U.P. TECHNICAL UNIVERSITY
LUCKNOW

Syllabus

of

Information Technology

2nd Year (III & IV Sem.)
[Effective from Session 2009-10]

B.Tech.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course Code</th>
<th>SUBJECT</th>
<th>PERIODS</th>
<th>Evaluation Scheme</th>
<th>Subject Total</th>
<th>Credits</th>
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<td>1.</td>
<td>ECS-301</td>
<td>Digital Logic Design</td>
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<td>Data Structures Using C</td>
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*Human values & Professional Ethics will be offered as a compulsory audit course for which passing marks are 40% in theory & 50% in aggregate. Students will be required to audit it within the period of their study. There will not be a carry-over facility for this course, and the failure student will be required to repeat this course (in next-semester).
### Study & Evaluation Scheme

**B. Tech. Information Technology**  
[Effective from Session 2009-10]  
**YEAR II, SEMESTER-IV**

<table>
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**Paper Code**  
EOE-031/EOE-041  
**Science Based Open-Electives**

- Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
- Nano Sciences
- Laser System and Applications
- Space Science
- Polymer Science & Technology
- Nuclear Science
- Materials Science
- Discrete Mathematics**

**Note**: CS & IT Students can not take the Open Elective Course EOE 048 : Discrete Mathematics.
ECS-301 : Digital Logic Design

Unit-I
Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes. Floating point representation
Gate-level minimization: The map method up to five variable, don’t care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method).

Unit-II
Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers

Unit-III
Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.

Unit-IV
Memory and programmable logic: RAM, ROM, PLA, PAL.
Design at the register transfer level: ASMs, design example, design with multiplexers.

Unit-V
Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.


EAS-301: MATHEMATICS –III

Unit – I : Function of Complex variable
Analytic function, C-R equations, Cauchy’s integral theorem, Cauchy’s integral formula for derivatives of analytic function, Taylor’s and Laurent’s series, singularities, Residue theorem, Evaluation of real integrals of the type \[ \int_{a}^{b} f(\cos \theta, \sin \theta) \, d\theta \] and \[ \int_{a}^{b} f(x) \, dx \]
Unit – II : Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Probability theory. 08

Unit – III : Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, $\bar{X}$, R, p, np, and c charts. 08

Unit – IV : Numerical Techniques – I

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, difference tables, Newton’s forward and backward interpolation , Lagrange’s and Newton’s divided difference formula for unequal intervals. 08

Unit – V : Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal, Simpson’s one third and three-eighth rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler’s, Picard’s and forth-order Runge- Kutta methods. 08

Test Books :-


Reference Books :-

ECS-302 : DATA STRUCTURES USING - C

Unit - I
Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)


Unit – II

Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

Unit – III

Unit – IV

Unit – V
Searching: Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.

Search Trees: Binary Search Trees(BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees

Textbooks and References:
5. Lipschutz, “Data Structures” Schaum’s Outline Series, TMH

ECS-305: Object Oriented Systems

Unit – I
Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

Unit – II
Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

Unit – III
Functional Modeling: Data flow diagram, specifying operations, constraints, a sample functional model. OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

Unit – IV


Unit – V
Software Development using Java:
Java Beans, Java Swing, Java Servlets, Migrating from C++ to java, Application of java, Dynamic Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabblets, JDBC, Brief functioning of upper layer E-mail and their applications.

Text Books:
3. E. Balagurusamy, “Programming in JAVA”, TMH.

References:
2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley
UNIT I:

UNIT II:

UNIT III:

STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention

UNIT IV:

UNIT V:
IT ETHICS- Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes

EMERGING TRENDS in IT- Electronics Commerce, Electronic Data Interchange, Mobile Communication Development, Smart Card, Expert Systems

ECS -351 : Logic Design Lab
Objective: To understand the digital logic and create various systems by using these logics.
1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of $V_{cc}$ and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.
9. Mini Project.
ECS-352 : Data Structure Lab

Write Program in C or C++ for following.

- Array implementation of Stack, Queue, Circular Queue, List.
- Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.
- Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
- Implementation of Searching and Sorting Algorithms.
- Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm.

ECS-354 : OOPS Lab

Experiments based on the course Object Oriented Systems to be done on C++/JAVA/UML/VISIO etc.

EIT-401 : Web Technology

UNIT I
Introduction and Web Development Strategies
History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws

UNIT II
HTML, XML and Scripting
List, Tables, Images, Forms, Frames, CSS
Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX
Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT III
Java Beans and Web Servers
Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API

UNIT IV
JSP
Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

UNIT V
Database Connectivity

REFERENCE:
3. Joel Sklar, “Principal of web Design” Vikash and Thomas Learning
6. Hans Bergsten, “Java Server Pages”, SPD O’Reilly

ECS-401 : COMPUTER ORGANIZATION
Fourth Semester B.Tech CSE & IT

L T P
3 1 0

Unit-I Introduction:

Number representation; fixed and floating point number representation, IEEE standard for floating point representation. Error detection and correction codes: Hamming code. Digital computer generation, computer types and classifications, functional units and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer.

Unit-II Central Processing Unit:


Unit-III Control Unit:

Instruction types, formats, instruction cycles and subcycles (fetch and execute etc), micro-operations, execution of a complete instruction. Hardwire and microprogrammed control: microprogramme sequencing, wide branch addressing, microinstruction with next address field, pre-fetching microinstructions, concept of horizontal and vertical microprogramming.
Unit-IV Memory:
Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories.
Cache memories: concept and design issues 9 performance, address mapping and replacement
Auxiliary memories: magnetic disk, magnetic tape and optical disks
Virtual memory: concept implementation.

Unit-V Input / Output:
Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions.
Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors.
Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

Books

ECS-402 : DATA BASE MANAGEMENT SYSTEM
IVth Semester B. Tech. CSE & IT

Unit-I
Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.

Data Modeling using the Entity Relationship Model:
ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationship of higher degree.

Unit-II
Relational data Model and Language: Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL
Unit-III
**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit-IV
**Transaction Processing Concept:** Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

**Distributed Database:** distributed data storage, concurrency control, directory system.

Unit-V
**Concurrency Control Techniques:** Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

**Books**
1. Date C J, “An Introduction to Database Systems”, Addision Wesley
7. Majumdar & Bhattacharyya, “Database Management System”, TMH
11. Maheshwari Jain.'DBMS: Complete Practical Approach”, Firewall Media, New Delhi

**EIT-402 : Software Engineering**

<table>
<thead>
<tr>
<th>Unit-I: Introduction</th>
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<th>Unit-II: Software Requirement Specifications (SRS)</th>
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Unit-III: Software Design

Unit-IV: Software Testing

Unit-V: Software Maintenance and Software Project Management
Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.
Reference Books:
5. Ian Sommerville, Software Engineering, Addison Wesley.
6. Pankaj Jalote, Software Engineering, Narosa Publication

EIT-451 : Software Engineering LAB

L T P

0 0 2

1. Program for configuration Management.
2. Perform SA/SD for the following software.
   • Hotel Automation System
   • Book Shop Automation Software
• Word processing Software
• Software Component Cataloguing Software.
3. Design and development of test cases for testing.
5. Development of Software tool for Halstead Analysis.
6. Perform Cost/Benefit analysis.
7. Illustration of various activities of Software development using MS Project 2000.
8. Lab exercise involving development of various practical applications using software like VJ++VB, SYBASE, JDK.
   [Students are to be given a major assignment to be completed using one or more of these tools, Student’s exposure to any CASE tool is desirable]

ECS-452 : DBMS LAB

1. Write the queries for Data Definition and Data Manipulation Language.
2. Write SQL queries using logical operations (=,<,>,etc)
3. Write SQL queries using SQL operators
4. Write SQL query using character, number, date and group functions
5. Write SQL queries for relational algebra
6. Write SQL queries for extracting data from more than one table
7. Write SQL queries for sub queries, nested queries
8. Write programme by the use of PL/SQL
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Create VIEWS, CURSORS and TRGGETRS & write ASSERTIONS.
11. Create FORMS and REPORTS

Note:
1. The queries to be implemented on DBMS using SQL
2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments.. However student may use Power Builder/SQL SERVER. Mini Projects may also be planned & carried out throughout the semester to understand important concepts of database.
2. Experiments with clocked Flip-Flop.
3. Design of Counters.
4. Bread Board implementation of counters & shift registers.
5. Implementation of Arithmetic algorithms.
6. Bread Board implementation of Adder/Subtractor (Half, Full)
7. Bread Board implementation of Binary Adder.
8. Bread Board implementation of Seven Segment Display.

Institute may also develop the experiment based on the infrastructure available with them.