

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P. (An Autonomous Institute Affiliated to RGPV Bhopal) DEPARTMENT OF CS & IT											
Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	DC	Subject Code:		IT- 401	Subject Name		Computer Network				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10	30	10	10	150	3	0	2	4
Prerequisites:											
Student having fundamental knowledge of analogue and digital communication, operating system and data structure.											
Course Objective:											
<ul style="list-style-type: none"> • Have fundamental knowledge of the various aspects of computer networking and enables 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 network. 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											

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

Reference Books-

1. Douglas E. Comer , "Computer Network & Internet", Pearson Education, 6th Edition.
2. Behraj A Forouzan, "Data Communication & Networking", McGraw-Hill, 4th edition.
3. Natalia Olifar & Victor Olifer, "Computer Networks", Willey Pub.
4. Prakash C. Gupta, "Data Communications and Computer Networks", PHI, 2nd edition.
5. 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 theory and 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 ₁₀	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 of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
2. Study of Network Devices in detail.
3. Demonstrate single parity bit for error detection.
4. To understand error detection and correction technique Implement hamming code.
5. To understand error detection technique Implement CRC.
6. To understand working of framing method Implement bit stuffing with start and end flag.
7. To understand framing methods implement character count framing method.
8. To study and understand network IP.
9. Connect the computer in local Area Network.

Recommendation by Board of studies on

Approval by Academic council on

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Department of CS & IT



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DEPARTMENT OF CS & IT

Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	DC	Subject Code:		IT- 402	Subject Name		Database Management System				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10	30	10	10	150	3	0	2	4
Prerequisites:											
Basic Knowledge of Mathematics and Programming											
Course Objective:											
<ul style="list-style-type: none"> ● 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-											
<ol style="list-style-type: none"> 1. RamezElmasri and Shamkant B. Navathe, Fundamentals of Database Systems , Pearson Education 2. Silberschatz, Korth, “Data base System Concepts”, 7th ed., McGraw hill. 											
Reference Books-											
<ol style="list-style-type: none"> 3. C. J. Date, “An Introduction to Database Systems”, 8th ed., Pearson. 4. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems McGraw Hill. 5. Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management ,Cengage Learning. 											
List/Links of e-learning resource											
<ul style="list-style-type: none"> ● 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 theory and 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 ₁₀	PO ₁₁	PO ₁₂	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

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DEPARTMENT OF CS & IT

Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	DC	Subject Code:		IT-403		Subject Name	Automata and Compiler Design				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz		3	0	2	4
60	20	10	10	30	10	10					
Prerequisites:											
Formal Languages and Automata Theory, Graph Theory.											
Course Objective:											
<ul style="list-style-type: none"> • 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 code, 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-											
<ol style="list-style-type: none"> 1. Louden, "Compiler construction", Cengage learning . 2. Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa. 											

Reference Books-														
<ol style="list-style-type: none"> 1. A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW. 2. Michal Sipser, "Theory of Computation", Cengage learning. □ H.C. Holub, "Compiler Design in C", Prentice Hall Inc. 3. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education. 4. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI 														
List/Links of e-learning resource														
1. 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 ₁₀	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									
Suggestive list of experiments:														
<ol style="list-style-type: none"> 1. Write a program to construct DFA for regular valid identifier 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 for Finite 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 follow 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 CS & IT				



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DEPARTMENT OF CS & IT

Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	DC	Subject Code:		IT-404		Subject Name	Software Engineering				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10	--	--	--	100	3	1	0	4
Prerequisites:											
Fundamental knowledge of system, analysis and design											
Course Objective:											
<ol style="list-style-type: none"> 2. To introduce students to the basic concepts, testing techniques and applications of Software Engineering. 3. To provide a brief, hands-on overview of software development life cycle. 4. Develop and write a software project proposal. 5. Develop and write a Software Requirements Specification. 6. 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 project.
 CO-4: Evaluate and quantify the quality of software through evaluation metrics.
 CO-5: Identify and analyse the risk in development. CO-5: Evaluate different testing methods for software project management.

Text Books-

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

Reference Books-

1. Pankaj Jalote "Software Engg" Narosa Publications.
2. Ian Sommerville: Software Engineering 6/e (Addison-Wesley).
3. Richard Fairley: Software Engineering Concepts (TMH).
4. Hans Vans Vilet, "Software Engineering Principles and Practice", Wiley.
5. Srinivasan Desikan 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 theory and 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 ₁₀	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 non-functional 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 cyclometric 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.

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DEPARTMENT OF CS & IT

Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	DL	Subject Code:		IT-406	Subject Name		Advanced Java Programming				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					0
				60	20	20	100				
Prerequisites:											
Fundamentals of Computing and Programming, Object Oriented Programming Using C++.											
Course Objective:											
<ul style="list-style-type: none"> • 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 ability 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 Frame Work - 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 and 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 word 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 ₁₀	PO ₁₁	PO ₁₂	PSO1	PSO2
CO-1	2	2	2										1	2
CO-2	2	2	2										1	2
CO-3	2	1	2	1									1	2
CO-4	2	1	2	1										2
CO-5	2	2	1	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 Data Base 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 concept of servlet.

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Department of CS & IT

Open Courses launched by Programme are not applicable for students of parental programme

Open Course Offered by IT Session: 2023-24 Semester IV			
Open Electives-II (OE-406)	A	B	C
	Foundation of Blockchain	Foundation of Data Science	Information Theory & Coding
Prerequisite	Discrete Mathematics	Python Programming	Mathematics
Remark	Open to all	Not applicable for -AIADS	Open to all



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Bachelor of Technology B.Tech in CSE (Information Technology)

Semester/Year		IV/II		Program			B.Tech – Information Technology							
Subject Category	OE	Subject Code:	OE-405 (A)	Subject Name		Foundation of Block chain								
Maximum Marks Allotted								Contact Hours			Total Credits			
Theory				Practical			Total Marks	L	T	P	3			
ES	MS	Assignment	Quiz	ES	LW	Quiz								
60	20	10	10	-	-	-	100	3	0	0	3			
Prerequisites:														
Basic Knowledge of mathematics.														
Course Objective:														
<ul style="list-style-type: none"> • Technology behind blockchain • Emerging trends in blockchain . • Real-world applications of block chain 														
UNITS	Descriptions										Hrs.			
I	Introduction to Information Technology: Basic ideas behind block chain, how it is changing the landscape of digitalization, introduction to cryptographic concepts, Hashing, public key cryptosystems, private vs public block chain and use cases, Hash Puzzles										7			
II	Blockchain Fundamentals: Basic architecture of Blockchain, different terminologies associated, Characteristics of Block chain, Types of networks, Introducing Smart contract concept in Blockchain.										7			
III	Components of Blockchain: Core components of Blockchain, Types of Block chains; Blockchain Protocol, Permission & Permission less Block chains,										7			
IV	Digital Ledger: Short History of Money and Trust, Bitcoin Mechanics, Introduction to Ethereum, Introduction to Hyperledger, Hyperledger Fabric and its architecture, Hyperledger Composer Emerging Trends in Blockchain: Cloud-based block chain, Multi chain, Geth , Stellar , Ripple, R3 Corda, Blockchain API, Blockchain Sandboxes										7			
V	Block Chain Use Cases: Supply Chain Management, Finance, Health Care, Internet of Things (IoT), Remittance, Land Records, Voting and election, Loyalty Programs, Go Green (Renewable Energy)										7			
Total Hours											35			
Course Outcomes:														
CO-1: Understand the basic concepts, principles and applications of block chain.														
CO-2: Understand basic architecture of Block chain, Characteristics of Block chain.														
CO-3: Explain Core components of Block chain, Types of Block chains; Blockchain Protocol.														
CO-4: Compare the working of different block chain platforms.														
CO-5: Analyse the importance of block chain in finding the solution to the real-world problems.														
Text Books-														
1. Artemis Caro, “Blockchain: The Beginners Guide to Understanding the Technology Behind Bitcoin & Crypto currency”.														
Reference Books-														
1. Scott Marks, “Blockchain for Beginners: Guide to Understanding the Foundation and Basics of the Revolutionary Information Technology”, Create Space Independent Publishing Platform.														
2. Mark Watney, “Blockchain for Beginners”.														
3. Alwyn Bishop, “Information Technology Explained”.														
List/Links of e-learning resource														
• https://archive.nptel.ac.in/courses/106/104/106104220/														
Modes of Evaluation and Rubric														
The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester theory examination.														
CO-PO Mapping:														
COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂	PSO1	PSO2

CO-1	3	1											3	3
CO-2	3	1											1	3
CO-3	3	2											2	1
CO-4	3	3	2											3
CO-5	3	3	2										3	

Suggestive list of experiments:

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(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF CS & IT

Semester/Year		IV/II		Program			B.Tech – Information Technology				
Subject Category	OE	Subject Code:		OE-405(B)	Subject Name		Foundation of Data Science				
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	-	-	-	100	3	0	0	3
Prerequisites:											
Mathematics											
Course Objective:											
<ul style="list-style-type: none"> • 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 Pre-processing- 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 Mongo DB.											
CO4: Examine the techniques of Data Visualization.											
CO5: Identification of various applications of Data Science.											
Text Books-											
1. Business Analytics: The Science of Data - Driven Decision Making, U Dinesh Kumar,											

John Wiley & Sons.

2. Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools, Davy Cielen, John Wiley & Sons.

Reference Books-

3. Annalyn Ng, Kenneth Soo, Numsense! Data Science for the Layman, Shroff Publisher Publisher
4. 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 theory examination.

CO-PO Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	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

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Semester/Year		IV/II		Program			B. Tech – Information Technology				
Subject Category	OE	Subject Code:	OE-405 (C)	Subject Name			Information Theory & Coding				
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	-	-	-	100	3	1	-	4
Prerequisites:											
Knowledge of Communication System.											
Course Objective:											
<ul style="list-style-type: none"> • The purpose of the course is to teach the fundamental principle of Information Theory. • To introduce the concepts of Channel and their capacity. • To equip students with fundamental knowledge of Encryption and Decryption. 											
UNITs	Descriptions										Hrs.
I	Introduction to uncertainty, information, entropy and its properties, entropy of binary memoryless source and its extension to discrete memory-less source, coding theorem, prefix coding, HUFFMAN coding, Lempel-Ziv Coding, data compression, Binary image compression schemes, run length encoding, CCIIT group 3 and 4 compression.										7
II	Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of Shannon's theorem.										7
III	Linear Block Codes, Systematic codes, syndrome and error detection, error detecting and correcting capabilities of block codes, Probability of undetected error for linear block code in BSC, Hamming codes and their applications.										7
IV	Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, Introduction to BCH codes, its encoding & decoding error location & correction. Introduction to convolution codes, its construction, Viterbi algorithm for maximum likelihood decoding.										7
V	Video image compression and algorithms, Cryptography, encryption, decryption, cryptogram, crypto analysis, Concept of cipher,										7
Total Hours											35

Course Outcomes:

CO-1: Explain the fundamentals of Information Theory.

CO-2: Apply various techniques for channel capacity.

CO-3: Define, formulate and analyze various techniques for Block Codes

CO-4: Analyze different techniques for Cyclic Codes

CO-5: Understand the fundamentals of Cryptography.

Text Books-

1. Digital Communication by Haykins Simon Wiley Publ.
2. Error control Coding: Theory and Application, by Shu Lin and Cosstello, PHI

Reference Books-

1. Medem analog and Digital Communication system, by B.P. Lathi
2. Digital Communication by Sklar Pearson Education

CO-PO Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	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

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