



Duranta Career & Skills Academy

Batch- 262

BUET+BPSC+IBA+DU+FBS+BSCS+BIBM+CTI+BANK+DUET+KUET+BCS+others

Pattern

Combined CSE/IT Job Course Outline

Artificial Intelligence	Definition, Goals of AI, Branches of AI, AI Types, Application of AI, Agents in AI, Performance Measure (PEAS); BFS, DFS, IDS,	Recorded
Machine Learning	What is ML, How ML Works, Types of ML, Algorithms of Machine Learning;	
Machine Learning	Skills learn to ML, Deep learning, How Neural Network works, Types and Application of Deep Learning, Deep Learning vs Machine Learning, NLP, NLP Pipelines, How NLP works, Data Acquisition technique, Big Data, NLP Techniques, Porter's streaming techniques,	Recorded
Artificial Intelligence	RBFS, Local Search, Global Search, Blind Search, Heuristic Search, Adversarial Search, First Order Logic, Turing machines, OTDR, LSTM, A* Search, Explainable AI (XAI) techniques, Simulated Annealing (SA) in optimization problems, Generative AI, HC-AI, Prompt Engineering, LLM (Large Language Model), Retrieval-Augmented Generation (RAG), Responsible AI. AI Evaluation Metrics	Live
Machine Learning	Weak and Strong learner Ensemble Learning, Decision Tree, Naïve Bayesian Model, Genetic Algorithm, ANN, K-means Clustering, Feature extraction method in ANN, ROC Curve, validity & reliability check of ML Model, Drawing of Neural Network, Parameters vs Hyperparameters, Gradient Descent, Learning Rate, Loss Function Convergence, Divergence, Oscillation, SGD & Adam Optimizer, Overfitting & Underfitting, Federated Learning (FL), Deep Learning, Reinforcement Learning, Feature Selection, Feature Extraction, Data Preprocessing Techniques. Model Training Concepts	Live
Cloud Computing	Definition of Cloud Computing, Advantages & Disadvantages of Cloud Computing, Types of Cloud Computing, Cloud Providers, Modern Cloud Topics, Containers (Docker), Scalability & Elasticity, Cloud Security, Load Balancing, High Availability, Serverless Computing, Kubernetes, Edge Computing, Multi-cloud, Cloud Migration CI/CD	Live
Data Center, Server, Virtualization (Basic & Advance) Back Up System	Data Center & its Maintenance, types of maintenance, Transform a data center to cloud, Server Concepts, Components of a server, configure a web server in data center Horizontal and Vertical Scaling, Data replication vs Data backup, Server maintenance, Virtualization, virtual machine with a neat diagram, ESXi, Hypervisor, Active Directory, Disaster Recovery, Backup Basics, Full vs Incremental vs Differential Backup, Backup vs Restore, 3-2-1 Backup Rule, Backup vs Disaster Recovery	Live

Digital Logic Design	Number System, Adder, Basic Gate, Boolean Algebra, Minimization of Boolean Expression, K-Map, Sequential Circuit, Combinational Circuit, Counter, Decoder & Encoder, Latch, Flip Flop, Logic Gates, MUX, Register, SOP & POS and Canonical Conversion, Subtractor, 7 Segment Display,	Recorded
Digital Logic Design	Parity Code, Excess-03 Code, Gray Code, BCD Code, Full Adder. Half Adder, Build XOR gate using NAND, construct a 3 bit-adder using the available ICs, Timing diagram from truth table/Latch/Flip-Flop, Implement and and Or gate using CMOS NAND AND NOR gate, Full Adder circuit using two half adders, NAND as a universal gate and XOR as universal gate, Design 4 bit Subtractor using 4 bit Adder, Drawing Boolean circuit using Logic Gate, RS latch using NOR gate, Construct a Truth Table for a system that triggers an Alarm, (Motion is Detected AND it is Night time) OR (Panic Button is pressed). For, $F = A$, $F = A+B$, $A = A+B'$, $F = A-1$, Design ALU, Design half adder using 2:4 Decoder and OR gate Identify the number of prime implicants and essential prime implicants for a specific function, Design a 4/8 Bit ALU, Design $m \times n$ decoder using gates or decoder, Draw 16×8 RAM using 16×4 RAM, logic circuit for 2-to-4 De-multiplexer, 8×1 Multiplexer, Design $m \times n$ MUX by using $P \times Q$, Using 2×4 active decoder and a NOR gate design a XOR gate. A 4×1 MUX is given, write down its expression in SOM form, Implement Function using 2×1 MUX, Design a Down Counter, Design an asynchronous counter using any flip flop. Design a mod-6/12/10 counter using T/JK Flip-flops. Register, Timing Diagram of a clock signals of T/JK/D flip flop.	Live
Software Engineering	SDLC, Software maintenance life cycle, Steps of Feasibility Study, Waterfall Model, Agile Model, Prototype Model, SCRUM Model, Spiral Model UML Diagram, Use Case diagram, Class Diagram, State Diagram, Design Pattern: MVC, Observer Pattern, Singleton Design Pattern, Strategy design pattern,	Recorded
Software Engineering	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,	Live

	DFS, Microservice Architecture, Defect removal efficiency	
Software Engineering	SOAP and RESTful APIs in web services, Software Quality Assurance (SQA), Verification and validation are two process areas at CMMI level 3. For both of these areas provide a) definition b) a description of how you can fulfill these areas in your software testing activities, real life software project problem/challenges, required effort math, project manager role and approaches to complete a project, software testing Level, which test in which level of implementation, Data Flow of a Method, Object-Oriented Analysis and Design (OOAD), Scenario based use case diagram, scenario based data flow, Choose which development model between our requirements, prefer between agile & waterfall, Describe the typical web application deployment architecture, and explain how they interact with each other during the deployment process, Between Waterfall Approach and Incremental Approach, Math problem & Real-life scenario-based problem solution.	Live
Networking	Basic Concepts: Network, Internet, Intranet, Extranet, Terminologies of Computer Network, Types of Networks based on Ownership, Types of Networks based on area coverage, Cloud Network, Types of system: Open-Close, Network Architecture: Peer-to-peer, Client-server, Hybrid Network Devices: Repeater, Hub, Bridge, Switch, Router, router, Modem, Gateway, Firewall, NIC, Access point, Network Topology: Bus, Star, Ring, Mesh, Tree, Hybrid, Point-to-point, Point-to multipoint, OSI Model & Layers, TCP-IP Model, Some other concepts	Recorded
Networking	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, Proxy Server, NMS, WAF, OCR, MICR, TDM, FDM, Serial Communication, ARP, RARP, Link State Algorithm, Distance vector routing.	Live
Networking	Addressing, MAC Address, IP Address, IPv4 & IPv6, Subnet Mask, Wildcard Mask, Classful IP & Classless IP, Subnetting, FLSM & VLSM, Super netting	Live
Operating System	Basics of Operating System, Feature, Function and Terms Process, Threads, Process Control Blocks, Deadlock Segmentation, Paging, Translation Lookaside Buffer, Context Switching, Virtual Memory: Types, technologies, Demand Paging, Process Scheduling Algorithms, Page Replacement Algorithm, Operating System Architecture & Kernel, Semaphore, Bankers Algorithm,	Live

	Producer Consumer Problem, Virtual Memory Related Math Example.	
Operating System	Linux Commands Summary, Linux Commands Details with example & Shell Scripts	Live
Database	Distributed DBMS, DDL, DML, Televiews, truncate, Various Key, ACID Properties, relational database, Degree of relationship, confidential, integrity, Functional Dependency, ER Diagram symbol and Drawing,	Recorded
Database	Indexing, B+ tree, B-tree, hashing techniques, Basic to advance SQL query, trigger, View, Procedure, SQL Function, Join, Create, Update, Delete. Transaction, Relational Algebra.	Recorded
Database	Live SQL query practice with Toad/Oracle	Live
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,	Recorded
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. Heterogeneous Multicore Processor (HMP), block and page? Draw simple block and page diagram in SSD (Solid State Drive), physical memory and virtual memory, memory organization, Amdahl's law. How does it mathematically dictate the absolute maximum performance speedup a system can achieve when adding more CPU cores? In banking applications data should not be lost or destroyed. How can disk redundancy and RAID technology help you to do active that, During Critical banking transaction, Which RAID level is best, you have 4 Hard Drives of 2TB each. Calculate usable storage for RAID 0 Calculate usable storage for RAID 5 Calculate usable storage for RAID 10; A maintenance engineer is setting up a RAID 5 array with five hard drives, each having a capacity of 4 TB. What is the total usable storage capacity, and why is it not 20 TB? What is BIOS. Discuss the factors that affects the speed of CPU. What do you mean by CISC and RISC? Compare	Live

	between RISC and CISC. Difference between Multi computer system and multi computer processor.	
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 & uniprocessor concept. 8086 microprocessors 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	Live
OOP	Main principles of OOP, Output Problem, Compile time polymorphism & Run time polymorphism, 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, Some Output Problem.	Live
Web Programming	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.	Live
TOC & Compiler Design	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	Recorded
Algorithm Analysis	Greedy algorithm, Dynamic Programming, matrix multiplications, Divide and Conquer Algorithm, Huffman Coding, DFS, BFS, Dijkstra algorithm, Bellman Ford, Floyd Warshell Algorithm, P, NP, NP hard, Np Complete	Live
Data Structure & Algorithm	Asymptotic Notation, Complexity Analysis, 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, Circular & doubly Linked List, Circular queue, algorithm to multiply the matrix, Merge two sorted linked list, BST, Prim's, Kruskal Algorithm. MST, Heap, In order, preorder, post order traversal, heap, binary tree, binary tree representation using array. Graph adjacency matrix, dijkstra algorithm, Binary search, linear search, complexities of various searching & sorting Algorithm, Recursive & Recursion, Radix Sort, Quicksort, Shell Sort, Bubble	Live

	Sort, Insertion sort, Selection Sort, Merge Sort, Infix & Postfix notation	
Discrete Math	Discrete Math: Pigeonhole principle, Recurrence Relation	Recorded
Electrical	Basic Electrical, Circuit Solution, Thevenin, Norton, Mesh, Superposition, Nodal analysis	Live
Data 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	Live
Programming	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 digit, 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	Live
Output Practice	indiabix, examveda, geeksforgeeks, tutorialspoint, javatpoint, gate cs. (https://gateoverflow.in/)	Live
Information & Cyber Security & Others	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	Live

	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, Encrypt and Decrypt a Message, What is Cryptocurrency? What is Bitcoin? What are the advantages of Blockchain Technology? Security requirement in banking app	
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Subject Name	Live Class	
Artificial Intelligence	02	
Machine Learning	02	
Cloud Computing	01	
Data Center, Server, Virtualization (Basic & Advance) Back Up System	03	
Exam -01	AI+ML+CC+V+DC+Server	

Digital Logic Design	03	
Exam -02	Digital Logic Design	
Software Engineering	02	
Exam -03	Software Engineering	
Networking	03	
Exam -04	Networking	
Operating System	03	
Exam -05	Operating System	
Database	02	
Exam -06	Database	
Computer Architecture	02	
Microprocessor	01	
Exam -07	Computer Architecture, Microprocessor	
OOP	01	
Exam -08	OOP	
Web Programming	00	
TOC & Compiler Design	00	

Exam -09	Web Programming, TOC & Compiler Design	
Algorithm Analysis	01	
Data Structure & Algorithm	03	
Exam -10	Data Structure & Algorithm, Algorithm Analysis	
Discrete Math	00	
Electrical	02	
Data Communication	02	
Exam -11	Discrete Math , Electrical, Data Communication	
Programming	02	
Output Practice	01	
Information & Cyber Security& Others	02	
Exam -12	Programming, Output, Security	
Exam-13 (Final Model Test)	BUET Pattern	
Exam-14 (Final Model Test)	BANK AD ICT/AP/AME	
Exam-15-(Final Model Test)	Petrobangla AM IT	
Closing Ceremony		

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Pattern

Combined CSE/IT Job Course

40+ Live class

60+ Recorded Video

15 Written Exams

5 Non-Technical Class (Suggestions)

CSE Career Master Guide – Job Solution -Hard Copy

CSE Career Master Guide- Question Paper-Set wise- Google Drive (Only view Access)

Concept Book 1,2,3,4 – Google Drive (Only view Access)

Gate CS Q Bank & Solution- Google Drive (Only view Access)

Non-Technical Job Solution – BUET Pattern - Google Drive (Only view Access)

Course Fee: 3000/-

Class Start- 05 August.

(ক্লাশ শুরুর আগে পূর্বের কোর্সের ভিডিও গুগলোতে দেখতে পারবেন, হ্যান্ড নোট পড়তে পারবেন)

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