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Roll No. 59

6TH TH SEMESTER

MID SEMESTER EXAMINATION

[B.TECH. - MC]

(MAR- 2016)

MC-311 **ALGORITHMS DESIGN AND ANALYSIS**

Time: 1.5 Hours **Max. Marks: 20**

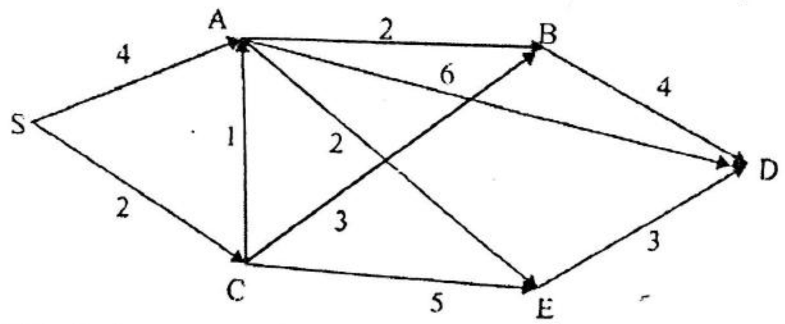
Note: Answer all four questions.
Assume suitable missing data, if any.

1. [a] Give the algorithm to sort a list of numbers using heap sort. Analyze its time complexity. (3)

   [b]Solve the given recurrence relation using master method. $T(n) = T(n/2) + \Theta(1)$ (2)

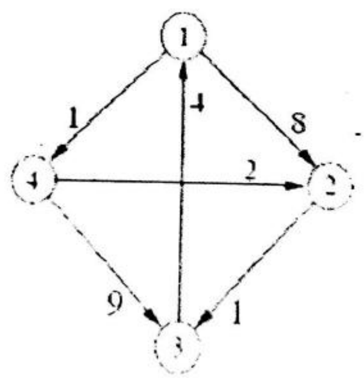
2. Explain divide and conquer strategy. Design a divide and conquer algorithm for finding the maximum element of n numbers. (5)

3. Write down Dijkstra's algorithm for solving the single-pair shortest path problem. Run the algorithm on the following graph for finding the single pairs shortest path starting from S.



(5).

4. What do you understand by the term all-pair shortest paths? Find all-pair shortest paths for the graph shown below: (5)



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SIXTH SEMESTER **B.Tech. Mathematics & Computing**

Mid Semester Exam, *March 2016*

Code & Title: MC 312 Stochastic Processes

Time: One and half hrs. *Max. Marks : 20*

Note : Answer all questions. All questions carry equal marks. Assume suitable missing data, if any.

1. Define simple random walk. Show that in case of unrestricted simple random walk, if the probability of a jump upward is more than the probability of a jump downward, then the particle will drift to ∞ with probability one.

2. Explain Poission process. Give example. Babies are born in a city at the rate of one birth every 15 minutes. In case the inter arrival time follows exponential distribution then find (i) expected number of births per week, (ii) the probability of no birth on a specific day.

3. What is a renewal process? Give examples. How does it differ from a Poission process ? Is it a Markov process? Justify.

4. Give examples of a homogeneous and a non-homogeneous Markov chain. A gambler has a fortune of Rs. 3. He bets Re 1 at a time and wins Re 1 with probability ½. He stops playing if he loses all his fortune or doubles it. Write the transition probability matrix. What is the probability that he has fortune of Rs. 5 at the end of four plays?

5. In context with a Markov chain explain the following with suitable examples: (i) Periodic and aperiodic states,
(ii) Communicating and non communicating states,
(iii) Reducible and irreducible chains
(iv) Transient and recurrent states

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SIXTH SEMESTER

B. Tech.[MC]

MID SEMESTER EXAMINATION

March, 2016

MC- 313, Matrix Computation

Time: 1.5 Hours

Max. Marks: 20

Note: *Attempt **All** questions. All questions carry equal marks. Assume suitable missing data, if any.*

1. Determine the condition number of the matrix $A = \begin{bmatrix} 1 & 2 & 9 \\ 4 & 9 & 16 \\ 9 & 8 & 25 \end{bmatrix}$ using (i) $||.||_1$ norm, and (ii) Spectral norm. [1+3]

2. Find the rate of convergence for the Gauss Jacobi method to solve the following system,

$$\begin{aligned} 2x + 3y &= 1 \\ 2x + y &= 2. \end{aligned}$$

3. Define the followings:
   (1) Banded matrix, (2) positive definite matrix,
   (3) SOR method. [1+1+2]

4. Estimate the eigen values of the matrix B using Gerschgorin method.
$$B = \begin{bmatrix} -1 & 0 & 1+2i \\ 0 & 2 & 1-i \\ 1-2i & 1+i & 0 \end{bmatrix}$$

5. Discuss the QR factorization for the matrix $C = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 1 & 1 \end{bmatrix}$

SIXTH SEMESTER

B.TECH (MC) 59

MID SEMESTER EXAMINATION

MARCH 2016

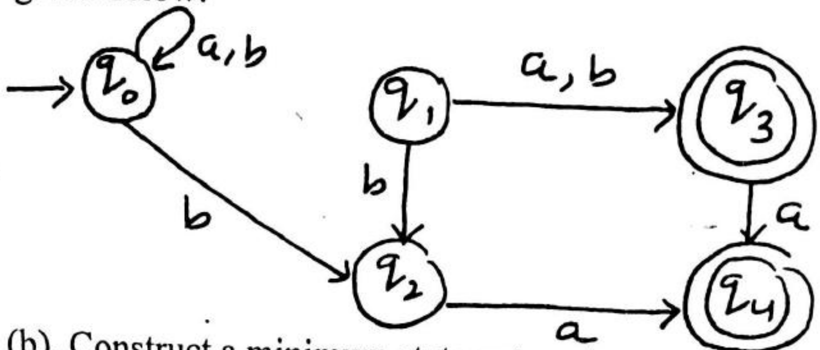
MC-314 THEORY OF COMPUTATION

Time: 1.30 Hours

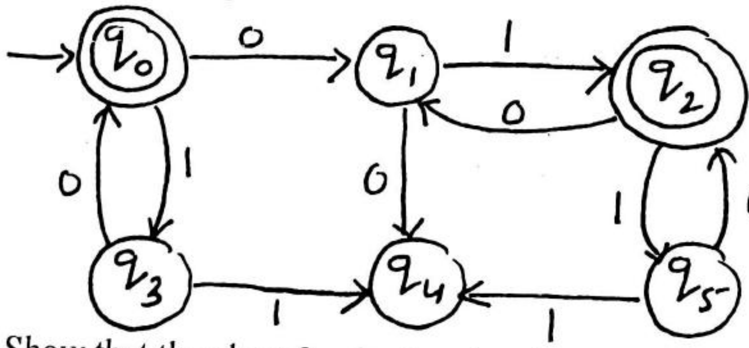
Maximum Marks: 20

Note: **Answer All.**

Q1(a). Construct a DFA equivalent to the NDFA whose transition diagram is given below:



(b). Construct a minimum state automaton equivalent to the DFA described by the following figure:



Q2 (a). Show that the class $\mathcal{L}_{rl}$ is closed under union where $\mathcal{L}_{rl}$ denotes the family of regular languages.

(b) Describe the algorithm to test whether $w \in L(G)$, where $L(G)$ is the language generated by a grammar G .Consider the grammar G given by $S \to 0S1, S \to 0A1, A \to 1A, A \to 1$. Using this algorithm test whether 00101, 0111 belong to $L(G)$.

Q3. *State & prove Pumping lemma for regular sets. Write the steps needed for proving that a given set is not regular and hence show that* $\{ a^i b^i : i \geq 1 \}$ *is not regular.*

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MID TERM EXAMINATION

VI SEMESTER

Paper Code: MC -315

Time: 1:30 Hours

MARCH-2015

[B.TECH (MC)] 59

Operating Systems

Max Marks: 20

NOTE: All Questions are compulsory. Assume Suitable missing data , if any

Q1. What are critical regions? Give examples. What are the minimum requirements that are satisfied by a solution to the critical section problem? Write Peterson solution to the critical section problem. [4]

Q2. What are cooperating processes? Describe an inter process communication mechanism in detail. [4]

Q3. What do you mean by preemptive scheduling? Describe any 2 preemptive CPU scheduling methods with the help of example. [4]

Q4. (a) Explain the important services of an operating system. [2]

(b) What is the principle advantage of multiprogramming? [2]

Q5. Why Semaphore is known as a blocking synchronization primitive? Explain the solution to bounded buffer problem using semaphore. [4]