc program to insert records into database.

4. Jdbc program to update records in database.

Week 3:

5. Jdbc program to delete records from database.

Week 4:

6. Jdbc program to read the data from database using ResultSet.

Week 5:

7. Jdbc program to demonstrate PreparedStatement.

Week 6:

8. Jdbc program to demonstrate CallableStatement.

Week 7:

9. Servlet program to print "Hello World".

Week 8:

10. Program to demonstrate Servlet Lifecycle methods.

Week 9:

11. Servlet Program to demonstrate Session Tracking.

Week 10:

12. Servlet Program to demonstrate Cookies.

Week 11:

13. Program to demonstrate JSP scripting elements.

Week 12:

14. Program to demonstrate JSP implicit objects.

Week 13:

15. JSP program to process the Form.

Week 14:

16. Develop simple application to process the registration form using JSP and JDBC.

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OF SCIENCE, HUMANITIES AND COMMERCE
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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f 2019-20)

COURSE NAME: Operating Systems Lab

PAPER CODE: CS102P

PPW: 4

Credits: 2

Week - 1

1. Basic UNIX operations (commands).

Week - 2

2. Shell program using 'case', 'then' and 'if' & 'else'.

Week-3

- 3. Shell programs on while & do-while loop statements.
- 4. Shall program on for structure.

Week - 4

- 5. Inter process communication using pipes.
- 6. To wish salutation depending on the time.

Week - 5

7. Program using system calls.

Week - 6

8. To create a child process using fork() and exec () system calls.

Week - 7

9. To convert upper case to lower case letters of a given ASCII file.

Week - 8

10. Program to search the given pattern in a file.

Week-9

11. Program using open, read, write system calls.

Week - 10

12. Implementation of Signals in UNIX.

Week - 11

13. Write a C program to simulate UNIX commands like ls, grep, cp.

Week - 12

14. Program to demonstrate FCFS and SJF process schedules on the given data.

Week - 13

15. Program to demonstrate CPU Priority and Round robin scheduling on the given burst time and arrival times.

Week - 14

16. Program implementing Producer and Consumer problem using Semaphores.

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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f 2019-20)
COURSE NAME: : Software Engineering Lab

COURSE NAME: CS103P

PPW:4

Credits: 2

Week - 1, 2

1. Study and develop DFD and ER-diagrams for "Banking System".

Week -3, 4, 5

2. Study and develop DFD and ER-diagrams for "Railway Reservation System".

Week-6,7

3. Study and develop DFD and ER-diagrams for "Hotel Management System".

Week-8,9

4. Study and develop DFD and ER-diagrams for "Inventory Control System".

Week - 10, 11, 12

5. Study and develop DFD and ER-diagrams for "Library Management System".

Week - 13, 14

6. Study and develop DFD and ER-diagram for "Examination Marks Processing System".

Note: The teacher should define the boundaries for the above case study problems and make the practice of problems with reference to the following.

- 1. Study of case tool Requirements
- 2. Implementation of requirements engineering activities such as elicitation, validation, management using case tools Analysis and Design
- 3. Implementation of Analysis and design using case tools
- 4. Study and usage of software project management tools such as cost estimates and scheduling
- 5. Documentation generators –Study and practice of Documentation generators
- 6. Data Modeling using automated tools
- 7. Practice reverse engineering and reengineering using tools
- 8. Exposure towards test plan generators, test case generators, test coverage and software metrics.
- 9. Meta modeling and software life cycle management.

10. Structure charts, Data Flow Diagrams, Decision tables and ER diagrams for

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(CBCS)

(w.e.f. the academic year 2019 - 2020)

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OF SCIENCE, HUMANITIES AND COMMERCE
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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f 2019-20)

COURSE NAME: PROGRAMMING USING PYTHON

PAPER CODE: CS201 YEAR/SEMESTER: I/II PPW: 4 NO. OF

CREDITS: 4

COURSE OBJECTIVE: To enable students with the concepts of programming to develop python scripts.

UNIT-WISE COURSE OBJECTIVES:

COb1: To explain conditional and looping statements.

COb2: To demonstrate the concepts of functions, files and exceptions.

COb3: To describe the functionalities of lists, tuples, strings, dictionaries and sets.

COb4: To illustrate object oriented concepts and GUI controls.

Unit – I - 15 Hrs.

Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

(Ch - 1.4, 1.5, 2.1 - 2.8, 3.1 - 3.6, 4.1 - 4.4, 4.6 - 4.7)

Unit – II - 15 Hrs.

Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions-Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules. **File and Exceptions:** Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

(Ch - 5.1 - 5.10, 6.1-6.4)

Unit – III - 15 Hrs.

Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists,

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Two-Dimensional Lists, Tuples. **Strings:** Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. **Dictionaries and Sets:** Dictionaries, Sets, Serializing Objects. **Recursion:** Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms.

(Ch - 7.1-7.9, 8.1-8.3, 9.1 - 9.3, 12.1 - 12.3)

Unit – IV – 15 Hrs.

Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, Working with Instances, Techniques for Designing Classes, Inheritance, Polymorphism.**GUI Programming:** Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

(Ch - 10.1 - 10.4, 11.1, 11.2, 13.1 - 13.8)

Prescribed Book

Tony Gaddis, Starting Out With Python (3e)

Reference Books

- 1. Kenneth A. Lambert, Fundamentals of Python
- 2. James Payne, Beginning Python using Python 2.6 and Python 3
- 3. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3
- 4. Charles Dierach, Introduction to Computer Science using Python
- 5. Clinton W. Brownley, Foundations for Analytics with Python

COURSE OUTCOMES: At the end of the course students will be able to:

CS201 CO1: Develop programs using conditional and looping statements.

CS201 CO2: Develop programs using functions, files and exceptions.

CS201 CO3: Develop programs using lists, tuples, strings, dictionaries and sets.

CS201 CO4: Develop programs using object oriented concepts and using GUI controls.

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BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
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Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science) (w.e.f 2019-20)

COURSE NAME: COMPUTER NETWORKS

PAPER CODE: CS202

PPW: 4

YEAR/SEMESTER: I/II

NO. OF

CREDITS: 4

<u>Course Objective</u>: This course provides the overview of networking. It deals with the seven layers of OSI/ISO Model in detail and gives an idea to a student as how the Message reaches to the recipient handset device from the handset device.

UNIT-WISE COURSE OBJECTIVES:

COb1: To illustrate some basic concepts of networks in hardware and software terminologies and describe some of the functionalities of Data Link Layer.

COb2: To describe the various functionalities of Network Layer. COb3: To describe the various functionalities of Transport Layer. COb4: To illustrate few services provided by the Application Layer.

Unit – I 15 Hrs.

Computer Networks Fundamentals: Overview, Network Hardware, Network Software, Reference models— OSI Model, TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Model, Network Standardization. Data Link Layer: Design Issues. Example Data Link Protocols, Multiple Access Protocols - Collision-Free Protocols, Limited-Contention Protocols. (Text Book 1: Chapter 1.2, 1.3, 1.4.1, 1.4.2, 1.4.4, 1.6) (Text Book 2: Chapter 3.1, 3.5) (Text Book 3: Chapter 4.2.3, 4.2.4)

Unit – II

Network Layer: Design Issues, Routing Algorithms – Shortest path, Flooding, Hierarchical, Broadcast Routing, Multicast Routing; Congestion Control Algorithms - Traffic Throttling, Load Shedding.

Internetworking: Tunneling, Internetwork Routing, Fragmentation, IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols–ICMP, ARP, RARP, DHCP.

(Text Book 1: Chapter 5.1, 5.2.2, 5.2.3, 5.2.6, 5.2.7, 5.2.8, 5.3.4, 5.3.5, 5.5.3, 5.5.4, 5.5.5, 5.6.1 to 5.6.4)

Unit – III 15 Hrs.

Transport Layer: Services provided to the upper layers, Transport Protocols, Overview of Congestion Control.

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The Internet Transport Protocols: Introduction to UDP&RPC, The Internet Transport Protocols—TCP, TCP Service Model, TCP protocol, TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Sliding Window, TCP Time Management.

(Text Book 1: Chapter 6.1.1, 6.2, 6.3, 6.4.1, 6.4.2, 6.5.1 to 6.5.9)

Unit – IV 15 Hrs.

Application Layer: DNS - Name Space, Domain Name Space, Distribution of Name Space, DNS in the internet, Resolution, DNS Messages, Types of Records.

TELNET, E-Mail, FTP, WWW and HTTP - Architecture, Web Documents, HTTP

(Text Book 2: Chapter 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7, 26.1, 26.2, 26.3, 27.1, 27.2, 27.3)

Prescribed Books

- 1. Andrew S. Tanenbaum, David J Wetherall, Computer Networks, (5e)
- 2. Behrouz A. Forouzan, Data Communication and Networking, 4th Edition.

Reference Books

- 1. William Stallings, Data and Computer Communications
- 2. Behrouz A Forouzan, Firouz Mosharraf, Computer Networks A Top-Down Approach

Course Outcomes: By the end of the course, student will be able

CS202 CO1: To relate the different network operations with the related layers of OSI and TCP Protocol

CS202 CO2: To identify the nomenclature used in IP Addresses and analyze the IP Header Format, different Routing Algorithms and Congestion Control Techniques used in Internet.

CS202 CO3: To analyze how Transport Layer exactly implements a reliable end to end delivery of messages and analyze TCP Header format and also how Transport Layer overcomes Congestion control at its level.

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CS202 CO4: To analyze the different services provided by Application Layer

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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science)

COURSE NAME: DESIGN AND ANALYSIS OF ALGORITHMS

Paper Code: CS203
Year/Semester: I/II
No. of Credits: 4

COURSE OBJECTIVE: It helps the student to learn different Sorting- searching algorithms, Divide and Conquer, Dynamic Programming – Back tracking algorithms.

UNIT-WISE COURSE OBJECTIVES

COb1: To acquire the knowledge of different sorting and searching techniques.

Cob2: To describe different problems related to divide and conquer & decrease and conquer.

Cob3: To describe the alternative methods for optimality of Dynamic Programming and Transform and Conquer.

Cob4: To aware of problems related to Greedy Technique and Branch and Bound techniques.

Unit – I -15 Hrs.

Introduction: Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types. Fundamentals of the Analysis of Algorithm: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive & Recursive Algorithms. Brute Force Search: Selection Sort, Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search, Breadth-First Search.

(Ch-1.2, 1.3, 2.1, 2.2, 2.3, 2.4, 3.1 – 3.5)

Unit – II - 15 Hrs.

Decrease–&–Conquer: Insertion Sort, Topological Sorting, Binary Search, Interpolation Search. **Divide-and-Conquer:** Merge Sort, Quick Sort, Multiplication of Large Integers, Strassen's Matrix Multiplication.

(Ch – 4.1, 4.2, 4.4, 4.5, 5.1, 5.2, 5.4)

Unit – III - 15 Hrs.

Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heap Sort, Problem Reduction. Space and Time Trade-Offs, Hashing, B-Trees.

Dynamic Programming: Knapsack Problem, Optimal Binary Search Trees, Warshall's and Floyd's Algorithms. **Greedy Technique:** Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes.

(CH - 6.1, 6.3, 6.4, 6.6, 7.3, 7.4, 8.2 - 8.4, 9.1 - 9.4,)

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Unit - IV - 15 Hrs.

Iterative Improvement: Simplex Method, Maximum-Flow Problem. Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP, and NP-Complete Problems. Backtracking: n-Queens Problem, Hamiltonian Circuit Problem, Subset-Sum Problem. Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesman Problem, Approximation Algorithms for the Knapsack Problem. (Ch –10.1, 10.2, 11.1, 11.2, 11.3, 12.1, 12.2, 12.3)

Prescribed Book

Anany Levitin, Introduction to the Design and Analysis of Algorithms (3e)

Reference Books

- 1. Richard Neapolitan, Foundations of Algorithms
- 2. Thomas H. Cormen, Introduction to Algorithms
- 3. E.Horowitz, S. Sahni, Fundamentals of Computer Algorithms
- 4. A.V. Aho, J.V. Hopcroft, J.D. Ullmann, The Design and Analysis of Computer Algorithms
- 5. Donald E Knuth, The Art of Programming_Volumes-1, 2, 3, 4

COURSE OUTCOMES: At the end of the course students will be able to:

CS203 CO1: Develop programs using different Sorting and Searching methods.

CS203 CO2: Develop programs using different programs based on Divide and Conquer approach

CS203 CO3: Develop programs related to Dynamic Programming concepts.

CS203 CO4: Develop programs related to Greedy Technique, Branch and Bound related problems Associate Professol

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OF SCIENCE, HUMANITIES AND COMMERCE
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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science)
COURSE NAME: Automata Languages and Computation

PAPER CODE: CS204

YEAR/SEMESTER: I/II

PPW: 4

NO. OF CREDITS: 4

<u>Course Objectives:</u> To Describe the behavior of DFA's and NFA's with Transition Diagrams, and the behavior of Pushdown automata and Turing Machine

Unit-wise Course Objective:

COb1: To describe and analyze the dynamic behavior of Discrete systems

COb2: To learn the behavior of DFA's,NFA's

COb3: To convert Finite automata to Regular Expression

COb4: To design the Turing machines

Unit - I

-15

Fundamentals – alphabets, strings, languages, problems, graphs, trees, Finite State Systems, definitions, FiniteAutomaton model, acceptance of strings, and languages, Deterministic finite automaton and Nondeterministicfinite automaton, transition diagrams, transition tables, proliferation trees and language recognizers, equivalence of DFA's and NFA's. Finite Automata with ε -moves, significance, acceptance of languages, ε -closure, Equivalence of NFA's with and

without ε -moves, Minimization of finite automata, Two-way finite automata, Finite Automata with output–Moore and Melay machines.(Ch. No:1,2 page no:1-45)

Unit – II - 15 Hrs.

Regular Languages: regular sets, regular expressions, identity rules, constructing finite automata for a givenregular expressions, conversion of finite automata to regular expressions. Pumping lemma of regular sets and itsapplications, closure properties of regular sets. Grammar Formalism: Regular grammars—right linear and left linear grammars, equivalence between regularlinear grammar and finite automata, inter conversion, Context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings, ambiguity.

(ch. no:3,4 pgno:55-87)

Unit – III - 15 Hrs.

Context Free Grammars: Simplification of Context Free Grammars, Chomsky normal form, Greiback normalform, Pumping lemma for context free languages and its applications, closure of properties of CFL (proofsomitted). Push Down Automata: PDA definition, model, acceptance of CFL, acceptance by final state and acceptance byempty state and its equivalence. Equivalence of PDA's and CFL's. (Proofs not required).

(ch. no:4,5,6.pg no:87-99,107-116,125-128,130-138)

Unit - IV - 15 Hrs.

Turing Machine: TM definition, model, design of TM, computable functions, unrestricted grammars, recursively enumerable languages. Church's hypothesis, , types of Turing machines (proofs omitted). Linear bounded automata and Context sensitive language. Computability Theory: Chomsky hierarchy of languages, (ch. no 7&9 pg. no:146-153,217-226)

Prescribed Book

J. E. Hopcroft, J. D. Ullman, Introduction to Automata Theory, Languages, and Computation

Reference Books

- 1. John C. Martin, Introduction to Languages and the Theory of Computation
- 2. Mishra, Chandrashekaran, Theory of Computer Science
- 3. Perter Linz, An Introduction to Formal Languages and Automata
- 4. ZviKohav, Niraj K Jha, Switching and Finite Automata Theory

Course Outcomes: Student will be able to

CS204 CO1: Familiar with Finite State System CS204 CO2: Summarize DFA'S and NFA'S CS204 CO3: Implement Regular expressions

CS204 CO4: Design various models of Turing Machines Associate Professor
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OF SCIENCE, HUMANITIES AND COMMERCE (Accredited with 'A' grade by NAAC)

Autonomous College

Affiliated to Osmania University PROGRAM NAME: M.Sc.(Computer Science) COURSE NAME: Robotics And Artificial Intelligence

PAPER CODE: SECS404(A) YEAR/SEMESTER: II/II PPW: 2

NO. OF CREDITS: 2

COURSE OBJECTIVE: This course is about the theory and practice of AI, Learning & Planning techniques and Neural Networks.

UNIT-WISE COURSE OBJECTIVES

COb1: To inculcate knowledge about Artificial Intelligence and the search strategies for solving problems.

COb2: To explain the concepts of Learning, Natural Language Processing and Robotics.

Unit – I: 15 Hrs.

Definition and Foundation of AI. The State of Art. The nature of Environments, The Structure of Agents; Solving Problems by Searching-Uninformed Search Strategies: Breadth First Search, Depth- First Search. Informed Search Strategies (Heuristic Search): Greedy Best First Search, Memory Bounded Heuristic Search, Hill Climbing Search, ADVERSIAL SEARCH: Optimal Decisions in games, Alpha-Beta Pruning. (Chap – 1, 3, 5)

Unit – II: 15 Hrs.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees, Artificial Neural Networks, Ensemble Learning, Practical Machine Learning.

Natural Language Processing: Language Models, Information Retrieval, Information Extraction.

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Speech Recognition.

Robotics: Introduction, Robot Hardware, Planning to move, Planning uncertain movements, Application Domains

Associate Professor

(Chap - 18, 22, 23,25)

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Prescribed Book

Artificial Intelligence: A Modern Approach, Third Edition by Stuart Russsell and Peter

Reference Books

- 1. Artificial Intelligence by Elaine Rich, Tata-McGraw Hill
- 2 Introduction to Artificial Intelligence & Expert System by Dan.W.Patterson, Prentice Hall of India
- 3. A Mathematical Introduction to Robotic Manipulation by Richard M Murray

COURSE OUTCOMES: At the end of the course students will be able to:

SECS404(A) CO1: Use the appropriate search strategies in solving the problems through Artificial Intelligence.

SECS404(A) CO2: Illustrate the process of Learning and Natural Language Processing in AI. Discuss the basics of Robotics and the Hardware that is involved in the concepts of Robotics.

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Head of the Department

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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science)
COURSE NAME: Internet of Things (IoT)

PAPER CODE: SECS404(B) YEAR/SEMESTER: I/I PPW: 4

NO. OF CREDITS: 4

COURSE OBJECTIVE: To enable students with the concepts of programming to develop client/server web applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To Introduce the concept of M2M (machine to machine) protocols.

COb2: To Implement web services on IoT devices, to explain the basics of Python Scripting Language which is used in many IoT devices.

Unit – I: 15 Hrs.

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, Logical Design of IoT - IoT communication models, IoT Communication APIs, IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IoT Levels and Deployment Templates, Domain Specific IoTs – Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle. IoT and M2M – Software Defined Networking, Network Function Virtualization, Difference between SDN and NFV for IoT.

(Chap - 1, 2, 3)

Unit – II: 15 Hrs.

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs WAMP – AutoBahn for IoT, XivelyCloud for IoT, Python web application framework-Django, Designing a RESTful Web API. Case studies illustrating IoT design. (Chap – 8, 9)

Prescribed Book

Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015,ISBN: 9788173719547.

Reference Books

 The Internet of Thin gs – Key applications and protocols, David Boswarthick, Omar Elloumi Olivier Hersent, Wiley Publications – 2015.

2. Designing Internet of Things - Adrian McEwen, Hakim Cassimally, Wiley Publications – 2014.

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- 3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,
- 4. ISBN:9789350239759.

Course Outcomes: At the end of the course, student will be able to -

SECS404(B) CO1: Summarize the Internet applications, Protocols, scripting environment. SECS404(B) CO2: Implement the IoT design on Case Studies(Cloud related environment study).

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Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science)

COURSE NAME: Programming using Python Lab

Paper Code: CS201P

PPW: 6

Credits: 3

Week - 1

- 1. Write a program that displays the following information: Your name, Full address, Mobile number, College name, Course subjects.
- 2. Write a program to find the largest three integers using if-else and conditional operator.

Week - 2

3. Write a program with a loop that asks the user to enter a series of positive numbers. The user

should enter a negative number to signal the end of the series. The program should display the numbers in order and their sum.

Week - 3

- 4. Write a program to find the product of two matrices [A]mxp and [B]pxr
- 5. Write recursive and non-recursive functions for the following:
- a. To find GCD of two integers.
- b. To find the factorial of positive integer
- c. To print Fibonacci Sequence up to given number n

Week - 4

6. Write a program to display two random numbers that are to be added, such as: 247 + 129, the

Program should allow the student to enter the answer. If the answer is correct, a message of congratulations should be displayed. If the answer is incorrect, a message showing the correct answer should be displayed.

7. Write recursive and non-recursive functions to display prime number from 2 to n.

Week - 5

- 8. Write a program that writes a series of random numbers to a file from 1 to n and display.
- 9. Write a program to create file, write the content and display the contents of the file with each

line preceded with a line number (start with 1) followed by a colon.

Week - 6

- 10. In a program, write a function that accepts two arguments: a list and a number n. The function displays all of the numbers in the list that are greater than the number n.
- 11. Write a program with a function that accepts a string as an argument and returns the no.

vowels that the string contains. Another function to return no. of consonants.

Week - 7

12. Write a program that opens a specified text file and then displays a list of all the unique words found in the file. (Store each word as an element of a set.)

Associate Professor

Week - 8

13. Write a program to analyze the contents of two text files using set operations.

Week - 9

14. Write a program to implement the inheritance and dynamic polymorphism.

15. Write a GUI program that converts Celsius temperatures to Fahrenheit temperatures.

Week - 11

16. Write a GUI program that displays your details when a button is clicked.

Week - 12, 13, 14

17. Practicing similar GUI based programs for different applications.

Note: Handle the exceptions raised from file operations.

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PROGRAM NAME: M.Sc.(Computer Science)

COURSE NAME: Computer Networks Lab

Paper Code: CS202P

PPW: 4 Credits: 2

Week - 1

- 1. Program to identify the category of the IP address for the given IP address
- 2. Program to implement sliding window protocol

Week - 2

- 3. Program Socket pair system call usage in IPC
- 4. Program for Socket options using signals

Week-3

5. Program to implement Echo concurrent Stream Server

Week - 4

6. Program to implement Echo concurrent stream client

Week - 5

7. Program to implement Listener and Talker

Week - 6

8. Program to implement TCP time service

Week - 7

9. Program to implement UDP time service

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10. Program to implement Ping service

Week - 9

11. Program to implement Route tracing program

Week-10

12. Program to implement File Transfer Protocol

Week - 11

13. Program to implement any Shortest path routing Algorithm

Week - 12

14. Program to implement Distance Vector Routing Implementation

Week - 13

15. Program to implement ICMP Error Message simulations

Week - 14

16. Program to implement Reverse Address Resolution Protocol

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Associate Professor



OF SCIENCE, HUMANITIES AND COMMERCE
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Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: M.Sc.(Computer Science)

COURSE NAME: Design and Analysis of Algorithms Lab

Paper Code: CS203P

PPW: 4

Credits: 2

Objective: Student will be able to practice different algorithms and their analysis.

Week - 1

1. Write a program recursive and non-recursive function for the following:

a) Factorial of an integer

b)GCD of two integers

c)Fibonacci Sequence

Week - 2

2. Write a program for sorting the given list using Insertion Sort, Topological Sort.

Week - 3

3. Write a program for sorting the given list using Selection Sort, BubbleSort.

Week - 4

4. Write a program for sorting the given list using Merge Sort.

5. Write a program for sorting the given list using Quick Sort.

Week-5

6. Write a program for sorting the given list using Heap Sort.

7. Write a program to find the given number in a list using Sequential Search, Binary Search.

Week - 6

8. Write a program to find product of two matrices [A]mxp and [B]pxr

Week - 7

9. Write a program to create AVL tree.

Week - 8

10. Write a program to create B-tree.

Week - 9

11. Write a program to find the Hamiltonian circuit for a weighted graph.

Week - 10

12. Write a program to find the shortest path in a weighted graph using Dijkstra's Algorithm.

Week - 11

13. Write a program to solve travelling sales man problem.

Week - 12

14. Write a program to solve knapsack problem.

Week - 13

15. Write a program to find the minimum spanning tree for a weighted graph using Kruskal's Algorithm.

Week - 14

16. Write a program to find the minimum spanning tree for a weighted graph using Prim's Algorithm.

Note: Analyze all the above problems with respect to time complexity.

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Department of Computer Science
Sainikpuri, Secunderabad
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M.Sc. [Computer Science] II Year, III & IV Semesters

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CHAIRPERSON
BOS in Computer Science
Bhavan's Vivekananda College
Salnikpuri

Bhavan's Vivekananda College, Sainikpuri BOS Meeting of M.Sc. (Computer Science) Online meeting on 14th July, 2021 at 2.00 P.M.

AGENDA

- 1. Adapting M.Sc. III and IV Semester (CBCS)syllabus as per Osmania University for the academic year 2021-22.
- 2. Inclusion of Objectives and Outcomes for Practical Papers in M.Sc. I, II and III, IV semesters.
- 3. Approval of M.Sc. I and II Year (CBCS)syllabus 2021-22 by OU Nominee, Faculty of Science, Osmania University and BOS Members from Academia and Industry.
- 4. Classification of courses based on Employability /Skill Development /Entrepreneur Skills.

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- 5. Suggestions for Value added courses.
- 6. Suggestions for Certificate Courses with MOU.
- 7. Percentage of change in syllabus course wise.
- 8. Suggestions for adapting new methodologies to conduct online classes.
- 9. Approval of Examiners Panel List.

10. Any other points.

CHAIRPERSON

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