Class Test II: Advanced Operating Systems

MSc Semester II, 2024

Full Marks: 20 *Answer all the Questions* Time: 45 minutes

Q1. Answer the following (within 200 words for each question): 2x4=8

a. State at least two different motivations behind process migration.
b. Why token based algorithms are said to be inherently safe?
c. Define pre-emptive and non pre-emptive process migration.
d. How do you interpret liveness and safety when you are designing an algorithm to detect possible deadlock in a system?

Q2. Comment on the correctness of the statement and justify your opinion: (any three): 4x3=12

a. Symmetric algorithms involve lower communication overhead in comparison with the diffusion computation approach.
b. Raymond's algorithm may grant access to processes out of turn.
c. In a distributed system, resource migration is more challenging than migration of codes for a process.
d. Receiver-initiated process migration requires support for pre-emptive migration.

Mid-semester examination, M.Sc. Semester 2
(Finite automata and compiler design)
Full Marks - 20
Time - 1 hour

Answer any four questions. **[4 x 5 marks = 20 marks]**

1. Write the formal definition of regular grammar. Give the regular grammar for the language $L = \{0^n \mid n>=1\}$ over $T = \{0\}$.
2. Design a DFA that accepts an odd number of *1*s.
3. What is an ambiguous grammar ? How can you eliminate ambiguity ? Explain with an example. Justify also.
4. Name and explain the different error recovery strategies used in parsing.
5. Write quadruples, triples, and indirect triples for the expression:

$$(a*b) + (c+d) - (a+b+c+d)$$

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING, UNIVERSITY OF CALCUTTA
CLASS TEST FOR M. SC. SEMESTER-II, 2024

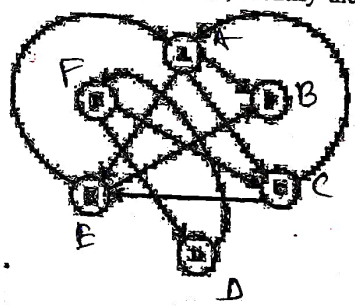
Full Marks: 20 Time: 1 hour

1. Answer any five of the following: 2x5=10

a) In a distributed system, what is the significance of finding two or more events as concurrent?
b) Define the global state of a system.
c) Explain the significance of name transparency for a distributed system.
d) Compare syntactic versus semantic distribution transparency.
e) Following the Ricart-Agrawala algorithm, deduce the number of control messages exchanged between N participating nodes for M successive access to the respective critical sections.
f) Why, in a distributed system, periodic synchronization of clocks in the participating sites is not considered good?

2. Answer any two of the following: 5x2=10

a) "It is required to record the state of the channel through which the first marker is delivered to any node as empty for the sake of consistent state record" - do you agree with this comment in the context of the Chandy-Lamport's state recording algorithm? Justify your opinion within 150 words.
b) Is it possible to follow a Master clock in a Master node as the system's clock for an entire distributed system? Justify your opinion within 150 words.
c) Identify the node set that can be reached from node A in the figure attached, in maximum 2-hops. Also, identify the node(s) for the attached figure that can act as possible initiator node(s) for diffusion computation algorithms. Also, for each of the possible initiator nodes(s), identify the order in which the nodes will be traversed till all nodes in the network are reached.



Mid-Term Examination, M.Sc. 2nd Semester, Full Marks: 30, Network Security

1. Answer five questions from the following: (5 x 2 =10)

a. Prove that $<Z_6^*, x>$ is an abelian group.
b. List all multiplicative inverse pairs in modulus 20.
c. Define Avalanche effect.
d. Is DES a Feistel Cipher? Why or Why not?
e. Define the term "Statistical Attack". Give an example.
f. What do you mean by Galois field? How is it related to cryptography?
g. How a cryptanalysis attack differs from a brute force attack?

2. Answer any five from the following: (5 x 4 = 20)

a. Discuss, in brief, the difference between Chosen PT attack and Known PT-CT attack through examples.
b. What is double DES? What kind of attack on double DES makes it useless?
c. Discuss the advantages of using Counter algorithmic mode for encryption algorithm.
d. Alice and Bob want to establish a secret Key using Diffie-Hellman Key exchange protocol. The values of n,g,x and y are 11,5,2,3 respectively. Find out the value of the secret key.
e. Find the GCD of 84 and 320 using Extended Euclidian Algorithm.
f. The plaintext "letusmeetnow" and the corresponding ciphertext "HBCDFNOPIKLB" are given. You know that the algorithm is a Hill cipher, but you don't know the size of the key. Find the key matrix.

Calcutta University
MSC 2nd Year
Advanced Database Management System (CSMC 201)
MID SEM 2024
Full Mark=20

1 Answer any **four** Question: **[4x2=8]**

a) What is insertion anomaly? Explain with an example.
b) Define transitive functional dependency with the help of suitable example.
c) Differentiate between B-Tree and B+ Tree.
d) Define query optimization.
e) Find out candidate key for relation R= (A, B, C, D, E) and given functional dependencies are: FD= {B → CD, D→E, B→A, E→ C, AD→E}.

2 Answer any **Three** question: **[3x4=12]**

a) Write properties of B-Tree. Insert following elements in the B-Tree of order 4:
65, 66, 70, 71, 74, 80, 91, 81, 99, 82, 75, 77, 89, 56

b) Explain extendible hashing with the following elements:
16. 6, 4, 22, 24, 10, 31, 7, 9, 20, 26, 28

c) Explain Cost-Based query optimization for **SELECT** operation.

d) Write rule of 3NF. Consider the relation R= (A, B, C, D, E, F, G, H, I, J) and the Functional dependencies are following:
FD= {AB →C, A→DE, B→F, F→GH, D→IJ}
Decompose R into **3NF.**