

(AUTONOMOUS INSTITUTION - UCG, GOVT. OF INDIA)

(Affiliated to JNTUH; Approved by AICTE - Accredited by NBA & NAAC - 'A' Grade, ISO 9001:2008 Certified)
Maisammaguda, Dhulapally, Secunderabad - 500100.

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Version: R22-V2-IOT-22.07.2023

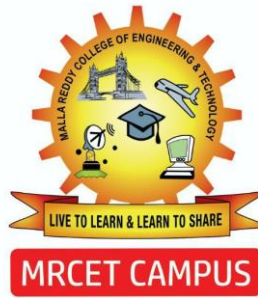


**MALLA REDDY COLLEGE
OF ENGINEERING & TECHNOLOGY**
(AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA)

Affiliated to JNTUH; Approved by AICTE, NBA & NAAC with A-GRADE | ISO 9001:2015



EAMCET/PGE CET/ICET CODE: MLRD



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)



BACHELOR OF TECHNOLOGY

CSE (Internet of Things)

COURSE STRUCTURE & SYLLABUS (R22)

(Batches admitted from the academic year 2022 - 2023)



Department of COMPUTER SCIENCE & ENGINEERING (EMERGING TECHNOLOGIES-IOT)

Updated Version: R22/V-2/22.07.2023

M R C E T CAMPUS

(Autonomous Institution – UGC, Govt. of India)

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – ‘A’ Grade - ISO 9001:2015 Certified)

Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.

Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.



PRELIMINARY DEFINITIONS AND NOMENCLATURES

- Autonomous Institution /College||- means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- Academic Autonomy -||means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- Commission - means University Grants Commission.
- AICTE - means All India Council for Technical Education.
- University - The Jawaharlal Nehru Technological University, Hyderabad.
- College – means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.
- Program - means:
 - Bachelor of Technology (B.Tech) degree program
 - UG Degree Program: B.Tech
- Branch means specialization in a program like B.Tech degree program in Computer Science and Engineering, B.Tech degree program in Electronics & Communication Engineering etc.
- Course or Subject means a theory or practical subject, identified by its course–number and course-title, which is normally studied in a semester.
- T–Tutorial, P–Practical, D–Drawing, L–Theory, C–Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

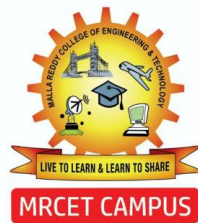
Malla Reddy College of Engineering & Technology (MRCET CAMPUS) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

“A thought beyond the horizons of success committed for educational excellence”

PRINCIPAL



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

Vision of the Department

“To be at the forefront of Emerging Technologies and to evolve as a Centre of Excellence in Research, Learning and Consultancy to foster the students into globally competent professionals useful to the Society.”

Mission of the Department

The department of CSE (Emerging Technologies) is committed to:

- To offer highest Professional and Academic Standards in terms of Personal growth and satisfaction.
- Make the society as the hub of emerging technologies and thereby capture opportunities in new age technologies.
- To create a benchmark in the areas of Research, Education and Public Outreach.
- To provide students a platform where independent learning and scientific study are encouraged with emphasis on latest engineering techniques.

QUALITY POLICY

- To pursue continual improvement of teaching learning process of Undergraduate and Post Graduate programs in Engineering & Management vigorously.
- To provide state of art infrastructure and expertise to impart the quality education and research environment to students for a complete learning experiences.
- Developing students with a disciplined and integrated personality
- To offer quality relevant and cost effective programmes to produce engineers as per requirements of the industry need.

For more information: www.mrcet.ac.in



BACHELOR OF TECHNOLOGY (B.Tech)

Internet 
Things

IOT

COURSE STRUCTURE (R22)

(Batches admitted from the academic year 2022 - 2023)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

B TECH – CSE (INTERNET OF THINGS) - R22 - COURSE STRUCTURE**I Year B. Tech - CSE (INTERNET OF THINGS) – I Semester**

S.No	Subject Code	SUBJECT (S)	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0001	English	2	0	0	2	40	60
2	R22A0023	Mathematics –I	3	1	0	4	40	60
3	R22A0021	Applied Physics	3	0	0	3	40	60
4	R22A0022	Engineering Chemistry	2	0	3	4	40	60
5	R22A0501	Programming for Problem Solving	3	0	0	3	40	60
6	R22A0082	Applied Physics/Engineering Chemistry Lab	-	0	2	1	40	60
7	R22A0083	Engineering and Computing Hardware Workshop	-	0	3	1.5	40	60
8	R22A0581	Programming for Problem Solving Lab	-	0	3	1.5	40	60
9	R22A0003	Human Values and Professional Ethics	2	0	0	0	40	60
		Total	15	1	11	20	360	540

I Year B. Tech - CSE (INTERNET OF THINGS) – II Semester

S.No	Subject Code	SUBJECT(S)	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0002	Professional English	2	0	0	2	40	60
2	R22A0024	Mathematics – II	3	1	0	4	40	60
3	R22A0201	Principles of Electrical and Electronics Engineering	3	1	0	4	40	60
4	R22A0301	Computer Aided Engineering Graphics	3	0	0	3	40	60
5	R22A0502	Problem Solving using Python Programming	3	0	0	3	40	60
6	R22A0081	English Language and Communication Skills Lab	-	0	3	1.5	40	60
7	R22A0281	Principles of Electrical and Electronics Engineering Lab	-	0	3	1.5	40	60
8	R22A0582	Problem Solving using Python Programming Lab	-	0	2	1	40	60
9	R22A0004	Environmental Science	2	0	0	0	40	60
		Total	16	2	8	20	360	540



II Year B. Tech - CSE (INTERNET OF THINGS) – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0503	Data Structures	3	0	0	3	40	60
2	R22A0504	Database Management Systems	3	0	0	3	40	60
3	R22A1261	Computer Organization & Architecture	3	1	0	4	40	60
4	R22A0509	Operating Systems	3	0	0	3	40	60
5	R22A0026	Probability and Statistics	3	1	0	4	40	60
6	R22A0583	Data Structures Lab	0	0	2	1	40	60
7	R22A0584	Database Management Systems Lab	0	0	2	1	40	60
8	R22A0587	Operating Systems Lab	0	0	2	1	40	60
9	*R22A0005	Foreign Language: French*	2	0	0	0	100	-
Total			17	2	6	20	420	480

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

II Year B. Tech - CSE (INTERNET OF THINGS) – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0507	Object Oriented Programming through Java	3	0	0	3	40	60
2	R22A0505	Software Engineering	3	0	0	3	40	60
3	R22A0512	Computer Networks	3	0	0	3	40	60
4	R22A0506	Design and Analysis of Algorithms	3	1	0	4	40	60
5	R22A6901	Sensors and Devices	3	0	0	3	40	60
6	R22A6981	Computer Networks & Sensors and Devices Lab	0	0	2	1	40	60
7	R22A0586	Object Oriented Programming through Java Lab	0	0	2	1	40	60
8	R22A6991	Industry Oriented Project	0	0	4	2	40	60
9	R22A0026	Public Policy and Governance*	2	0	0	0	40	60
Total			17	1	8	20	360	540

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree



III Year B. Tech - CSE (INTERNET OF THINGS) – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A62xx	Microprocessors and Microcontrollers	3	0	0	3	40	60
2	R22A73xx	Artificial Intelligence	3	0	0	3	40	60
3	R22A12xx	Automata and Compiler Design	3	1	0	4	40	60
4		Open Elective-I	3	0	0	3	40	60
5	R22A05xx R22A62xx R22A05xx R22A66xx	Professional Elective-I 1. Discrete Mathematics 2. Cyber Security Essentials 3. Web Programming 4. Human Computer Interaction	3	0	0	3	40	60
6	R22A62xx	Microprocessors and Microcontrollers Lab	0	0	2	1	40	60
7	R22A73xx	Artificial Intelligence Lab	0	0	2	1	40	60
8	R22A62xx	Application Development -I	0	0	4	2	40	60
		Total	15	1	8	20	320	480

III Year B. Tech - CSE (INTERNET OF THINGS) – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A62xx	IoT System Architecture	3	0	0	3	40	60
2	R22A73xx	Machine Learning	3	1	0	4	40	60
3	R22A62xx	Embedded Systems Design for IoT	3	0	0	3	40	60
4		Open Elective -II	3	0	0	3	40	60
5	R22A62xx R22A05xx R22A05xx R22A73xx	Professional Elective-II 1. Mobile Application Development 2. Distributed Systems 3. Ethical Hacking 4. IoT Communication Protocol	3	0	0	3	40	60
6	R22A62xx	Embedded Systems Design for IoT Lab	0	0	2	1	40	60
7	R22A73xx	Machine Learning Lab	0	0	2	1	40	60
8	R22A62xx	Application Development –II	0	0	4	2	40	60
		Total	15	1	8	20	320	480



IV Year B. Tech - CSE (INTERNET OF THINGS) – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A05xx	Full Stack Development	3	0	0	3	40	60
2	R22A69xx	IoT Security & Privacy	3	0	0	3	40	60
3	R22A69xx	Industrial IoT	3	1	0	4	40	60
4	R22A05xx R22A12xx R22A12xx R22A69xx	Professional Elective-III: 1. Information Retrieval Systems 2. Database Security 3. Computer Vision 4. Architecting Smart IoT Devices	3	0	0	3	40	60
5	R22A05xx R22A73xx R22A69xx R22A73xx	Professional Elective-IV: 1. Big Data Analytics 2. Software Testing Methodologies 3. Cloud Computing 4. Blockchain Technology	3	0	0	3	40	60
6	R22A05xx	Full Stack Development Lab	0	0	2	1	40	60
7	R22A69xx	Mini Project Development	0	0	6	3	40	60
		Total	15	1	8	20	280	420

IV Year B. Tech - CSE (INTERNET OF THINGS) – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A03xx	Innovation, Start-Up & Entrepreneurship	4	0	0	4	40	60
2	R22A05xx R22A62xx R22A73xx R22A67xx	Professional Elective-V: 1. Programming Languages for IoT 2. Metaverse 3. Expert Systems 4. IoT Automation	3	0	0	3	40	60
3	R22A66xx R22A12xx R22A67xx R22A73xx	Professional Elective-VI: 1. Smart Sensors Technologies 2. Virtual Reality 3. Wireless Networks 4. 5G and IoT Technologies	3	0	0	3	40	60
4	R22A67xx	Major Project Development	0	0	20	10	80	120
		Total	10	0	20	20	200	300



List of Open Electives:

OPEN ELECTIVE – I		
S.No	Subject Code	SUBJECT NAME
1	R22A1251	WEB DEVELOPMENT
2	R22A2151	INTELLECTUAL PROPERTY RIGHTS
3	R22A0551	JAVA PROGRAMMING
4	R22A0351	ROBOTICS AUTOMATION PROCESS
5	R22A0451	ELECTRONICS FOR HEALTH CARE
6	R22A0251	RENEWABLE ENERGY SOURCES
7	R22A6751	PRINCIPLES OF DATA SCIENCE
8	R22A6752	BUSINESS ANALYTICS

OPEN ELECTIVE – II		
S.No	Subject Code	SUBJECT NAME
1	R22A05XX	DATABASE SYSTEMS
2	R22A6753	BIG DATA ARCHITECTURE
3	R22A0352	DESIGN THINKING
4	R22A0552	PRINCIPLES OF CLOUD COMPUTING
5	R22A6951	IOT & IT'S APPLICATIONS
6	R22A2152	NANO MATERIALS
7	R22A0252	ELECTRICAL AND HYBRID VEHICLES
8	R22A6251	CYBER GOVERNANCE





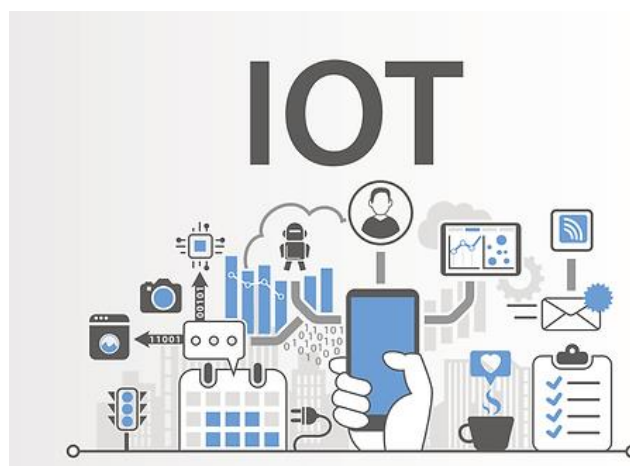
BACHELOR OF TECHNOLOGY (B.Tech)

Internet of Things (IoT)

II Year B.Tech (R22)

SYLLABUS

(Batches admitted from the academic year 2022 - 2023)



II Year – I Semester (R22) CSE (Internet of Things)

Course Structure of II Year – I Sem CSE(IoT) – R22 Regulation

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0503	Data Structures	3	0	0	3	40	60
2	R22A0504	Database Management Systems	3	0	0	3	40	60
3	R22A1261	Computer Organization & Architecture	3	1	0	4	40	60
4	R22A0509	Operating Systems	3	0	0	3	40	60
5	R22A0026	Probability and Statistics	3	1	0	4	40	60
6	R22A0583	Data Structures Lab	0	0	2	1	40	60
7	R22A0584	Database Management Systems Lab	0	0	2	1	40	60
8	R22A0587	Operating Systems Lab	0	0	2	1	40	60
9	*R22A0005	Foreign Language: French	2	0	0	0	100	-
		Total	17	2	6	20	420	480

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II Year B.Tech CSE(IoT) – I Sem (R22)

L/T/P/C

3/-/-/-3

(R22A0503) DATA STRUCTURES**COURSE OBJECTIVES:**

This course will enable students to

1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Understanding how searching and sorting is performed in Python.
4. Understanding how linear and non-linear data structures works.
5. To learn the fundamentals of writing Python scripts.

UNIT – I

Oops Concepts - class, object, constructors, types of variables, types of methods. **Inheritance:** single, multiple, multi-level, hierarchical, hybrid, **Polymorphism:** with functions and objects, with class methods, with inheritance, **Abstraction:** abstract classes.

UNIT – II

Data Structures – Definition, Linear Data Structures, Non-Linear Data Structures, Python Specific Data Structures, List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.

UNIT - III

Arrays - Overview, Types of Arrays, Operations on Arrays, Arrays vs List.

Searching - Linear Search and Binary Search.

Sorting - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

UNIT - IV

Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists.

Stacks - Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack

Queues: Overview of Queue, Implementation of Queue(List & Linked list), Applications of Queues, Priority Queues.

UNIT - V

Graphs - Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search.

Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation.

TEXTBOOKS:

1. Data structures and algorithms in python by Michael T. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

The students should be able to:

1. Examine Python syntax and semantics and apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists,
3. Apply Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Master object-oriented programming to create an entire python project using objects and classes

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II Year B.Tech CSE(IoT) – I Sem (R22)

L/T/P/C

3/-/-/3

(R22A0504) DATABASE MANAGEMENT SYSTEMS**COURSE OBJECTIVES:**

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database
3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server(Database Server),Data Warehousing.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
5. Familiar with basic database storage structures and access techniques: file and page organizations

UNIT I:

Database System Applications, Purpose of Database Systems, View of Data–Data Abstraction –Instances and Schemas–Database Languages–database Access for applications Programs–Database Users and Administrator–Transaction Management–Database Architecture–Storage Manager–the Query Processor.

Data Models: Introduction to the Relational Model– Structure – Database Schema, Keys – Schema Diagrams. Database design– Other Models, ER diagrams – ER Model -Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design with relevant Examples. Relational Query Languages, Relational Operations.

UNIT II:

Relational Algebra–Selection and projection set operations–renaming–Joins–Division Examples of Algebra overviews – Relational calculus – Tuple Relational Calculus (TRC) –Domain relational calculus(DRC).

Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions–GROUPBY–HAVING, Nested Subqueries, Views, Triggers, Procedures.

UNIT III:

Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyce/Codd normal form.Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form

UNIT IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability –Concurrent Executions – Serializability- Recoverability – Implementation of Isolation –Testingforserializability-Lock-BasedProtocols-TimestampBasedProtocols-Validation-BasedProtocols–MultipleGranularity.

UNIT V:

Recovery and Atomicity– Log– Based Recovery – Recovery with Concurrent Transactions – Check Points – Buffer Management–Failure with loss of non-volatile storage.

TEXTBOOKS:

1. DatabaseSystemConcepts,Silberschatz,Korth,McGrawhill,SixthEdition. (All units except IIIrd)
2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition.

REFERENCEBOOKS:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNITIII.

COURSE OUTCOMES:

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

1. Demonstrate the basic elements of a relational database management system
2. Ability to identify the data models for relevant problems
3. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries.
4. Apply normalization for the given database
5. Understand the various Recovery Mechanisms

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA

II Year B.Tech CSE(IoT) – I Sem (R22)

L/T/P/C

3/1/-/-4

(R22A1261) COMPUTER ORGANIZATION AND ARCHITECTURE**OBJECTIVES:**

The students will be able to:

1. To understand the working of a Computer System and its basic principles.
2. To learn the architecture and design of 8086 processor.
3. To know the concepts of Memory and corresponding technologies.
4. To understand the functional aspects of various peripheral devices.
5. To acquire knowledge about parallel processors.

UNIT - I:

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Computer Organization and Architecture - Von Neumann

Data representation: signed number representation, fixed and floating point Representations, Character representation. Computer arithmetic – integer addition and Subtraction, Ripple carry adder, carry look-ahead adder, etc. Multiplication – shift-and add, Booth multiplier, Carry save multiplier, etc. Division restoring and non-restoring techniques, Floating point arithmetic.

UNIT – II:

Introduction to x86 architecture.

Instruction set architecture of a CPU: Registers, instruction execution cycle, RTL Interpretation of instructions, addressing modes, instruction set.

CPU Control unit design: Hardwired and micro-programmed design approaches.

UNIT – III:

Memory system design: Semiconductor memory technologies, memory organization. **Memory organization:** Memory interleaving, concept of hierarchical memory organization, Cache memory, cache size vs. block size, mapping functions, Replacement algorithms, write policies.

UNIT – IV:

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

UNIT – V:

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

TEXT BOOKS:

1. “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. “Computer Organization and Embedded Systems”, 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

REFERENCE BOOKS:

1. “Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw- Hill
2. “Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education.
3. “Computer System Design and Architecture”, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course Outcomes :

At the end of the course, Students will be able to:

1. Illustrate the functional block diagram of a single bus architecture of a computer.
2. Analyze the various instruction sets and addressing modes.
3. Design a memory module and analyze its operation by interfacing with the CPU for a specific architecture.
4. Compare and contrast the peripherals and the related I/O transfers
5. Assess the performance, and apply design techniques to enhance performance using pipelining & parallelism.

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA

II Year B.Tech CSE(IoT) – I Sem (R22)

L/T/P/C

3/-/-/3

(R22A0509) OPERATING SYSTEMS**COURSE OBJECTIVES:**

1. To understand the fundamental concepts and techniques of Operating Systems.
2. To study the concepts of LINUX OS and process scheduling.
3. To understand the concepts in deadlocks and process management.
4. To understand the techniques in memory managements and IPC mechanism.
5. To study file system concepts and sockets.

UNIT - I

Operating System-Introduction, Structures-Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services.

Introduction to Linux operating system, Linux file system, Linux Utilities

UNIT - II

Linux: Introduction to shell, Types of Shell's, example shell programs.

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT - IV

Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory implementation in Linux. Corresponding system calls.

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, kernel support for files, system calls for file I/O operations open, create, read, write, close, lseek, stat, ioctl

Disk Management: Disk Scheduling Algorithms-FCFS, SSTF, SCAN, C-SCAN

TEXT BOOKS:

1. Beginning Linux Programming –Neil Mathew, Richard Stones 4th Edition, Wiley
2. Operating System Principles- Abraham Silberschatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
3. Unix System Programming using C++, T. Chan, PHI.
4. Unix Concepts and Applications, 4th Edition, SumitabhaDas, TMH, 2006.
5. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:

At the end of the course students should have:

1. Ability to apply concepts of operating system.
2. Ability to write shell programs and simulate process scheduling algorithms.
3. Skills to analyze memory management and deadlocks situations.
4. An ability to develop programs using system calls and utilities.
5. Capability to compare various file systems.

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – I Sem (R22)****L/T/P/C****3/1/-/-4****(R22A0026) PROBABILITY AND STATISTICS****Course Objectives:**

- To understand a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
- To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
- To Understand linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
- To learn the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
- Use of probability theory to make inferences about a population from large and small samples.
- To understand different queuing models.

UNIT – I: Basic Probability and Random Variables

Basic Probability: Definition, The axioms of probability, some elementary theorems, conditional probability, Bayes' theorem.

Single Random Variables: Discrete and Continuous. Probability distribution function, Probability mass and density functions, mathematical expectation, Moments about origin.

Multiple Random variables: Discrete and Continuous, Joint probability distributions-Joint probability mass and density functions, Marginal probability mass and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution. Moment generating function of probability distributions.

UNIT -III: Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression-Regression coefficients, Lines of regression.

Multiple correlation and regression- Coefficient of multiple Correlation, multiple regression, Multiple linear regression equations.

UNIT –IV: Testing of Hypothesis

Sampling: Definitions ,Standard error . Estimation - Point estimation and Interval estimation.

Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, Critical region - confidence interval - Level of significance, One tailed and Two tailed test.

Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, difference of proportions.

Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test) ,Chi- square test for goodness of fit and independence of attributes.

UNIT V: Queuing Theory

Queuing theory –Structure of a queuing system and its characteristics- Arrival pattern and service pattern- Pure birth and Death process. Terminology of Queuing systems-queuing models and its types - M/M/1 Model of infinite queue(without proofs) and M/M/1 Model of finite queue(without proofs).

Suggested Text Books:

- i) Fundamental of Statistics by S.C. Gupta, 7th Edition, 2016.
- ii) Fundamentals of Mathematical Statistics by SC Gupta and V.K. Kapoor
- iii) Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition, 2000.
- iv) R. A. Johnson, Miller and Freund's "Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2017.

References :

- i) Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross.
- ii) Probability and Statistics for Engineers by Dr. J. Ravichandran.

Course Outcomes: After learning the contents of this paper the student must be able to

1. Describe randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Make objective, data-driven decisions by using correlation and regression.
4. *Draw statistical inference* using samples of a given size which is taken from a population.
5. To design balanced systems that serve customers quickly and efficiently but it is not cost effective.

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II Year B.Tech CSE(IoT) – I Sem (R22)

L/T/P/C

0/-/2/1

(R22A0583) DATA STRUCTURES LAB**COURSE OBJECTIVES:**

1. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
2. To know how linear data structures work
3. To implement non-linear data structures.
4. To simulate searching and sorting techniques.
5. To develop programs for performing operations on Trees and Graphs .

WEEK 1: Write a Python program for class, Flower, that has three instance variables of type str, int, and float, that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.

WEEK 2: Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area() and perimeter(). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area() and perimeter() methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter.

WEEK 3: Write a python program to implement method overloading and method overriding.

WEEK 4: Write a Python program to illustrate the following comprehensions:

- | | |
|------------------------|------------------------------|
| a) List Comprehensions | b) Dictionary Comprehensions |
| c) Set Comprehensions | d) Generator Comprehensions |

WEEK 5: Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. **Example:** Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] [7, 8] [7, 9] [8, 9].

WEEK 6: Write a program for Linear Search and Binary search

WEEK 7: Write a program to implement Bubble Sort and Selection Sort

WEEK 8: Write a program to implement Merge sort and Quick sort

WEEK 9: Write a program to implement Stacks and Queues

WEEK 10: Write a program to implement Singly Linked List

WEEK 11: Write a program to implement Doubly Linked list

WEEK 12: Write a program to implement Binary Search Tree

COURSE OUTCOMES:

The students should be able to:

1. Examine Python syntax and semantics and apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists
3. Apply Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Master object-oriented programming to create an entire python project using objects and classes

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – I Sem (R22)****L/T/P/C****-/-/2/1****(R22A0587)-OPERATING SYSTEMS LAB****OBJECTIVES:**

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Linux commands, system call interface for process management, inter-process communication and I/O in Unix.
3. Student will learn various process and CPU scheduling Algorithms through simulation programs
4. Student will have exposure to System calls and simulate them.
5. Student will learn deadlocks and process management & Inter Process communication and simulate

WEEK1:

Practice File handling utilities, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

WEEK2:

Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of lines present in it.

WEEK3:

Simulate the following CPU scheduling algorithms. a) FCFS b) SJF c) Round Robin
d) Priority.

WEEK4:

Simulate Bankers Algorithm for Dead Lock Avoidance; Simulate Bankers Algorithm for Deadlock Prevention.

WEEK5:

- a) Write a C program to simulate the concept of Dining-philosophers problem.
- b) Write a C program to simulate producer-consumer problem using Semaphores

WEEK6:

- a) Write a C program to implement kill(),raise()and sleep()functions.
- b) Write a C program to implement alarm(),pause()and abort()functions
- c) Write a program that illustrate communication between two process using unnamed pipes

WEEK7:

- a) Write a program that illustrates communication between two process using named pipes or FIFO.
- b) Write a C program that receives a message from message queue and display them.

WEEK8:

Write a C program that illustrates two processes communicating using Shared memory.

WEEK9:

Simulate all page replacement algorithms a) FIFO b) LRU c) OPTIMAL

WEEK10:

Write a C program that takes one or more file/directory names as command line input and reports following information A)File Type B)Number Of Links C)Time of last Access D)Read, write and execute permissions

WEEK11

- a) Implement In c language the following UNIX commands using system calls i)cat ii)ls iii) Scanning Directories(Ex: open dir(), read dir(),etc.)
- b) Write a C program to create child process and allow parent process to display “parent” and the child to display “child” on the screen

WEEK12:

Write a C program to simulate disk scheduling algorithms. a) FCFS b) SCAN c) C-SCAN

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – I Sem (R22)****L/T/P/C****0/-/2/1****(R22A0584) - DATABASE MANAGEMENT SYSTEMS LAB****COURSE OBJECTIVES:**

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation
3. To enable students to use Non-Relational DBMS and understand the usage of document oriented and distributed databases.
4. To enable the students to use TCL and DCL Commands and perform all states of Transaction operations.
5. To familiarize issues of concurrency control and transaction management

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors
11. Installation of MySQL / MongoDB and practicing DDL, commands

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3 rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

COURSE OUTCOMES:

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – I Sem (R22)****L/T/P/C****2/-/-/-****(R22A0005) - FOREIGN LANGUAGE-FRENCH****INTRODUCTION**

In view of the growing importance of foreign languages as a communication tool in some countries of the world, French has been identified as one of the most popular languages after English. As a result, French program is introduced to develop the linguistic and communicative skills of engineering students and to familiarize them to the French communication skills. This course focuses on basic oral skills.

COURSE OBJECTIVES

1. To inculcate the basic knowledge of the French language
2. To hone the basic sentence constructions in day to day expressions for communication in their vocation
3. To form simple sentences that aids in day-to-day communication
4. To prepare the students towards DELF A1
5. To develop in the student an interest towards learning languages.

UNIT - I:

Speaking: Introduction to the French language and culture –
 Salutations - French alphabet -Introducing people
 Writing: Understand and fill out a form
 Grammar: The verbs “to be ” and “to have ” in the present tense of the indicative
 Vocabulary: The numbers from 1 to 20 - Professions- Nationalities

UNIT - II:

Speaking: Talk about one’s family – description of a person -
 express his tastes and preferences - express possession - express negation
 Writing: Write and understand a short message
 Grammar: Nouns (gender and number) - Articles - The-
 erverbs in the present-Possessive adjectives - Qualifying adjectives
 Vocabulary: The family – Clothes-Colors- The numbers from 1 to 100-
 The classroom

UNIT - III

Speaking: Talk about your daily activities - be in time - ask and
 indicate the date and time - talk about sports and recreation - express

the frequency

Writing: A letter to a friend

Grammar: The expression of time- The -ir verbs in the present- The verbs do, go, take, come,- Adverbs-Reflexive verbs

Vocabulary: The days and months of the year- The sports-Hobbies

UNIT - IV

Speaking: Express the quantity - ask and give the price - express the need, the will and the capacity - compare (adjective) - speak at the restaurant / in the shops

Writing: A dialogue between a vendor and a customer at the market

Grammar: Verbs "to want", "to can"- Express capacity / possibility- Express will / desire - the future tense

Vocabulary: The food - Meals-Fruits and vegetables- The parts of the body

UNIT - V

Speaking: Express the prohibition and the obligation - describe an apartment - talk about the weather / ask the weather - ask the opinion - give your opinion - express your agreement or disagreement

Writing: Descriptions

Grammar: Demonstrative adjectives- Prepositions- The verb 'must' to indicate obligation and necessity in the present

Vocabulary: Seasons - Holidays-The city- Furniture

NOTE: The students are exposed to simple listening and reading activities.

REFERENCE BOOKS

1. Apprenons le Français 1& 2, New Saraswati House, 2015
2. A propos, A1, Langers International, 2010
3. [Easy French Step-by-step](#) by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Coursebook) By Livid Language
5. À L'Aventure: An Introduction to French Language and Francophone Cultures by [Evelyne Charvier-Berman](#), [Anne C. Cummings](#).

COURSE OUTCOMES

1. The students will be able to communicate in French at A1 level.
2. The student will have an advantage in the competitive job market.
3. This course benefits the graduates when pursuing study *opportunities* in the countries where French is the official language

II Year – II Semester (R22) CSE (Internet of Things)

Course Structure of II Year – II Sem CSE(IoT) – R22 Regulation

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0507	Object Oriented Programming through Java	3	0	0	3	40	60
2	R22A0505	Software Engineering	3	0	0	3	40	60
3	R22A0512	Computer Networks	3	0	0	3	40	60
4	R22A0506	Design and Analysis of Algorithms	3	1	0	4	40	60
5	R22A6901	Sensors and Devices	3	0	0	3	40	60
6	R22A6981	Computer Networks & Sensors and Devices Lab	0	0	2	1	40	60
7	R22A0586	Object Oriented Programming through Java Lab	0	0	2	1	40	60
8	R22A6291	Industry Oriented Project	0	0	4	2	40	60
9	R22A0061	Public Policy and Governance	2	0	0	0	40	60
		Total	17	1	8	20	360	540

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II Year B.Tech CSE(IoT) – II Sem (R22)

L/T/P/C

3/-/-/3

(R22A0507)- OBJECT ORIENTED PROGRAMMING THROUGH JAVA**COURSE OBJECTIVES:**

1. To understand objectoriented principles like abstraction, encapsulation, inheritance, polymorphism and apply them in solving problems.
2. To understand the implementation of packages and interfaces.
3. To understand the concepts of exception handling, multithreading and collection classes.
4. To understand how to connect to the database using JDBC.
5. To understand the design of Graphical User Interface using applets and swing controls.

UNIT-I

Java Programming- History of Java, comments, Java Buzz words, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, arrays, simple java stand alone programs, class, object, and its methods constructors, methods, static fields and methods, access control, this reference, overloading constructors, recursion, exploring string class, garbage collection.

UNIT – II

Inheritance – Inheritance types, super keyword, preventing inheritance, final classes and methods.

Polymorphism – method overloading and method overriding, abstract classes and methods. **Interfaces-** Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface, inner class.

Packages- Defining, creating and accessing a package, importing packages.

UNIT-III

Exception handling- Benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception subclasses.

Multithreading – Differences between multiple processes and multiple threads, thread life cycle, creating threads, interrupting threads, thread

priorities, synchronizing threads, inter-thread communication, producer consumer problem.

UNIT-IV

Collection Framework in Java – Introduction to java collections, Overview of java collection framework, Commonly used collection classes- Array List, Vector, Hash table, Stack, Lambda Expressions.

Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, File management using File class.

Connecting to Database – JDBC Type 1 to 4 drivers, Connecting to a database, querying a database and processing the results, updating data with JDBC, Data Access Object (DAO).

UNIT-V

GUI Programming with Swing - The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – JButton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow.

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, Examples: Handling Mouse and Key events, Adapter classes.

TEXT BOOK:

1. Java Fundamentals–A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
2. Core Java: An Integrated Approach – Dr R Nageswara Rao

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program ,P.J.Deitel and H.M.Deitel, PHI
2. ObjectOrientedProgrammingthroughJava, P.RadhaKrishna, Universities Press.
3. Thinking in Java, Bruce Eckel, PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.
5. Design Patterns Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides.

COURSE OUTCOMES:

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

1. Understand the use of OOP's Concepts.
2. Implement Packages and interfaces in java
3. Develop and Understand exception handling ,multithreaded applications with synchronization
4. Understand the use of Collection Framework
5. Design GUI based applications using AWT and Swings

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II Year B.Tech CSE(IoT) – II Sem (R22)

L/T/P/C

3/-/-/3

(R22A0505) - SOFTWARE ENGINEERING**COURSE OBJECTIVES**

1. The aim of the course is to provide an understanding of the working knowledge of the techniques to understand Software development as a process.
2. Various software process models and system models.
3. Various software designs, Architectural, object oriented, user interface etc.
4. Software testing methodologies overview: various testing techniques including white box testing black box testing regression testing etc.
5. Software quality: metrics, risk management quality assurance etc.

UNIT -I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering-a layered technology, a process framework, the capability maturity model integration(CMMI).

Process models: The waterfall model, Spiral model and Agile methodology

UNIT -II

Software Requirements: Functional and non- functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT-III

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, usecase diagrams, component diagrams.

UNIT-IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT-V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXTBOOKS:

1. Software Engineering, A practitioner's Approach-Roger S.Pressman, 6th Edition, McGraw Hill International Edition.
2. Software Engineering-Sommerville, 7th edition, Pearson Education.

Course Outcomes

1. Understand software development life cycle Ability to translate end-user requirements into system and software requirements.
2. Structure the requirements in a Software Requirements Document and Analyze Apply various process models for a project, Prepare SRS document for a project
3. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
4. Understand requirement and Design engineering process for a project and Identify different principles to create an user interface
5. Identify different testing methods and metrics in a software engineering project and Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

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II Year B.Tech CSE(IoT) – II Sem (R22)

L/T/P/C

3/-/-/-3

(R22A0512) – COMPUTER NETWORKS**COURSE OBJECTIVES:**

1. To know the fundamentals of computer networks, TCP/IP & OSI model.
2. To know Data link layer Issues, Protocols.
3. To know Network layer Protocols, IP addressing.
4. To know end to end communication & various things in Transport layer.
5. To know various user services in a network

UNIT - I:

Introduction: Network, Uses of Networks, Types of Networks, Reference Models: TCP/IP Model, The OSI Model, Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, Wireless transmission media, Switching

UNIT - II:

Data Link Layer - Design issues, Error Detection & Correction, Elementary Data Link Layer Protocols, Sliding window protocols
Multiple Access Protocols - ALOHA, CSMA, CSMA/CD, CSMA/CA, Collision free protocols, Ethernet- Physical Layer, Ethernet MAC Sub layer.

UNIT - III:

Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks, routing algorithms: optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Link State Routing, Path Vector Routing, Hierarchical Routing; Congestion control algorithms,
IP addresses, CIDR, Sub netting, Super Netting, IPv4, Packet Fragmentation, IPv6 Protocol, Transition from IPv4 to IPv6, ARP, RARP.

UNIT - IV:

Transport Layer: Services provided to the upper layers elements of transport protocol, addressing, connection establishment, Connection release, Error Control & Flow Control, Crash Recovery. The Internet Transport Protocols: UDP, Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Sliding Window, The TCP Congestion Control Algorithm.

UNIT - V:

Application Layer- Introduction, providing services, Applications layer paradigms: Client server model, HTTP, E-mail, WWW, TELNET, DNS.

TEXT BOOKS:

1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

REFERENCES BOOKS:

1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

COURSE OUTCOMES:

The students will be able to:

1. Explore the basics of Computer Networks and Various Protocols.
2. Recall the World Wide Web concepts.
3. Interpret the working of TCP layer functionalities.
4. Describe the functionalities of application layer services.
5. Administrate a network and flow of information further.

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II Year B.Tech CSE(IoT) – II Sem (R22)

L/T/P/C

3/1/-/-3

(R22A0506) - DESIGN AND ANALYSIS OF ALGORITHMS**COURSE OBJECTIVES:**

1. To analyze performance of algorithms.
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
4. To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
5. To understand the differences between tractable and intractable problems and to introduce P and NP classes.

UNIT-I

Introduction: Algorithms, Pseudocode for expressing algorithms, performance analysis-Space complexity, Time Complexity, Asymptotic notation- Big oh notation, omega notation, theta notation and little oh notation.

Divide and Conquer: General method. Applications- Binary search, Quick sort, merge sort, Strassen's matrix multiplication.

UNIT-II

Disjoint set operations, Union and Find algorithms, AND/OR graphs, Connected components, Bi-connected components.

Greedy method: General method, applications-Job sequencing with deadlines, Knapsack problem, Spanning trees, Minimum cost spanning trees, Single source shortest path problem.

UNIT-III

Dynamic Programming: General method, applications-Matrix chained multiplication, Optimal binary search trees, 0/1 Knapsack problem, All pairs shortest path problem, Traveling sales person problem.

UNIT-IV

Backtracking: General method Applications-n-queues problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT-V

Branch and Bound: General method, applications- Travelling sales person problem, 0/1 Knapsack problem LC branch and Bound solution, FIFO branch and bound solution.

NP-Hard and NP-Complete Problems: Basic concepts, Non deterministic algorithms, NP-Hard and NP-Complete classes, NP-Hard problems, Cook's theorem.

TEXTBOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, Universities press
2. Design and Analysis of Algorithms, P.h.Dave, 2nd Edition, Pearson Education.

REFERENCES:

1. Introduction to the Design And Analysis of Algorithms ALevitin Pearson Education
2. Algorithm Design foundations Analysis and Internet examples, M.T.Goodrich and R Tomassia John Wiley and sons
3. Design and Analysis of Algorithms, S.Sridhar, Oxford Univ.Press
4. Design and Analysis of Algorithms, Aho,Ulman and Hopcraft, Pearson Education.
5. Foundations of Algorithms,R.NeapolitanandK.Naimipour,4thedition

COURSE OUTCOMES:

1. Ability to analyze the performance of algorithms.
2. Ability to choose appropriate algorithm design techniques for solving problems.
3. Ability to understand how the choice of data structures and the algorithm design methods to impact the performance of programs.
4. Describe the dynamic programming paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic programming algorithms and analyze them.
5. Describes NP hard and NP complete classes and also about the importance of Cook's theorem.

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – II Sem (R22)****L/T/P/C****3/-/-/3****(R22A6901) – SENSORS AND DEVICES****Course Objectives:**

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

UNIT-I:**Introduction to Signals and systems** - Brief introduction

Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT-II:

IoT and M2M- Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III:

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C)

Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors

UNIT-IV:

Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor

UNIT-V:

IoT Physical Servers and Cloud Offerings- Introduction to Cloud Storage models and communication APIs Web Server – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 9789352133895

REFERENCE BOOKS:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
2. Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
3. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

Course Outcomes:

1. Understand IoT value chain structure (device, data cloud), application areas and technologies involved.
2. Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
3. Market forecast for IoT devices with a focus on sensors
4. Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – II Sem (R22)****L/T/P/C****0/-/2/1****(R22A6981) – COMPUTER NETWORKS & SENSORS AND DEVICES LAB****COMPUTER NETWORKS LAB EXPERIMENTS****Course Outcomes:**

1. Implement data link layer framing methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijkstra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.

SENSOR DEVICES EXPERIMENTS**List of Experiments**

- 1: Connect an LED to GPIO pin 25 and control it through command line.
- 2: Connect an LED to GPIO pin 24 and a Switch to GPIO 25 and control the LED with the switch.
- 3: The state of LED should toggle with every press of the switch Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds
- 4: Use joystick and display the direction on the screen
- 5: Use Light Dependent Resistor (LDR) and control an LED that should switch-on/off depending on the light.
- 6: Create a traffic light signal with three colored lights (Red, Orange and Green) with a duty cycle of 5-2-10 seconds
- 7: Switch on and switch of a DC motor based on the position of a switch.

TEXT BOOKS:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.
3. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.
4. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, J. Sammons, Syngress Publishing, 2012.

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**II Year B.Tech CSE(IoT) – II Sem (R22)****L/T/P/C****-/-/2/1****(R22A0586) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB****COURSE OBJECTIVES:**

1. To prepare students to become familiar with the Standard Java technologies of J2SE
2. To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript
3. To train Students with good OOP programming breadth so as to comprehend, analyze, design and create novel products and solutions for the real life problems.
4. To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate java programming issues to broader application context.
5. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career

Week 1:

- a) Write a java program to find the Fibonacci series using recursive and non-recursive functions
- b) Write a program to multiply two given matrices.
- c) Write a program for Method overloading and Constructor overloading

Week 2:

- a) Write a program to demonstrate execution of static blocks ,static variables & static methods.
- b) Write a program to display the employee details using Scanner class
- c) Write a program for sorting a given list of names in ascending order

Week 3:

- a) Write a program to implement single and Multi level inheritance
- b) Write a program to implement Hierarchical Inheritance.
- c) Write a program to implement method overriding.

Week 4:

- a) Write a program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the given shape.
- b) Write a program to implement Interface .

- c) Write a program to implement multiple and Hybrid Inheritance

Week 5:

- a) Write a program to create inner classes
- b) Write a program to create user defined package and demonstrate various access modifiers.
- c) Write a program to demonstrate the use of super and final keywords.

Week 6 :

- a) Write a program if number is less than 10 and greater than 50 it generate the exception out of range. else it displays the square of number.
- b) Write a program with multiple catch Statements.
- c) write a program to implement nested try

Week 7:

- a) Write a Program to implement simple Thread by extending Thread class and implementing runnable interface.
- b) Write a program that implements a multi-thread application that has three threads
- c) write a program to set and print thread priorities

Week 8:

Write a program to implement following collections

- a) array List b) Vector c) Hash table d) Stack

Week 9:

- a) Write a program to demonstrate lambda expressions.
- b) Write a program for producer and consumer problem using Threads

Week 10:

- a) Write a program to list all the files in a directory including the files present in all its subdirectories.
- b) Write a Program to Read the Content of a File Line by Line

Week 11:

- a) Write a program that connects to a database using JDBC display all records in a table.
- b) Write a program to connect to a database using JDBC and insert values into it.
- c) Write a program to connect to a database using JDBC and delete values from it

Week 12:

Write a program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to:

1. Analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.
2. Demonstrate an ability to design and develop Java programs, analyze, and interpret object oriented data and report results.
3. Analyze the distinguish between various types of inheritance.
4. Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per needs and specifications.
5. Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications for standalone programs.

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II Year B.Tech CSE(IoT) – II Sem (R22)

L/T/P/C

2/-/-/0

(R22A0061)-PUBLIC POLICY & GOVERNANCE**Course objectives:**

1. To make the students understand in-depth analysis of public policy and to solve its ills prevailing in the society.
2. To provide an opportunity for the students to learn the basic areas of public policy analysis, implementation and evaluation.
3. To make understand the process and various approaches in public policy making.
4. To understand the theories and issues of social coordination and the nature of all patterns of rule.
5. To make the students understand the techniques of governance and emerging trends in public and private governance its policy-making and implementation.

Unit-I

Introduction of Public Policy: Definition, Nature, Scope and Importance of Public Policy, Evolution of Public Policy and Policy Sciences, Public Policy and Public Administration. **Approaches to Public Policy Analysis:** The Process Approach, The Logical Positivist Approach, The Phenomenological Approach, The Participatory Approach and Normative Approach

Unit-II

Theories and Process of Public Policy Making: Theories and Models of Policy Making, Perspectives of Policy Making Process, Institutions of Policy Making.

Unit-III

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation

Unit-IV

Introduction of Governance: Definitions, Issues and Controversies, Reinventing Government, Reforming Institutions: The State, Market and Public domain. **State and Governance:** Origin and types of State, Democratic State and Democratic Administration, Neo-Liberalism and Rolling Back State and Governance as Government.

Unit-V

Citizen and Techniques of Governance: Rule of Law and Human Rights, Accountability, Participation, Representation. **Techniques of Governance:** Openness and Transparency, Citizen Charter, Social Audit. **Emerging**

Trends in Public and Private Governance: An Overview, Market, Civil Society, Information and Communication Technology.

TEXT AND REFERENCE BOOKS:

1. Introduction to Public Policy- Charles Wheelan, Naked Economics 2010.
2. Birkland Thomas A., (2005), An Introduction to The Policy Process: Theories, Concepts, And Models of Public Policy Making, Armonk; M.E. Sharpe.
3. Anderson J.E., (2006) Public Policy-Making: An Introduction, Boston, Houghton
4. Bardach, Eugene (1977), The Implementation Game: What Happens After a Bill Becomes a Law, Cambridge, MA: MIT.
5. Bell, S., and Hind moor, A. (2009) Rethinking Governance: The Centrality of the State in Modern Society, Cambridge: Cambridge University Bell, Stephen and Andrew Hind moor.
6. Joyee M. Mitchell & William C. Mitchell, Political Analysis & Public Policy: An Introduction to Political Science, Thomson Press Limited, New Delhi, 1972.
7. R.K. Saprú, Public Policy, Art and Craft of policy Analysis, PHI learning private limited, New Delhi, 2011.
8. Brian W. Hogwood & Lewis A. Gunn, Policy Analysis for the Real world, Oxford University, Press, 1986.

COURSE OUTCOMES

After completion of the course, student will be able to

1. Understand public policy analysis and they will be able to understand policy evaluation and implementation.
2. Understand the public policy and governance on the largest gamut of its canvas.
3. Students will understand the what are emerging trends in public and private governance and various theories in public policy making



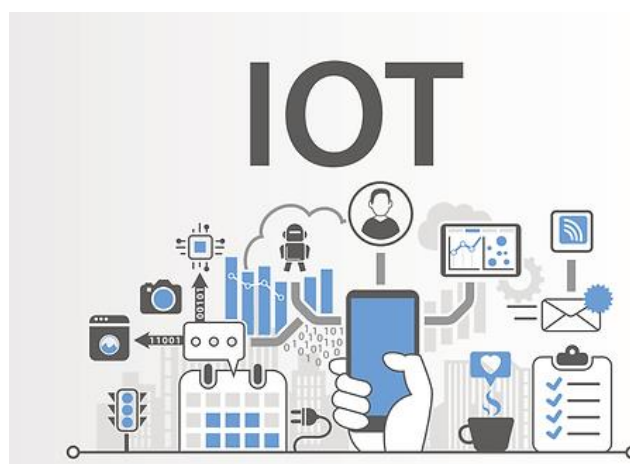
BACHELOR OF TECHNOLOGY (B.Tech)

Internet of Things (IoT)

III Year B.Tech (R22)

SYLLABUS

(Batches admitted from the academic year 2022 - 2023)



III Year – I Semester (R22) CSE (Internet of Things)

Course Structure of III Year B. Tech - CSE (Internet of Things) – I Semester- R22 Regulation

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A62xx	Microprocessors and Microcontrollers	3	0	0	3	40	60
2	R22A73xx	Artificial Intelligence	3	0	0	3	40	60
3	R22A12xx	Automata and Compiler Design	3	1	0	4	40	60
4		Open Elective-I	3	0	0	3	40	60
5	R22A05xx R22A62xx R22A05xx R22A66xx	Professional Elective-I 1. Discrete Mathematics 2. Cyber Security Essentials 3. Web Programming 4. Human Computer Interaction	3	0	0	3	40	60
6	R22A62xx	Microprocessors and Microcontrollers Lab	0	0	2	1	40	60
7	R22A73xx	Artificial Intelligence Lab	0	0	2	1	40	60
8	R22A62xx	Application Development -I	0	0	4	2	40	60
		Total	15	1	8	20	320	480

*** The Detailed Syllabus from III Year Onwards is subject to Internal Dept. AAC and BoS Approval**