9597 H2 Computing Paper

Paper 1 Format

- Duration: 3 hours 15 min
- Total Marks: 100
- Weighting: 35%
- Number of questions: 4

Paper 2 Format

- Duration: 3 hours
- Total Marks: 100
- Weighting: 65%
- Number of questions: 6

Contents

Module 1: Algorithms and Design

1.1 Fudamental Algorithms

1. Search
    1.1 Linear / sequential
    1.2 Binary search (iterative / recursive)
    1.3 Hash table search
2. Sorting
    2.1 Bubble sort (normal and improved)
    2.2 Insertion sort
    2.3 Quick sort
3. Modulo operations and weighted modulo
4. Binary search tree
    4.1 Building: iterative / recursive
    4.2 Sort: iterative / recursive
    4.3 Search: iterative / recursive
    4.4 Traversal: recursive (pre-order, in-order, post-order)

1.2 Abstraction

1. Data representation
    1.1 ASCII code: ord( ), chr( )
    1.2 Unicode
    1.3 Binary, octal, hexadecimal
2. Data structures and associated operations (insert, delete, search)
    2.1 Array: append, pop
    2.2 Dictionary: mapping values
    2.3 Stack: push, pop
    2.4 Queue: enqueue, dequeue
    2.5 List: add, delete

1.3 Modularity

1. Types of programme errors
2. Test cases
    2.1 Normal
    2.2 Invalid
    2.3 Errornous
    2.4 Boundary
3. Data validation
    3.1 Range
    3.2 Length
    3.3 Format

    3.4 Data type
4. Programme Design
    4.1 Modular design
    4.2 Top-down approach
5. Use of meaningful variable names

1.4 Programming

1. I/O operations
2. Serial / sequential text files
    2.1 Opening / closing files
    2.2 Reading / writing files
    2.3 Finding locations: seek(), tell()
3. Classes and objects
4. Encapsulation (not allowing for access to class data from external methods and functions)
5. Inheritance: calling super().__init__()
6. Polymorphism

Module 2: Interface and Interactions

2.1 Interacting with Computers (User Interface)

1. Types of user interfaces
    - 1.1 Command line
    - 1.2 Menu
    - 1.3 Form-based
    - 1.4 Graphical
2. Specifications of appropriate interface
3. Design considerations (8 Golden Rules)
4. Interaction techniques / input methods
    - 4.1 Mouse
    - 4.2 Keyboard
    - 4.3 Voice
    - 4.4 Gesture
    - 4.5 Touch
5. Styles of interaction
    - 5.1 Command line
    - 5.2 Menu
    - 5.3 Graphical
    - 5.4 Virtual reality
6. Effects and impacts of computers
    - 6.1 Social issues
    - 6.2 Ethical issues
    - 6.3 Economic issues

2.2 Interfacing Computers (Networking)

1. Types of networks and examples of them
    1.1 Local area network
    1.2 Wide area network
2. Purposes of networking hardware
    2.1 Servers
    2.2 Clients
    2.3 Switches
    2.4 Routers
    2.5 Bridges
3. Intranet
    3.1 Usage
    3.2 Reasons for implementing Intranet
4. Cloud computing
    4.1 Types of services
        4.1.1 Application as a service
        4.1.2 Infrastructure as a service
        4.1.3 Platform as a service
    4.2 Benefits of using cloud
    4.3 Social and security issues related to cloud storage
5. Rate of transmission (baud / bps)
6. Types of data transmission
    6.1 Synchronous
    6.2 Asynchronous
7. Modes of data transmission
    7.1 Simplex
    7.2 Half-duplex

    7.3 Full-duplex
8. Types of switching and their benefits / drawbacks
    8.1 Circuit switching
    8.2 Packet switching
9. Error detection in transmission
    9.1 Parity bit check
    9.2 Checksums

2.3 Interacting with data (Relational database)

1. Attributes of database
    1.1 Tables
    1.2 Records
    1.3 Fields
    1.4 Tuples
2. Entity-Relationship diagrams
3. Data redundancy and data dependency
4. Privacy and integrity of data

Module 3: Systems Engineering

3.1 System Development Cycle (SDC)

1. Data and processes in software system / applications
    1.1 Business systems
    1.2 Information systems
    1.3 Education systems
    1.4 Entertainment systems
2. Phases of development
    2.1 Specification
    2.2 Design
    2.3 Development
    2.4 Documentation
    2.5 Implementation
    2.6 Testing / Modification
    2.7 Maintenance
3. Testing strategies
    3.1 Bottom-up testing
    3.2 Top-down testing
    3.3 White box testing
    3.4 Black box testing
    3.5 Alpha testing
    3.6 Beta testing

3.2 Project Management Techniques

1. Purpose of project proposal
2. Project management

2.1 PERT chart and critical path analysis

2.2 Gantt chart

3. Importance of team work and roles of team members on a project

3.3 Network Applications

1. Methods for creating network app
    1.1 Client side scripting
    1.2 Server side scripting
2. Tools for network application
    2.1 Hand-held devices
    2.2 Technology standards
    2.3 Application software
3. Security of network application
    3.1 Access rights
    3.2 Editing rights
    3.3 Password and protected access
4. Network security
    4.1 Firewalls
5. Issues of network applications
    5.1 Social issues
    5.2 Ethical issues
    5.3 Copyright issues