

MUC WOMENS COLLEGE, BURDWAN

MODULES (COMPUTER SCIENCE)

PART-I

Paper	Group	Sub-part	Topic	Lectures	Total Lectures
Paper-I	Group -A	Computer Fundamentals	Introduction to Computers & Problem Solving	1	30
			Hardware & Software	2	
			Generations of Computers	1	
			Introduction to Programming Languages	1	
			Problem solving: Flowcharts, Decision Tables. Pseudo codes	3	
			Types of number systems	1	
			Base conversions	3	
			Binary arithmetic	3	
			Error detecting and correcting codes	2	
			Fundamentals of boolean algebra, logic gates & boolean laws	3	
			De-Morgan's Theorem and finding complements	1	
			Truth tables and algebraic minimization	2	
			Normal forms and conversion to/from canonical forms	2	
			Universal gates and Universal logic realization	2	
			Circuit synthesis	2	
			Karnaugh Maps	1	
		'C' Language	Introduction: Syntax, keywords, identifiers, data types, program structure	4	32
			Operators	1	
			Formatted and unformatted Input/Output	3	
			Arrays	3	
			Functions and Recursion	4	
			Working with strings	3	
			Enumerations	1	

			Structures and Unions, Arrays of structures	4		
			Pointers, Array of pointers, Function Pointers, Dynamic memory allocation, pointer arithmetic	5		
			File handling	4		
	Group -B	Graph Theory		Introduction to Graph Terminology and Definitions	5	15
				Paths & Circuits, Euler's Graphs, Hamiltonian paths	4	
				Distance measures	2	
				Graph representations: matrix, incidence, adjacency	4	
		Algorithms & Data Structures		Introduction, Concepts and Definitions	2	38
				Arrays: single and multi-dimensional	2	
				Linear and non-linear data structures	1	
				Singly & Doubly linked lists: operations and applications	5	
				Stacks and Queues: operations and applications	5	
				Infix, Prefix and Postfix notations, evaluations, conversions	3	
				Recursion and Divide-and-Conquer approaches	2	
				Trees: definitions, properties and traversals	2	
	Binary Search Trees: operations		2			
	Searching: linear and binary search		2			
	Hashing: concepts, advantages & disadvantages, collision, hash functions, types of hashing	5				
	Sorting: Bubble, Insertion, Quick, Merge, Heap, Partition-Exchange, Radix sorts, complexities	7				
Paper-II	Group-A (Operating Systems)		System Software: Assemblers, Loaders, Linkers, Interpreters, Compilers	5	48	
			Introduction to OS: Concepts, Definitions, Functions	3		
			Types of OS, Concepts of Files, Kernels & Shells	3		
			System calls, OS Architectures & Layers	3		
			Processes and Threads	2		
			Process Scheduling and Management, Schedulers & Scheduling Queues	4		
			Interprocess Communication	3		
			Semaphores, Critical Regions, Monitors	5		
			I/O Management: Devices, Device Controllers, Interrupts & Handlers	3		

		Memory Management: Real & Virtual Memory, Paging, Segmentation, Swapping, Page Replacement techniques	7	50
		File Systems: Files & Directories, Allocation Methods, File Servers, Security & Protection	4	
		Deadlocks: Concepts, Techniques for prevention, avoidance and recovery	3	
		Case Studies: DOS, UNIX, Windows	3	
	Group-B (Practical on C Language & Data Structures)	Programs in C Language	30	
		Programs on data structures using C	20	

PART-II

Paper	Group	Sub-part	Topic	Lectures	Total Lectures
Paper-III	Group-A	Digital Logic	Realization of basic gates using transistors, standard gate assemblies, IC packaging nomenclature	2	34
			Adders: Half Adder, Full Adder, Parallel Adder, Ripple Carry & Look-ahead carry adders, Adder/subtractor, BCD Adder	4	
			Multiplexers and Demultiplexers: Types, expansions, reductions	3	
			Encoders and Decoders: Types, expansions, reductions	3	
			Circuit realization using multiplexers, decoders and demultiplexers	3	
			Universal function realization using multiplexers	1	
			Code convertors and Parity generators/checkers	1	
			Comparators, Keyboard encoders, 7-Segment LED Display units	2	
			Introduction to sequential computing, differences with combinational circuits	1	
			RS-Latches using NAND & NOR gates, Latches as RAM cells, problems	1	
			Digital clocks, duty cycle, frequency and other terminology	1	
Flip-Flops: Edge and Level triggered SR, JK, T and D, preset & clear	3				

Group-B		Counters: synchronous and asynchronous	1		
		Mod-n, decade and up/down counters, ring counters, Johnson's counters	4		
		State transition table & diagrams	1		
		Registers: Parallel, Shift, Universal	3		
	Computer Architecture & Organization		Introduction: IAS Computer, Von-Neumann Architecture, System Bus, Instruction Cycle, Data Representation	6	26
			Hardware: ALU, CU, Registers, Cache, Program Counter, RISC & CISC, Stack Pointer, CPU Organization	6	
			Instructions: Size, Type, Opcode, Operand, Addressing modes, stack organization	6	
			Memories: Types of RAM, ROM, secondary & tertiary storage, and various storage technologies	4	
			I/O System organization & interfacing, Bus Arbitration	4	
	Object Oriented Programming		Introduction and differences with procedural programming	1	35
			Data abstraction and information hiding: objects, classes, methods	2	
			Encapsulation, inheritance, polymorphism	1	
			Introduction to C++	3	
			Input and Output Functions	2	
			Functions and Operator Overloading, Friend functions	5	
			Constructors and Destructors, Copy Constructors	4	
			Single, Multi-Level and Multiple Inheritance	4	
			Overriding, Polymorphism and Virtual Functions	4	
			Namespaces	1	
Exception Handling			4		
Templates			4		
Numerical Methods				Errors: concepts and types of errors	
	Finding roots: Bisection method, regular-falsi method, Newton-Raphson method, problems & graphical significance	4			
	Solution of differential equations: Euler method, Taylor method, Runge-Kutta 2 nd and 4 th order methods	4			
	Interpolation: Newton's forward & backward interpolation, Lagrange	3			

			interpolation		
			Integration: Trapezoidal, Simpson's 1/3 rd rules & its composite forms	3	
Paper-IV	Group-A (Hardware Practical)	Combinational and Sequential Circuits		50	50
	Group-B (Software Practical)	DOS, Windows, UNIX		25	50
		Programming on problems on numerical methods		25	

PART-III

Paper	Group	Sub-part	Topic	Lectures	Total Lectures
Paper-V	Group-A (Formal Languages & Language Translation)		Introduction to Formal Languages and Grammar	3	30
			Finite Automata	5	
			Regular Expressions	3	
			DFA, NFA and their equivalence	2	
			State minimization	2	
			Chomsky classification of grammars	1	
			Context free languages	4	
			Push Down Automata	4	
			Turing Machines, Universal Turing Machines	6	
	Group-B	Data communications & communication networks	Data communications and transmission media	4	32
			Network, protocols & standards	4	
			Analog & Digital Signals, Periodic & Non-Periodic Signals, Time & Frequency Domain	4	
			Multiplexing: FDM, TDM	3	
			Encoding: Analog-to-Digital, Digital-to-Analog	4	
			Errors, types, detection methods	4	
			Concepts of centralized and distributed computing	1	
			Advantages of networking	1	
			Layered Architecture & OSI Model	4	
			LAN, MAN, WAN, Simple PC based network	3	
Internet	Intranet and Internet, Servers and clients	2	18		

		Technologies	TCP/IP model	2		
			Ports, domains, DNS	1		
			IP Addressing, classful & classless, IP Routing	3		
			TCP Segments	1		
			Accounts, ISPs, Connections: Dial-up, ISDN, ADSDN	1		
			Cable, modem	1		
			E-mail: accounts, sending, receiving, mailing lists	1		
			IRC, Voice and Video conferencing	1		
			WWW, web browsers, web servers	1		
			Internet programming using HTML	4		
Paper-VI	Group-A (Software Engineering)		Introduction, Software life cycle models	5	28	
			Software requirements analysis & specification	4		
			Software project management	4		
			Structured analysis	2		
			DFD, Data dictionary	3		
			Structured design	2		
			Structure charts	2		
			Software Testing	4		
			Software Quality Assurance	2		
		Group-B (Database Management systems)		Basic concepts, file management systems, advantages of DBMS	4	49
				ANSI/SPARC Architecture, Physical, Conceptual & External models	2	
				ER Diagram	3	
				Data Models	3	
				File Organization	3	
				Query Languages	1	
				Relational Algebra & Calculus	3	
				Functional Dependencies	6	
				Normal Forms	5	
				SQL	6	
		Transaction processing	6			
		Security and Integrity	2			
		Case Study	5			
Paper-	Group-A		Evolution of microprocessors	2	38	

VII	(Microprocessor)	Architecture of 8-bit and 16-bit microprocessors	1	
		Machine Language instructions, Instruction formats	1	
		Addressing modes	2	
		Instruction set	10	
		Instruction & clock cycle, Timing diagrams	5	
		Interrupts, DMA, Bus Standards & Types	3	
		Memory & I/O Interfacing	5	
		Keyboard & Display interfacing	2	
		Interrupt Handling	3	
		Case Studies on 8085, 8086	4	
	Group-B (Practical: programming using 8085)	Programs in 8085 assembly language	50	50
Paper-VIII	Group-A (RDBMS Practical)	Lab related to Paper-VI (Group-B)	50	50
	Group-B (Front-end programming practical)	Lab related to Paper-V (Group-B)	50	50