Total No. of pages 1 Roll No. 19C/009

Sixth Semester B.Tech [M&C]

Mid Semester Examination, February 2015

MC-312 STOCHASTIC PROCESSES

Time : 1 hour 30 minutes **Max. Marks : 20**

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

1. Define a Poisson process. Give an example. Find the distribution for the number of events in any time interval of length $t > 0$.

2. Describe the general birth-and-death process. Find the steady-state solution for this process.

3. Describe a renewal process. Find the expected number of renewals in the interval $(0,10]$, when the inter-arrival time is
   i. exponential with parameter one, ii. gamma with parameter one.

4. Describe simple random walk. Give example. In case of unrestricted random walk, find an expression for the probability that at time n the particle is found in one of the states $j, j+1, \ldots, k-1, k$ where j and k are possible values of X_n, $(j < k)$. Calculate it by giving values of your choice to the various parameters involved.

5. Show that in case of a random walk with two absorbing barriers, absorption is certain to occur. Find the probability that particle is in a state k at time n before the absorption occurs.

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Total No. of Pages: 01 Roll No:.....

SIXTH SEMESTER B. Tech.[MC]

MID SEMESTER EXAMINATION Feb, 2015

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 $A = \begin{bmatrix} 1 & 4 & 9 \\ 4 & 9 & 16 \\ 9 & 16 & 25 \end{bmatrix}$ using (i) $||.||_1$ norm, and (ii) Spectral norm.

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

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

3. Define the followings:
   (1) Banded matrix, (2) positive definite matrix,
   (3) SOR method, (4) Singular values of a matrix.

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 $C = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$

MC/009

SIXTH SEMESTER **B.TECH (MC)**

MID SEMESTER EXAMINATION **FEBRUARY 2015**

MC-314 THEORY OF COMPUTATION

Time: 1.30 Hours **Maximum Marks: 20**

Note: **Answer All.**

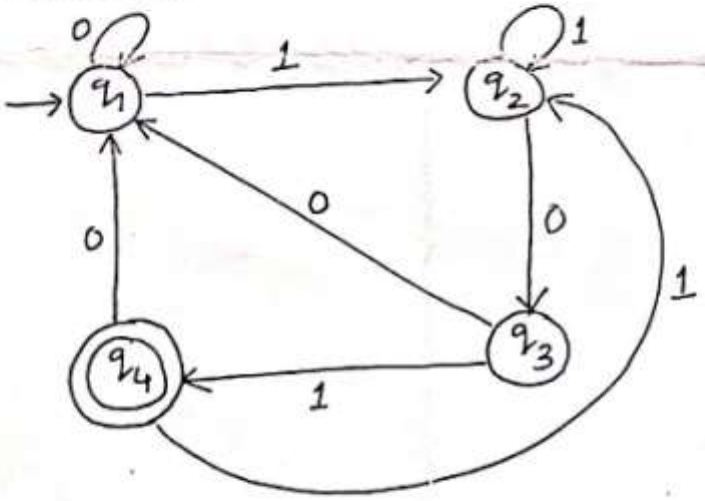
Q1. Define NDFA. Prove that for every NDFA, there exists a DFA which simulates the behaviour of NDFA.

Construct a DFA equivalent to an NDFA whose transition table is defined below.

State/Σ	a	b
→ q_0	q_1, q_3	q_2, q_3
q_1	q_1	q_3
q_2	q_3	q_2
(q_3)	-	-

(7)

Q2. State and prove Arden's theorem. Find the regular expression corresponding to the state diagram given below.



(7)

Q3. Define a Grammar and derivation in a grammar. Find the language generated by the grammar

(i) $S \to 0S1, S \to 0A1, A \to 1A, A \to 1$

(ii) $S \to 0A, S \to 1S, S \to 0, S \to 1, A \to 1A, A \to 1S, A \to 1$

(6)

MC|009

Roll No.....

Total No. of Pages 1

B.Tech.(MCE)

VI-SEMESTER

Feb- 2015

MID SEMESTER EXAMINATION

MC-315 Operating System

Time: 1:30 Hours

Max. Marks: 20

Attept all questions

Q.No. 1

A) What is a process? Explain different states of a process with the help of state diagram and List the various services provided by the operating system. [3]

B) Consider the set of processes given in the following table [5]

Process	Arrival Time	CPU burst Time	Priority
P1	0	5	2
P2	1	15	3
P3	2	10	1

Assuming 1 to be the highest priority, calculate average waiting and turnaround time using SJF (Preemptive & no preemptive) and Priority (preemptive) scheduling algorithms.

Q.No. 2

A) What is process control block? Explain context switching with example. [3]

B) Define critical section problem and its solution for the two processes. Use semaphore solution for the Reader writer problem. [5]

Q.No. 3 Explain Following with suitable example [4

i. Real time system and Time sharing

ii. System calls and Starvation

Total No. of Pages 1 *Roll No.* MC/9

6TH SEMESTER B.Tech. (MC)

MID SEMESTER EXAMINATION (Feb. – 2015)

MC-311 Algorithm Design and Analysis

Time: 1:30 Hours Max. Marks: 20

Note: Answer all questions.

1. a) What are asymptotic notations? Define Big-Oh and Big-omega notations. (3)

   b) Solve the following recurrence using master's theorem: (2)

   $$T(n) = 7\ T(n/2) + n^2$$

2. a) Build a max heap using the elements from the given array (3)

   23,17,10,6,13,14,1,5,19,12

   b) If we delete the largest element, what is the resultant max-heap? (2)

3. Show the construction of optimal Huffman code using greedy strategy for the following set of frequencies, based on the first 8 Fibonacci numbers. (5)

   { (a:1), (b:1), (c:2), (d:3), (e:5), (f:8), (g:13), (h:21) }

4. Use the Dijkstra's algorithm to find the shortest path from source vertex A in the following graph. (5)