TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

3-Year Diploma Engineering Curriculum and Syllabus for Computer Science & Engineering (CSE)

Third Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIUSD-301	Career Advancement & Skill Development-III	2	1	1	3
TIUDEV-302	Environmental Engineering	2	1	0	3
TIUDMT-303	Discrete Mathematics	2	1	0	3
TIUDCS-304	Programming in C	2	1	0	3
TIUDCS-305	Digital Logic Design	2	1	0	3
TIUDCS-306	Computer Organisation	2	1	0	3
Practical					
TIUDCS-394	Programming in C Lab	0	0	3	2
TIUDCS-395	Digital Logic Design Lab	0	0	3	2
TIUDCS-396	Website Design & Development Lab	0	0	3	2
Sessional					
TIUCSL-381	Entrepreneurship & Skill Development-III	0	0	2	2
Total Credits					26

Approved By:
External Expert VC Registrar Dean of Academics Mentor of the Deptt. HOD

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Syllabus

Environmental Engineering

TIUDEV-302

L-T-P: 2-1-0 Credit: 3

GROUP – A AIR & ENVIRONMENT

Introduction: Man & Environment, Overview (socio-economic structure & occupational exposures), Scope of Environmental Engineering, pollution problem due to urbanisation & industrialisation

Air Pollution: Causes of air pollution, types & sources of air pollutants, Climatic & Meteorological effect on air pollution concentration, formation of smog & fumigation

Analysis of Air Pollutants: Collection of Gaseous Air Pollutants, Collection of Particulate Pollutants, Analysis of Air Pollutants like, Sulphur dioxide, Nitrogen oxide, Carbon monoxide, Oxidants & Ozone, Hydrocarbons, Particulate Matter.

Air Pollution Control Measures & Equipment: Control of Particulate Emission, Control of Gaseous Emission, Flue Gas Treatment Methods: Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Venturi Scrubbers, Electrostatic Precipitators, Gas/solid Adsorption, Thermal Decomposition

Methods & Approach of Air Pollution Control: Controlling smoke nuisance, Develop air quality criteria and practical emission standards, creating zones suitable for industry based on micrometeorology of air area, Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere.

GROUP – B WATER & ENVIRONMENT

Water Sources: Origin of waste water, Type of water pollutants and their effects, Different Sources of Water Pollution.

Biological Pollution (point & non-point sources), Chemical Pollutants: Toxic Organic & Inorganic Chemicals, Oxygen demanding substances, Physical Pollutants, Thermal Waste, Radioactive waste, Physiological Pollutants: Taste affecting substances, other forming substances.

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Water Pollution & its Control: Adverse effects on: Human Health & Environment, Aquatic life, Animal life, Plant life, Water Pollution Measurement Techniques, Water Pollution Control Equipments & Instruments, Indian Standards for Water Pollution Control.

GROUP – C SOIL & ENVIRONMENT

Soil Polluting Agencies & Effect of Solution.

Liquid & Solid Wastes, Domestic & Industrial Wastes, Pesticides, Toxic: Inorganic & Organic Pollutants, Soil Deterioration, Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil.

Solid Waste Disposal: Dumping domestic & Industrial Solid Wastes, Advantages & Disadvantages.

Incineration: Advantages & Disadvantages.

Sanitary Land Field: Advantages & Disadvantages, Management of Careful & Sanitary Disposal of Solid Wastes.

GROUP – D NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM

Noise Pollution & Control.

Noise Pollution: Intensity, Duration, Types of Industrial Noise, Ill effects of Noise, Noise Measuring & Control, Permissible Noise Limits.

Environmental Legislations, Authorities & Systems.

Air & Water Pollution Control Acts & Rules (Salient Features only), Functions of State / Central Pollution Control Boards, Environmental Management System: ISO 14 000 (Salient Features only).

Recommended Books:

Main Reading:

Kormondy, Concept of Ecology, Prentice Hall of India, New Delhi

Odum, Fundamental of Ecology, Cengage

Supplementary Reading:

R. Dev and S. Das, Human Rights – A Source Book Eds., NCERT

Dix, Environmental Pollution, Wiley

Pollution Control Acts, Rules and Notification / Central Pollution Control Board, New Delhi

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Discrete Mathematics

TIUDMT-303

: 2-1-0 **Credit: 3**

G R O U P – A

SET THEORY

Concept of Sets: Notation, Subset, Superset, Empty set, Universal set, Examples.

Operation on Sets: Union, Intersection, Complementation, Difference, Symmetric difference, Problems relating simple set identities, Definition of power set, Cartesian product of finite number of sets, Simple problems, Cardinality of a set, Finite and infinite sets.

Relation between two sets: Binary relation as a subset of Cartesian product, Reflexive, symmetric & transitive relations, Examples, Equivalence relation, Examples, Partition, Problems.

Functions: Definition of function, Domain, Co-domain & Range of a function, Injective, Surjective and Bijective functions, Related problems

MATRIX THEORY

Elementary Transformation on a Matrix: Equivalent matrices, Definition of sub-matrix of a matrix, Rank of a matrix (definition), Echelon form of a matrix, Theorems on rank (statement only), Evaluation of rank of a matrix, Problems.

Adjoint of a square matrix, Definition of INVERSE of a matrix, Uniqueness of the inverse, Theorems on inverse of matrices, Problems

System Of Simultaneous Linear Equations: Test of consistency; Solution of n Linear Equations in n unknowns – Problem, Solution of m Linear equations in n unknowns with m<n and m>n – Problems.

Definition of Eigenvalues and Eigenvectors; Characteristic values and Characteristic vectors of a Matrix; Characteristic equation – relation between Characteristic Roots and Characteristic Vectors,

Nature of Characteristic Roots of special type of Matrices, The Process of finding the Eigenvalues and Eigenvectors, Theorems and Related problems.

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G R O U P – B

COUNTING TECHNIQUES

Principle of Inclusion and Exclusion: Statement of the principle – Set theoretic problems relating to principles of inclusion and exclusion

Mathematical Induction: Concept of Induction, Statement of the principle of Mathematical Induction, Application of the principle of Induction in various problems

Recurrence relation: Definition, Examples (Fibonacci series etc.), Linear recurrence relations with constants coefficients, Homogeneous solutions, Particular solutions, Total solutions, Problems

GRAPH THEORY

Introduction: Definition of a graph, Directed & Undirected graphs (Definition & Example), Basic Terminology, Loop, Multigraph, Pseudo graph, Simple graph, Finite and Infinite graphs, Definition and examples; Subgraph, Spanning subgraph, Removal of a Vertex and an edge-Induced subgraph-Definition & Example.

Graph Isomorphism: Definition and Examples. Walk, Paths, length and Circuits, Definition and Examples; Euler graphs –Euler path, Euler Circuit – Definition and examples; Hamiltonian Graphs – Definition and example, Problems.

Tree: Definition & properties of trees – Distance & centre in a tree ; Rooted tree- Co Tree-definition & example; Binary trees –Definition & Properties, Path length, Binary tree representation of general trees-Problems, Traversal. Spanning tree – Branch of tree- chord- definition & properties; Spanning tree in a weighted graph, Algorithm for constructing Spanning tree – BFS algorithm-DFS algorithm - Problems

Graph theoretic algorithms – Minimal Spanning tree algorithm –Kruskal's Algorithm – Problems; Shortest path algorithm – Dijkstra's algorithm, Floyd-Warshall algorithms – Problems.

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Recommended Books:

Main Reading:

1. K. D. Joshi, Foundation of Discrete Mathematics
2. Albertson & Hutchinson, Discrete Mathematics with Algorithms, John Wiley

Supplementary Reading:

1. Iyenger, Venkatesh, Chandrasekaran and Arunachalam, Discrete Mathematics, Vikash Publishing House.
2. S.K.S. Rathore and H. Chaudhuri, Discrete Structure and Graph Theory, Everest Publishing House.
3. Narsingh Deo, Graph Theory with Application to Engineering and Computer Science, Prentice Hall of India.

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Programming in C

TIUDCS-304

L-T-P: 2-1-0 **Credit: 3**

G R O U P – A

Overview of Programming.

Steps in program development: Problem identification, Task analysis, Data analysis inputs and output, Use of flow chart, program coding, testing, debugging and executing

Place of C in computer language.

Data Types & Variables : Data Types, Constants, Variables, Variable declaration.

Storage class specification: Auto, Static, Extern, Register.

Type modifiers: Expressions, Operators & Assignment Statements.

Operators: Arithmetic increment, Decrement, Relational, Logical, Conditional, Bit Wise, Precedence of operators.

Expressions and type conversion in expressions, Type casting, Assignment statements

CONTROL STATEMENTS

If – Nested if – The if-else-if ladder, The '?' operator as an alternative to 'if', Loop Control Structure: while – for – do-while – Nesting of loops

Switch, Break and continue statements, Exit( ) function, goto.

Console I / O, I / O FUNCTIONS

G R O U P – B

Arrays: Declaration and initialisation, One-dimensional, Two dimensional, Array element access and display.

Functions: Utility of function, Declaration and prototypes, Function arguments, The return statement, Function call (Call by value, Call by reference), Recursive function, Scope rules of functions.

Pointers: '&' and '*' operators, Pointer expressions, Pointer assignments, Pointer arithmetic

Dynamic Allocation Functions: malloc () and calloc (), Pointer versus Array, Arrays of pointers, Pointers to pointers.

Structures, Unions and User Defined Variables.

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BASICS OF STRUCTURE: Declaring a structure, Referring structure elements, Array of structure, passing a structure to a function, Structure within structure, Structure pointers.

UNION BASICS: Declaration, Referring union elements, Uses of structure and unions, Enumerated data type and type definition.

Function returning pointer, File Handling, File pointer

FILE ACCESSING FUNCTIONS: fopen ( ), fclose ( ), fputc ( ), fgetc ( ), feof ( ), ferror ( ), fprintf ( ), fscanf ( ), fgets ( ), fputs ( ), fflush ( ), fseek ( ), ftell ( ).

G R O U P – C

C Pre-processor, Macro directives, Inclusive directives

Conditional compilation directives: #ifdef – #ifndef – #else – #endif – #if – #elif

C Standard Library and Header Files

HEADER FILES: stdio.h, ctype.h, string.h, math.h, stdlib.h, stdarg.h, conio.h (uses of these files)

Standard library functions (names of the categories and utilities)

MATHEMATICAL FUNCTIONS: abs ( ), cos ( ), sin ( ), exp ( ), log ( ), pow ( ), sqrt ( ), tan ( ).

STRING FUNCTIONS: strcat ( ), strcmp ( ), strcpy ( ), strlen ( ), strstr ( ), strrev ( ), strset ( ), strupr ( ), strlwr ( ).

Recommended Books:

Main Reading

Kernigham and Ritchie, The C Programming Language, McGraw-Hill

Tim Grady, C Programming and Practices, McGraw-Hill

Y.T. Kanetkar, Let us C, BPB Publications

Supplementary Reading

H. Schieldt, C Made Easy, McGraw Hill

T. Jeyapoovan, A first course in programming with C, Vikash Publishing House

E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

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Digital Logic Design

TIUDCS-305

L-T-P: 2-1-0 **Credit: 3**

G R O U P – A

Number and Character Representation: Bits, Bytes, Fixed & Floating point numbers, Biased representation, Arithmetic operation, Booth's algorithm, Number representation: Sign magnitude, 1's complement, 2's complement forms, Common errors, Round off errors, CODES: BCD, Excess-3, Gray, ASCII, EBCDIC.

Boolean Algebra and Logic Gates: Definition of Boolean Algebra, Boolean Theorems (with their proofs), Standard forms of expression & their conversion from one to another, Logic gates: AND, OR, NOT, NAND, NOR, XOR, XNOR (truth table, logic expression, symbol), Simple logic circuits using these gates.

G R O U P – B

Simplification of Logic Expressions: Simplification of Boolean expression or logic expression using (i) Boolean Algebra; (ii) Karnaugh Maps & (iii) Quine Maclusky Method.

Combinational Logic Circuits: Arithmetic Circuits: Half adder – Full adder – Half subtractor – Full subtractor (truth table, logic expression, equivalent circuit diagram, brief description), Comparator, Multiplexer, Demultiplexer / Decoder, Code Converter, Encoder, Parity Generator & Checker.

G R O U P – C

Sequential Circuits: Introduction to sequential circuits, Model of sequential circuits: latch & flip flops, timing parameters of latch & flip flops, conversion of one flip flop to another.

Counter: Introduction to counter, Binary ripple counter (UP/DOWN), Module-n-counter, Synchronous & Asynchronous counter.

Registers: Shift registers, Serial data, Parallel data, Design of registers & their functional detail.

DATA CONVERTER

Digital to Analog converter (DAC): Weighted register ladder, Commercially Available DAC.

Analog to Digital converter (ADC): Different types, Successive approximation, Dual, Slope type, ADC performance, Commercially available ADC.

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Recommended Books:

Main Reading

1. M. Morris Mano, Digital Logic & Computer Design, Prentice Hall of India
2. Malvino and Leach, Digital Principles & Applications, Tata McGraw-Hill
3. R.P. Jain, Modern Digital Electronics, Tata McGraw-Hill

Supplementary Reading

1. M. Yarbrough, Digital Logic Applications & Design, Vikash Publishing House
2. Malvino & Brown, Digital Computer Electronics, Tata McGraw-Hill
3. Ronald J. Tocsin, Digital Systems, Prentice Hall of India.
4. R. K. Gaur, Digital Electronics & Microcomputers, Dhanpat Rai Publications
5. Anand Kumar, Fundamental of Digital Circuits, Prentice Hall of India

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Computer Organisation

TIUDCS-306

L-T-P: 2-1-0 **Credit: 3**

G R O U P – A

Evolution of Computer and Basic structure: Brief history of development of Babbage's machine, Stored program concept, Von Neumann architecture (definition only), Generations of computers; SSI, LSI & VLSI classification; Micro, Mini, Mainframe & Supercomputers; PC, PC/XT, PC/AT; Functional units, Bus structures.

Instruction, Addressing Modes & Register: Instruction format, Different types of instructions, ADDRESSING MODES: Implied, Immediate, Direct, Register, Register Indirect, Indirect, Indexed, Paged, Different CPU registers: Programmer accessible & non-accessible, Operational concept of computer.

G R O U P – B

Memory

Concept of words, Memory size, TYPES OF MEMORY: Input processor memory, Main memory, Secondary memory, Cache memory, Virtual memory — MEMORY ORGANIZATION: SRAM, DRAM, ROM, PROM, EPROM, EEPROM etc., Floppy & Hard Disk (Sectors, Tracks, & Cylinders, Accessing mechanisms, Storage capacity), Magnetic tapes, CD-ROM — Memory hierarchy considering size, speed, cost

I/O devices

Printers: Dot Matrix, Inkjet (Line, Laser), Visual Display Unit, Keyboard, Mouse, Joystick, Scanners, Digitisers.

Recommended Books:

Main Reading

Hamacher, Vranesic, Zaky , Computer Organization, McGraw-Hill

William Stallings, Computer Organization and Architecture, Prentice Hall of India

Supplementary Reading

B Ram, Computer Fundamentals, Architecture and Organization, Tata McGraw-Hill

Ajit Pal, Microprocessor, Tata McGraw-Hill

V. K. Jain, Computer System Architecture, S.K. Kataria & Sons

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Programming in C Lab

TIUDCS-394

L-T-P: 0-0-3 **Credit: 2**

Exercise on data type conversion, use of variable of different types.

Write simple program using expression, assignment statements and different types of operators.

Write simple programs using control statements: if, switch, conditional operator, for, while, do-while, break and continue statements.

Familiarity with formatted and unformatted console I / O with simple programs.

Write program using 1D and 2D arrays, sorting and matrix manipulation.

Write programs on function, using function prototype declaration, function definition, with or without arguments, returning value or no value, call by value and call by reference, recursive functions.

Write program using pointer (int, float and character type), using malloc () and calloc () functions, pointer to pointer, pointer to function.

Write program using structure, accessing structure elements, array of structure, passing structure to function and using structure pointers, using unions, accessing union elements, using structure and union in same function, to write programs on enunciated data type and familiarity with type definition.

Write program using different file function. Write program using different macro definition, file inclusion and conditional compilation.

Write program using string function and math function.

Realize Int86 functions.

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Digital Logic Design Lab

TIUDCS-395

L-T-P: 0-0-3 **Credit: 2**

(At least any ten experiments from the following)

Verify the truth tables for AND, OR, NOT, XOR, XNOR, NAND AND NOR gates.

Design Half adder and Full adder using all NAND gates or with all NOR gates.

Realize a truth table or a logic expression using the minimum number of logic gates.

Study 4-bit full adder IC chip (7483); Cascading of 7483.

Design 1's, 2's, 9's and 10's complement circuit using full adder.

Design BCD adder.

Design a simple multiplexer using discrete logic gates.

Use commercial multiplexer using IC chips for the design of combinational circuits.

Design simple decoder using discrete logic gates.

Use commercial multiplexer IC chips for the design of multi-output combinational circuit.

Design Gray-to-Binary and Binary-to-Gray code converter using discrete logic gates, multiplexers & decoders.

Design RS and D latch using all NAND gates or NOR gates.

Debounce mechanical switch using latch.

Design Master Slave JK flip-flop.

Design ripple counter.

Design synchronous counter.

Study some commercially available counter chips.

Design shift registers using flips-flops and to study its behaviour.

Study commercially available shift register IC chips.

Design astable and monostable multivibrator using 555 timer chip.

Study commercially available ADC and DAC chips.

Design ramp generator using DAC and counter.

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Website Design & Development Lab

TIUDCS-396

L-T-P: 0-0-3 **Credit: 2**

Introduction: Introduction to www, History, Understanding client/server roles, IP & Port, website, hypertext , webpage, Web Server(Apache, Tomcat), scripting language, DNS, 3 tier architecture, e-commerce.

HTML, CSS, PHP, MySQL.

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