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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Computer Science & Engineering)

Batch 2011-2015, 2012-16, 2013-2017

SEMESTER-FIFTH

Detailed Syllabus

&

Scheme of Examination

OPERATING SYSTEM

Course Code	**:**	**CSE501**
Course Title	**:**	**Operating System**
Course Credits	**:**	**4**
Total Hours Per Week (L+T+P)	**:**	**3 + 1 + 2**

Course Syllabi (Theory):

- Basic Elements of Computer System, Processor Registers, Instruction Execution, Interrupts, The Memory Hierarchy, Cache Memory, Operating System Objectives and Functions, The Evolution of OS, Major Achievements, Characteristics of Modern OS , Process States, Process Description, Process Control, UNIX Process Management, Processes and Threads, Principles of Concurrency, Mutual Exclusion, Software Approaches, Mutual Exclusion: Hardware Support, Semaphores, Monitors, Message Passing, Reader/Writer Problem, Principles of Deadlock, Deadlock Prevention,

- Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategy, Dining Philosophers Problem, Memory Management Requirements, Memory Partitioning, Paging, Segmentation, Hardware and Control Structures, OS Software, UNIX Memory Management

- Uni-processor Scheduling: Types of Scheduling, Scheduling, Algorithms, Traditional UNIX Scheduling, Multiprocessor and Real-time Management: Multiprocessor Scheduling, Thread Scheduling, Real- Time Scheduling

- I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, OS Design
- Issues, I/O Buffering, Disk Scheduling, RAID, Disk cache, File Management: Overview, File Organization, File Directories, File Sharing, Record Blocking, Secondary Storage Management.

- Distributed Processing, Client/Server and Clusters: Client/Server Computing, Distributed Message, Passing, Remote Procedure Calls, Clusters.

Course Syllabi (Practical)

- Linux Basics, File System, Commands in Linux, Pipes and Filters, Communication commands, Shell Scripting in Linux

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

T1. Stalling W, "Operating Systems", 6th edition, Prentice Hall India.

T2. C.L. Liu, Elements of Discrete mathematics, McGraw-Hill, 1985

Reference Books:

R1. Silberschatz, A., Peter B. Galvin and Greg Gagne, "Operating System Principles, Wiley India, 8th Edition

R2. Tanenbaum A.S., "Modern Operating Systems", 4th Edition, PHI, 2001

R3. Flynn I.M, "Understanding Operating Systems", Cengage India Publication

DATA BASE MANAGEMENT SYSTEM

Course Code	**:**	**CSE502**
Course Title	**:**	**Data Base Management Systems**
Course Credits	**:**	**4**
Total Hours Per Week (L+T+P)	**:**	**3 + 1 + 2**

Course Syllabi (Theory):

- Basic Concepts : data, database, database systems, database management systems, instance, schema, Database Applications, Purpose and Advantages of Database Management System (over file systems), View of Data (Data Abstraction, Data Models), Database Languages (DML, DDL), Relational Databases (Tables, DML, DDL), Data Storage and Querying (Components, Storage Manager, Query Processor), Database Architecture, Database User and Administrators

- Design Phases, Design Alternatives (Major Pitfalls), Entity Relational Model (Entity Sets, Relationship Sets, Attributes), Constraints (Mapping Cardinalities, Keys, Participation Constraints), Entity Relationship Diagram, Weak Entity Set, Extended E-R features (Generalization, Specialization and Aggregation), E-R Notations, Examples of ERD

- Features of Good Relational Design, Atomic Domain and First Normal Form, Decomposition Using Functional Dependency (Key and Functional Dependency, BCNF, 2NF, 3NF), Functional Decomposition Theory (Closure Set of Functional Dependency with Armstrong Rules, Canonical Cover and Loseless Decomposition), Dependency Preservation, Comparison of 3NF and BCNF, Decomposition Using Multi-Valued Dependencies (Multi-Valued Dependency and 4 NF)

- Structure of Relational Databases (Basic Structure, Database Schema, Types of Keys), Fundamental Relational Algebra Operations (Select, Project, Union, Set Difference, Cartesian Product and Rename Operator), Additional Relational Algebra Operators (Set Intersection, Natural Join, Division Operator, Assignment Operator), Examples

- Transaction Concept (Transaction State, Basic Definitions, ACID Property), Implementation of Atomicity and Durability (Shadow Paging Concept), Concurrent Execution (Reasons of Concurrent Execution, Serial and Concurrent Schedule), Serializability (Conflict and View Serializability), Recoverability of Schedules (Recoverable Schedule and Cascade-less Schedule), Lock-based Protocol (Types of Lock and Deadlock Concept), Two-Phase Locking Protocol, Deadlock Handling (Deadlock Prevention Techniques like Wait-Die, Wound-Wait), Recovery of Deadlock (Selection of

Victim, Rollback, and Starvation), Insert and Delete Operations (Delete, Insertion, Phantom Phenomenon), Transaction Failure, Storage Structure and Transaction Log and Log-Based Recovery (Deffered Database Modification, Immediate Database Modification, Checkpoints)

Course Syllabi (Practical):

- Introduction to SQL, Advantages of using SQL, SQL concepts and tools, The generic SQL Sentence Construct, Create Table, Insertion of Data into tables, Viewing data in the tables, Delete Operations, Update Operations, Modifying the structure of tables, Renaming Tables, Destroying Tables, Examining Objects created by a User, Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Column Alias, Aggregate Functions, Scalar Functions, Date Conversion Functions, Data Constraints, Defining integrity constraints in the alter table command, Dropping integrity constraints in the alter table command, Default Value Concept, Grouping Data from tables, Manipulating dates in SQL, Subqueries, Joins, Union, Intersect and Minus Clause, Index, View, Sequence

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40

3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

T1. Silberschatz, Korth, Sudarshan, "Database System Concepts", 5th Edition, McGraw Hill Publication

Reference Books:

1. C J Date, A Kannan, S Swaminathan, "An Introduction to Database Systems", 8th Edition, Pearson Education (2006)
2. S K Singh, "Database Systems: Concepts, Design and Applications", Pearson Education
3. Elmsari, Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education (2008)
4. Peter Rob, Carlos Coronel, "Database Systems: Design, Implementation and Management", 7th Edition, Cengage Learning (2007)

Textbook for Practical

1. "Oracle 9i PL/SQL", Oracle Press.

Reference Book for Practical

2. Ivan Bayross, "SQL, PL/SQL The Programming Language Oracle".

COMPUTER NETWORKS

Course Code	**:**	**CSE503**
Course Title	**:**	**Computer Networks**
Course Credits	**:**	**4**
Total Hours Per Week (L+T+P)	**:**	**3 + 0 + 2**

Course Syllabi (Theory):

- Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

- Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

- Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

- Transport Layer: Transport Layer - Design issues, connection management, session Layer- Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

- Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Course Syllabi (Practical):

1. Packet transmission – packetization of data, simple point-to-point communication.

2. MAC Layer – Observe and measure the performance of various MAC Layer protocols by changing the network load, distance between the nodes wherever applicable and compare them:

- BUS Topology:

- ALOHA: Exposure to multiple access to a shared medium, throughput vs offered load
- CSMA: Throughput vs offered load for various node distances in the form of bit delays
- CSMA/CD: Throughput vs offered load, packet delay vs throughput at various loads
- Token-Passing BUS: Demand assignment when compared to random access protocols, packet delay vs throughput – comparison with CSMA/CD
- CSMA/CA: DCF mode operation – Throughput vs offered load – comparison with CSMA/CD performance

- RING Topology:
  - Token Ring: Throuhgput vs average packet delay at various loads and timeout values, performance comparison with CSMA/CD

3. DLL: Observe and measure the performance of various DLL protocols by changing the network load, various timeout period, introducing bit errors and compare them

- Stop-and-Wait: Throughput vs BER for different packet lengths and timeout values
- Sliding Window – Go-Back-N: Pipelining concept – throughput vs BER for different packet lengths and timeout values – comparison with Stop-and-Wait
- Sliding Window – Selective-Repeat: Pipelining with selective re-transmissions concept – throughput vs BER for different packet lengths and timeout values – comparison with Go-Back-N

4. Network Layer: Study of Routing Protocols

- Distance Vector routing: Hop-by-hop routing, routing table updation, count-to-infinity problem exposure
- Link State routing: Routing table updation, effect of shortest path algorithm, comparison with DV routing

5. Application Layer:

- File transfer using sockets: TCP connection establishment, session management

6. Serial/Parallel port networking: Simple network connectivity using serial and parallel ports in a PC, setup TCP/IP communication through PPP.

7. Data security in computer networks:

- Data protection: RC4 symmetric stream cipher-key generation, encryption-decryption steps
- Network threat: Sniffing of raw data and encrypted data in a LAN

8. STAR Topology (Optional):

- ALOHA, CSMA, CSMA/CD, Stop & Wait and Sliding Window GBN protocols performance in STAR topology

- Switching in LAN: Switching at Layer 2, self-learning using Baran's backward learning algorithm

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Evaluation Scheme (Practical):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test	2 hour	20
2.	End Term Test	2 hour	40
3.	Class Participation and/or Attendance	Day to day	15
4.	Additional Continuous Evaluation (Assignments, Discipline, Punctuality, & Viva Voce)	Day to day	25

***Note: The ratio of weightage between Theory and Practical content will be (60%: 40% respectively)**

Text Books:

1. Forouzen, "Data Communication and Networking", TMH

2. A.S. Tanenbaum, Computer Networks, Pearson Education

3. W. Stallings, Data and Computer Communication, Macmillan Press

4. Anuranjan Misra, “Computer Networks”, Acme Learning

5. G. Shanmugarathinam, ”Essential of TCP/ IP”, Firewall Media

THEORY OF COMPUTATION

Course Code	**:**	**CSE504**
Course Title	**:**	**Theory of Computation**
Course Credits	**:**	**3**
Total Hours Per Week (L+T+P)	**:**	**3 + 0 + 0**

Course Syllabi (Theory):

- 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), NFA with epsilon transit ion, Language of NFA, Equi valence of NFA and DFA, Minimization of Finite Automata, Distinguis hing one string from other, Myhill-Nerode Theorem

- Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA toRegular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regu lar Languages, Decision properti es of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

- Context free grammar (CFG) and Contex t Freee Languages (CFL): Definition, Examples, Derivation , Derivation trees, Am biguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless sym bols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs,

- Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA

- Turing machines (TM): Basic model, definit ion and representatio n, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Chur ch's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction

to recursive function theory

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text & reference Books

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education

2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI

3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH

4. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI

OBJECT ORIENTED ANALYSIS AND DESIGN

Course Code	**:**	**CSE521 (Elective-II)**
Course Title	**:**	**Object Oriented Analysis and Design**
Course Credits	**:**	**3**
Total Hours Per Week (L+T+P)	**:**	**3 + 0 + 0**

Course Syllabi (Theory):

Introduction to UML : Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Basic Structural Modeling : Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling : Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Class & Object Diagrams : Terms, concepts, modeling techniques for Class & Object Diagrams.

Basic Behavioral Modeling-I : Interactions, Interaction diagrams.

Basic Behavioral Modeling-II : Use cases, Use case Diagrams, Activity Diagrams.

Advanced Behavioral Modeling : Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Architectural Modeling : Component, Deployment, Component diagrams and Deployment diagrams.

Case Study : The Unified Library application.

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*

1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text Book

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.

2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.

2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.

3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.

4. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

MANAGEMENT INFORMATION SYSTEM

Course Code	**:**	**IT521 (Elective-II)**
Course Title	**:**	**Management Information System**
Course Credits	**:**	**3**
Total Hours Per Week (L+T+P)	**:**	**3 + 0 + 0**

Course Syllabi (Theory):

- Organization & Types, Decision Making, Data & information, Characteristics & Classification of information, Cost & value of information, Various channels of information & MIS.

- Foundation of Information System : Introduction to Information System in Business Fundamentals of Information System, Solving Business Problems with Information System, Concept of Balanced MIS, Effectiveness & Efficiency Criteria. Tool and Techniques of MIS- dataflow diagram, flow chart etc.

- Business application of information technology, electronic commerce, Internet, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage.

- Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change.
- Reports: Various types of MIS reports, GUI & Other Presentation tools. 6
- Advanced concepts in information system: Enterprise Resource Planning: introduction, various modules like Human Resources, Finance, Accounting, Production & Logistics. Supply Chain Management, CRM, Procurement Management System Object Oriented modeling case studies. 10

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20

3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10
5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text & Reference Books

1. O.Brian, “Introduction to Information System”, Mc-Graw Hill.
2. O.Brian, “Management Information System”, TMH.
3. Alter, “Information Systems : A Management Perspective”, Addison Wesley.
4. Arora & Bhatia, “Information Systems for Managers”, Excel
5. Bansal, “Information System Analysis & Design”, TMH.
6. Jawadegar, “Management Information System”, TMH.
7. Murdick, “Information System for Modern Management”, PHI.
8. Alexis Leon, “Enterprise Resource Planning”, TMH.

NUMERICAL ANALYSIS

Course Code	**:**	**MA501**
Course Title	**:**	**Numerical Analysis**
Course Credits	**:**	**4**
Total Hours per Week (L+T+P)	**:**	**3 + 0 + 2**

Course Syllabi (Theory):

- **Modeling, Computers, and Error Analysis:** Mathematical Modeling and solution using Programming and Software, Computer Arithmetic and Errors: *Approximations and Round-Off Errors, Truncation Errors and the Taylor Series*
- **Transcendental and polynomial equation:** Solution of non-linear Equations: *Bracketing Methods, Open Methods, Roots of Polynomials*
- **Linear Algebraic Equations:** LU Decomposition and Matrix Inversion, Iterative methods for solving system of linear equations.
- **Interpolation and approximation:** Interpolation for equally and unequally spaced points, Lagrangian Polynomial, Curve Fitting: *Least-Squares Regression*
- **Numerical Differentiation and Integration:** Numerical Differentiation and Integration, Newton-Cotes Integration Formulae.
- **Ordinary Differential Equations:** Difference equation, Single step methods, Stiffness and Multistep Methods, Predictor-corrector method
- **Partial Differential Equations:** Finite Difference: *Elliptic and Parabolic Equations*, Mesh analysis

Evaluation Scheme (Theory):

EC No.	Evaluation Component	Duration	Marks (100) (Weightage %)*
1.	Mid Term Test-I	1 hour	20
2.	Mid Term Test-II	1 hour	20
3.	End Term Test	3 hour	40
4.	Class Participation	Day to day	10

5.	Additional continuous Evaluation (Quizzes, Assignments, Presentations, and others)	30 min.	10

Text and Reference books:

1. K. E. Atkinson, Introduction to Numerical Analysis, John Wiley and Sons.
2. M.K. Jain, S. R. K. Iyengar, R. K. Jain, Numerical Methods For Scientific And Engineering Computation, New age International publishers, New Delhi.
3. Steven C Chapra, Raymond P Canale, Numerical Methods for Engineers, 6/e, Mc Graw Hill
4. Cheney and Kincaid, Numerical Methods and Applications, Cengage Publications, New Delhi.
5. Sastry S.S., Introductory methods of Numerical Analysis, Prentice Hall of India, New Delhi