

M.Sc. IT (Part II) Examination, 2010

Operating Systems

Attempt any five questions. All questions carry equal marks.

1. (a) What is an operating system? Explain its major functions.
(b) Explain the evaluation of operating system including the following:
 - (i) Batch processing system
 - (ii) Multi processing system
 - (iii) Time sharing system
 - (iv) Distributed system
 - (v) Real time system
2. (a) What is CPU scheduling? State its major objectives.
(b) What is a process scheduler? Explain different types of schedulers.
3. Explain the following any two:
 - (a) Architecture of Windows 2000
 - (b) Linux architecture
 - (c) Layered structure of DOS
 - (d) VI editor in Linux.
4. (a) Explain the basic method of paging technique. Discuss its advantages and limitations. Give suitable diagram.
(b) Explain how paging is different from segmentation.
(c) Explain the concept of swapping. Give suitable diagram.
5. (a) Define deadlock with a suitable example. Also state conditions for a deadlock to occur in the system.
(b) Describe various deadlock detection algorithms.

6. Write short notes on the following:

(a) Virtual memory

(b) Inter-process communication

(c) System calls

(d) Processes in Unix

(e) Critical section

7. (a) Explain the architecture of distributed system. What are the advantages of distributed system?

(b) List various security threats in case of distributed system.

8. (a) Explain the Linux file system.

(b) What are shell variables and the rules of building shell variables.

(c) Write note on 'if', 'while' and 'for' statements in Linux.

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Object Oriented Concepts and C++

Attempt any five questions. All questions carry equal marks.

1. What is object oriented programming? How is it different from the procedure oriented programming?
2. What do you mean by data conversion between incompatible types? Explain.
3. Explain the following:
 - (a) Inline function
 - (b) Copy constructor
 - (c) Operator overloading
4. What are various visibility modes in C++? Explain each of them with a suitable example.
5. What are streams? Explain the input and output streams with an example.
6. What is public and private inheritance? Explain multiple inheritance with an example.
7. What is the difference between a tree and a graph? Write BFS algorithm for graph traversal.
8. Write a program to convert an infix expression to postfix expression.
9. Write short notes on the following:
 - (a) Early binding
 - (b) Linked list
 - (c) AVL tree
10. What do you mean by sorting? Write an algorithm of merge sort.

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Computer Oriented Numerical Methods

Attempt any five questions. All questions carry equal marks.

1. (a) Explain the characteristics of Numerical Computation and Approximation. What is the use of significant digit?

(b) Find the transpose of X if:

$$X = \begin{bmatrix} 9 & 1 & 2 \\ 7 & 3 & 5 \\ 2 & 4 & 3 \end{bmatrix}$$

2. (a) What is bisection method? Explain its algorithm.

(b) Find real root of $x^3 - x = 1$ between 1 and 2, by bisection method. Compute at least 3 iterations.

3. (a) Explain Regula-Falsi method. Also explain geometrical interpretation and rate of convergence.

(b) Use Regula-Falsi method to find a real root of the equation $\log x - \cos x = 0$ accurate the four decimal places after three successive approximations.

4. (a) Explain the geometrical interpretation of rate of convergence of Newton-Raphson method.

(b) Find the positive root of $f(x) = 2x^3 - 3x - 6 = 0$ by Newton-Raphson method correct to five decimal places.

(c) Using Newton-Raphson method find the root of the equation $x \log_{10} x = 1.2$

5. (a) Explain the concept of Gauss Elimination Method. Describe the algorithm.

(b) Solve the system of equations:

$$28x + 4y - z = 32$$

$$x + 3y + 10z = 24$$

$$2x + 17y + 4z = 35$$

by Gauss elimination method.

(c) Solve the system of equations using Gauss-Jordan elimination method:

$$x + 2y + z = 8$$

$$2x + 3y + 4z = 20$$

$$4x + 3y + 2z = 16$$

6. (a) Explain the concept of Gauss-Jacobi method.

(b) What do you mean by forward difference? Explain.

7. (a) Write notes on the following:

(i) Backward Difference

(ii) Central Difference

(b) One entry in the following table is incorrect and y is a cubic polynomial in x . Use the difference table to locate and correct the error.

x	y
0	25
1	21
2	18
3	18
4	27
5	45
6	76
7	123

8. (a) What is Newton's Backward Interpolation method? Explain its algorithm.

(b) Interpolate by means of Gauss's backward formula, the population of a town for the year 1974:

Year	Population (in thousand)
1939	12
1949	15
1959	20

1969	27
1979	39
1989	52

9. Explain the following with example:

(a) Simpson $\frac{1}{3}$ rd rule.

(b) Simpson $\frac{3}{8}$ th rule.

(c) Weddle's rule

(d) Trapezoidal rule

10. Obtain the values of y at $x = 0.1, 0.2$ using R.K. method of (i) Second order (ii) Third order and (iii) fourth order for the differential equation:

$$y' = -y \text{ given } y(0) = 1$$

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Programming in Java

Attempt any five questions. All questions carry equal marks.

1. What do you understand by RMI? Explain with suitable example.
2. Write a note on 'Exception handling in Java'.
3. Write short notes on: (any two)
 - (a) JDBC drivers and connectivity to database
 - (b) CORBA architecture
 - (c) Multi-threading
4. What is a basic difference between String and StringBuffer classes? Explain different constructors of String class. Write down the purpose of the following functions with suitable example:
 - (a) charAt()
 - (b) indexOf()
 - (c) replace()
 - (d) toUpperCase()
5. What is inheritance? Explain different types of inheritance supported by Java.
6. What is polymorphism? Explain function overloading and constructor overloading with example.
7. Explain:
 - (i) Java beans
 - (ii) CGI
8. (a) Create an applet to display 'Hello' with font 'Times New Roman' size 20 color blue.
(b) Write a Java program to accept an integer, a float and string value from user and display those values.

9. Write a note on Java by incorporating the following:

(a) Features

(b) Advantages

(c) Constructs and control statements

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Software Engineering

Attempt any five questions. All questions carry equal marks.

1. What is software engineering? Discuss in detail the steps being taken while designing the software under software engineering.
2. What are the set of attributes that should be encompasses by effective software metrics? Explain them. Also differentiate between process and project metrics with appropriate examples.
3. Discuss the advantages and disadvantages of Halsted theory and function point analysis.
4. Differentiate between:
 - (a) Water fall model and Prototype model
 - (b) Size metric and Complexity metric
5. What is estimation? Explain estimation role in S/W planning. Explain any cost estimation model with its merits and demerits.
6. Discuss the various quality factors while carrying out the detailed design of a system. Also discuss the role of management.
7. Write short notes on any two:
 - (a) SDLC
 - (b) COCOMO Model
 - (c) Clean Room Approach
8. Discuss the good programming practices, also discuss the various types of errors encountered while finalizing the program. How the various types of errors are handled?
9. (a) Discuss the need of software re-engineering with the help of suitable examples, also explain the restructuring technique for re-engineering.

(b) Is it possible to assess the quality of software if the customer keeps changing the requirements? Justify your answer with suitable measures.
10. Write short notes on the following:

- (a) Test Case Design
- (b) Functional and Structural Testing
- (c) Fault Reliability Models.

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Artificial Intelligence

Attempt any five questions. All questions carry equal marks.

1. (a) What is Artificial Intelligence? Explain the difference between intelligent and conventional programming.

(b) Describe the various branches of Artificial Intelligence.
2. (a) Distinguish between conventional programs and rule based systems.

(b) Translate the following sentence into formulae in predicate logic:
 - (i) Sam likes easy course
 - (ii) Artificial intelligence courses are easy
 - (iii) Sam likes playing tennis
 - (iv) Everyone is loyal to someone
3. (a) What is an expert system? Explain its various parts.

(b) Explain in short the working of MYCIN.
4. (a) What are the advantages of heuristic search?

(b) What are the constraints satisfaction?

(c) Compare and contrast forward and backward reasoning.
5. (a) Explain the logics for non-monotonic reasoning with an example.

(b) Explain how Bayesian statistics provides reasoning under various kinds of uncertainty.
6. Explain the following:
 - (i) Partial matching
 - (ii) Fuzzy matching algorithms
7. (a) Explain the algorithm for steepest hill climbing.

(b) Explain the following search strategies:

(i) Best First Search

(ii) A* Search

8. Write short notes on the following:

(i) Program structure in PROLOG

(ii) Speech recognition

9. (a) What do you understand by FOPL? Write its syntax and semantics.

(b) Write a note on semantic net and frame.

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Cyber Law, Internet Security

Attempt any five questions. All questions carry equal marks.

1. (a) What is network security? How security is provided to a network? What measures should be taken care while designing network security?

(b) What is cryptography? Explain process of encryption-decryption using suitable examples.
2. (a) What is steganography? Explain some cyber laws used to prevent E-Commerce.

(b) Describe in detail all steps of Euclidian algorithm.
3. Explain the following:
 - (i) Digital signatures
 - (ii) Logic bomb
 - (iii) Crackers
 - (iv) Trojan Horse
4. What is a product cipher? What is the difference between differential and linear cryptanalysis? Why do some block cipher modes of operation only use encryption while others use both encryption and decryption.
5. (a) What problem was Kerberos designed to address? List three approaches to secure user authentication in a distributed environment.

(b) List four general categories of schemes for the distribution of public keys.
6. Write brief note on the following:
 - (i) Electronic Mail Security
 - (ii) Credit-Card Security
 - (iii) Principle elements of public key cryptosystem
 - (iv) Pretty good privacy

7. (a) For a user workstation in a typical business environment, list potential locations for confidentiality attacks.

(b) Describe concept of session key and master key with example.
8. (a) Formulate strategy to combat cyber crimes, also draw the requirement for infrastructure and professionals.

(b) Discuss the cyber law prevailing in India. What areas have been covered by Indian Cyber Law?
9. Write a note on the following differences:
 - (i) Spoofing and phishing
 - (ii) Hacker and Cracker
 - (iii) Copyright and Patent
 - (iv) Firewall and Key logger.