Tripura University
(A Central University)

Course Structure of Information Technology
(UG Programme)

As per NEP-2020 under Tripura University

INFORMATION TECHNOLOGY (IT)
(Interdisciplinary Courses)

Year	Sem	Paper	Credit	Marks	IA	ESE	Subject
1st	I	ITID001	3	Theory=60	24	36	Fundamentals of Information Technology
				Lab=40	16	24	
2nd	III	ITID002	3	Theory=60	24	36	Introduction to Programming
				Lab=40	16	24	
	IV	ITID003	3	Theory=60	24	36	Basics of Computer Networking
				Lab=40	16	24	

DETAILED COURSE CONTENT OF

Information Technology (IT)
(Interdisciplinary Courses)

Sub-Interdisciplinary Information Technology (IT)

Paper-I (Theory + Lab)   **Total Mark = 100 (60 + 40)**   **Credit = 03**

Fundamentals of Information Technology	Paper Code: ITID001
3 Credits	Prerequisites: *None*

Theory (Marks: 24 + 36)

UNIT I

Introduction: Characteristics of Computer, Generation of computer, Types of computer and features, Application of computer;

Software: Definition, Relationship between Software and Hardware, Software Categories, System Software, Application Software and other software's with example, Software Terminology;

UNIT II

Number Systems: Types of Number systems, Conversion between number bases, Binary arithmetic including 1's complement and 2's complement;

Data and Memory:

Block diagram of digital computer and function of each block; Introduction to computer memory, Types of Computer Memory: Input & Output Devices, Data & Information, Different data processing methods

UNIT III

Introduction to Computer Languages. Introduction, to Operating System: Types of Operating, System, Functions of Operating System, Modern Operating Systems with example, Difference between process and program. Processing function of an Operating System with example.

UNIT IV

Data Communication and Computer Network: Introduction, Data Transmission mode, Transmission Media, Types of Computer Network, Network Topologies, Communication Protocols, Network devices;

Internet Basics: Introduction, Basic Internet Terms (Website, Webpage, URL, Web Browser etc.), Internet Applications, Electronic Mail: Working principle, Search Engines, Intranet, Extranet, Data Security: Need of security, Basic principle of security.

Text Books:
1. P. K. Sinha, "Fundamental of Computers", B.P.B. Publications
2. Balaguruswamy, "Fundamental of Computers", TMH
3. V. Raja Raman, "Fundamental of Computers", PHI
4. Anita Goel," Computer *Fundamentals* ", Pearson

Laboratory (16+24)

Laboratory activities will be based on the syllabus of subject "**Fundamentals of Information Technology**".

SEMESTER-III

Sub- Interdisciplinary Information Technology (IT)
Paper-II (Theory + Lab)   Total Mark = 100 (60+40)   Credit = 03

Introduction to Programming	Paper Code: ITID002
3 Credits	Prerequisites: *Fundamentals of Information Technology*

Theory (Marks: 24 + 36)

UNIT-I (Introduction to Problem Solving)
Introduction to programming- General Problem solving- Algorithmic & Heuristic, Steps of problem solving, Problem solving using computer – programming; Basic programming concept – Input, Processing Data, Output Data; Data types- Variables and constants- Integer, Float, Character, Boolean, String etc.-Format of variable names; Type specific operations- arithmetic, logical, relational etc, Built-in functions for operation, Operator Precedence & Associativity, Expressions

UNIT-II(Introduction to Programming)
The Program Development - Development Cycle; Program Design - Modular Programming, pseudo code, flowchart; Coding, Documenting & Testing - Programming Languages – Types, Examples, Translators – Assemblers, Interpreters & Compilers, Editors, Debuggers; Coding & Documenting - Testing & Errors; Commercial Programs – Testing & Documenting, Testing phases, External Documentation; Structured Programming, Flowchart-Creating flowchart, Control Structures, Programming Conventions.

UNIT-III(Control Structures and Arrays)
Introduction to Selection Structures - Single,dual, multiple alternative structures, Constructing flow chartswith selection structure, ASCII Code, Revisit Logical & Relational Operators, Hierarchy of operators, Using **IF** structure - Simple IF, IF-Else, Nested IF & IF-ladder, Using **Case** - like structures, Applications of Selection Structures, Problem solving with selection structures–examples.
Arrays in everyday world, One dimensional Arrays, Array Basics, Working with multiple arrays, Propertiesand Advantages of arrays, Searching and Sorting, Linear Searching, Bubble / Sink Sort, Strings as Array of characters, String operations, Two Dimensional Arrays, Introduction to two dimensional arrays, Using Nested loops to work with two dimensional arrays, Multi Dimensional Arrays, Problem solving with One,Two,Multi-DimensionalArrays

UNIT-IV(Modules and Subprograms)
Need of Sub Programs - Problems requiring modules, Problem analysis, Design, and Data flow diagrams, Arguments and Parameters, Passing data between modules, Assigning types to parameters, Value & Reference parameters, Scope of Variables - Global, Local; Functions - Revisit built-in functions, User defined functions; Recursion-Recursive Process, Simple recursion examples, Problem solving involving subprograms.
Introduction to sequential files-File Basics, Creating, Reading & Writing into files

TextBook: -
1. Venit,S&DrakeE., *Prelude to Programming: Concepts & Design*, 4ᵗʰ Ed.,Addison-Wesley(Pearson)

References: -
2. Sprankle, Maureen., *Problem Solving and Programming Concepts*,7ᵗʰ Ed.,Pearson.
3. Juliff, Peter, *Program Design,*4ᵗʰ Ed., Prentice-Hall India
4. Tremblay,J & Bunt, R.B.,*Introduction to Computer Science:An Algorithmic Approach,* 2ⁿᵈ Ed.,Tata-McGrawHill
5. Balaguruswamy,E., *Programming in ANSIC*,4ᵗʰ Ed.,Tata-McGrawHill
6. http://docs.python.org/tutorial/
7. http://radiantbytes.com/books/pdfs/pylatex.pdf

Laboratory (16+24)
Laboratory activities will be based on the syllabus of subject "**Introduction to Programming**".

SEMESTER-IV

Sub- Interdisciplinary Information Technology (IT)
Paper-III (Theory + Lab)   Total Mark = 100 (60+40)   Credit = 03

Basics of Computer Networking	Paper Code: ITID003
3 Credits	Prerequisites: *Fundamentals of Information Technology and Introduction to Programming*

Theory (Marks: 24 + 36)

UNIT-I
Introduction to Signals Data and Information, Data communication, Characteristics of data communication, Components of data communication, Data Representation, Data Flow, Simplex, Half Duplex, Full Duplex, Analog and Digital Signals, Periodic and Aperiodic signals, Time and Frequency Domain, Composite Signals
Basic concepts of Networks: Components of data communication, standards and organizations, Network Classification, Network Topologies; network protocol; layered network architecture;
Network definition: Layered network architecture, OSI reference model, TCP/IP Model, Comparison between OSI and TCP/IP.

UNIT-II
Analog and digital signal, data-rate limits, digital to digital line encoding schemes, PCM, digital to analog modulation, multiplexing techniques FDM, TDM, transmission media,
Physical Layer: Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway.
Data Link Layer: Designing issues, Flow control, Framing and Data Link Control, Error detection schemes (parity, checksums, CRCs), Error correction schemes (Hamming codes, binary convolution codes), Data link layer protocols (Simplest, Stop & Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Sliding Window), MAC sublayer (Ethernet, ALOHA, CSMA family, Contention-free access/Token Ring), Ethernet LANS, connecting LAN.

UNIT-III
Network Layer: Design issues, Switching (Circuit switching, packet switching- connection-less datagram switching, connection-oriented virtual circuit switching), Routing algorithms (Shortest path, Link state, Flooding, Broadcast, Multicast), Distance vector routing and link state routing, Packet Scheduling, Internetworking, Internet Protocol (IPv4, IPv6), IP addressing, Internet Control Protocols (IMCP, ARP, DHCP), Mobile IP, dial-up modems, digital subscriber line, cable TV for data transfer.
Transport Layer: Transport layer services, Connection establishment and teardown, TCP, UDP, Congestion Control, Quality of Service, Domain Name System, World Wide Web.
Application Layer: Application layer protocols and services – Domain Name System, HTTP, WWW, TELNET, FTP, SMTP

UNIT-IV
Network Security: Common Terms, Network security issues, Common threats, Security barriers in the network pathways, Official levels of computer security, Types of security controls, Approaches to network security, Ethical Hacking, Virtual Private Networks.
Firewalls: Need and features of firewalls, Types of firewall technology – network level and application level, IP packets filter screening routers, limitations of firewalls.
Cryptography: Encryptions and Decryption, Type of encryptions, encryption keys, Public/Private key encryption.

Text Books:
1. B. A. Forouzan: Data Communications and Networking
2. Tannenbaum: Computer Networks
3. Miller: Data & Network Communication
4. Stallings: Data & Computer Communication

Reference Books:
1. James F. Kurose, Keith W. Ross, "Computer Networking", Pearson Education
2. Dr. Prasad: Data Communication & Network
3. Scitech: Computer Network Theory
4. Shanmugam & Rajeev: Computer Communication Networks
5. Prakash C. Gupta: Data Communication

Laboratory (16+24)
Laboratory activities will be based on the syllabus of subject "**Basics of Computer Networking"**.