

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DOCTOR HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.)

470003

(A CENTRAL UNIVERSITY)

NAAC A+ Accreditation

(Approved by AICTE, New Delhi)



**Curriculum Framework & Syllabus
of**

UNDERGRADUATE PROGRAMME

B.Tech. in

COMPUTER SCIENCE AND ENGINEERING

III rd Year

(V th and VI th Semester)

Courses effective from Academic Session 2024-2025

Based on

National Educational Policy (NEP) -2020

Date of BoS:

27/09/2024

PREAMBLE

The curriculum of B.Tech. Computer Science and Engineering program is prepared in accordance with the curriculum framework of AICTE. Further this Outcome Based Curriculum (OBC) is designed with Choice Based Credit and Semester System (CBCSS) In addition; the curriculum and syllabi are designed in a structured approach by deploying Feedback Mechanism on Curriculum from various stakeholders viz. Industry, Potential Employers, Alumni, Academia, Professional Bodies, Research Organizations and Parents to capture their voice of the respective stakeholders. The Curriculum design, delivery, and assessment, the three major pillars of academic system is completely aligned in line with Outcome Based Education (OBE) to assess and evaluate the learning outcomes to facilitate the learners to achieve their Professional and Career Accomplishments. The Vision To become the Centre of Excellence for technically competent and innovative computer engineers.

The B.Tech. in Computer Science and Engineering at Institute of Engineering and Technology focuses on teaching the fundamentals of hardware and software, algorithm analysis, and mathematics and science knowledge. The programme provides students with solid programming and engineering fundamentals as well as research and innovation skills in computer engineering. Artificial Intelligence, Machine Learning, Data Analytics, Cloud Computing, High-Performance Computing, Internet of Things, Network and Cyber Security, and Computer Forensics are among the cutting-edge technologies taught by experienced and eminent faculty.

For Semester V

S. No.	Nature of Courses	Credits
1.	Professional Core Courses	11
2.	Basic Science Courses	0
3.	Departmental Elective Courses	3
4.	Practical/ Laboratory Courses/PR/INT	7
	Total	21 Credits

For Semester VI

S. No.	Nature of Courses	Credits
1.	Professional Core Courses	10
2.	Open Elective Courses	3
3.	Departmental Elective Courses	3
4.	Practical/ Laboratory Courses/PR/INT	5
	Total	21 Credits

[A] Scheme of Examination:**(a) Theory Block**

1. Mid exam (internal)	i Mid-I	: 20%
	ii Mid-II (IA)	: 20%
	(Assignments, tutorials, regularity, quizzes, class test)	
2. End Exam (external)	i End-semester examination	: 60%
Total		: 100%

(b) Practical Block

1. Mid exam (internal)	i Mid-I	: 20%
	ii Mid-II (IA)	: 20%
	(Lab work, field work/seminar, quizzes, assignments and regularity)	
2. End Exam (external)	i End-semester examination	: 60%
Total		: 100%

(c) Project Evaluation:

1. Mid exam (internal)	i Mid-I Presentation and evaluation of Synopsis	: 20%
	ii Mid-II (IA) Presentation and evaluation of Progress of work	: 20%
2. End Exam (external)	i End-semester examination	: 60%
	▪ Evaluation of Project	
	▪ Presentation	
	▪ Viva	
Total		: 100%

[B] Assessments:**Internal Assessment (IA)**

Each theory course, practical and project must clearly mention the methodology of assessment i.e. assignment, presentation, group discussion etc depending on the number of students in the

class and feasibility of adopting a particular methodology. The distribution of marks for internal assessments (IA) shall be as follows;

- | | | | |
|------|---|---|----------|
| (i) | Evaluation of the assignment,
presentation, group discussion etc | : | 10 Marks |
| (ii) | Attendance | : | 10 Marks |

The marks for attendance shall be awarded as follows:

- | | | | |
|-------|---------------------|---|----------|
| (i) | 75 % and Below | : | 00 Mark |
| (ii) | >75 % and upto 85 % | : | 04 Mark |
| (iii) | >85 % and upto 95 % | : | 08 Marks |
| (iv) | >95 % and above | : | 10 Marks |

Choice Based Grading System

Each course (Theory or Practical) is to be assigned 100 marks irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade
91-100	A+
81-90	A
71-80	B+
61-70	B
51-60	C+
46-50	C
40-45	D
<40	F

The Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) shall be calculated as under.

$$\text{SGPA} = \frac{\sum_{i=1}^n c_i p_i}{\sum_{i=1}^n c_i}$$

Where C_i is the number of Credits assigned for the i subject of a Semester, p_i is the grade point earned in that ith subject, where i = 1, 2 n. is the number of subjects in that semester for which SGPA is to be calculated.

$$\text{CGPA} = \frac{\sum_{i=1}^n SG_i NC_i}{\sum_{i=1}^n NC_i}$$

here NCj is the number of total Credits assigned for the Jth semester. SGj is the SGPA earned in the Jth semester, where j = 1, 2, ..., m, is the number of semesters till which CGPA is being calculated.

Credits earned through MOOCS shall not be included in SGPA/CGPA calculations.

AWARD OF DIVISION

Division shall be awarded only after successful completion of the course, on the basis of integrated performance of the candidate in all the four years as per following details:

CGPA Score	Divisions
CGPA > 7.5	First Division with Distinction
7.5 > CGPA > 6.5	First Division
6.5 > CGPA > 5.0	Second Division

The conversion from grade to an equivalent percentage shall be according to the following formula:

Percentage marks scored = CGPA obtained X 10

- ***The introductory note must also mention that to be eligible to appear in End Semester Examination a student must appear in Mid Semester Examination and internal Assessment.***
- ***Attendance: 75 % attendance in a course is mandatory for a student to appear in end semester examination. Minimum passing marks for internal and external exams 40% individually***

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New Scheme Based on AICTE Flexible Curriculum

B.Tech Programme in Department of Computer Science and Engineering

Vth Semester

S.N,	Category	Subject code	Subject Name	Hours			
				L	T	P	C
1	PCC	BTC PCC 501	Theory of Computation	3	1	0	4
2	PCC	BTC PCC 502	Database Management System	3	0	0	3
4	PCC	BTC PCC 503	Computer Network	3	1	0	4
5	DE	BTC PDE 504	Departmental Elective -I	3	0	0	3
6	LC	BTC LC 505	Laboratory –IV (CN and DBMS Lab)	0	0	4	2
7	PR	BTC PR 506	Minor Project – I/Seminar & Group Discussion	0	0	4	2
8	INT	BTC INT 507	Evaluation of Internship – III	0	0	6	3
9	INT	BTC INT 707	Internship – IV	To be completed during fifth/sixth semester. Its evaluation/credit 3 to be added in seventh semester.			
TOTAL				12	2	14	21

S.N,	Departmental Electives - I
1	BTC DE 504 (A) Cyber Security
2	BTC DE 504 (B) Data Analytics

- PCC- Professional Core Courses
- INT- Internship
- P- Practical
- LC- Laboratory Courses
- MC-Mandatory Courses
-
- PDE- Professional Departmental Elective

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B. Tech Programme in Department of Computer Science and Engineering
VI th Sem

S .N	Category	Subject code	Subject Name	Hours			
				L	T	P	C
1	PCC	BTC PCC 601	Machine Learning	3	1	0	4
2	PCC	BTC PCC 602	Network Security	3	0	0	3
3	PCC	BTC PCC 603	Distributed Systems	3	0	0	3
4	DE	BTC DE 604	Departmental Elective – II	3	0	0	3
5	OE	BTC OE 605	Open Elective – I	3	0	0	3
6	LC	BTC LC 606	Laboratory – V (ML Lab)	0	0	4	2
7	PR	BTC PR 607	Minor Project – II / Seminar & Group Discussion	0	0	6	3
8	INT	BTC INT 707	Internship – IV	To be completed during fifth/sixth semester. Its evaluation/credit 3 to be added in seventh semester.			
TOTAL				15	1	10	21

S .N,	Departmental Electives – II	Open Elective – I
1	BTC DE 604 (A) Compiler Design	BTC OE 605 (A) Knowledge Management
2	BTC DE 604 (B) Data Warehousing and Mining	BTC OE 605 (B) Networking with TCP/IP
3	BTC DE 605I Python Programing	BTC OE 605 I Simulation Modeling & Analysis

- DE – Departmental Elective
- OE- Open Elective
- PCC- Professional Core Courses
- INT- Internship
- P- Practical
- LC- Laboratory Courses
- MC-Mandatory Courses

Fifth Semester (5th Semester)

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B.Tech. Third Year (V semester)
Category- Professional Core Courses PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 501	Theory of Computation	3	1	0	4	20	20	60	100

COURSE OBJECTIVES:

- To understand compute ability, decide ability, and complexity through problem solving.
- To analyze and design abstract model of computation & formal languages.
- To understand and conduct mathematical proofs for computation and algorithms.

Unit 1: Introduction to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and Mealy machines, Composite Machine, Conversion from Mealy to Moore and vice versa

Unit 2: Types of Finite Automata: Non-Deterministic Finite Automata (NFA), Deterministic finite automata machines, conversion of NFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Pumping lemma, applications, Closure properties of regular languages, 2wayDFA

Unit 3: Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Right most and Left most derivation so Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, Chomsky Normal Form(CNF) and Greibach Normal Form(GNF)

Unit 4: Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion PDA into context free grammar and vice versa, CFG equivalent to PDA

Unit 5: Turing Machine: Techniques for construction. Universal Turing machine Multi tape, multi head and multi-dimensional Turing machine, N-P completer Problems. Decide ability and Recursively Enumerable Languages, decide ability, decide able languages, undecidable able languages, Halting problem of Turing machine & the post correspondence problem(PCP).

RECOMMENDED BOOKS:

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman ,Narosa Publication.
- Element of the Theory Computation, Lewis & Christos ,Pearson.
- Theory of Computation ,Chandrasekhar & Mishra, PHI.
- Theory of Computation ,Wood ,Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen ,Wiley

COURSE OUTCOMES:

- After completion of this course, the students would be able to:
- CO1.explain the basic concepts of switching and finite automata theory & languages.
- CO2.relate practical problems to languages, automata, computability and complexity.
- CO3.construct abstract models of computing and check their power to recognize the languages.
- CO4.analyse the grammar, its types, simplification and normal form. CO5.interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
- CO6.develop an overview of how automata theory, languages and computation are applicable in engineering application.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (V semester)
Category- Professional Core Courses PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 502	Database Management System	3	0	0	3	20	20	60	100

COURSE OBJECTIVES:

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts & normalization.
- To manipulate a database using SQL commands.

Unit-1 Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques

Unit-2 Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc

Unit-3 SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc. Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-4 Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-5 Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools

Unit-5 Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS :

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke, “Database Management System”, McGraw Hill., 3rd Edition.
- Elmasri & Navathe, “Fundamentals of Database System”, Addison-Wesley Publishing, 5th Edition.
- Date C.J, “An Introduction to Database”, Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, “An introduction to Database systems”

COURSE OUT COMES:

After completion of this course, the students would be able to:

- CO1.** Define the terminology, features, classifications, and characteristics embodied in database systems.
- CO2.** Identify different issues involved in the design and implementation of database system.
- CO3.** Analyze database schema for a given problem domain.
- CO4.** Justify principles for logical design of databases, including the E-R modeling and Normalization approach.
- CO5.** Apply transaction processing concepts and recovery methods over real time data.
- CO6.** Formulate, using relational algebra and SQL, solutions to a broad range of query Problem

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B.Tech. Third Year (V semester)
Category- Professional Core Course PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 503	Computer Network	3	1	0	4	20	20	60	100

Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Unit-1 Introduction: Computer Network, Types- LAN, MAN & WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Wireless router, & Wireless Access Point (WAPs). Performance Criteria- Bandwidth, Throughput, Latency (Delay), Propagation Time, Transmission time & Queuing Time.

Unit-2 Physical Layer: Network topologies- Bus, Ring, Star Topology & Mesh, Switching- Circuit switching, Message switching & Packet switching, Multiplexing; FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing, Wireless transmission- Electromagnetic spectrum, Radio transmission & Microwave transmission.

Unit-3 Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, IEEE 802.3 frame format.

Unit-4 Network Layer & Transport Layer: Introduction, Design issues, Services, Routing- Distance vector routing, Hierarchical routing, Link state routing, shortest path algorithm- Dijkstra's Algorithm & Floyd-Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, Port addressing basics, subnetting. Comparative study of IPv4 & IPv6.

Unit-5 Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption & Compression. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

Recommended Books

- Behrouz A. Forouzan “Data Communication and Networking”, McGraw – Hill Publications.
- Andrew Tanenbaum – Computer Networks, PHI
- Peterson and Davie, “Computer Networks, A systems Approach”, 5th ed., Elsevier, 2011.
- Ying-Dar Liu, Ren-Hwang, Fred Baker, “Computer Networks: An open Source Approach”, McGraw – Hill, 2001.

COURSE OUT COMES

After completion of the course students would be able to:

- **CO1. Categorizing** the components of data communication system
- **CO2. Illustrate** the different types of network topologies, protocols, networks devices, transmission media
- **CO3. Evaluate** channel allocation, framing, Error and flow control techniques.
- **CO4. Describe** the functions of Network Layer and Transport Layer functions.
- **CO5. Elaborate** the functions offered by session, presentation, and application layer and theirImplementation.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (V semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 504 (A)	Cyber Security	3	0	0	3	20	20	60	100

Unit 1: Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Stream Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit 2: Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Crypto system, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit 3: Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit 4: IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion Detection System): Statistical Anomaly Detection And Rule Based Intrusion Detection, Penetration Testing, Risk Management Fire walls: Types, Functionality and Policies.

Unit 5: Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing. Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Principles of Cyber crime, Jonathan Clough Cambridge University Press
- John R. Vacca, Computer Forensics:Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005
- Cyber Law Simplified, VivekSood, Pub: TMH.
- Cyber Security by Nina Godbole, SunitBelapure Pub: Wiley-India
- Information Warfare: Corporate attack and defense in digital world, William Hutchinson, Mathew Warren, Elsevier.
- Cyber Laws and IT Protection, Harish Chander, Pub:PHI.

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B.Tech. Third Year (V semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 504 (B)	Data Analytics	3	0	0	3	20	20	60	100

Unit-1: DESCRIPTIVE STATISTICS: Probability Distributions, Inferential Statistics, Inferential Statistics through hypothesis tests Regression & ANOVA, Regression ANOVA(Analysis Variance)

Unit-2: INTRODUCTION TO BIG DATA: Big Data and its Importance, Four V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications. BIG DATA TECHNOLOGIES: Hadoop's Parallel World, Data discovery, Open-source technology for Big Data Analytics, cloud and Big Data, Predictive Analytics, Mobile Business Intelligence and Big Data, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics, Information Management.

Unit-5: BIG DATA TOOLS AND TECHNIQUES: Installing and Running Pig, Comparison with Databases, Pig Latin, User- Define Functions, Data Processing Operators, Installing and Running Hive, Hive QL, Querying Data, User-Defined Functions, Oracle Big Data

Unit-3: PROCESSING BIG DATA: Integrating disparate data stores, Mapping data to the programming framework, Connecting and extracting data from storage, transforming data for processing, subdividing data in preparation for Hadoop Map Reduce.

Unit-4: HADOOP MAPREDUCE: Employing Hadoop Map Reduce, Creating the components of Hadoop Map Reduce jobs, distributing data processing across server farms, Executing Hadoop Map Reduce jobs, monitoring the progress of job flows, The Building Blocks of Hadoop Map Reduce Distinguishing Hadoop daemons, Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

RECOMMENDED BOOKS

- Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business
- Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely
- CIO Series, 2013.

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B.Tech. Third Year (V semester)
Category- Laboratory Course (LC)

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 505	Laboratory – IV (CN and DBMS Lab)	0	0	4	2	20	20	60	100

List of Experiment of Computer Network: (Any 6)

1. Study of Different Type of LAN & Network Equipment's.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to Implement various types of framing methods.
6. Study of Tool Command Language (TCL).
7. Study and Installation of Standard Network Simulator: N.S-2, N.S3.OpNet,QualNetetc .
8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks .
9. Configure 802.11 WLAN.
10. Implement & Simulate various types of routing algorithm.
11. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using Standard Network Simulators.
12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet

List of Experiments of DBMS: (Any 6)

- 1 Introduction to Structure Query Language (SQL)
 - a) Overview of SQL
 - b) Various Data Types in SQL
 - c) Various Commands in SQL
 - d) Various Constraints in SQL

2. Implementation of DDL commands of SQL with suitable examples
 - a) Create table
 - b) Alter table
 - c) Drop table
3. Implementation of DML commands of SQL with suitable examples
 - a) Insert
 - b) Update
 - c) Delete
4. Study and implementation of different types of constraints.
5. Implementation of different types of functions with suitable examples
 - a) Number function
 - b) Aggregate function
 - c) Character function
 - d) Conversion function
6. Implementation of different types of operators in SQL
 - a) Arithmetic operators
 - b) Logical operators
 - c) Comparison operators
 - d) Set operation
7. Implementation of different types of joins
 - a) Inner join
 - b) Outer join
 - c) Natural join
8. Study and implementation of
 - a) Group by and having clause
 - b) Order by clause
 - c) Indexing
9. Study and implementation of
 - a) Sub-queries
 - b) View

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B.Tech. Third Year (V semester)
Category- Project PR

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PR	BTC PR 506	Minor Project-I/Seminar & Group Discussion	0	0	4	2	20	20	60	100

Guidelines:

Overview:

Each student should complete a project in a group. Dissertations might be research-focused or application-oriented, utilizing the newest technology.

Supervisor:

Faculty of the department will be a project guide for the mentoring project which is decided by Head of the Department.

Platform:

The dissertation can be on any platform e.g., WINDOWS, UNIX, LINUX, Mac OS, etc. The dissertation can be done using any language or package learned within or outside the course such as C, C++, Java, NET, Python, etc.

Venue:

The project may be carried out at the university itself.

Evaluation of Mid-I, Internal Assessment& Final Examination: Mid I and internal assessment consider the progress of the project and final examination through seminar/presentation, write-up/synopsis/ progress report and as per the below guidelines.

The students have to submit the power point presentation of minimum 15 slides of the training performed (comprising of points given by guide) along with the original certificate of training performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the project coordinator/external examiner

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B.Tech. Third Year (V semester)
Category- Internship INT

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
INT	BTC INT 507	Evaluation of Internship-III	0	0	6	3	20	20	60	100

Evaluation of Mid-I, Internal Assessment & Final Examination: Mid I and internal assessment consider the progress of the internship and final examination through seminar/presentation, write-up/synopsis/ internship report and as per the below guidelines.

The students have to submit the power point presentation of minimum 15 slides of the internship performed (comprising of points given by guide) along with the original certificate of internship performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the internship coordinator/external examiner.

Sixth Semester (6th Semester)

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Third Year (VI semester)
Category- Professional Core Course PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 601	Machine Learning	3	1	0	4	20	20	60	100

Course Objectives:

- To understand types of issues and challenges that could be solved by machine learning.
- To be able to understand wide variety of learning models and use them.
- To be able to evaluate and optimize these models

Unit –1 Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

Unit –2 Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters,

Unit -3 Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dense layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

Unit –4 Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, Actor-critic model, Q-learning, SARSA

Unit –5 Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

Recommended Books

- Christopher M. Bishop, “Pattern Recognition and Machine Learning”, Springer-Verlag New York Inc., 2nd Edition, 2011.
- Tom M. Mitchell, “Machine Learning”, McGraw Hill Education, First edition, 2017.
- Ian Goodfellow and Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press, 2016

Text Books

- Aurelien Geon, “Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems”, Shroff/O'Reilly; First edition (2017).
- Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
- Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Shroff/O'Reilly; First edition (2016).

COURSE OUT COMES

After completion of the course students would be able to:

- CO1 Apply knowledge of computing and mathematics to machine learning problems, models and algorithms;
- CO2 Analyze a problem and identify the computing requirements appropriate for its solution;
- CO3 Design, implement, and evaluate an algorithm to meet desired needs; and
- CO4 Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.

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B.Tech. Third Year (VI semester)
Category- Professional Core Course PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 602	Network Security	3	0	0	3	20	20	60	100

Course Objectives:

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-1 Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Stream Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-2 Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-3 Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -4 IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion Detection System): Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Policies

Unit -5 Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Footprinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

Recommended Books

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, TataMcGraw Hill.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1: define various aspects of network security.
- CO2: illustrate fundamentals of number theory and cryptography.
- CO3: apply security mechanisms to achieve principles of network security. CO4: analyze the cause for various existing network attacks.
- CO5: examine the vulnerabilities in applications over internet.
- CO6: develop a secure protocol for achieving various network security services.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (VI semester)
Category- Professional Core Course PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 603	Distributed Systems	3	0	0	3	20	20	60	100

Course Objectives:

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit – 1 Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed System, Hardware and Software Concepts, Distributed Computing Model, Advantages & Disadvantage Distributed System, Issues in Designing Distributed System.

Unit -2 Distributed Share Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & Its Types, Design & Implementations Issues in DSM System, Structure of Share Memory Space, Consistency Model and Thrashing. Distributed File System: Desirable Features of Good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Caching Scheme, File Application & Fault **Tolerance**.

Unit – 3 Inter Process Communication and Synchronization: Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit – 4 Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.

Unit – 5 Distributed Databases and Multimedia Management System Distributed Data Base Management System (DDBMS), Types of Distributed Database, and Distributed Multimedia: - Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System: - Amoeba, Mach, Chorus

Recommended Books

- Distributed Operating System Concept & Design, Sinha, PHI .
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1. Tell the basic elements and concepts related to distributed system technologies
- CO2. Demonstrate knowledge of the core architectural aspects of distributed systems.
- CO3. Identify how the resources in a distributed system are managed by algorithm.
- CO4. Examine the concept of distributed file system and distributed shared memory.
- CO5. Compare various distributed system algorithms for solving real world problems.
- CO6. Develop application for achieving various services of distributed system

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (VI semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 604(A)	Compiler Design	3	0	0	3	20	20	60	100

Course Objectives:

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-1 Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Compiler Design Tools.

Unit-2 Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-3 Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-4 Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Syntax and Semantic Errors.

Unit-5 Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGs, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Data Flow Analysis of Structured Flow Graphs.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

Recommended Books

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Loudon, Cengage Learning.

COURSE OUT COMES

After completion of the course students would be able to:

- **CO1.** Define the concepts of finite automata and context free grammar.
- **CO2.** Build the concept of working of compiler.
- **CO3.** Examine various parsing techniques and their comparison.
- **CO4.** Compare various code generation and code optimization techniques.
- **CO5.** Analyze different tools and techniques for designing a compiler.
- **CO6.** Design various phases of compiler.

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Third Year (VI semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 604(B)	Data Warehousing and Mining	3	0	0	3	20	20	60	100

Course Objectives:

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems

Unit 1 Data Warehousing: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Data ware house schema, Partitioning strategy Data warehouse Implementation, Data Marts, Meta Data, Example of a Multidimensional Data model. Introduction to Pattern Warehousing.

Unit 2. OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup and Recovery

Unit 3. Introduction to Data & Data Mining: Data Types, Quality of data, Data Preprocessing, Similarity measures, Summary statistics, Data distributions, Basic data mining tasks, Data Mining V/s knowledge discovery in databases. Issues in Data mining. Introduction to Fuzzy sets and fuzzy logic.

Unit 4. Supervised Learning: Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, Neural network-based algorithms, Rule-based algorithms, Probabilistic Classifiers

Unit 5. Clustering & Association Rule mining : Hierarchical algorithms, Partitional algorithms, Clustering large databases – BIRCH, DBSCAN, CURE algorithms. Association rules : Parallel and distributed algorithms such as Apriori and FP growth algorithms.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

Recommended Books

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd

COURSE OUT COMES

After completion of this course, the students would be able to:

CO1. Classify various databases systems and data models of data warehouse.

CO2. Compare various methods for storing and retrieving data from different data sources/repository.

CO3. Apply preprocessing techniques for construction of data warehouse.

CO4. Analyze data mining for knowledge discovery & prediction.

CO5. Explain data mining methods for identification of association for transactional databases.

CO6. Develop various classification and clustering algorithms for data using data mining.

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B.Tech. Third Year (VI semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 604(C)	Python Programming	3	0	0	3	20	20	60	100

Course Objectives:

- To understand components of Python Program
- To learn the basic construct of python programming for solving real world research based problems.
- To visualize and analyze data using python libraries

Unit 1: Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements.

Unit 2: Introducing loops, working of input function, various operations on Tuples, lists, Set and Dictionary, Loops, Conditional Statement

Unit 3: Built in function, defining a function, passing arguments, return value, lambda function, exception handling

Unit 4: Object oriented programming, Creating and using class and object, methods, inheritance, debugging.

Unit 5: Working with packages, pandas, NumPy, Matplotlib and scikit-learn shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors

Recommended Books

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
- Learn Python the Hard Way: 3rd Edition
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1. Tell the use of various built-in data structures used in python.
- CO2. Outline the working of file handling operations, normal functions and lambda functions in python.
- CO3. Apply the concepts of object oriented programming in python.
- CO4. Analyze the data and visualize it using python's matplotlib.
- CO5. Rule out various important characteristics of data using scikit-learn package.
- CO6. Create efficient algorithms in python to solve real world problems.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (VI semester)
Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 605 (A)	Knowledge Management	3	0	0	3	20	20	60	100

Course Objectives:

- Learn the Evolution of Knowledge management.
- Be familiar with tools.
- Be exposed to Applications.
- Be familiar with some case studies.

Unit 1 Introduction: An Introduction to Knowledge Management – The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management – Key Challenges Facing the Evolution of Knowledge Management – Ethics for Knowledge Management.

Unit 2 Creating The Culture Of Learning And Knowledge Sharing

Organization and Knowledge Management – Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

Unit 3 Knowledge Management-The Tools

Telecommunications and Networks in Knowledge Management – Internet Search Engines and Knowledge Management – Information Technology in Support of Knowledge Management – Knowledge Management and Vocabulary Control – Information Mapping in Information Retrieval – Information Coding in the Internet Environment – Repackaging Information.

Unit 4 Knowledge Management-Application

Components of a Knowledge Strategy – Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries)

Unit 5 Future Trends And Case Studies

Advanced topics and case studies in knowledge management – Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan – A case

study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

Recommended Books

- Srikantaiah, T.K., Koenig, M., “Knowledge Management for the Information Professional” Information Today, Inc., 2000.
- Nonaka, I., Takeuchi, H., “The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation”, Oxford University Press, 1995.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1. Learning the various Key Challenges Facing the Evolution of Knowledge Management.
- CO2. Outline the working of Knowledge Management and Vocabulary Control .
- CO3. Apply the concepts of Tacit Knowledge and Quality Assurance.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 605 (B)	Networking with TCP/IP	3	0	0	3	20	20	60	100

Course Objectives:

- To understand TCP/IP Internetworking and Addressing.
- To understand framing, Routing, Address resolution and Error reporting mechanism used in the Internet
- To understand the working of Application layer protocols
- To Troubleshoot networking issues

Unit-1

TCP/IP model, Addressing- Physical, logical and port addressing, IPv4 addresses: Classful addressing, Classless addressing. Special addresses, DHCP and NAT. Subnetting and Supernetting, Ipv6 addressing.

Unit-2

IP Datagram- format, options, fragmentations, checksum, Ipsec. Address Resolution Protocol (ARP), Reverse address resolution protocol (RARP). Internet Control message protocol (ICMP).

Unit-3

TCP: TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timers. UDP: Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing. Stream Control Transmission Protocol

Unit-4

Routing Protocols- RIP, OSPF and BGP, Application Layer: DNS, FTP, TFTP, Mail Transfer protocols, TELNET, HTTP, Voice over IP.

Unit- 5

Troubleshooting Principles, Ping, Traceroute, nslookup and Netstat, Study of network packet analyzer tools: Wireshark, CISCO packet Tracer etc. Scanner Tools: Nmap, Nessus etc.

Recommended Books

- Data and Computer Communication – W. Stalling, Pearson
- Internetworking with TCP/IP – Vol. – I – D.E. Comer, PHI
- Data Communication & Networking -B.A. Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM – W. Stalling
- LANs – Keiser

COURSE OUT COMES

After completion of the course students would be able to:

- CO1. Outline of the basic functionality of TCP/IP layers.
- CO2. Analyze various addressing mechanism used in the internet
- CO3. Elaborate the framing, Routing and Address translation mechanism used in the internet
- CO4. Analyze the working of Application layer protocols
- CO5. Simulate network protocols & Topologies
- CO6. Install, maintain and troubleshoot

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Third Year (VI semester)
Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 605 (C)	Simulation Modeling & Analysis	3	0	0	3	20	20	60	100

Course Objectives:

- Define the basics of simulation modeling and replicating the practical situations in organizations
- Generate random numbers and random variates using different techniques.
- Develop simulation model using heuristic methods.
- Analysis of Simulation models using input analyzer, and output analyzer
- Explain Verification and Validation of simulation model.

Unit – 1 Introduction to Simulation: Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study. Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples.

Unit – 2 General Principles: Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling. Random Numbers: Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test.

Unit – 3 Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique Optimization Via Simulation: Meaning, difficulty, Robust Heuristics, Random Search.

Unit – 4 Analysis of Simulation Data Input Modelling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis. Verification and Validation of Model – Model Building, Verification, Calibration and Validation of Models.

Unit – 5 Output Analysis – Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations. Simulation Software's: Selection of Simulation Software, Simulation packages, Trend in Simulation Software.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

Recommended Books

- Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol, Discrete Event system Simulation, Pearson Education, Asia, 4th Edition, 2007, ISBN: 81-203-2832-9.
- Geoffrey Gordon, System Simulation, Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-4.
- Averill M Law, W David Kelton, Simulation Modelling & Analysis, McGraw Hill International Editions – Industrial Engineering series, 4th Edition, ISBN: 0-07-100803-9.
- Narsingh Deo, Systems Simulation with Digital Computer, PHI Publication (EEE), 3rd Edition, 2004, ISBN : 0-87692-028-8.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1 Describe the role of important elements of discrete event simulation and modeling paradigm.
- CO2 Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
- CO3 Develop skills to apply simulation software to construct and execute goal-driven system models.
- CO4 Interpret the model and apply the results to resolve critical issues in a real world environment

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B.Tech. Third Year (VI semester)
Category- Laboratory Course LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 606	Laboratory – V (ML Lab)	0	0	4	2	20	20	60	100

LIST OF EXPERIMENT

1. Perform exploratory data analysis and visualization after importing a .CSV file.
 - Handle missing data by detecting and dropping/ filling missing values.
 - Transform data using different methods.
 - Detect and filter outliers.
 - Perform Vectorized String operations on Pandas Series.
 - Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.
2. Recognize data Skew-ness, outliers both using statistical function and Graphical representation.
10. Write a Python program to implement Simple Linear Regression to predict if male or female based on Height.
10. Implement Various Regression algorithm for House Price Prediction (USA housing Dataset) and compare there accuracy using scikitlearn
 - Linear Regression
 - Polynomial Regression
 - Support Vector machine
5. Implement Logistic regressor using softmax on iris dataset using scikitlearn.
6. Implement Regularized Regression for house price prediction and evaluate there accuracy using scikitlearn.
 - Ridge Regression
 - Lasso Regression
7. Implement Various Classification algorithm for iris data set and evaluate there performance.
 - Navie Bayes Classifier
 - Logistic Regression
 - Support vector Machine
 - Decision tree
8. Implement Various ensemble on housing and iris dataset and evaluate there performance
 - Voting classifier
 - Random Forest (Bagging and pasting)

9. Implement principle component analysis on any choosen dataset/
10. Implement various clustering algorithm on choosen dataset
 1. K-Mean
 2. DBSCAN

Skill Based Mini Project

1. Implement a regressor for any Medical disease diagnosis.
2. Implement a Cervical Cancer Risk Classifier
3. Regression model for Video Game Sales Prediction
4. Regression model for predicting if song will be popular
5. Regression model for Customer Behavior Analysis
6. Regression model to predict health insurance cost
7. Titanic Survival Prediction
8. Spam and not Spam Classifier
9. Spotify Music Recommendation System
10. Target Customer segmentation

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B.Tech. Third Year (VI semester)
Category- Project PR

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PR	BTC PR 607	Minor Project-II/ Seminar & Group Discussion	0	0	6	3	20	20	60	100

Guidelines:

Overview:

Each student should complete a project in a group. Dissertations might be research-focused or application-oriented, utilizing the newest technology.

Supervisor:

Faculty of the department will be a project guide for the mentoring project which is decided by Head of the Department.

Platform:

The dissertation can be on any platform e.g., WINDOWS, UNIX, LINUX, Mac OS, etc. The dissertation can be done using any language or package learned within or outside the course such as C, C++, Java, NET, Python, etc.

Venue:

The project may be carried out at the university itself.

Evaluation of Mid-I, Internal Assessment& Final Examination: Mid I and internal assessment consider the progress of the project and final examination through seminar/presentation, write-up/synopsis/ progress report and as per the below guidelines.

The students have to submit the power point presentation of minimum 15 slides of the training performed (comprising of points given by guide) along with the original certificate of training performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the project coordinator/external examiner