

Government of Nepal  
Teachers Service Commission

**Lower Secondary Level Curriculum of Subjective Examination- 2076**

**Subject: Computer Science**

**Full Marks: 100**

**Time: 3 Hours**

**Section: A**

**Unit 1. Computer Fundamentals, Number System and Digital Logic**

- 1.1 Fundamentals of computer
- 1.2 Computer Hardware: Input device, Output device, Hardware interface, Storage devices
- 1.3 Computer Architecture, Central processing unit, Control unit, Computer arithmetic, input output organization, memory organization
- 1.4 Number system, Binary Arithmetic, Base Conversion
- 1.5 Boolean Logic and Boolean algebra
- 1.6 Introduction to digital system, Logic gates and Boolean algebra, Boolean function
- 1.7 Concept of Sequential and Combinational Circuits
- 1.8 Concept of Microprocessor

**Unit 2. Computer Application, Multimedia and Graphics**

- 2.1 Computer software and its classification
- 2.2 Office Automation application: Word processor, Spread Sheet and Presentation
- 2.3 Database packages and its applications
- 2.4 Concept Multimedia, Component of Multimedia: Text, Graphics, Audio, Video and Animation
- 2.5 Application of Multimedia, Computer Graphics (image size, format and editing)
- 2.6 Use of Computer Application and Multimedia in teaching and learning

**Unit 3. Programming Concepts and Object-Oriented Programming**

- 3.1 Programming Language Translators, Pseudo code, Algorithm and Flow chart
- 3.2 Programming in QBasic, Opening, reading and writing data file, modular programming approach, function and Sub procedure
- 3.3 Programming Language types and generations
- 3.4 C-Programming: Key words, identifier's, data types, constants and variables, input, output and control statement, functions, array, pointer, structure and file handling concept
- 3.5 Object Oriented Programming (OOP): Class, Object, Encapsulation, Polymorphism and Inheritance, Object Oriented Programming with C++ and Java Programming

**Unit 4. Web Technology**

- 4.1 Concept of Internet and Email
- 4.2 Internet technology: WWW, Social Media and Web 2.0, Tire architecture, HTTP
- 4.3 HTML Tag and web site design concept
- 4.4 CSS (Inline, embedded and external) and JavaScript
- 4.5 Concept of PHP and MySQL
- 4.6 Content Management System (CMS) and Practices

**Unit 5. Computer Network and Data Communication**

- 5.1 Concept of Telecommunication and Computer Networking
- 5.2 Data communication and communication System
- 5.3 Elements of Data Communication/Transmission, Simplex, Half duplex and Full duplex communication mode
- 5.4 Concept of LAN and WAN, Transmission Medium: Guided and Unguided, Elements of Network
- 5.5 Types of Network, Network Architecture, Topologies, Protocols
- 5.6 OSI reference model and TCP/IP model
- 5.7 Network Security, Conventional Encryption, Cryptography, Authentication and Public Key Infrastructure (PKI)VPN

**Section: B**

**Unit 6. Data Structure, Algorithm and Database Management System**

- 6.1 Introduction to Data Structure and Algorithm
- 6.2 Stacks, Queues and Lists, Sorting and Searching algorithms, Tree and Graph
- 6.3 Concept of Database model: Relational Model, Entity Relationship Data Model

- 6.4 DDL, DDL and DCL, Relational Algebra, Structured Query Language (SQL) and Integrity constraints
- 6.5 Database Normalization (1NF, 2NF, 3NF and BCNF)
- 6.6 Concurrency Control and Transaction Processing
- 6.7 Database security and recovery
- 6.8 Concept of Distributed Database, NoSQL, Bigdata, Data warehouse and data mining

### **Unit 7. Operating System**

- 7.1 Introduction of Operating System,
- 7.2 Window operating system and Basic Operation
- 7.3 Open source operating system and mobile operating system,
- 7.4 Process management,
- 7.5 Memory management,
- 7.6 Storage management,
- 7.7 System administration using Linux

### **Unit 8. Software Development and Software Project Management**

- 8.1 Fundamentals of System Analysis and System Design,
- 8.2 Feasibility Analysis,
- 8.3 Software process and software development model
- 8.4 Requirement Engineering and Software Architecture
- 8.5 Software testing, Verification and Validation
- 8.6 Software Re-engineering
- 8.7 Software Project Management: initiation, planning, execution and closing

### **Unit 9. Recent Technology, Ethical and Social Issue**

- 9.1 Concept of Cloud Computing: SaSS, PaSS, IaSS
- 9.2 Concept of Artificial Intelligence: Virtual Reality, IoT, Augmented Reality
- 9.3 e-Enable Services: E-Governance, e-commerce, e-medicine
- 9.4 Ethical and Social Issues in ICT: Security threats, Malicious software and Spam, malicious codes, security and ethical challenge, Digital Citizenship, Digital Footprint, Opportunities and threats in Social Media, Digital society and computer ethics, Cybercrime,
- 9.5 Authentication systems: Password, biometric, Firewalls, Antivirus software,
- 9.6 Backup System, Hardware Security, Power protection device (Volt guard, Spike guard, UPS)
- 9.7 Intellectual Property Right, Concept of Digital Signature, Cyber law in Nepal

### **Unit 10. ICT in Education**

- 10.1 ICT Education and ICT in Education
- 10.2 Learning theory and practices: Constructivism, Connectivism, Network, PBL
- 10.3 E learning and ICT Education pedagogy: e-learning Concept and Characteristics, ICT integrated lessons, ICT in Assessment,
- 10.4 e-Learning 3.0 and ICT educational tools
- 10.5 Learning Management System: MOODLE based learning Management system
- 10.6 ICT for Teacher Professional Development, Teachers ICT competencies
- 10.7 ICT in Education in ICT policy in Nepal and Digital Nepal Framework

## Specification Grid

**Subject:** Computer Science

**Level:** Secondary

Units	Content Area	Question	Marks
<b>Section A</b>			
1	Computer fundamental, Number system and Digital Logic	1	10
2	Computer Application, Multimedia and Graphics	1	10
3	Programming Concept and Object-Oriented Programming	1	10
4	Web Technology	1	10
5	Computer Network and Data Communication	1	10
<b>Section B</b>			
6	Data Structure, Algorithm and Database Management System	1	10
7	Operating System	1	10
8	Software Development and Software Project Management	1	10
9	Recent Technology, Ethical and Social Issue	1	10
10	ICT Education	1	10
	Total	10	100

**Notes:**

1. This curriculum is divided into sections A & Section B.
2. Generally from section A questions will be asked related to pedagogy and integration with contents.
3. From section B questions will be asked covering cognitive level.
4. Separate answer sheets will be used for each section.
5. The medium of the language in written test will be either Nepali or English or both.
6. This curriculum will be effective from 2076/12 /02.

**Model Question**  
**Computer Science**  
**Secondary Level (Grade 9-12)**  
**Group A (10 x 5=50)**

**Attempt All questions**

1. a) What are the components of computer system? How do you describe it in the classroom?  
b) Describe the logic gates demonstration techniques for teaching.
2. What are major features of word processor? How do you implement these features to classroom teaching learning purpose? Explain with examples.
3. a) Describe the array. Explain the methods to practical demonstration of array in laboratory work.  
b) Explain the inheritance concept in C++/Java programming language to classroom teaching.
4. Demonstrate the different types of CSS and how do you show to integration in HTML page on teaching.
5. How do you teach OSI reference model in higher order thinking? Describe.

**Group B (10 x 5=50)**

**Attempt All questions**

6. Describe the software development process. How do apply verification and validation process in software quality assurance?
7. Describe the different category of cybercrime and counter measure methods to prevention form cybercrime.
8. Explain the ICT integrated pedagogy and e-learning tools to the classroom teaching.
9. Demonstrate the quick sort algorithm with example.
10. Describe the round robin CPU scheduling algorithm with example.