TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
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3-Year Diploma Engineering Curriculum and Syllabus for Computer Science & Engineering (CSE)

Fourth Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIUSD-401	Career Advancement - Skill Development-IV	2	1	0	3
TIUDCM-402	Communication Skills	2	1	0	3
TIUDCS-403	Data Structures and Algorithms	2	1	0	3
TIUDIM-404	Industrial Management	2	1	0	3
TIUDCS-405	Numerical Methods	2	1	0	3
TIUDCS-406	Electronics Device and Circuit	1	1	0	2
TIUDCS-407	Data Communication and Computer Networks	2	1	0	3
TIUDCM-491	Communication Skills Lab	0	0	2	2
TIUDCS-492	Data Structure Lab in C	0	0	2	2
TIUDCS-493	Computer Networks Lab	0	0	2	1
TIUDCS-494	Numerical Methods Lab	0	0	2	1
TIUDCS-495	Electronics Device and Circuit Lab	0	0	2	1
Sessional					
TIUCSL-481	Entrepreneurship Skill Development-IV	0	0	3	2
Total Credits					29

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

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Syllabus

Communication Skills

TIUDCM-402

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

Looking for a Job: Asking for an Application Form, Filling in Application Forms, Writing a Covering Letter, Writing a Curriculum Vitae, Letters of Application: Reporting to an Advertisement

At the Workplace: Writing Memos, Business Letters: General Features, Letters of Enquiry, Letters to Place Orders

Teaching Instructions: There should be no difference between the teaching methodology of the lecture classes of the subject COMMUNICATION SKILLS (JOB) and those of the sessional classes of the subject COMMUNICATION SKILLS (JOB) LAB, since all the modules are practical oriented.

Things to be followed by the polytechnics for effective teaching of the subject: —

(i) L R U C Room to be used for the classes;
(ii) English newspapers be made available on a regular basis to the students;
(iii) Samples of different Application Forms be available the students.

Recommended Book:

1. ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL / Orient Longman

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Data Structures and Algorithms
TIUDCS-403

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

Problem Solving & Basic Concepts: Algorithms and flow charts, concepts of algorithmic complexity (big O notation, small o notation), concepts of structured programming: top-down design. Control structures, concepts of program modules functions and subroutines. (Algorithms are to be described in C language. The same language must be used for the lab as well).

Linear Data Structure: Primitive Data Structures: Integer (signed, unsigned, long, short), Real (float, double, long double), Character and Boolean data types, their declaration & space usage in computer memory.

Non-Primitive Data Structures:
Array: Definition, declaration, initialisation and usage of one and two-dimensional arrays, Numeric and character type arrays, Arrays as parameters, Matrix operations: Addition, subtraction, multiplication, transpose.

String: Definition, Declaration, String operations: String comparison, length of a string, concatenation of two strings, copy of a string; extract a portion of a string, reversing of a string.

Stack: Definition, Declaration, Operation, Stack implementation using array, Expression evaluation by stack (infix, prefix and postfix).

Queue: Definition, Declaration, Operation, Priority queue (definition and example).

Linked Lists: Concepts and representation of linked lists in memory, Array implementation of lists and its limitation, Operation and analysis of singly, doubly and circular linked lists, their comparison and applications (e.g., polynomial arithmetic).

Recursion: Basic concepts and examples of recursion e.g. factorial problem, Fibonacci sequence, towers of Hanoi etc., Direct and indirect recursion and their overhead.

Non-Linear Data Structures: Concepts of non-linear data structures and their examples, Tree: Definition and application of tree, Binary tree: Definition and it's implementation, expression processing by binary tree, Tree traversal (pre-order, post-order and in-order), Spanning tree concept and its application, Balancing of a tree, AVL tree its definition, construction and rotation, B-tree its definition and use.

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Sorting & Searching: Definition of internal and external Sorting and Searching and their examples.

Sorting: Algorithms and their analysis (time and space), Bubble sort, Insertion sort, Merge sort, Quick sort, Radix sort, Heap sort

Searching: Linear search — Binary search — Hashing — Hash functions, their collisions & resolutions (chaining, open addressing etc)

Recommended Books:

Main Reading:

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, Data Structures using C and C++, PHI
2. Tremblay, Introduction to Data Structures with application, Tata McGraw-Hill

Supplementary Reading:

1. Kyle Loudon , Mastering Algorithms with C, O'Reilly / SPD

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Industrial Management
TIUDIM-404

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

Introduction to Management Science: Principles & functions of management — Contributions of F.W. Taylor, Henry Fayol, Max Weber and Elton Mayo & Roethlisberger in development of the theories of management science.

Organisational Behaviour: Objectives, Brief introduction to: Motivation & Morale, Perception, Leadership & Leadership Styles, Communication, Team Building , Work Culture.

Human Resources Management: Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal – Industrial Safety.

Production Management: Production Planning**:** Routing – Loading – Scheduling — Production Control**:** Expediting – Dispatching — Materials Handling — Work Study — Productivity — Quality Management**:** Tools & Techniques – Quality Management System.

Materials Management: Objectives & functions**:** Purchase function – Stores function — Inventory Management**:** ABC, VED analyses.

Financial Management: Financial Ratios, Elements of Costing, Auditing

Marketing & Sales Management: Objectives & Functions, Marketing of products & Services, Advertising & Sales Promotion, Consumer Behaviour.

Quantitative techniques: Linear programming (graphical method only) — Network Analysis**:** PERT – CPM

Recommended Books:

Main Reading:

1. Harold Kontz, Essentials of Management, McGraw-Hill of India
2. Keith Davis & Newstrom, Human Behaviour at Work: Organizational Behaviour, McGraw-Hill of India
3. Mirza Saiyatain, Human Resources Management, Tata McGraw-Hill

Supplementary Reading:

1. Nikhil Bharat, Production Management & Control, U.N. Dhar & Co.
2. Keith Lockyer, Production Management, ELBS
3. Philip Kolter, Marketing Management, Prentice Hall of India
4. Dr. B.K. Basu, Lectures on Management Accounting, Basusri Bookstall, Kolkata

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Numerical Methods
TIUDCS-405

: 2-1-0Credit: 3

Error Handling: Approximation in Numerical Computation — Significant Figures — Absolute, Relative and Percentage Errors — Truncation and Round-off Errors — Accumulation and Propagation of Errors.

Polynomial Interpolation: Forward, Backward and Divided Difference Table, Newton's Forward and Backward Interpolation Formula — Newton's General Interpolation Formula with the remainder term — Lagrange's Interpolation Formula — Inverse Interpolation.

Solution of Algebraic and Transcendental Equations: Method of Tabulation — Bisection Method — Newton-Raphson Method.

Numerical Differentiation and Integration: Differentiation of Forward and Backward Formula — Trapezoidal rule — Simpson's 1/3 rule.

Numerical Solution of a System of Linear Equations: Gauss-Elimination Method — Matrix Inversion Method — Gauss-Jacobi Method — Gauss-Siedal Method.

Solution of Ordinary Differential Equation: Solution of first order Differential Equation by Euler's Method — Modified Euler's Method and Runge-Kutta Method.

Recommended Books:

Main Reading:

1. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill
2. Srimanta Pal, Numerical Methods, Oxford University Press
3. C. Froberg, Introduction to Numerical Analysis, Addison Wesley

Supplementary Reading:

1. J. B. Scarborough, Numerical Mathematics Analysis, Oxford & IBH Publishing Co. Pvt. Ltd.
2. Dutta & Jana, Introductory Numerical Analysis, Sreedhar Prakashani, Kolkata

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Electronics Device and Circuit
TIUDCS-406

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

Module 1 Transistor Biasing

Concept of Q-point – AC and DC load line – Stabilization and stability factor
types of biasing**:** (a) Base Bias, (b) Collector Feedback Bias, (c) Emitter Feedback Bias, (d) Potential Divider Bias.
Bias compensation circuits using diode and thermistors – FET biasing

Module 2 Small Signal Transistor Amplifier

Hybrid model and h-parameters of CB, CE & CC mode transistor amplifier – Calculation of voltage gain, current gain, power gain, input and output impedance in terms of h-parameters for RC coupled amplifier – Comparison of three configurations
Functional Characteristics and the operation of MOSFET and CMOS

Module 3 Rectifier & Power Supply

Half-wave and full-wave rectifier, average voltage, rms voltage, efficiency and ripple factor, percentage voltage regulation
Function of filter circuits**:** Capacitor input filter, inductive filter, Π type filter – Calculation of ripple factor and average output voltage – Function of bleeder resistor
Series and shunt regulator using transistor
Concept of switch mode power supply
Block schematic description of uninterrupted power supply.

Module 4 Operational Amplifier

Circuit operation of differential amplifier, single ended and double ended
Introduction to operational amplifier – Inverting and non inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current – Slew rate, open loop and closed loop gain – Input and output impedance – Frequency response and virtual ground
Applications of OPAMP as**:** Adder, Subtractor, Voltage Follower, Integrator, Differentiator, Comparator, Schmitt Trigger

Module 5 Timer Circuits

Principle of operation of electronic timer
Functional description of internal blocks of timer IC555
Use of 555 timers in monostable and astable mode
Principle of operation of digital timer

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Recommended Books:

Main Reading:

1. Malvino, Electronic Principles, Tata McGraw-Hill
2. Boylestad & Nashalsky, Electronic Devices and Circuits, Prentice Hall of India.
3. S. Salivanan, Electronic Devices and Circuits, Tata McGraw-Hill

Supplementary Reading:

1. Mottershed, Electronic Devices and Circuits, Prentice Hall of India, N. Delhi
2. Chattopadhyay and Rakhshit, Electronic Fundamentals and Applications, New Age International

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Data Communication and Computer Networks

TIUDCS-407

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

Module 1 Introduction to Computer Networks

Basic Concepts**:** Servers, Client, Workstation, Hosts (definition & applications)
Types of Computer Networks**:** LAN, MAN and WAN.
Types Network Architecture**:** Peer-to-peer, Client-Server, Distributed.

Module 2 Network Topology (Physical & Logical)

Bus, Ring, Star, Mesh and Tree.

Module 3 Transmission Media & Switching

Guided**:** Coaxial, Twisted-pair (UTP, STP), fibre-optics cable.
Unguided**:** Line of site transmission and communication satellites.
Switching**:** Circuit Switching, Packet Switching, Message Switching.

Module 4 Modes of Data Transmission & Multiplexing

Parallel and Serial, Asynchronous and Synchronous
Simplex, Half duplex and Full duplex
FDM, TDM and Inverse Multiplexing.

Module 5 Network Reference Model, Protocols, Services & Standards

OSI reference model of Data Communication and its different layers.
Protocols, Services and Standards (in brief): TCP, FTP, TELNET, RPC, DNS, ICMP, IP (IP addressing, Subnet masking), FDDI, X.25, ISDN (Architecture and different channel specifications only), ATP.

Module 6 Devices of Network & Inter-network Connectivity

Repeater, Bridge, Router (router concepts, least-cost routing, non-adaptive and adaptive routing, distance vector and link state routing), switches (store and forward and cut through), Gateways, Modem.

Module 7 Flow Control, Error Control & Noise

Flow Control**:** Stop-and-wait, Sliding window, Error Control**:** Stop-and-wait ARQ: Piggybacking, Sliding window ARQ: Go-back-n, selective-reject, Noise**:** Definition and different types of Noise, Nyquist rate, Shannon's Capacity.

Module 8 Application & Standards of LAN

Ethernet (Thick, Thin, Twisted pair) – VLAN

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Module 9 Internet

Definition of Internet and compare with Intranet – URL – HTTP – HTML.

Module 10 Network Security

Encryption (Private and Public key) – Decryption – Digital Signature.

Recommended Books:

Main Reading

1. B.A. Forouzan, Data Communications and Networking, Tata McGraw Hill
2. William Stallings, Data and Computer Communications, Prentice Hall of India
3. M.A. Miller, Data Networking Communication, Vikas Publishing House

Supplementary Reading

1. M. Tulloch, Encyclopaedia of Networking, Prentice Hall of India
2. Firewalls and VPNs, Basics of Network Security, Prentice Hall of India
3. B.A. Forouzan, TCP/IP Protocol suite, Tata McGraw Hill
4. P.C. Gupta, Data Communications, Prentice Hall of India

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Communication Skills Lab

TIUDCM-491

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

Module –1 Looking for a job

Identifying Sources — Skimming Newspapers for Information
JOB INTERVIEWS Preparing for an interview — Responding Appropriately — Group Discussions — Using Language Effectively for Interaction
*Mock interviews are to be arranged and to be conducted by any suitable person
Preparation of C.V.

Module –2 Phonetics

The speech mechanism
Speech sounds: Vowels & consonants
Phonetic symbols
The syllable
Intensive drilling in phonetic skills, and accent and intonation

Module–3 Writing skills

Writing using a variety of simple and complex sentences and a range of subordinate and co-ordinate clauses of time, manner, reasons, relation, results etc.
Knowledge to construct a coherent and cohesive text, using a range of cohesive devices dealing with consequences, addition, concession, apportion, agreement, contrast.
Dialogue writing considering various purposes – formal, semi-formal, informal

Module – 4 Developing conversational skills

Develop different forms of conversation, formal or informal in different situations like– Greetings, Salutations b) Asking the way c) In the Post office d) Catching a train e) Booking a room at a hotel f) At the bank g) Making a telephone call h) At the police station I) Receiving and seeing off a guest.

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Module –5 making presentations

Methods of speaking – speaking from a manuscript – speaking from memory – Impromptu delivery – extemporaneous delivery.

Analysing the Audience.

Organizing the presentation – Using visual Aids – Designing and presenting visual Aids.

Recemmended Books:

1. ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL /Orient Longman.

2. V.G. Natu and C Kaur, Business Correspondence.

3. Pravin Bhatia and A.M. Shaikh, Professional Communication Skills, S Chand

4. Wren & Martin, High School English Grammer and Composition, S. Chand

5. A . Parry, S. Harlle, M. Bartram and T. Balasubramanian, A text book of Students English : Phonetice for Indian Writing skills, Macmillan India Ltd.

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Data Structure Lab in C
TIUDCS-492

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

Array, string, stack, queue &pointer related problems
One and two dimension ARRAY related problems, Different STRING operations using different C library functions, Creation of STACK and its related problems such as expression conversion and evaluation, QUEUE, its creation and related problems, POINTER related problems.

STRUCTURE, UNION, LINKED LIST RELATED PROBLEMS
To create a heterogeneous data structure (using STRUCTURE) and then perform related problems. Singly, Doubly and Circular LIST related problems.

RECURSION,SORTING,SEARCHING,TREE &FILE
To write a RECURSIVE function and change it to non-recursive way.
To write the following different SORTING programs in C:—
(a) Bubble sort, (b) Insertion sort, (c) Merge sort, (d) Quick sort, (e) Radix sort, and, (f) Heap sort. To construct a binary TREE and traverse its different nodes. Binary SEARCH related problems., FILE related problems

Recommended Books:

1. D. Samanta, Classic Data Structures, PHI
2. Tanenbaum , Data Structures using C and C++, PHI
3. R. K. Venugopal & Prasad, Programming with C, Tata McGraw-Hill

LIST OF SAMPLE PROBLEMS FOR DATA STRUCTURE LAB

1. To write a program to check whether a word is palindrome or not.
2. To create a two dimensional array of numbers and calculate & display the row & column sum and the grand total.
3. To write a program of matrix multiplication.
4. To write a program to insert (Push) an element into the sack and delete (Pop) an element from the stack using pointer.
5. To write a program to convert an infix expression to a postfix expression.
6. To evaluate a postfix expression.
7. To write a program to insert an element in the queue and delete an element from the queue using pointer.
8. To create a circular queue and add an element and delete an element from a circular queue.
9. To write a program of a structure containing an item name along with the unit price. The user enters the item name and quantity to be purchased. Program print outs total price of

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item with name using pointer in a structure or array in a structure.

10. To create a single linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b0 delete a node from the list (1st node, last node, in between two nodes); (c) Concatenate two lists.
11. To create a doubly linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b0 delete a node from the list (1st node, last node, in between two nodes); (c) Concatenate two lists.
12. To create a circular linked list and insert & delete an element from the list.
13. To write a program to calculate the binomial co-efficient of ${}_nC^r$ of two numbers using recursive function. Also write the same program using function in non-recursive way.
14. To write a program to generate Fibonacci Series using recursive function. Also write the same program using function in non-recursive way.
15. To write a program to sort a list of numbers using — (i) Heap Sort, (b) Quick Sort, (c) Bubble Sort.
16. To write a program to sort a list of numbers using — (i) Insertion Sort, (b) Merge Sort, (c) Radix Sort.
17. To write a program to create a binary tree and traverse it in pre-order and post-order form.
18. To write a program to create a binary search tree and — (a) insert a new node in the BST, (b) search a node in the BST, (c) delete a node from the BST.
19. To write a program to create a file, read the file, update the file, insert into the file, and, delete from the file. (The file contains, say for example, student first name, middle name, surname, address, phone no., roll no., branch etc.)

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Computer Networks Lab
TIUDCS-493

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

Job 1 To be familiar with different network cables (UTP, STP, Coaxial), Connectors (BNC, BNC-T, RJ-11 (4 wire) RJ-45 (8 wire), DB9, DB15) and Terminator.
Job 2 To study crimping: RJ-45, RJ-11, Cross-over Cable.
Job 3 To study the different expansion slots of a motherboard, set the NIC to expansion slot and to install the driver.
Job 4 To connect HUB with other nodes and HUB-to-HUB.
Job 5 To make a peer-to-peer Network System.
Job 6 To run the following application in a network system and get knowledge**:** (i) FTP, (ii) Telnet, (iii) Mail, and, (iv) Talk.
Job 7 To use the ping utility in order to understand its use in a troubleshooting environment.
Job 8 To be familiar with loop back testing.
Job 9 To be familiar with the idea of socket and to write a socket program.

Recommended Books:

1. Hands on networking essentials with projects / M.J. Palmer
2. Internet working with TCP-IP / D.E. Comer and D. Stevens / Prentice Hall of India
3. CISCO Internet working / Charles Riley / SPD Pvt. Ltd.
4. Networking Cabling handbook / Chris Clark / Tata McGraw Hill
5. Designing and implementing local and WANs / M.J. Palmer and R.B. Sinclair / Vikas Publishing House

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Numerical Methods Lab
TIUDCS-494

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

1. Classes –objects –Declaring & Creating Objects –Concept of members variable, methods– Private, Public, protected variable.
2. Constructors: Constructor with parameter , Constructor without parameter, Copy Constructor.
3. Destructor.
4. Passing objects to method.
5. Inheritance: Private, Public, protected inheritance –Single, Multiple inheritance, Multilevel, hierarchical inheritance.
6. Operator overloading & polymorphism: Unary operator overloading like ++, -- etc. – Binary operator overloading like arithmetic operator –Comparison operator, Assignment operator etc. –Introductory problem on virtual function & friend function.
7. Class Templates and Exception handling.

Books:

1. E Balaguruswami, Objected Oriented Programming with C++, TMH
2. Robart Lafore, Object Oriented Programming in Microsoft C++, SAMS
3. Y Kanethkar, Let Us C++, BPB Puplicatios

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Electronics Device and Circuit Lab

TIUDCS-495

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

Job 1 To study the VI characteristics of a reverse biased Zener diode.

Job 2 To study the input and output characteristics and to find the h-parameters of a BJT for**:**

(a) C – E configuration; (b) C – C configuration; (c) C – B configuration.

Job 3 To study the FET characteristics.

Job 4 To study the rectifier with and without capacitor filter for**:**

(a) half-wave rectifier ;(b) full-wave rectifier; (c) bridge rectifier.

Job 5 Determination of frequency response characteristics of RC coupled amplifier circuit and calculation of bandwidth, midband gain, input impedance and out put impedance for**:**

(a) single stage amplifier; (b) double stage amplifier.

Job 6 To study the following applications of op-amp using IC741**:**

(a) adder; (b) subtractor; (c) differentiator (d) integrator; and, (e) voltage follower.

Job 7 To study the characteristics of IC555 timer connected as**:** astable multi-vibrator; (b) monostable multi-vibrator.

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