1 Nov 2022

TT#01 Course: Theory of Computation (**SWE 227**)

Marks: 20 Time: **50 mins**

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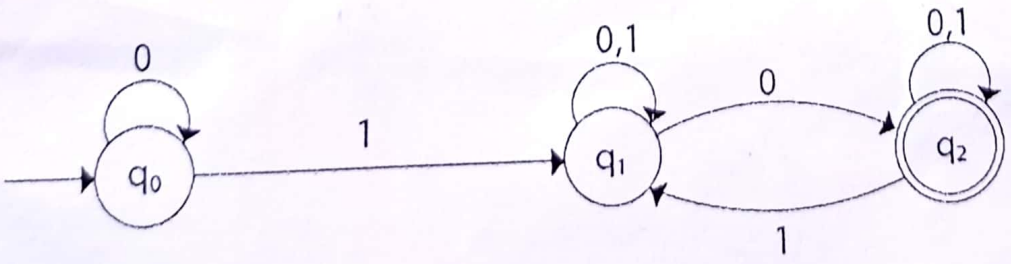
1. Let $S(n) = 1 + 2 + \cdots + n$ be the sum of the first n natural numbers and let $C(n) = 1^3 + 2^3 + \cdots + n^3$ be the sum of the first n cubes. Prove the following equalities by induction on n: **2*3 = 6**
   a. $S(n) = \frac{1}{2}n(n+1)$
   b. $C(n) = \frac{1}{4}n^2(n+1)^2$
2. What is finite automata and its application? **2**
3. What is meant by Regular Language? **1**
4. Give state diagrams of DFAs recognizing the following languages. In all parts, the alphabet is {0,1}. **2*3 = 6**
   a. {w| w is any string except 11 and 111}
   b. {w| every odd position of w is a 1}
5. Convert the given NFA to DFA. **5**



TT#01 Course: Theory of Computation (**SWE 227**) 15th Dec, 2022

Marks: 20 Time: **35 mins**

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1. Why does the Finite Automata can't solve the counting problem but the PDA can? - 04
2. Give the formal definition of PDA. - 02
3. Write the Regular expression that matches the following types of patterns : - 03
   "pencil#2","mambo#5","grade#8"
4. Remove unit production from the following grammar. - 05
   $S \rightarrow XY$, $X \rightarrow a$, $Y \rightarrow Z|b$, $Z \rightarrow M$, $M \rightarrow N$, $N \rightarrow a$
5. Draw the PushDown Automata for the language - 06
   $D = \{ a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j \text{ or } j = k \}$

Algorithms TT - 01

26 Oct, 2022

1) State the formal definition of CRT. (3)

2) Prove the existence of Modular Inverse of a number A with respect to M. (5)

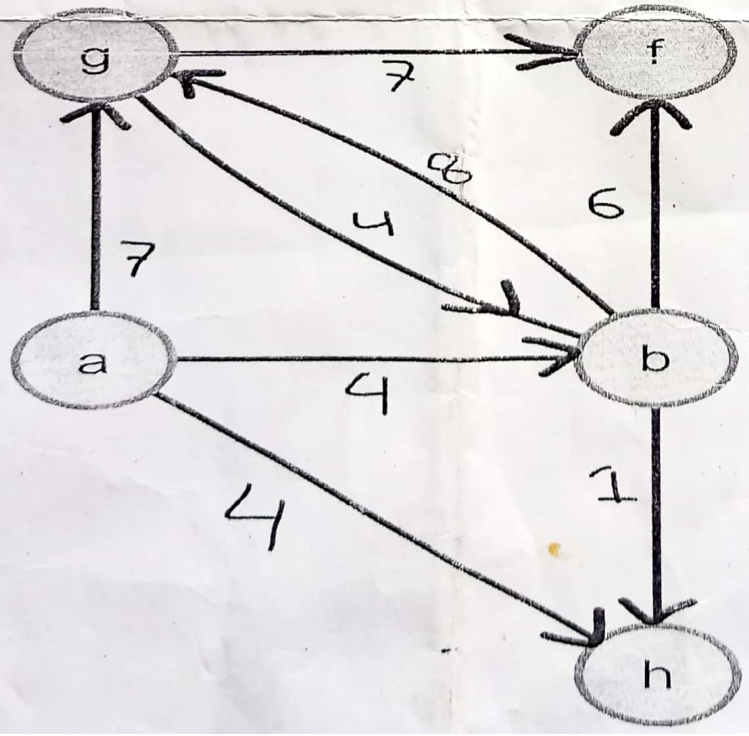
3) What do you understand by 'Path Relaxation'? (2)

4) Can you improvise the following code to run faster? Explain your answer with complexity analysis. (5)

```
void SieveOfEratosthenes(int n)
{
    bool prime[n + 1];
    memset(prime, true, sizeof(prime));

    for (int p = 2; p * p <= n; p++) {
        if (prime[p] == true) {
            for (int i = p * p; i <= n; i += p)
                prime[i] = false;
        }
    }
    for (int p = 2; p <= n; p++)
        if (prime[p])
            cout << p << " ";
}
```

5) Write down each step for the 'Floyd-Warshall Algorithm' on the following graph. Start from node a. (5)



8Dec, 2022

Algorithms TT - 02

Course Code: SWE 229 Time: 40 Min Total: 20

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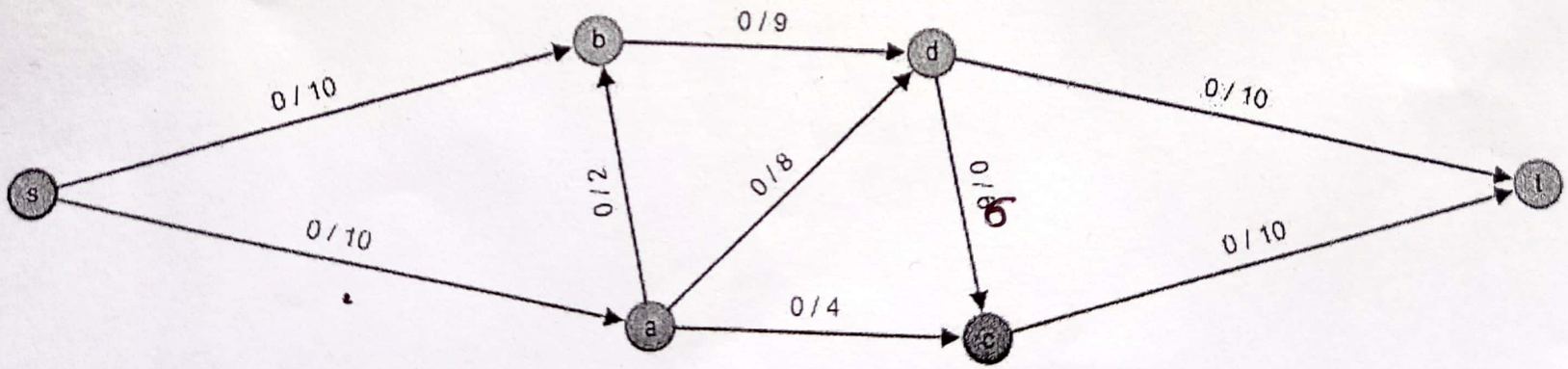
1. Given an array **a=[9,7,1,2,3,10,-1]**. Sort this array in ascending order using 'Quick Sort'. Use the middle index as the pivot and write the steps to sort. (7)
2. Find the LCS between "BRAZIL" & "ARGENTINA" and the length of that LCS using DP & show table representation for your approach. (6)
3. Compute the max-flow from *s* to *t* using 'Ford-Fulkerson' algorithm & write the steps. (7)



9 NOV, 2022

Numerical Analysis; 2/2 – 2019; TT#1; Marks: 10; Time: 40 minutes

[If (students_ID/2=0) answer even numbered questions, else answer odd numbered questions]

Q.1. Discuss the method of Newton-Rapson's to find an approximate root of an equation $f(x) = 0$.

Q.2. Discuss the method of False Position to find an approximate root of an equation $f(x) = 0$.

Q.3. Find a real root of the equation $x^3 - 2x^2 - 4 = 0$ by using Newton-Rapson method. Assume that a= $0, b = 3$.

Q.4. Find a real root of the equation $x^3 - 2x^2 - 4 = 0$ by using False Position method. Assume that a= $0, b = 3$.

2021(2); NA; CT#2; Time: 30 minutes; Marks: 10 16 NOV, 2022

ii) Solve the following system of linear equations by the Gauss-Seidel iterative method.

$$10x - 5y - 2z = 3$$

$$4x - 10y + 3z = -3$$

$$x + y + 8z = 20$$

i) Solve, by Euler's method of the equation $\frac{dy}{dx} = x + y,\ y(0) = 1, for\ 0 \leq x \leq 1\ taking\ h = 0.1$.

Class Assessment #1

SWE-233 (Operating Systems and System Programming)

Time: **40 minutes** Marks: **20**

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15 NOV, 2022

Short Questions : Any Four (4 x 2.5 = 10)

1) Differentiate the program and the process.
2) What is Socket? Give example.
3) Define the PCB and it's usage.
4) Contrast between background processes and foreground processes.
5) State the role of the CPU scheduler.
6) Give examples of I/O-bound and CPU-bound processes.

Analytical Questions : Any Two (2 x 5 = 10)

7) Draw the process-state diagram with proper labeling for the transitions.
8) If you are running three programs - FDM (downloading three files), Mozilla (three tabs for email access) and VisualStudioCode (debugging three source-codes), then what will be content of the PCBs for these three programs.
9) Explain the context-switching with proper example.

Aptitude Test on SWE-233 B'2019

Marks#30 Time#40 minutes 13Dec, 2022

Short Questions [4*4 = 16]

Q1 "We may avoid the deadlock by violating the conditions: a) Hold and Wait or b) Circular Wait". How could you implement (violate) these condition(s)?

Q2 Write the adverse affect or technical challenge of violating the condition a) resource preemption or b) mutual exclusion to avoid deadlock?

Q3 Choose the appropriate storage device for the defined applications/services: a) CD/NVM/RAM for Media Player or b) CD/HDD/Tape for Data-Backup. Justify you selection.

Q4 Write Short notes on a) Kernel or Unsafe-State, b) Deadlock Avoidance or Deadlock Recovery.

Analytical Questions [2x7 = 14]

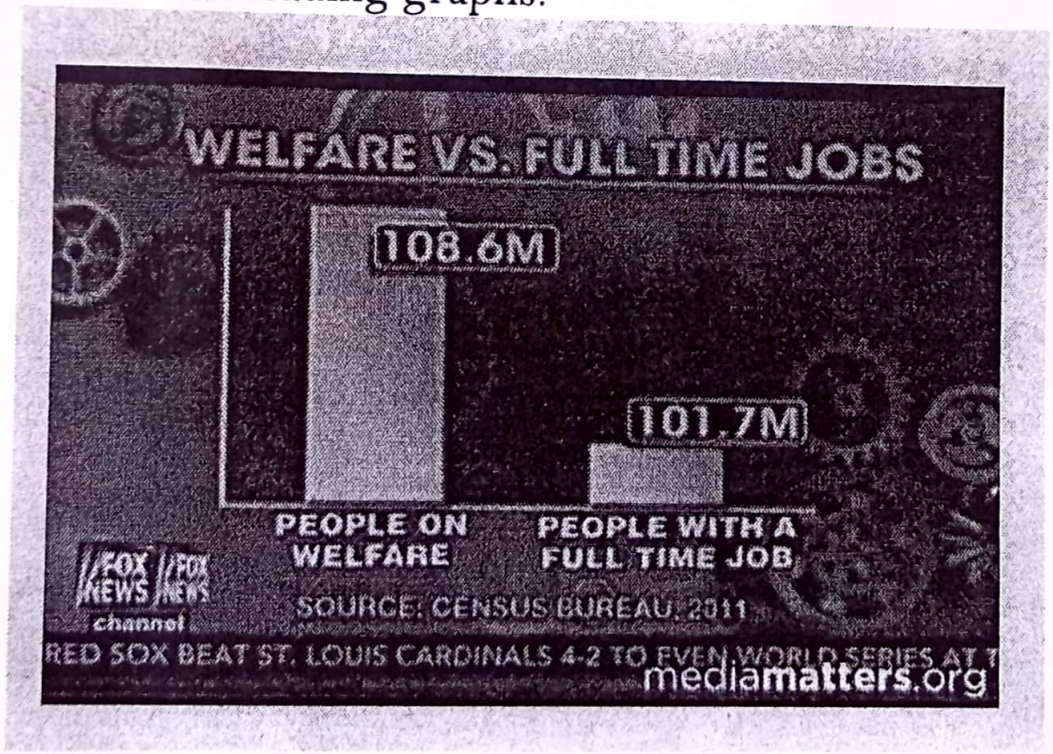
Q5 Using RAG (or Banker's) Algorithm, find whether the given scenario (which includes 5 processes and 3 resource types) is a safe or unsafe state. Resources (10, 5, 7), Processes (P_1, P_2, P_3, P_4, P_5), Max-Requirement (7 5 3; 3 2 2; 9 0 3; 2 2 3; 4 3 3) and Allocation (0 1 0; 2 0 0; 3 0 2; 2 1 1; 0 0 2).
If the allocation-matrix is (0 1 0; 2 0 0; 3 0 3; 2 1 2; 0 0 2), can you conclude the state as unsafe without re-drawing the RAG (or using only the first pass of iteration for Banker's Algorithm).

Q6 List the factors that should consider to eliminate the deadlock-cycle by process-termination. Explain any two of them.
Why should we execute the rollback after resource preemption for deadlock recovery?

Course: Ethics and Cyber Law
Exam Time: 30 minutes, Marks: 20

6 Dec, 2022

1 What is the issue in these misleading graphs? 4



2 According to APA guide what ethics you should maintain? 4

3 What is plagiarism? Why is plagiarism crime? 4

4 ~~What is plagiarism? Why is plagiarism crime?~~ Different types of plagiarism 4

5 What are macro ethics and micro ethics? 4

24 Nov, 2022 MIS – TT-1 30 min

Q.1 – for 3/2

Explain Decision Support System (DSS), Executive Information System(EIS), and Office Information System (OIS) with a proper diagram. [4+3+3]

Q.2 – for 2/2

What are some disciplines that are contributing to the field of MIS? Briefly explain the different components of MIS. [4+6]

MIS TT-2

18.1. Define Informal Information with examples. (3)
18.2. What are the goals sought by systems? (3)
18.3. Briefly explain at least 2 characteristics of Open Organizational Systems. (4)

19.1. Define Closed, Relatively Closed, and Open Systems with proper diagram. (6)

19.2. What do you understand by Human-Machine systems? (4)

17 Dec, 2022