

M.Sc. IT (Part II) Examination, 2012

Operating Systems

Part A (Marks: 10)

1. Define 'Kernel' and 'Shell'.
2. What do you mean by "Spooling"?
3. Write the difference between processes and threads.
4. Draw the 'process state diagram'.
5. What is pre-emptive scheduling?
6. Why do you need "Virtual Memory"?
7. What do you understand by "mutual exclusion"?
8. Who developed the 'Linux' originally and when?
9. Write the syntax of 'ls' command, used in Linux.
10. Why you have to write a Shell script?

Part B (Marks: 10)

1. Differentiate "real time" and "time sharing" operating systems.
2. What is critical section problem? How it is solved?
3. Define Paging. Describe the optional page replacement algorithm briefly.
4. What are the benefits of a 'distributed file system' over a 'centralized system'?
5. What is 'VI' in Linux? Define the behaviour of the different modes of VI.

Part C (Marks: 60)

1. What is the need of process scheduling? Explain the scheduling policies used by the operating system with example for each.

OR

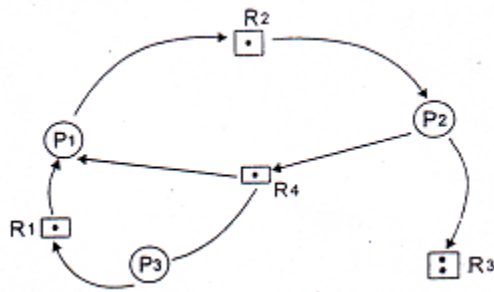
List out the difference between:

- (a) Monitors and semaphores
- (b) Long term scheduling and short term scheduling
- (c) Logical address and physical address.

2. When does a page fault occur? What are the actions that taken by the operating system when the page fault occurs? Describe.

OR

(a) Explain the following resource allocation graph. Mention the dead locked processes if any:



(b) Explain Banker's Algorithm used for dead lock avoidance.

- 3. (a) What are the different types of file systems in Linux? Explain.
- (b) Write a shell program to find factorial of an inputted number.

OR

Describe following Linux commands with proper syntax and example:

- (a) chmod
- (b) who
- (c) ping
- (d) tar
- (e) kill

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Object Oriented Concepts and C++

Part A (Marks: 10)

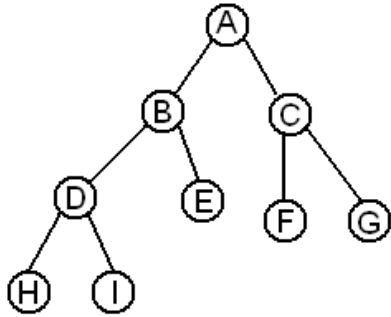
1. List out different datatypes of C++.
2. What is the concept of data hiding?
3. Define recursive construction.
4. Define multiple inheritance.
5. What is the role of new and delete operator.
6. Define early and late binding.
7. How template programming is useful.
8. Convert the following infix sentence in postfix and prefix:

$z = x + y \% z * x$

9. What are the key characteristics of B tree?
10. Define pure virtual function.

Part B (Marks: 10)

1. Explain the concept of function overloading with example.
2. Differentiate between class and structure.
3. What do you understand by precedence and associativity of operators.
4. Explain call by value and call by reference concept using examples.
5. Consider following graph and write its pre, post and inorder path of traversal:



Part C (Marks: 60)

1. (a) Define constructor and destructors. Explain different types of constructors with example.

(b) Write a program in C++ to explain overriding concept.

OR

(a) What is friend function. How it is useful?

(b) Define operator overloading and give its usefulness.

(c) Write a program in C++ for operator overloading using friend function.

2. (a) What is inheritance? Explain different types of inheritance using C++ code.

(b) Write a program in C++ for sorting an array using a pointer to array.

OR

(a) Explain the role of quantifiers in inheritance.

(b) What is virtual function? Write different rules for virtual functions.

(c) Write a program to find out factorial using template function.

3. (a) Define circular list. Write an algo for inserting item in a circular list.

(b) Write a program for selection sort in C++.

OR

(a) What is binary search tree? How it is useful in searching?

(b) Explain any one shortest path algo with an example.

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Software Testing and Quality Assurance

Part A (Marks: 10)

1. Define software testing.
2. What do you understand by test oracles?
3. What is the objective of testing?
4. Define test case.
5. What is black box testing?
6. Define mutation testing.
7. What is a test plan?
8. Enlist automated tools for testing.
9. Define software quality.
10. Define system testing.

Part B (Marks: 10)

1. What are the fundamental properties of testing criterion?
2. Discuss the need and psychology of testing.
3. Define and distinguish between varification and validation testing.
4. Describe functional testing.
5. Differentiate between unit testing and integration testing.

Part C (Marks: 60)

1. Differentiate between top down and bottom up approach to testing.

OR

Describe in detail the various levels of testing.

2. Describe the various test plan activities during testing.

OR

Write a detailed note on test case generation and specification for test case.

3. Write short notes on any three of the following:

- (a) Boundary value analysis
- (b) Strategic issues in testing
- (c) Test plan documentation
- (d) Test monitoring and control
- (e) Testing web enabled applications
- (f) Cause effect graphing

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Software Engineering

Part A (Marks: 10)

1. Which life model would you use for developing a commercial video game that requires about 8 months of effort 6 people?
2. Which software model takes more development time?
3. What is problem based estimation?
4. CASE stands for what?
5. What is quality factor?
6. What is white box testing?
7. What is validation?
8. What are reliability models? List.
9. What is integration testing?
10. What are the main objective of testing?

Part B (Marks: 10)

1. Do you agree with the following statement:
“The focus of exploratory programming is error correction while the software engineering principles emphasize error prevention”? Give the reasoning behind your answer.
2. What difficulties would a software development company face, if it tries to use of build and fix program development style in its development projects? Explain your answer.
3. Explain how a software development effort is initiated and finally terminated in the spiral model?
4. What are the relative advantages of using either the LOC or the function point metric to measure the size of a software product?
5. Discuss the relative advantages of formal and informal requirements specifications?

Part C (Marks: 60)

- (a) What do you mean by the terms cohesion and coupling in the context of software design? How are these concepts useful in arriving at a good design of a system?
 - (b) In the context of software development, distinguish between analysis and design with respect to intention, methodology and the documentation technique used.

OR

- (a) What do you understand by the term down decomposition in the context of function oriented design? Explain your answer using suitable examples.
 - (b) Why are design reviews important? Suppose you are required to review a SA/SD document, make a list of items that can be used as a checklist for carrying out the review?
- (a) What do you understand by component based user interface development? What are advantages of component based user interface development?
 - (b) What is coding standard? Identify the problems that might occur if the engineers of an organisation do not adhere to any coding standard?

OR

- (a) List two coding standards each for:
 - (i) Enhancing readability of the code
 - (ii) Reuse of the code
 - (b) Which is stronger testing: Data flow testing or path testing? Give the reasoning behind your answer.
- (a) Design a black box test suits for a function that checks wether a character string is a palindrome?
 - (b) Do you agree with the following statement:
"System testing can be considered a pure black box test"? Justify your answer.

OR

- (a) What do you understand by “code review effectiveness”? How can review effectiveness for an organisation be measured quantitatively?
- (b) What do you mean by cyclomatic complexity of a program? How can it be measured? What are its applications?

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Programming in Java

Part A (Marks: 10)

1. What is data abstraction?
2. What is an empty statement? What is its usefulness?
3. When do you declare a method or class final?
4. What is collection?
5. What is annotation?
6. What is difference between suspending and stopping a thread?
7. How to implement Java API?
8. What are bitwise operators in Java?
9. What is the range of Byte type?
10. Define a Java bean.

Part B (Marks: 10)

1. What is vector? What are advantages of vectors over arrays?
2. Why Java is known as platform independent language? Explain.
3. How an applet is different than a stand alone Java program?
4. What is multi threading? How does it improves the performance of Java?
5. What is finally block? When and how is it used? Give a suitable example.

Part C (Marks: 60)

1. (a) Explain data types available in Java with an example of each.
(b) What are differences between Java and C++?

OR

- (a) Describe sound features of Java. How is Java strongly associated with the Internet? Explain.
 - (b) Write a program to reverse the digits of an integer number.
2. (a) What is major difference between an interface and a class? How to implement the concept of multiple inheritance using interface? Explain with an example.
- (b) Develop an applet that receives three numeric values as input from the user and then displays the largest of these three on the screen. Write a HTML page to use applet.

OR

- (a) Explain the architecture of RMI.
 - (b) Differentiate distributed and non-distributed Java programs. Write code to invoke a remote method using Java RMI.
3. Write notes in detail on any two:
- (a) AWT
 - (b) Java beans architecture
 - (c) JDBC components & Driver
 - (d) CORBA Services

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Artificail Intelligence

Part A (Marks: 10)

1. Write application of Artificail Intelligence.
2. List basic elements of Prolog.
3. What is Prolog query?
4. What is resolution principle in artificial intelligence?
5. What is FOPL?
6. What is Fuzzy logic?
7. Write the basic principle of Dempster-Shafer Theory.
8. Explain blind search.
9. Write the principle of Expert system.
10. Write two issues of knowledge acquisition.

Part B (Marks: 10)

1. What are control strategies of PROLOG?
2. What are various techniques to represent the knowledge?
3. Write syntax of semantics of propositional logic.
4. Define associative networks.
5. List different equivalence laws used in propositional logic.

Part C (Marks: 60)

[Answer any 3 questions]

1. Write short note on the following:
(a) Bayesian Probabilistic Inference

- (b) Frame Networks
 - (c) And-Or Graph
 - (d) Indexing and retrieval techniques.
2. (a) Discuss the framework of Prolog in detail.
 - (c) How the database is handled in Prolog?
 3. (a) Explain the knowledge based systems with suitable examples.
 - (b) Discuss the needs of Heuristic reasoning methods.
 4. (a) Discuss the Expert system with respect to non-productive system architecture dealing with uncertainty
 - (b) Discuss the various matching techniques in detail, also discuss their application areas.

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Computer Oriented Numerical Methods

Part A (Marks: 10)

1. If the number P is correct to three decimal places. What will be the error?
2. Explain computational errors.
3. Prove that error in algorithm is many times the error in logarithm.
4. Explain transpose of matrix.
5. If $A = \begin{bmatrix} -2 & 3 \\ 8 & -9 \end{bmatrix}$ $B = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$
Find A - B
6. Write formula of Runge Kutta fourth order.
7. If $A = \begin{bmatrix} 3 & 9 \\ 2 & 0 \end{bmatrix}$ then find A^{-1}
8. If $A = \begin{bmatrix} -2 & -1 \\ -1 & 0 \end{bmatrix}$ then find A^2 .
9. Find the smaller root of the equation $x^2 - 32x + 1 = 0$ correct to four significant figures.
10. Explain averaging operator μ .

Part B (Marks: 10)

1. Evaluate
 - (i) $\Delta^2 \cos 2x$
 - (ii) $\Delta^3 y_2 = \Delta^3 y_5$
2. Construct a backward difference table for $y = \log x$ given that:

x	10	20	30	40
y	1	1.30	1.47	1.60

3. Explain Simpson 3/8 rule.
4. If $A = \begin{bmatrix} 5 & -2 \\ -3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} -4 & 6 \\ 2 & 0 \end{bmatrix}$

then Find $2A \times 3B$

5. Estimate the missing term in the following table

x	0	1	2	3	4
y	1	3	9	?	81

Part C (Marks: 60)

1. (a) Solve $x^3 - ax + 1 = 0$ for the root lying between 2 and 4 by the method of false position.
- (b) Explain the geometrical interpretation and rate of convergence of bisection method.

OR

- (a) Find the real root of the equation $x \log_{10} x - 1.2 = 0$ by bisection method correct to 2 place of decimal.
- (b) Find the cube root of 15 correct to 3 significant figures by iteration method.
2. (a) Write notes on the following:
- (i) Backward operator
 - (ii) Newton Raphson method
- (b) Find the value of 52° from the given table.

θ	45°	50°	55°	60°
$\sin\theta$.7071	.7660	.8192	.8660

OR

- (a) Differentiate between Gauss Elimination method and Gauss Jordan method.
- (b) Solve the following by Gauss Jacobi methods:
- $$6x + 15y + 2z = 72$$
- $$27x + 6y - z = 85$$
- $$x + y + 54z = 110$$
3. (a) Apply Runge Kutta method of fourth order to solve:

$$\frac{dy}{dx} = x^2 + y$$

$$y(0) = 1 \text{ for } 0 \leq x \leq .4 \text{ and } h = .2$$

(b) Taking $h = .05$ determine the value of y at $x = .1$ by Euler modified method given that:

$$\frac{dy}{dx} = x^2 + y \quad y(0) = 1$$

OR

(a) (i) Explain Trapezoidal Rule

(ii) Explain Weddle Rule

(b) Find $\int_0^6 \frac{e^x}{1+x} dx$ approximately using Simpson's $\frac{3}{8}$ Rule.

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Cyber Law, Internet Security

Part A (Marks: 10)

1. What is chiphertext?
2. What is encryption and decryption of data?
3. Define phishing.
4. What is stanography?
5. Differentiate between white hat hackers and black hat hackers.
6. What do you mean by digital signature?
7. What are cyber crimes?
8. Differentiate between viruses and worms.
9. What does email security involve?
10. Define firewalls.

Part B (Marks: 10)

1. Explain significance of software patents in implementing security.
2. What security measures should be undertaken while shopping online.
3. Explain briefly Euclidean algorithm using suitable example.
4. In an RSA system, the public key of a given user is $e = 31$, $n = 3599$. What is the private key of the user.
5. What services are provided by IPSec?

Part C (Marks: 60)

[Any Three]

1. (a) How is triple DES algorithm more secure than DES? Explain with the help of suitable example.

(b) How is the AES expected to be an improvement over triple DES?

2. Explain in detail various approaches to message authentication using suitable examples. Give some examples where traffic analysis could jeopardize security.
3. Explain prevalent international laws in cyber space using suitable examples.
4. What should be the essential features of private policy for an E-commerce site. Explain in detail using examples.