Course Contents

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<tr>
<th>Category of Course</th>
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<th>Course Code</th>
<th>Credits-6C</th>
<th>Theory Paper (ES)</th>
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<tbody>
<tr>
<td>Departmental Core DC-19</td>
<td>Object Oriented Analysis and Design</td>
<td>IT 701</td>
<td>L T P</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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</table>

**Branch:** Information Technology, VII Semester

**Course:** Object Oriented Analysis and Design

**Unit I:** Overview of Object Oriented concepts: Objects and classes, abstraction, generalization and inheritance, encapsulation, multiple inheritance, aggregation abstraction classes, polymorphism, link and association, Need for object oriented approach

**Unit II:** System design life cycle, object oriented S/W development process model, Object Oriented Analysis, Object Modeling Technique (OMT): object model, function model, relationship among models, object diagrams, state diagrams, data flow diagrams, analysis.

**Unit III:** Object oriented Design: Overview of object design, Combination the models, Designing algorithms, design optimization, Implementation of control, Adjustment, Design of association, object representation, physical packaging, documenting design decision, comparison of use-case driven approach.

**Unit IV:** Translation Object Oriented design into implementation, Programming style, Documentation, characterization of object oriented languages, Comparison of object oriented language like C++, JAVA, object programming.

**Unit V:** Unified Modeling Language (UML): Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs .object oriented database, the architecture of object oriented database, query language for Object Oriented database.

**References:-**

- Michael Blaha and J. Rumbugh, “Object oriented Modeling and design with UML”, Pearson Education
- O’Docherty, “Object Oriented Analysis and Design Understanding, System Development with UML2.0”, Wiley India.
List of Experiment:-

- Draw Object, state, Data flow Diagram of ATM.
- Draw Object, state, Data flow Diagram of Telephone Call.
- Draw Object, state, Data flow Diagram of Library Information System.
- Draw Object, state, Data flow Diagram of Airline reservation System.
- Draw Object, state, Data flow Diagram of Calculator.
- Draw Object, state, Data flow Diagram of College Management system.
- Draw Object, state, Data flow Diagram of Payroll System.
- Draw Object, state, Data flow Diagram of Railway Reservation system.
- Draw Object, state, Data flow Diagram of Online Sales.
- Draw Object, state, Data flow Diagram of Examination result display System of a University.
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<tr>
<td>Departmental Core DC-20</td>
<td>Wireless &amp; Mobile Computing</td>
<td>IT 702</td>
<td>L 3 T 1 P 0</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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</table>

**Branch**: Information Technology, VII Semester

**Course**: Wireless & Mobile Computing

**Unit I**: Antenna, variation pattern, antenna types, antenna gain, propagation modes, types of fading. Model for wireless digital communication, multiple access technique-SDMA, TDMA, FDMA, CDMA, DAMA, PRMA, MAC/CA, Cellular network organization, operations of cellular system, mobile radio propagation effects, handoff, power control, sectorization, traffic engineering, Infinite sources, lost calls cleared, grade of service, poison arrival process

**Unit II**: GSM- Services, system architecture, radio interface, logical channels, protocols, localization and calling, handover, security, HSCSD, GPRS-architecture, Interfaces, Channels, mobility management DECT, TETRA, UMTS.

**Unit III**: IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer, MAC management, HIPERLAN-protocol architecture, physical layer, access control sub layer, MAC sub layer. Bluetooth-user scenarios- physical layer, MAC layer.

**Unit IV**: Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, transaction oriented TCP. Introduction to WAP.

**Unit V**: Intruders, Intrusion detection, password management, viruses and related threads, worms, trojan horse defense, difference biometrics and authentication system, firewall design principle.

**References:-**

- J. Schiller, “Mobile Communication”, Addision, Wiley
- Upen Dalal,” Wireless Communication”, Oxford Higher Education
- Dr. Kamilo Feher, “Wireless Digital communication”, PHI
## Course Contents

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<tr>
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<tr>
<td>Departmental Core DC-21</td>
<td>Information Storage &amp; Management</td>
<td>IT 703</td>
<td>L T P</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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</table>

**Branch:** Information Technology, VII Semester  
**Course:** Information Storage & Management

### Unit-I

Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

### Unit-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

### Unit-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

### Unit-IV

Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances.  
Data center concepts & requirements, Backup & Disaster Recovery: Principles  

### Unit-V


**References:**

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. **Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein:** Storage Network explained: Basic and application of fiber channels, SAN, NAS, iSES, INFINIBAND and FCOE, Wiley India.


6. **Saurabh:** Cloud Computing: Insight into New Era Infrastructure, Wiley India.

7. **Sosinsky:** Cloud Computing Bible, Wiley India.

8. **Rich Schiesser:** IT Systems Management: Designing, Implementing and Managing World-class Infrastructures, PHI Learning
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<td>DCO(E)-I</td>
<td>Advanced Concept In Database Systems</td>
<td>IT 710</td>
<td>L 3 T 1 P 0</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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</table>

**Branch**: Information Technology, VII Semester

**Course**: Advanced Concept In Database Systems

**Unit I**: An overview of database, The Extended Entity Relationship Model and Object Model: The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization, Relationship types of degree higher than two.

**Unit II**: Query Processing, Optimization & Database Tuning: Algorithms For Executing Query Operations. Heuristics For Query Optimizations, Estimations of Query Processing Cost, Join Strategies for Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering & Indexing, Multiple Attribute Search Keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue in RDBMS.

**Unit III**: Distributed Database System: Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel & Pipeline Join, Distributed Query Processing In R * System, Concurrency Control In Distributed Database System, Recovery In Distributed Database System, Distributed Deadlock Detection and Resolution, Commit Protocols.


**Unit V**: Accessing databases from Web, JavaScript, JDBC, Java Servlets, database technology to Web related areas such as semi-structured databases and data integration, XML, XQuery, XPath, XML Schemas, distributed database design, distributed database transactions, and distributed query processing

**References:**

- Majumdar & Bhattacharya, “Database Management System”, TMH.
- Data C J,” An Introduction To Database System”, Addison Wesley.
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<tr>
<td>DCO(E)-I</td>
<td>Simulation and Modeling</td>
<td>IT 711</td>
<td>L 3 T 1 P 0</td>
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**Branch:** Information Technology, VII Semester  
**Course:** Simulation and Modeling

**Unit I: PHYSICAL MODELING:** Concept of system and environment, continuous and discrete system, linear and nonlinear system, stochastic activities, static and dynamic models, principles used in modeling. Basic simulation modeling, Role of simulation in model evaluation and studies, Advantages and Disadvantages of simulation. Modeling of systems, Iconic, analog and Mathematical Modeling.

**Unit II: COMPUTER BASED SYSTM SIMULATION:** Technique of simulation, Monte Carlo method, experimental nature of simulation, numerical computation techniques, calumnious system models, analog and hybrid simulation, feedback systems, Buildings simulation models- Financial Model for an office Building, Sensitivity analysis for office building Model.


**Unit IV: PROBABILITY CONCEPTS IN SIMULATION:** Stochastic variables, discrete and continuous probability functions, Distributed Random numbers, generation of random numbers-Uniform and Non Uniform Random numbers, variance reduction techniques-Introduction, Common Random numbers-Rationale, Applicability and Synchronization.

**Unit V: SIMULATION SOFTWARE:** Introduction, Comparison of Simulation Package with Programming Languages, Classification of Simulation Software, Desirable Software features, General Purpose Simulation Package-ARENA, EXTEND, Study of SIMULA, DYNAMO.

**References:**

- Averill M Law “ Simulation Modeling and Analysis”, TMH
- Severance” System Modelling & Simulation : An Introduction”,John Wiley
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<td>Departmental Elective DCO(E)-I</td>
<td>Human-Computer Interaction</td>
<td>IT 712</td>
<td>L T P</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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Branch: Information Technology, VII Semester

Course: Human-Computer Interaction

Unit I: Introduction, Human Computer Interaction (HCI) concepts and definitions, Nature of interaction-human and Machine, interaction design, understanding and conceptualizing interaction, understanding users, interfaces and interactions, data gathering.

Unit II: Introduction to User Centered System Design (UCSD), Natural computing, user centered system design, core concepts, interactive design and its strength and weakness, types of user model, user model and evaluation, Heuristic evaluation.


Unit IV: Modeling of system understanding. Mental models and metaphor, use of design prototypes, controlled experiments. Cognitive walkthrough. Evaluation from the perspective of a novice learning to use the system.


References:-

- Alan Dix, Janet E. Finlay, “Human-Computer interaction”, Pearson Education.
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<td>DCO(E)-I</td>
<td>Automata and Compiler Design</td>
<td>IT 713</td>
<td>L 3</td>
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<td>Duration-3 Hrs.</td>
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Branch: Information Technology, VII Semester
Course: Automata and Compiler Design

Unit 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.

Unit II: Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Implementation of Lexical Analyzer. The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers,


Unit IV: Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit V: 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

References:-

• Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”, Pearson Education.
• K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science : Automata, Languages and Computation”, PHI.
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<td>DCO(E)-II</td>
<td>Embedded System</td>
<td>IT 720</td>
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<th>Max. Marks-100</th>
<th>Min. Marks-35</th>
<th>Duration-3 Hrs.</th>
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**Branch**: Information Technology, VII Semester  
**Course**: Embedded System

**Unit I**: Introduction to Embedded System, Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, Embedded firmware, system components.

**Unit II**: Fundamental issues of hardware software co-design, computational models in embedded design-data flow graph, control flow graph, state machine model, sequential programmed model, concurrent model, unified modeling language.

**Unit III**: Architecture of 8085 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets.

**Unit IV**: Embedded firmware design approaches- OS based, Super loop based. Embedded firmware development languages- Assembly language based, high level language based, mixed. Programming in embedded C.

**Unit V**: Types of Operating system, Task, process and threads, Multi processing and multi task, Task scheduling, Task communication, Task synchronization.

**References:-**

- Shibu K V, “Introduction to Embedded System”, TMH.
- Sriram V Iyer, Pankaj Gupta, “Embedded Realtime Systems Programming”, TMH.
- Raj Kamal, “Embedded Systems”, TMH.
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<tr>
<td>DCO(E)-II</td>
<td>E-Commerce and Governance</td>
<td>IT 721</td>
<td>L 3</td>
<td>T 1</td>
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</table>

Branch: Information Technology, VII Semester
Course: E-Commerce and Governance


Unit II: Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

Unit III: E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.


Unit V: E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

References:-

- David Whiteley, “E-commerce study, technology and applications”, TMH.
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<td>DCO(E)-II</td>
<td>High Performance Computing</td>
<td>IT 722</td>
<td>L 3 T 1 P 0</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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Branch : Information Technology, VII Semester
Course: High Performance Computing

Unit I: Introduction to high performance computing: Aim, Architectures, Cluster, Grid, Meta-computing, Middleware, Examples of representative applications. Programming models: Parallel programming paradigms, task partitioning and mapping, shared memory, message passing, peer-to-peer, broker-based. Introduction to PVM and MPI.


Unit III: Shared-memory processing: Architectures (extensions of the memory hierarchy), Programming paradigms, OpenMP. Distributed-memory processing: Architectural issues (networks and interconnects), Programming paradigms, MPI (+MPI2).


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<td>DCO(E)-II</td>
<td>Bioinformatics</td>
<td>IT 723</td>
<td>L 3 T 1 P 0</td>
<td>Max. Marks-100 Min. Marks-35 Duration-3 Hrs.</td>
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Branch: Information Technology, VII Semester

Course: Bioinformatics

Unit I: Introduction to bioinformatics: Definition and History of Bioinformatics, Application and research of bioinformatics, finding Bioinformatics data online Bioinformatics, private and future data sources, Meta data Summary and reference systems.

Unit II: Bioinformatics Database: Characteristics and categories of Bioinformatics database, Navigating databases, Information retrieval Systems, Sequence database Nucleotide(primary and Secondary), Protein sequence, Structure Databases: File Formats, Protein Structure, PDB, MMDB, CATH, Other Database Enzyme, MEROPS, BRENDA, Pathway databases

Unit III: Bioinformatics Tools: Need for tools, Industry Trends, Data Mining Tools, Data Submission tools: Nucleotide Sequence, protein Submission tools, Data Analysis tools: Nucleotide Sequence, protein Sequence, Prediction Tools: Phylogenetic trees, Gene prediction, Protein Structure and Function prediction, Modeling Tools: 2D and 3D Protein Modeling.


Unit V: Bioinformatics Software: Local Alignment Search Tool (BLAST),Purpose of BLAST,BLAST Analysis, Purpose of BLAST II, Scoring Metrics, PAM, BLOSUM, Working of BLAST. Introduction of HMMER, Practical example of HMMER.

References:

- Harshawardhan P.bal, “Bioinformatics Principle and Applications”, TMH.
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<td>DCO(E)-II</td>
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<td>IT 724</td>
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<td>Duration-3 Hrs.</td>
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Branch: Information Technology, VII Semester
Course: Unix & Shell Programming

UNIT–I
General Overview of the System: System structure, user perspective, O/S services assumption about Hardware The Kernel and buffer cache architecture of Unix O/S, System concepts, Kernel data Structure, System administration, Buffer headers, Structure of the buffer pool, Scenarios for retrieval of the buffer, Reading and writing disk block, Advantage and disadvantage of buffer cache.

UNIT–II
Internal Representation of Files: Inodes, Structure of regular, Directories conversions of a path name to an inode, Super block, Inode assignment to a new file, Allocation of disk blocks, Open read write file and record close, File creation, Operation of special files change directory and change root, change owner and change mode. STAT and FSTAT, PIPES mounting and unmounting files system, Link Unlink

UNIT–III
Structures of Processes and process control: Process states and transitions layout of system memory, the context of a process, manipulation of process address space, Sleep process creation/termination. The user Id of a process, changing the size of a process. Killing process with signals, job control, scheduling commands: AT and BATCH, TIME, CORN.

UNIT–IV
Introduction to shell scripts: shell Bourne shell, C shell, Unix commands, permissions, editors, grep family, shell variables, scripts, metacharacters and environment, if and case statements, for while and until loops. Shell programming.

UNIT–V
Introduction of Awk and perl Programming: Awk pattern scanning, BEGIN and END patterns, Awk arithmetic and variables, and operators, functions, perl; the chop() function, variable and operators. Networking tools: Resolving IP addressing, TELNET, FTP, Socket programming, introduction of Linux structure.

References:-