

# ExitPass Ethiopia Computer Science Exit Exam Questions

## Analysis Summary

Created for you from our exam datasets from last year's exit and model exam questions. Helps you prepare strategically.

### Computer Security

#### High Focus

- Vulnerabilities and Attacks (SQLi, XSS, Brute-force, Buffer Overflow, Interception) 28%
- Cryptography (Symmetric vs Asymmetric, AES rounds, RSA modulus, Keys, Digital Signatures) 22%
- Access Control Models and Principles (MAC, DAC, RBAC, Least Privilege, AAA) 18%

#### Moderate Focus

- Database and Operating System Security (Inference control, Trusted OS, Evaluation criteria) 15%
- Security Services and Malware (CIA Triad, Viruses, Worms, Trojans) 12%

#### Limited (Less Frequent but Still Tested)

- Network Protection Mechanisms (Firewalls, IDS, VPN) 9%

#### Exam Pattern Summary

- Dominant Themes: Identifying and mitigating specific cyber-attacks and understanding the mathematical foundations of encryption.
- Question Types: Mix of Definition-based (defining vulnerabilities) and Scenario-based (determining which security service is violated).
- Exam Structure: Significant emphasis on technical standards like AES structure and RSA calculations.

#### ExitPass Ethiopia Recommendation

Prioritize the mechanics of AES and RSA and distinguish clearly between Discretionary and Mandatory access control.

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### Compiler Design

#### High Focus

- Parsing Techniques (Top-down, Bottom-up, Shift-Reduce, LL/LR, Handle) 30%
- Compiler Phases and Outputs (Lexical, Syntax, Semantic, Synthesis) 25%
- Syntax-Directed Translation and Attributes (Synthesized vs Inherited) 15%

#### Moderate Focus

- Code Optimization (TAC, Dead code, Code motion, DAGs, Strength reduction) 15%
- Runtime Environment and Symbol Table (Activation Records, Parameter Passing) 10%

#### Limited (Less Frequent but Still Tested)

- Compiling Tools and Static Checking (LEX, YACC, Linker, Loader) 9%

#### Exam Pattern Summary

- Dominant Themes: Technical mechanics of grammar recognition and the internal flow of compilation phases.
- Question Types: Conceptual (logic of parsers) and Technical calculation (token counts, grammar terminals).
- Exam Structure: Focuses heavily on the front-end (Lexical to Semantic) of the compiler.

#### ExitPass Ethiopia Recommendation

Master the Shift-Reduce actions and the specific task of each compiler phase.

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### Computer Organization & Architecture

#### High Focus

- CPU Operation and Register Transfer (PC, IR, MAR, Fetch/Decode/Execute) 25%
- Digital Logic and Combinational Circuits (Gates, Mux, Decoders, Flip-Flops) 20%
- Memory Hierarchy and Cache (Mapping, Hit ratio, Write policies, LRU) 20%

#### Moderate Focus

- I/O Systems and Data Transfer (DMA, Programmed I/O, Interrupts) 18%
- Data Representation (2's Complement, BCD, Floating point, Hexadecimal) 10%

#### Limited (Less Frequent but Still Tested)

- Architecture Comparison and Parallelism (RISC vs CISC, Flynn's Classification) 7%

#### Exam Pattern Summary

- Dominant Themes: Low-level data movement between hardware components and binary logic.
- Question Types: Calculation-based (binary conversion, hit ratio) and Conceptual (register roles).
- Focus Orientation: Deeply Theoretical regarding hardware structure.

#### ExitPass Ethiopia Recommendation

Ensure proficiency in Instruction Cycle micro-operations and Cache mapping techniques.

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### Computer Programming (C++)

#### High Focus

- Control Structures and Loops (while, for, do-while, switch, break/continue) 35%
- Arrays and Strings (Declarations, Indices, strcmp, NULL terminator) 20%
- Functions and Scope (Parameters, pass-by-value/reference, Recursion) 20%

#### Moderate Focus

- Pointers and Dynamic Memory (Addresses, dereference, new/delete) 15%
- Basics and Syntax (Data types, Operators, IO objects, Linker) 10%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Output prediction based on complex increment/decrement operators and loop nesting.
- Question Types: Clinical / Scenario-based (tracing code) and Definition-based.
- Exam Structure: Heavy emphasis on predicting values after pointer and array manipulations.

#### ExitPass Ethiopia Recommendation

Prioritize tracing nested loops and understanding pointer dereferencing logic.

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### Automata & Complexity Theory

#### High Focus

- Turing Machines (Tapes, Components, Halting Problem, Decidability) 25%
- Grammars and Languages (Chomsky Hierarchy, Regular, CFG, CNF, GNF) 25%
- Finite Automata and Regular Expressions (DFA, NFA, Closure properties) 20%

#### Moderate Focus

- Complexity Classes (P, NP, NP-Complete, Polynomial time) 15%
- Pushdown Automata (Stacks, memory differentiation) 10%

#### Limited (Less Frequent but Still Tested)

- Set Theory and Formal Proofs (Cardinality, Cartesian product, Contradiction) 5%

#### Exam Pattern Summary

- Dominant Themes: Determining which machine recognized which language class and the formal definition of these machines (tuples).
- Question Types: Conceptual (identifying language regularity) and Definition-based (formal 5/7-tuples).
- Focus Orientation: Highly Theoretical mathematical logic.

#### ExitPass Ethiopia Recommendation

Memorize the Chomsky Hierarchy table (Language, Grammar, Automaton) as it is the most recurring technical theme.

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### Data Communication & Networking

#### High Focus

- IP Addressing and Subnetting (IPv4, CIDR, Usable Hosts, Masks) 35%
- OSI and TCP/IP Model Layers (Responsibilities, Encapsulation) 30%
- Network Protocols (DHCP, ARP, DNS, ICMP, HTTP, FTP) 15%

#### Moderate Focus

- Network Topologies and Standards (Bus, Star, Mesh, ARPANET, De Jure) 10%
- Transmission Media and Impairments (Fiber, UTP, Jitter, Attenuation, Noise) 10%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Practical subnet mask calculations and the source-to-destination delivery flow.
- Question Types: Calculation-based (subnet host ranges) and Application-based (choosing protocols).
- Focus Orientation: Problem-solving in network configuration.

#### ExitPass Ethiopia Recommendation

Ensure you can calculate usable hosts ( $2^n - 2$ ) and broadcast addresses for any given CIDR mask.

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### Data Structure & Algorithm

#### High Focus

- Trees and BSTs (Traversals: In/Pre/Post-order, Node properties, AVL) 25%
- Sorting Algorithms (Bubble, Quick, Merge, Selection, Complexity) 22%
- Linear Structures (Stacks and Queues, Push/Pop, Enqueue/Dequeue, LIFO/FIFO) 20%

#### Moderate Focus

- Algorithm Analysis (Big-O, Space/Time Complexity, Growth rates) 18%
- Searching and Hashing (Binary vs Linear Search, Collision Handling) 15%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Sequential stack/queue operations and the resulting data states.
- Question Types: Conceptual (logic of ADTs) and Problem-solving (calculating sorted array states).
- Exam Structure: Heavy focus on performance (Big-O) across different structures.

#### ExitPass Ethiopia Recommendation

Master BST in-order traversal and the asymptotic complexities for searching/sorting algorithms.

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### Database System

#### High Focus

- Normalization (1NF, 2NF, 3NF, BCNF, Functional Dependencies) 28%
- Transaction Management and Concurrency (ACID, Locks, Deadlock, Failure) 25%
- Database Architecture and SQL (Conceptual levels, DDL/DML commands) 20%

#### Moderate Focus

- Database Design and ER Modeling (Attributes, Keys, Entities, Relationships) 15%
- Advanced Models and Integrity (Distributed, Object-Oriented, Integrity Rules) 12%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Maintaining data consistency through normalization and handling transaction anomalies like "dirty reads".
- Question Types: Conceptual (integrity rules) and Practical SQL analysis.
- Focus Orientation: Theory-heavy regarding database states and concurrency logic.

#### ExitPass Ethiopia Recommendation

Focus on identifying Partial and Transitive dependencies to resolve 2NF/3NF violations.

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### Design & Analysis of Algorithms

#### High Focus

- Greedy Algorithms (MST: Prim/Kruskal, Huffman, Knapsack, Dijkstra) 30%
- Algorithm Complexity and Notations (Big-O, Master Theorem, Upper Bound) 25%
- Dynamic Programming (Optimality Principle, LCS, Multistage Graph, OBST) 20%

#### Moderate Focus

- Backtracking and Branch & Bound (N-Queens, TSP, State Space Trees) 15%
- Graph Traversals and Connectivity (DFS, BFS, Articulation Points) 10%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Selecting the most efficient algorithm strategy (Greedy vs DP) for optimization problems.
- Question Types: Calculation-based (deriving time complexity) and Problem-solving (finding MST edges).
- Focus Orientation: Optimization-driven scenarios.

#### ExitPass Ethiopia Recommendation

Concentrate on the Master Theorem for solving recurrences and step-by-step Prim's Algorithm execution.

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### Introduction to AI

#### High Focus

- Search Algorithms (BFS, DFS, A\*, Heuristics, Minimax, Hill Climbing) 28%
- Agent Concepts and Environments (Reflex, Goal, Utility, Observability) 25%
- Knowledge Representation and Logic (FOL, Quantifiers, Inference) 20%

#### Moderate Focus

- Machine Learning (Supervised, Unsupervised, Reinforcement, Neural Networks) 15%
- AI Applications and Ethics (NLP, Robotics, Vision, Bias, Laws) 12%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Characterizing environments and selecting the correct search strategy for an agent.
- Question Types: Conceptual (identifying agent types) and Formal Translation (FOL to FOL translation).
- Focus Orientation: Rationality and Logic based problem solving.

#### ExitPass Ethiopia Recommendation

Focus on the PEAS framework for agent analysis and the difference between admissible and consistent heuristics.

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### Network & System Administration

#### High Focus

- Operating System Admin (Boot process, Shell, Kernel, Runtimes, Processes) 25%
- System Security and Protection (ACL, SSH, Firewalls, RADIUS, Auditing) 22%
- Active Directory and User Management (Forests, Domains, Quotas, Shell) 18%

#### Moderate Focus

- Administration Tasks and Roles (User management, Data center, Ethics) 15%
- Networking Tools and Troubleshooting (Ping, Tracer, Netstat, ARP) 12%

#### Limited (Less Frequent but Still Tested)

- Backup and Recovery (Full, Incremental, Differential) 9%

#### Exam Pattern Summary

- Dominant Themes: Linux command-line proficiency and Active Directory structure.
- Question Types: Application-based (identifying which tool to use) and Scenario-based (system failure recovery).
- Focus Orientation: Practical Situations regarding server maintenance.

#### ExitPass Ethiopia Recommendation

Students must be comfortable with Linux file permissions (chmod) and the Active Directory hierarchy (Schema-Forest-Tree-Domain).

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### Object Oriented Programming

#### High Focus

- Core OOP Principles (Inheritance, Polymorphism, Encapsulation, Abstraction) 35%
- Methods and Behaviors (Overloading vs Overriding, Static, Constructors) 20%
- Exception Handling (Checked/Unchecked, try-catch-finally, throws) 15%

#### Moderate Focus

- Collections Framework (List, Set, Map, Hash, Iteration) 15%
- Java Environment and Syntax (JVM, JIT, Packages, Memory addresses) 10%

#### Limited (Less Frequent but Still Tested)

- Enum methods and basic syntax (ordinal, default values) 5%

#### Exam Pattern Summary

- Dominant Themes: Distinguishing between different forms of polymorphism and the lifecycle of exception blocks.
- Question Types: Conceptual (identifying OOP principles in code) and Definition-based.
- Focus Orientation: Theory of Object Interaction.

#### ExitPass Ethiopia Recommendation

Master the execution order of the 'finally' block and the difference between checked and runtime exceptions.

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### Operating System

#### High Focus

- CPU Scheduling (FCFS, SJF, RR, Priority, Throughput calculations) 30%
- Memory Management (Paging, Swapping, Fragmentation, Page Faults, LRU) 25%
- Process and Thread Management (States, PCBs, Context Switching, IPC) 20%

#### Moderate Focus

- Deadlocks (Mutual Exclusion, Circular Wait, Prevention, Avoidance) 15%
- File and Device Management (I/O, Controller, Access Methods) 10%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Calculating average waiting time for scheduling algorithms and identifying page replacement outcomes.
- Question Types: Calculation-based (Gantt Charts) and Conceptual (state transitions).
- Focus Orientation: Fair allocation of System Resources.

#### ExitPass Ethiopia Recommendation

Prioritize Round Robin time quantum calculations and the four necessary conditions for deadlock.

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### Software Engineering

#### High Focus

- Process Models (Waterfall, Spiral, Incremental, Agile, RAD) 30%
- Requirements Engineering (Functional/Non-functional, SRS, JAD, Elicitation) 25%
- UML Modeling (Use Case, Class, Sequence, Activity Diagrams) 20%

#### Moderate Focus

- Software Testing (Black/White box, Unit, Integration, Acceptance) 15%
- System Design and Management (Coupling, Cohesion, Risk, FPA metrics) 10%

#### Limited (Less Frequent but Still Tested)

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#### Exam Pattern Summary

- Dominant Themes: Identifying actors/use cases from system descriptions and choosing the correct SDLC model.
- Question Types: Scenario-based (choosing design models) and Definition-based.
- Focus Orientation: Practical Project Management and documentation standards.

#### ExitPass Ethiopia Recommendation

Focus on the differences between Aggregation and Composition in UML and risk mitigation strategies.

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### Web Programming

#### High Focus

- HTML and DOM Structure (Tags, Document types, Window/Document objects) 30%
- PHP and Server-Side Logic (SQL/XSS prevention, Sessions, Cookies, Arrays) 25%
- JavaScript (Function scope: let/var, Event loop, DOM manipulation, Math functions) 25%

#### Moderate Focus

- CSS and Styling (Selectors, specificity, z-index, Inlining) 15%

#### Limited (Less Frequent but Still Tested)

- Web Basics (User agents, Browsers vs Servers) 5%

#### Exam Pattern Summary

- Dominant Themes: Security in web forms (preventing SQLi) and JavaScript scope rules.
- Question Types: Clinical (code snippets for output) and Definition-based.
- Focus Orientation: Modern Secure Development practices.

#### ExitPass Ethiopia Recommendation

Prioritize understanding PHP session\_start() and the specificity of CSS selectors

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