SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF CSE

Semester/Year		IV/II	Program			B.Tech – Computer Science & Engineering			
Subject Category	DC	Subject Code:	CS-401	Subject Name		Computer Network			

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total				
ES	MS	Assignment	Quiz	ES	LW	Quiz	Marks	L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Fundamental knowledge of analog and digital communication.

Course Objective:

- Have fundamental knowledge of the various aspects of computer networking and enable students to appreciate recent developments in the area.
- Be familiar with various types of computer networks.
- Understand the concepts of Network Layer ,Transport Layer, Application Layer

UNITs	Descriptions	Hrs.
I	Computer Network: Definitions, goals, components, structure, Architecture, Classifications & types, Growth, Complexity and applications etc. Layered Architecture: Protocol hierarchy, Connection Oriented & Connectionless Services, Service primitive Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization	8
II	Transmission Media, Sources of transmission impairment. Network Topology: Mesh, Bus, Star, Ring, Tree, etc. Standards Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway.	8
III	Data Link Layer: Need, Services Provided, Framing & its methods, Flow Control, Error control. DLL Protocol: Elementary & Sliding Window. Piggybacking & Pipelining. MAC Sub layer: Static & Dynamic channel allocation, Media access control for LAN & WAN.Collision free & limited contention protocolALOHA : pure, slotted CSMA, CSMA/CD,CSMA/CA, IEEE 802 standards for LAN & MAN & their comparison.	8
IV	Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing Strategies, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets.Comparison of IPv4 & IPv6, Mobile IP.	8
V	Processes to Processes Delivery: Transmission Control Protocol (TCP) – User Datagram Protocol, Data Traffic, Congestion Control and Quality of Service, Techniques to improve QOS, Integrated Services, and Differentiated Services,DNS,SMTP, FTP, HTTP, WWW, Virtual Terminal Protocol, VoIP: Basic IP Telephone System.	8
Total Hours		40

Course Outcomes:

CO1: Develop a fundamental understanding of network design principles and structure of computer networks.

CO2: Explain the importance of data communications, how communication works in data networks and the internet, recognize the different internetworking devices and their functions.

CO3: Explain the role of protocols in networking, Analyze the role and services and features of the various layers of data networks.

CO4: Analyze the features and operations of various routing protocols such as Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing.

CO5: Describe and examine working of Transport Layer and Application Layer protocol.

Text Books-

- Tanenbaum A. S, "Computer Networks", Pearson Education , 4th Edition
- William Stallings, "Data and Computer Communications", PHI 6th Edition .

Reference Books-

- Douglas E. Comer ,"Computer Network & Internet", Pearson Education, 6th Edition.
- Behraj A Forouzan,"Data Communication & Networking", McGraw-Hill,4th edition.
- Natalia Olifar& Victor Olifer,"Computer Networks", Willey Pub.
- Prakash C. Gupta, "Data Communications and Computer Networks", PHI,2end edition.
- Gallo,"Computer Communication & Networking Technologies",Cengage Learning.1st edition.

List/Links of e-learning resource

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

Cos	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	3	2											3	
CO-2	3	3			1								2	
CO-3	3	3	1		1							3		3
CO-4	3	3	2	1								1		3
CO-5	3	3										1	2	

Suggestive list of experiments:

1. Study different types of Network cables and practically implement the cross-wired cable and straight through cable using clamp tools.
2. Study of Network Devices in detail.
3. Demonstrate single parity bit for error detection.
4. To understand error detection and correction techniques, Implement hamming code.
5. To understand error detection techniques Implement CRC.
6. To understand the working of the framing method Implement bit stuffing with start and end flags.
7. To understand farming methods, implement character count framing methods.
8. To study and understand network IP.
9. Connect the computer to the local Area Network.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering			
Subject Category	DC	Subject Code:	CS-402	Subject Name		Database Management System			

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical						
ES	MS	Assignment	Quiz	ES	LW	Quiz	Total Marks	L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Basic Knowledge of Mathematics and Programming

Course Objective:

- To understand the different issues involved in the design and implementation of a database system.
- To represent a database system using ER diagrams and to learn normalization techniques
- To learn the fundamentals of data models, relational algebra, and SQL.
- To understand the basic issues of transaction processing and concurrency control.
- To become familiar with database storage structures and access techniques

UNITs	Descriptions	Hrs.
I	Introduction: Purpose of Database System -– Views of data – data models, database management system, three-schema architecture of DBMS, components of DBMS. E/R Model - Conceptual data modeling - motivation, entities, entity types, attributes relationships, relationship types, E/R diagram notation, examples.	6
II	Relational Model: Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra operators, SQL - Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses.	8
III	Database Design: Dependencies and Normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, 4NF, and 5NF.	9
IV	Transactions: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods.	9
V	Implementation Techniques: Data Storage and Indexes - file organizations, primary, secondary index structures, various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.	8
Total Hours		40

Course Outcomes:

CO-1: Understand the basic concepts, principles and applications of database systems.

CO-2: Discuss the components of DBMS, data models, Relational models.

CO-3: Use knowledge to find the functional dependencies and differentiate between different normal forms.

CO-4: Execute transaction concepts and concurrency protocols

CO-5: Articulate the basic concept of storage and access techniques.

Text Books-

- RamezElmasri and Shamkant B. Navathe, Fundamentals of Database Systems , Pearson Education
- Silberschatz, Korth, "Database System Concepts", 7th ed., McGraw hill.

Reference Books-

C. J. Date, "An Introduction to Database Systems", 8th ed., Pearson.

Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems McGraw Hill.

Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management ,Cengage Learning.

List/Links of e-learning resource

- https://nptel.ac.in/courses/106/104/106104135/
- https://nptel.ac.in/courses/106/106/106106220

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

Cos	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁	PO₁₁	PO₁₂	PSO1	PSO2
CO-1	1	1	2										1	2
CO-2	3	2	2										1	2
CO-3	2	1	2		2								1	2
CO-4	2	1	2											2
CO-5	2	2	2											1

Suggestive list of experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables
3. Write a sql statement for implementing ALTER,UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the query for implementing the aggregate functions
6. Write the query to implement the concept of Integrity constraints
7. Write the query to create the views
8. Perform the queries with group by and having clauses
9. Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
10. Write the query for creating the users and their role

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering				
Subject Category	DC	Subject Code:		CS-403	Subject Name	Automata and Compiler Design				

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz	L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Discrete Mathematics.

Course Objective:

- This course aims at introducing the major concepts of language translation and phases of compiler, besides the techniques used in each phase
- The purpose of this course is to acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages.

UNITs	Descriptions	Hrs.
I	Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Arden's theorem.	8
II	Compiler Structure: Compilers and Translators, Various Phases of Compiler, Symbol Table management Error Detection and Recovery, Pass Structure of Compiler, Bootstrapping of Compiler. Lexical Analysis. The Syntactic Specification of Programming Languages: CFG, Chomsky hierarchy, Derivation and Parse tree, Ambiguity, Capabilities of CFG.	9
III	Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers. Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC.	9
IV	Intermediate Code Generation: Different Intermediate forms: three address codes, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.	6
V	Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes. Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.	8
Total Hours		40

Course Outcomes:

CO1: Explain finite state machines for modeling and their power to recognize the languages.

CO2: Understand the functionality of parsing mechanisms.

CO3: Construct syntax trees and generate intermediate code

CO4: Understand the concepts of storage administration for different programming environments.

CO5: Understand the concepts of optimization and generate the machine code..

Text Books-

- Louden, "Compiler construction", Cengage Learning .
- Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa.

Reference Books-

- A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW.
- Michal Sipser, "Theory of Computation", Cengage learning. □ H.C. Holub, "Compiler Design in C", Prentice Hall Inc.
- Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
- K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation",PHI

List/Links of e-learning resource

- https://www.udemy.com/course/formal-languages-and-automata-theory/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁	PO₁₁	PO₁₂	PSO1	PSO2
CO-1	2	3	3	2	2							3	2	2
CO-2	2	2	3	2								2		
CO-3	2	2	3	2	1							2	2	2
CO-4	3	3	1									1	2	
CO-5	3	3	3	2	3									

Suggestive list of experiments:

1. Write a program to construct DFA for regular valid identifiers in C .
2. Write a program to construct DFA for regular expression a+.
3. Write a C program to identify whether a given line is a comment or not.
4. Case study of JFLAP (Formal Languages and Automata Package) tool forFinite automata.
5. Exercise on JFLAP tool for Regular Expression.
6. Exercise on JFLAP tool for NFA to DFA conversion.
7. Download and analyze the LEX/FLEX Tool.
8. Write a C Program to find first sets of particular Grammar.
9. Write a C Program to find the following sets of particular Grammar.
10. Write a Program to find leading and trailing symbols of operator precedence Grammar.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering				
Subject Category	DC	Subject Code:		CS-404	Subject Name		Software Engineering			

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical						
ES	MS	Assignment	Quiz	ES	LW	Quiz	Total Marks	L	T	P	
60	20	10	10				100	3	1	0	4

Prerequisites:

System Software.

Course Objective:

- To introduce students to the basic concepts, testing techniques and applications of Software Engineering.
- To provide a brief, hands-on overview of the software development life cycle.
- Develop and write a software project proposal.
- Develop and write a Software Requirements Specification.
- To understand and apply the various phases of software development like information gathering, feasibility, Process model, analysis, design, Estimations, quality, risk, maintenance, reengineering.

UNITs	Descriptions	Hrs.
I	Introduction to Software and Software Engineering The Evolving Role of Software, Software: Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Incremental Model, Spiral, Evolutionary Process Models, Agile Process Model, Component-Based Development, the capability maturity model integration (CMMI) , ISO 9000 Models.	8
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. System models: Context models, behavioral models, data models, object models, structured methods.	6
III	Software Project Planning, Design Methodologies and Software Metrics, Software Project Planning: Project planning objectives, Decomposition Techniques, Empirical estimation models, Software Project Estimation Models, CPM/PERT. Design concept: Design Principles, Abstractions, refinement modularity, effective modular design, Cohesion & Coupling, Design notation, and specification, structure design methodologies, & design methods. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.	9
IV	Software Testing, Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.	9
V	Software Maintenance and Software Reengineering, Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Adaptive,Corrective and Perfective Maintenance, Cost of Maintenance, Software Reengineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools, Risk management: Reactive vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM plan.	8
Total Hours		40

Course Outcomes:

CO-1: Interpret and justify different software development life cycle models.
CO-2: Understand the requirement analysis and identify state & behavior of real world software projects.
CO-3: Use various design methodologies to derive solutions for software projects.
CO-4: Evaluate and quantify the quality of software through evaluation metrics.
CO-5: Identify and analyze the risk in development. CO-5: Evaluate different testing methods for software project management.

Text Books-		

- Roger S. Pressman, "Software Engineering — A Practitioner's Approach", Seventh Edition, McGraw-Hill International Edition,2010.
- Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited,2009.

Reference Books-

- Elis Awad, "System Analysis & Design", Galgotia publications.
- PankajJalote "Software Engg" Narosa Publications.
- Ian Sommerville: Software Engineering 6/e (Addison-Wesley).
- Richard Fairley: Software Engineering Concepts (TMH).
- Hans Vans Vilet, "Software Engineering Principles and Practice", Wiley.
- SrinivasanDesikan and Gopalaswamy : Software Testing, Principle.

List/Links of e-learning resource

https://onlinecourses.nptel.ac.in/noc23_cs122/preview

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	3	3	1	1								2	3	1
CO-2	3	2	3	2								3	2	
CO-3	3	2	1	3	2							2	2	2
CO-4	2	3	2	2			3						2	2
CO-5	2	2	1									3	1	2

Suggestive list of design methodology tools:

1. Develop requirements specification for a given problem (The requirements specification should include both functional and nonfunctional requirements. For a set of about 10 sample problems .
2. Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problem.
3. Develop UML Use case model for a sample problem .
4. Develop Sequence Diagrams.
5. Develop Class diagrams.
6. Use testing tool such as junit
7. To compute cyclomatic complexity for any flow graph.
8. Using configuration management tool-libra.
9. Use CPM/PERT for scheduling the assigned project.
10. Use Gantt Charts to track progress of the assigned project.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering				
Subject Category	DL	Subject Code:		CS-406	Subject Name	Advanced Java Programming				

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical						
ES	MS	Assignment	Quiz	ES	LW	Quiz	L	T	P	
				60	20	20	0	0	4	2

Prerequisites:

Concepts of object oriented programming and core java.

Course Objective:

- To introduce and understand students to programming concepts and techniques using the Java language and programming environment, class and objects.
- To learn about lifetime, scope and the initialization mechanism of variables and improve the general problem solving abilities in programming.
- Be able to use the Java SDK environment to create, debug and run simple Java program

UNITs	Descriptions	Hrs.
I	Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes .	7
II	Java Collective FrameWork - Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: sort, shuffle, reverse, fill, copy, max and min ,binary Search, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Unmodifiable Collections.	7
III	Advance Java Features - Multithreading: Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC.	7
IV	Advance Java Technologies - Servlets: Overview and Architecture, Handling HTTP & HTTPS, get Requests, Using JDBC from a Servlet, Java Server Pages (JSP): First JSP Example, JSP elements, JSP tag library, Session tracking, Java Cryptographic Architecture(JCA).	7
V	Advance Web/Internet Programming (Overview): Struts- Basics of MVC, architecture, action class, interceptors, tag library, validations, Hibernate- basics, architecture, CRUD, Spring- framework introduction.	7
Total Hours		35

Course Outcomes:

CO1: Use the syntax and semantics of java programming language and basic concepts of
     OOP.

CO2: Write basic Java applications and use arrays.

CO3: Develop reusable programs using the concepts of RMI and JDBC.

CO4: Apply the concepts of Servlet and JSP using advanced tools.

CO5: Design event driven GUI and web related applications which mimic the real world scenarios.

Text Books-

1.   E. Balaguruswamy, "Programming In Java"; TMH Publications
2.   The Complete Reference: Herbert Schildt, TMH

Reference Books-

3.   Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson
4.   Cay Horstmann, Big JAVA, Wiley India
5.   Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

List/Links of e-learning resource

- https://archive.nptel.ac.in/courses/106/105/106105191/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	1	1	2										1	2
CO-2	2	2	2										1	2
CO-3	2	1	2										1	2
CO-4	2	1	2											2
CO-5	2	2	1										1	2

Suggestive list of experiments:

1. Installation of JDK.
2. Write a program to show Scope of Variables
3. Write a program to show Concept of CLASS in JAVA
4. Write a program to show Type Casting in JAVA
5. Write a program to show How Exception Handling is in JAVA
6. Write a Program to show Inheritance
7. Write a program to show Polymorphism
8. Write a program to show Access Specifiers (Public, Private, Protected) in JAVA
9. Write a program to show use and Advantages of CONSTRUCTOR
10. Write a program to show Interfacing between two classes
11. Write a program to Add a Class to a Package
12. Write a program to show Life Cycle of a Thread
13. Write a program to demonstrate AWT.
14. Write a program to Hide a Class
15. Write a Program to show Database Connectivity Using JAVA
16. Write a Program to show "HELLO JAVA " in Explorer using Applet
17. Write a Program to show Connectivity using JDBC
18. Write a program to demonstrate multithreading using Java.
19. Write a program to demonstrate applet life cycle.
20. Write a program to demonstrate the concept of servlet.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

Semester/Year			IV/II	Program		B.Tech – Computer Science & Engineering			
Subject Category	OE	Subject Code:	OE-405 (OE-2A)	Subject Name		Computer Network			

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical						
ES	MS	Assignment	Quiz	ES	LW	Quiz	Total Marks	L	T	P
60	20	10	10				100	3	0	0	3

Prerequisites:
Fundamental knowledge of analog and digital communication.

Course Objective:
• Have fundamental knowledge of the various aspects of computer networking and enable students to appreciate recent developments in the area.   • Be familiar with various types of computer networks.   • Understand the concepts of Network Layer ,Transport Layer, Application Layer

UNITs	Descriptions	Hrs.
I	Computer Network: Definitions, goals, components, structure, Architecture, Classifications & types, Growth, Complexity and applications etc. Layered Architecture: Protocol hierarchy, Connection Oriented & Connectionless Services, Service primitive Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization	8
II	Transmission Media, Sources of transmission impairment. Network Topology: Mesh, Bus, Star, Ring, Tree, etc. Standards Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway.	8
III	Data Link Layer: Need, Services Provided, Framing & its methods, Flow Control, Error control. DLL Protocol: Elementary & Sliding Window. Piggybacking & Pipelining. MAC Sub layer: Static & Dynamic channel allocation, Media access control for LAN & WAN.Collision free & limited contention protocolALOHA : pure, slotted CSMA, CSMA/CD,CSMA/CA, IEEE 802 standards for LAN & MAN & their comparison.	8
IV	Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing Strategies, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets.Comparison of IPv4 & IPv6, Mobile IP.	8
V	Processes to Processes Delivery: Transmission Control Protocol (TCP) – User Datagram Protocol, Data Traffic, Congestion Control and Quality of Service, Techniques to improve QOS, Integrated Services, and Differentiated Services,DNS,SMTP, FTP, HTTP, WWW, Virtual Terminal Protocol, VoIP: Basic IP Telephone System.	8
Total Hours		40

Course Outcomes:
CO1: Develop a fundamental understanding of network design principles and structure of computer networks.
CO2: Explain the importance of data communications, how communication works in data networks and the internet, recognize the different internetworking devices and their functions.
CO3: Explain the role of protocols in networking, Analyze the role and services and features of the various layers of data networks.
CO4: Analyze the features and operations of various routing protocols such as Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing.
CO5: Describe and examine working of Transport Layer and Application Layer protocol.

Text Books-
• Tanenbaum A. S, "Computer Networks", Pearson Education , 4th Edition   • William Stallings, "Data and Computer Communications", PHI 6th Edition .

Reference Books-
• Douglas E. Comer ,"Computer Network & Internet", Pearson Education, 6th Edition.   • Behraj A Forouzan,"Data Communication & Networking", McGraw-Hill,4th edition.   • Natalia Olifar& Victor Olifer,"Computer Networks", Willey Pub.   • Prakash C. Gupta, "Data Communications and Computer Networks", PHI,2end edition.   • Gallo,"Computer Communication & Networking Technologies",Cengage Learning.1st edition.

List/Links of e-learning resource		
Modes of Evaluation and Rubric		
The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.		
CO-PO Mapping:		

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	3	2											3	
CO-2	3	3			1								2	
CO-3	3	3	1		1							3		3
CO-4	3	3	2	1								1		3
CO-5	3	3										1	2	

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering
Subject Category	OE	Subject Code:	OE-405 (OE-2B)	Subject Name		Foundation of Data Science

Maximum Marks Allotted							Total Marks	Contact Hours			Total Credits
Theory				Practical				L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10				100	3	0	0	3

Prerequisites:

Mathematics & Python Programming

Course Objective:

☐ To provide the knowledge and expertise to become a proficient data scientist;
☐ Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
☐ Produce Python code to statistically analyze a dataset;
☐ Critically evaluate data visualizations based on their design and use for communicating stories from data;

UNITs	Descriptions	Hrs.
I	Data Science-What is Data Science, Need for Data Science, Difference between Data Science & Business Intelligence, Data Science Components, Tools for Data Science, Data Science Life cycle, Applications of Data Science, Data Science Ethics. Representation of Data- Types of data, primary, secondary, quantitative and qualitative data. Types of Measurements, nominal, ordinal, discrete and continuous data.	7
II	Presentation of data by tables, construction of frequency distributions for discrete and continuous data. Graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions. Data Preprocessing Knowing Data, Data Cleaning, Data Integration, Data Selection, Data Transformation	7
III	Descriptive Statistics-Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean. Partition values: Quartiles, Deciles and percentiles. Measures of dispersion: Mean deviation, Quartile deviation, Standard deviation, Coefficient of variation. Moments: measures of skewness, Kurtosis	7
IV	Correlation-Scatter plot, Karl Pearson coefficient of correlation, Spearman's rank correlation coefficient, multiple and partial correlations. Regression: Concept of errors, Principles of Least Square, Simple linear regression and its properties. Types of Regressions.	7
V	Basics of Big Data, Problem handling large data, general techniques for handling large data, Basic concept of Machine Learning, training model, validating model, supervised & unsupervised learning.	7
Total Hours		35

Course Outcomes:

CO1: To explain how data is collected, managed and stored for data science.
CO2: To understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists.
CO3: To implement data collection and management scripts using MongoDB.
CO4: Examine the techniques of Data Visualization.
CO5: Identification of various applications of Data Science.

Text Book

1.Introducing Data Science" by Davy Cielen, Arno D. B. Meysman, Mohamed Ali, 1st Edition, Manning Publications Co.
2. An Introduction to Probability and Statistics" by Rohatgi V.K and Saleh E, 3rd Edition, John Wiley & Sons Inc., New Jersey,
3. Data Mining Concept & Techniques" by Han & Kamber, 3rd Edition, The Morgan Kaufmann,

Reference Books

1. Joel Grus, Data Science from Scratch, Shroff Publisher/O'Reilly Publisher Media
2. Annalyn Ng, Kenneth Soo, Numsense Data Science for the Layman, Shroff Publisher Publisher
3. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline. O'Reilly Publisher.

List/Links of e-learning resource

- https://nptel.ac.in/courses/106106179

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	1	3		2									1	2
CO-2	2	2											2	2
CO-3	2	1	3										1	2
CO-4	1	2											3	1
CO-5	3	3		2									2	3

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE

Semester/Year		IV/II		Program		B.Tech – Computer Science & Engineering				
Subject Category	OE	Subject Code:		OE-405 (OE-2C)	Subject Name	Automata and Compiler Design				

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total				
ES	MS	Assignment	Quiz	ES	LW	Quiz	Marks	L	T	P	
60	20	10	10				100	3	0	0	3

Prerequisites:

Discrete Mathematics.

Course Objective:

- This course aims at introducing the major concepts of language translation and phases of compiler, besides the techniques used in each phase
- The purpose of this course is to acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages.

UNITs	Descriptions	Hrs.
I	Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Arden's theorem.	7
II	Compiler Structure: Compilers and Translators, Various Phases of Compiler, Symbol Table management Error Detection and Recovery, Pass Structure of Compiler, Bootstrapping of Compiler. Lexical Analysis. The Syntactic Specification of Programming Languages: CFG, Chomsky hierarchy, Derivation and Parse tree, Ambiguity, Capabilities of CFG.	7
III	Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers. Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC,	7
IV	Intermediate Code Generation: Different Intermediate forms: three address codes, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.	7
V	Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes. Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.	7
Total Hours		35

Course Outcomes:

CO1: Explain finite state machines for modeling and their power to recognize the languages.

CO2: Understand the functionality of parsing mechanisms.

CO3: Construct syntax trees and generate intermediate code

CO4: Understand the concepts of storage administration for different programming environments.

CO5: Understand the concepts of optimization and generate the machine code..

Text Books-

- Louden, "Compiler construction", Cengage Learning .
- Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa.

Reference Books-

- A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW.
- Michal Sipser, "Theory of Computation", Cengage learning. □ H.C. Holub, "Compiler Design in C", Prentice Hall Inc.
- Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
- K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation",PHI

List/Links of e-learning resource

- https://www.udemy.com/course/formal-languages-and-automata-theory/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO1	PSO2
CO-1	2	3	3	2	2							3	2	2
CO-2	2	2	3	2								2		
CO-3	2	2	3	2	1							2	2	2
CO-4	3	3	1									1	2	
CO-5	3	3	3	2	3									

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CSE