BUET Pattern- DPDC AM (ICT), JAM (ICT)

SL	Subject	Details Syllabus for BUET Pattern
Exam-01	C Programming, OOP Output problem, Conceptual problem	1-D array, 2-D array, pointer, call by reference & call by value, array reverse, leap year check, series related problem, pattern related problem, Fibonacci series, palindrome number, prime number, Armstrong number, String related problem, string compare, reverse, number division, separation of digiti, summation of digit, transpose of matrix, matrix sum, multiplication, find highest lowest value, file related problem like append, adding two sorted or unsorted arrays, sorting an array, find/duplicate specific word/number or digit, perfect number, Recursion Problem, Problem of quadratic equation, value replace in c, removing character/string from a string. Binary Search, Linear Search, Merge Sort, Quicksort, Radix Sort, Bubble Sort, check odd-even number, Which language is interpreted or compiled Output: indiabix, examveda, geeksforgeeks, tutorialspoint, javatpoint, gate cs. (https://gateoverflow.in/) Inheritance, Abstraction, Polymorphism, Function Overloading, overriding, Late binding, dynamic binding, Java interface, Extends Runnable, Java Inheritance problem, Java variable instance, Java Lamda Expression, Functional Interface in Java, Object initialization Practice: calculation of electricity bill, gas bill or others bill, tax return, salary calculation etc
2	HTML, CSS, JavaScript, regarding these and related with job exam	HTML head, body, meta, heading, hyperlink practice, Paragraph, CSS inline or external, basic functionalities like == & ===; validate a number/email/phone or checking password, PHP how to connect with database, making a webform, pass data with the form and insert into database. Registration, Login Practice, Json.

3	Computer Fundamentals, Computer Architecture, Microprocessor & Microcontroller & Basic hardware related issues that is important for job exam.	**Computer Fundamentals:** SRAM, DRAM, Memory hierarchy, CPU Function, Virtual Memory & Cache memory, some troubleshooting related problem like laptop overheating, blue screen problem, Peripherals and various port name, printer & its types, windows restoring, motherboard, SSD interfacing, Printer Driver, Device Driver, **Computer Architecture:** Write back cache & write through cache, Hazard in computer arch & its types, Memory Operations, Flash RAM & static RAM, Blank Memory, Categories of Computer Architecture, Share memory and parallel processing architecture, RAID, Von Neuman & Harvard Architecture, RAID all. Pipelining mechanism and its advantages, Branching, five stages of pipeline CISC & RISC processor, BIOS & UEFI, Loader & Firmware, Mathematical Problem: Speed of processor, cache hit, miss related math, CPI Calculations. Direct Mapping & overhead calculation. Find average access time. **Microprocessor:** Microprocessor & Microcontroller advantages & difference. Timing diagram while reading data from memory. Microprocessor activities fetch and execution cycle. Pentium superscalar processor. 8,16,32,64-bit microprocessor. Multiprogramming & uni processor concept. 8086 microprocessor drawing and explanation of various parts. Interrupts & DMA. Assembly code practice like print 1 to n, sum of two number etc. Address bus Data Bus etc. Addressing Modes
4	Database	Distributed DBMS, DDL, DML, views, truncate, Various Key, ~~ACID~~ Properties, relational database, Degree of relationship, confidential, integrity, Functional Dependency, ~~ER~~ Diagram symbol and Drawing,

Database (Data info) Relational

File System

Draw on FR

Degree Relation (Constraint) System

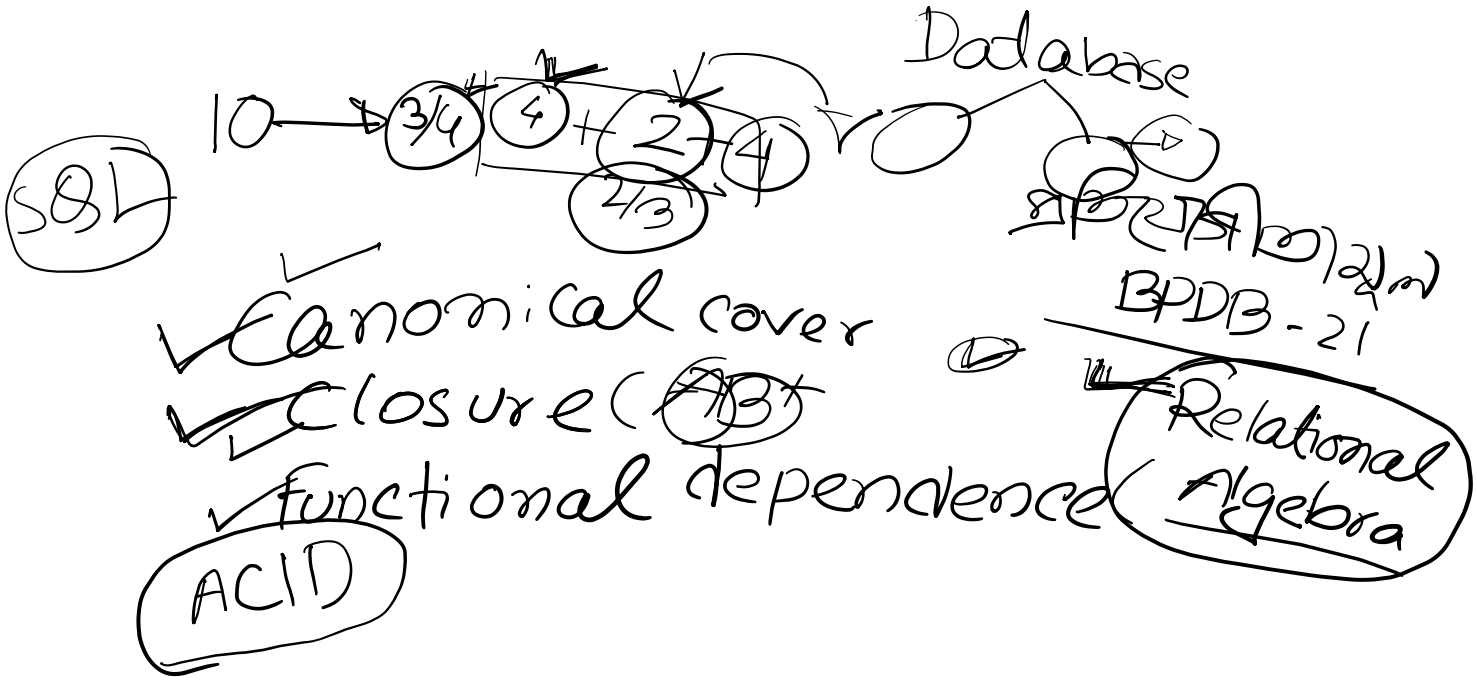
weak/Strong & is

		Indexing, B+ tree, B-tree, Hashing techniques, Basic to advance SQL query, trigger, View, Procedure, SQL Function, Join, Create, Update, Delete. Transaction, Relational Algebra.
5	Operating System	OS Definition, Functions, Multitasking, multiprocessing, multi-programming, multi-threading, mount point in linux, thrashing, Open Source, 32-bit & 64-bit, Process, Threads, PCB, Fork, State of Process, Symmetric & Assymmetric Encryption Deadlock, Deadlock conditions, Resource Allocation, 4 Conditions Paging, Segmentation, small Page Size in memory, Demand Paging, Page Fault, Virtual MemoryPage Replacement Algorithm, FIFO, LIFO, LRU, Scheduling Algorithms: FCFS, SJF, Round Robin, SRTF, Priority Scheduling, Preemptive, Nonpreemptive, Semaphore, Kernel, Micro, Macro Kernel, Shell vs Kernel, Linux Commands & shell Scripts, Mathematical Problem regarding page fault, logical address, physical address, processor, page size.
6	Networking	Circuit Switching, Packet Switching, Cell Switching, WiMAX, Network Topologies, Flooding, Forwarding, Ethernet, IPv6, IPv4, Gateway, Router, Switch, Hub, Firewall, Multicast, Broadcast, Fiber Cable Slicing, Twisted pair cable, Private IP & Public IP OSI Layer, OSI Layer Protocol, TCP, UDP, Distance Vector, DNS, FTP, CSMA, OSPF, RIP etc, MAC flood in switch, backbone, Wi-Fi, Bluetooth, WiMAX, LAN, WAN, MAN, TCP/UDP, Connection & Connection Oriented, TCP Congestion control protocol,3 Way handshaking protocol, TCP/IP. DHCP, NAT, SMTP, DNS, DNS Server, DHCP Server, HTTP, ARP, I2C, SPI, https vs http, DHCP starvation IP Subnetting, VLSM, Internet Cookies, MAC flood in switch, stateless & stateful IP addressing, risk, threat and vulnerability, DNS Poisoning, online and offline UPS,

		Proxy Server, NMS, WAF, OCR, MICR, TDM, FDM, Serial Communication, ARP, RARP,
7	Digital Logic Design	**Binary Systems and Number Conversion:** Binary-Decimal-Octal-Hexadecimal Conversion Gray Code, Excess-3, Parity Code **Boolean Algebra and Logic Gates** Full Adder, Half Adder, 3-bit adder, X-OR, AND gates, Multiply bit,Sum of product, product of sum, universal gate, Basic gates Or, AND, XOR, NAN, NOR, ALU Design, **Simplifications of Boolean Functions** K-map, (3 variable & 4 variable), F =A , F =A+B, A = A+B', F= A-1 এর জন্য ALU Design, Simply Boolean Expression, SOP, POS, Decoder, Encode Design, Prime implicants, **Combinational Logic** 4*1 MUX, 4/16 line decoder from 2/4 line decoder, 8*1 multiplexer, 6*1 MUX by using 2*1 MUX, 3 input NAND Gate using 4*1 MUX, 2*4 decoder using basic gates, 3-8 decoder using 2-4 decoders. **Sequential Logic, Flip Flop** Design a Down Counter, Design an asynchronous counter using any flip flop. latch and flip flop, describe synchronous sequential circuits, D-Flip Flop into T-FF adding logic circuits, state diagram of a digital circuit, **Counter, Registers & clock** mod-6 counter using T Flip-flops, logic diagram of MOD-12 Up counter using only T FF, convert a 100 MHz clock to 50 MHz and 25 MHz by only using D flip-flops? four type of Register
8	Software Engineering	SDLC, Software maintenance life cycle, Steps of Physibility Study, Waterfall Model, Agile Model, Protype Model, SCRUM Model, Spiral Model. UML Diagram, Use Case diagram, Class Diagram, Satte Diagram. Design Pattern: MVC, Observer Pattern, Singleton Design Pattern, Strategy design pattern, Software Testing: Cohesion & Coupling, Unit Testing, Acceptance Testing, Black Box, White box, Gray Box Testing, Regression Testing, Alpha testing, Beta testing, Gamma Equivalence Partitioning, Smoke Testing, Boundary Value Analysis. Functional, Non-functional Testing. Pert Chart, Critical Path, Decision tree build, buy & customize, Reason for failure of a software project.

		Software Validation & Verification, Application framework, DSS, MIS, Git, Docker, UI/UX design, Socket, Get, Post, DFS, Microservice Architecture, Defect removal efficiency
9	Compiler Design, Theory of Computation, Machine Learning, Artificial Intelligence, Big Data, Cloud Computing	NFA, DFA, NFA vs DFA, Regular Expression, Context Free Grammer, Turing Machine. Compiler Design Basic, Lexical Analyzer, Token,Code Optimization, Eliminate left, right empty string recursion, Syntax analysis and Semantic analysis A* Search, RBFS, IDA* Algorithm, First Order Logic,Hybridization of local and global search, Adversarial search, Turing Machine, OTDR, LSTM gates, PEAS, Agent, Approximate value & heuristic value. Supervised Learning, Unsupervised Learning, Test set and validation set, Strong and Ensemble learning, one layer two output ANN, Reinforcement learning, decision tree, Overfitting problem. Cloud Computing definition, types and real-life example. Definition of Big Data and uses.
10	Computer Security, Cyber Security, Information Security,	Basics of Computer/Network Security: Computer Virus, Antivirus Digital Signature, Encryption, Decryption, Cyber-attack, Cryptography: Symmetric and Asymmetric Cryptography & Example Symmetric key cryptographic algorithm, Computer attack/Virus, Patch and Update, Phishing attack, ARP Spoofing, Man in the Middle attack, Rootkit, Bootkit, Rootkit, Worm, Malware, Spyware, Threats, Ransomware attack, Active attack & Passive attack Network Security: Https and http, MAC Flooding, DNS Poisoning attack etc Firewall & DMZ, Firewall basic and types, Non-Repudiation, DMZ etc, Server-Side Security:Black listing, White listing, gray listing,VPN, DDOS attack in web server, server side attack & client side attack name Sha-256, Sha-512;Others: DHCP starvation, Cyber vandalism, biometric security, Trojan horse, Hellman Key exchange algorithm,

		RSA Algorithm, Packet sniffing and spoofing, Cross site script, Buffer overflow attack, SQL Injection attack, Social Engineering
11	Algorithm Analysis, Data Structure,	Implement stack using linked list, implement queue using linked list, Enqueue & dequeue operation,Array insert delete update, Linked list: insert, delete, update, reverse, traverse, Queue: insert, delete, Stack Push, Pop, Cirulcar & doubly Linked List, Circular queue, algorithm to multiply the matrix, Merge two sorted linked list, BST, Prim's , Kruskal Algorithm. MST, In order, preorder, post order traversal, heap, binary tree, binary tree repsentation using array.Graph adjacency matrix, dijsktra algorithm, Binary search, linear search, complexities of various searching & sorting Algorithm, Recursive & Recursion, Radix Sort, Quicksort, Shell Sort, Bubble Sort, Insertion sort, Selection Sort, Merge Sort, Infix & Postfix notation, B+ tree, B tree Greedy algorithm, Dynamic Programming, matrix multiplications, Divide and Conquer Algorithm, Huffman Coding, DFS, BFS, Dijkstra algorithm, Bellman Ford, Floyad Warshell Algorithm, P, NP, NP hard, Np Complete
12	Discrete Mathematics, Basic Electrical, Communication:	Discrete Math: Pigeonhole principle, Recurrence Relation Basic Electrical, Circuit Solution, Thevenin, Norton, Mesh, Superposition, Nodal analysis Communication: sampling, What is AWGN, quantizing error, PCM & Delta PCM, CDMA, communication channel, single mode and multi-mode fibre, dimmer using a Triac, seven segment display, Modulation and Demodulation, data communication, guided and unguided media, simplex, half duplex and full duplex, ADC steps? What is quantization error, Nyquist sampling theorem, the numeral aperture of optical fibre, Amplitude Modulation given Find Modulation Index, Signal to noise ratio, bit rate, baud rate calculation, working principle of optical fiber, total power and carrier frequency, STS, STM, Delta modulation and Demodulation, AM, FM, Bit Error Rate, SNR



DPDC JAM ICT : C Programming, Flow Chart, Algorithm Basic, Computer Fundamentals & Microprocessor 8086, Peripherals etc.
Database Basic & SQL Query
Web Technology
Digital Logic Design: Counter, Register, Flip Flop, MUX, Logic gates & Circuit, Simplification etc
Operating System Basic + Linux command (File, network & Server)
Networking: Subnetting, OSI Model , Topology, Protocol,
Probability Math/ analytical = 2 ta

DPDC AM ICT: All are important.
Grade -1 : Database, Networking, Programming, Data Structure & Algorithm, Operating System, Digital Logic Design

Grade-2 : Computer Fundamentals, Microprocessor + Architecture, Computer Security

Grade -3: Theory of Computation, Compiler Design, Machine Learning, Artificial Intelligence, Algorithm Analysis.

Most Chance: 50 + 50 = 100
50 = Bangla English General Knowledge, Power Sector
50 = ½ Analytical Written + 40 Technical