Seat No_____

GANPAT UNIVERSITY
M.Tech. Semester I (CE) Examination
December-2014
3CE101: Advanced Topics in Networks

Max Time : 3 Hour] **[Total Marks : 60**

Instructions:
1. All questions are compulsory
2. Figures to the right indicate full marks.
3. Answer Both Sections in Separate Answer sheets.

SECTION-I

Q-1 **10**

A Compute delivery delay of **Source spray and wait routing** for Random walk mobility model. Area = 400x400 , M =20, K =10 , L = 10.

B Prove theorem: Expected message delivery time for **optimal** algorithm (single copy) **ED_{opt}(mm)** is given by :

$$ED_{opt}^{(mm)} = \frac{H_{M-1}}{(M-1)} EM_{min}.$$

[OR]

Q-1 **10**

A Compute delivery delay of **Binary spray and wait** routing for Random walk mobility model. Area = 500x500 , M =15, K =5 , L = 8

B **Compute expected delay** for direct transmission given random walk mobility model, Network area = 6400, transmission range = 5, no. of nodes = 20

Q-2 **10**

A Compute **Hitting time and Meeting time for random direction** mobility model :

$$\overline{T} = 300,\ \overline{v} = 1,\ \overline{T}_{stop} = 50$$

N= 300 x 300 K=10

B Prove theorem: Let **ED_{opt}** denote the expected message delivery delay of the optimal algorithm. When transmission range K is equal to **zero**

$$ED_{opt} = \frac{cN \log N}{2(M-1)} \cdot H_{M-1}$$

Where,H_n is the harmonic number of order n.

[OR]

Q-2 **10**

A Calculate Hitting time for **(small) community** based random direction model :

Area= 400 x 400 , Pl= 0.5 Pr=0.5, Tl = 160, K =10, $\overline{v} = 1$

B Using taylor series find L_{min} for a =10 and M =90

Q-3 **10**

A Compute pairwise meeting rate p for RD & RWP and packet forwarding rate for n-epidemic routing : Avg. relative speed = 5 m/sec, Area = 400x400, transmission range = 5, battery energy = 2000 units/node, energy consumed =4 unit transmit/receive, number of forwards =4, neighbors=4.

B Show the **classification** of Mobility models. Fill up details in following table in terms of YES / NO with justification.

	Temporal dependency	**Spatial Dependency**	**Geographic restriction**
Random way point			
RPGM			
Freeway			
Manhattan			
Pursue			

SECTION – II

Q-4 **10**

A Analytically compute AER(encounters/min) for random way point mobility model : Communication range= 5 m, Node Density = 18, Average Speed = 10 m/s and time = 5 sec

B **Draw** schematic diagram of **Internet Vs. DTN Routing. Name** the strategy used for information exchange. List the class of service (**CoS**) provided by Bundle layer.

[OR]

Q-4 **10**

A Draw schematic diagram of ONE simulator along with routing and movement package classification.

B Find **AEF**(Average encounter frequency) ,**AER** (Average encounter rate)for set of contact C_n=10, Set of Encounters E_n=14 , T=70s, **ACR**(Average contact rate) =5.

Q.5 **10**

A How to make Encounter based routing protocol **secure**? Discuss **Time stamp protocol** with suitable example & diagram.

B Compute the **delivery predictability** new values for $P_{A,B}$ $P_{B,C}$,$P_{A,C}$

P_{init} =0.85 ,β =0.15

From/To	B	C
A	0.3	0.7
B	0.2	0.8

OR

Q-5 **10**

A Compute EV_A & EV_B for given CWC_A=10, CWC_B=5, ά= 0.75, EV_A=2 & EV_B=4 using encounter based routing. Suppose node A has 10 copies of Message M1 and 5 copies of message M2. How many copies of each **messages** node A transmits to Node B ?

B Write pseudo code for the following buffer management policies:

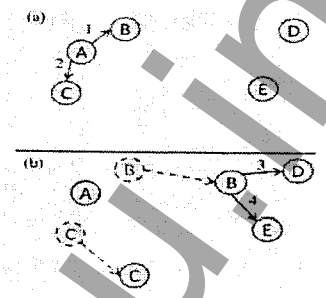
1. Random forwarding
2. E-drop

Q.6 **10**

A Prove expected delay of epidemic routing with d degree is derived using:

$$E^d_{epid} = \frac{1}{\lambda(m-1)} \sum_{p=1}^{m-1} \frac{m-p}{p\, s(p)}.$$

B



Apply **fuzzy spray** technique to figure (a) & (b) for preparing the table showing distribution of **CDM, FTC and HOP** count values. Further compute accuracy of FTC and accuracy of Hop Count. Assume initial value of Hop count and FTC 1.

---------X---------X--------- **END OF PAPER**----------X----------

Student Exam No._____

GANPAT UNIVERSITY

M. Tech Semester: I (Computer Engineering)

Regular Examination November – December 2014

3CE102: COMPUTATIONAL INTELLIGENCE

Time: 3 Hours **Total Marks: 60**

Instruction: 1 Figures to the right indicate full marks of question
2 All questions are compulsory
3 Each section should be written in a separate answer book

Section – I

Que. – 1 (A) Explain Characteristics of the following problems. [5]
i) Chess
ii) 8 puzzle

(B) Differentiate Breadth first search and Depth first search. Explain with an appropriate example how breadth first search is better than depth first search. [5]

OR

Que. – 1 (A) Explain Block word problem. [5]

(B) What is the difference between hill climbing and best first search? Both of them which technique is better and why? [5]

Que. – 2 (A) What is Cut Predicate. Explain Cut-Fail predicate with suitable example. [6]

(B) When Hill climbing will be fail. Which are the solutions to overcome to those problems? Explain with Block World Problem. [4]

OR

Que. – 2 (A) You are given two water jugs of 16 liters and 7 liters. There is no any measuring mark on it. There is a pump by which you can pour the water into the jugs. How can you get exactly 8-liters of water into the 16 liters jug? [6]

(B) Explain Resolution with suitable example. [4]

Que. – 3 Define following terms with example. [10]
i) Heuristic search
ii) Backtracking

Section – II

Que. – 4 (A) What is constraint satisfaction? Solve the cryptarithmetic puzzle [5]

```
  B E S T
+ M A D E
----------
M A S E R
```

(B) When h' underestimates h. Explain with suitable example. [5]

OR

Que. – 4 (A) Prove Fuzzy Demorgan's Law. $(A \cap B) = (A^C \cup B^C)^C$ [5]

(B) Explain Artificial Neural Network briefly. [5]

Que. – 5 (A) Show the comparison between Set Theory, Classical Logic and Fuzzy logic. With a suitable example compare the results by using Subsethood theorem and Fit-Violation Theorem [5]

(B) What is Fuzzy logic? Which are the propositional operators to be used in Fuzzy Logic? [5]

OR

Que. – 5 (A) What is Resolution? Write an Algorithm of propositional Resolution. [5]

(B) What is List ? Write a program for rotation of List in left direction. [5]

Que. – 6 Consider the following sentences: [10]

1. John like all kinds of food.
2. Apples are food.
3. Chicken is food.
4. Anything anyone eats and isn't killed by is food.
5. Bill eats peanuts and is still alive.
6. Sue eats everything Bill eats.

Give following answers.
(a) Translate these sentences into formulas in predicate logic.
(b) Prove that John likes peanuts using backward chaining.
(c) Convert the formulas of part (a) into clause form.
(d) Prove that john likes peanuts using resolution.
(e) Use resolution to answer the question, "What food does Sue ear?

END OF PAPER

Exam No: _____

GANPAT UNIVERSITY

M. Tech Sem. I (Computer Engineering) Regular Examination NOV/DEC – 2014

3CE103: COMPUTER ALGORITHMS

Max. Time: 3 hours **Max. Marks: 60**

Instructions: 1. This Question paper has two sections. Attempt each section in separate answer book.
2. Figure to the right indicates full marks.
3. Be precise and to the point in answering the descriptive questions.

SECTION – I

Q – 1 (a) Express complexity of following functions using theta (Θ) notation. Clearly indicates value of constants C1, C2 and n_0. **[6]**

1. $f(n)= 3n^2- 6n$ 2. $f(n) = 2*6^n + 2n + 3$

(b) State whether the following statements are true or false. Justify the answer: **[4]**

1. $5+ n = O(n^2)$ 3. $n* \lg n + 8n^2 = \Omega(n^3)$
2. $\lg n + 2^n = O(n^3)$ 4. $n^2 + 6n + 7 = \Omega(n)$

OR

Q – 1 (a) Prove followings: **[6]**

1. $\log(\sqrt{n}) = O(\log n)$
2. If $P(n) = a_0+ a_1 n + a_2 n^2 + \ldots\ldots + a_m n^m$ then Prove that $P(n) = \Omega(n^m)$

(b) Express time complexity of following functions using omega (Ω) notation. Clearly indicates value of constants Cand n_0. **[4]**

1. $f(n) = 2^n + 5n^n 2$. $F(n) = 1000$

Q – 2 (a) Solve following recurrences using master theorem. **[6]**

1. $T(n) = 16T(n/4) + n^2$ 2. $T(n) = 4T(n/2) + n^3$

(b) Solve the following recurrence and express the time complexity using theta notation : **[4]**

$T_n = 1$, if n=0
$= 3T_{n-1} + n + 2^n$, n>0

OR

Q – 2 (a) Solve the following recurrence and express the time complexity using theta notation : **[5]**

$T(n) = T(4n/5) + T(n/5) + n$

(b) Solve the following recurrence and express the time complexity using big-oh notation : **[5]**

$T(n) = T(n-1) + T(n-2)$, if n>1
$= n$, if n=0 or n=1

Q – 3 (a) Match the correct pairs for the following methods and their time complexities: **[2]**

1	Binary search (Best case)	(a)	O(n)
2	Bubble sort (worst case)	(b)	O(n log n)
3	Counting inversion (D & C)	(c)	O(1)
4	Insertion sort (Best case)	(d)	$O(n^2)$

(b) Write a function / algorithm to add two matrices of the size NxN. Find out the step count for this function using tabular method. **[4]**

(c) Give complexity of divide and combine stage of merge sort and show the working of merge sort on 10, 25, 18, -1, 87, 96, 34, 65. **[4]**

SECTION – II

Q – 4 (a) Find the longest common subsequence for the following two sequences using dynamic programming: [5]

X = PQRESQEP

Y = QSEPRQ

(b) Solve the following matrix chain multiplication problem using dynamic programming: [5]

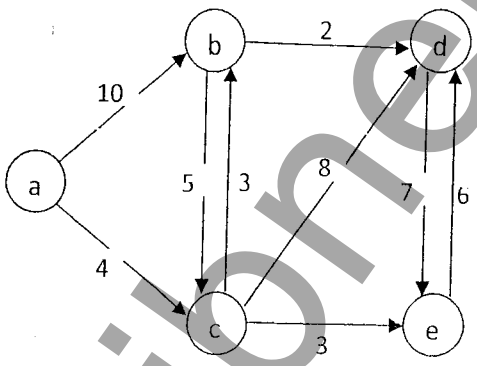
A1: 20 x 5 A2: 5 x 50 A3: 50 x 10 A4: 10 x 30

OR

Q – 4 (a) On what kind of input the worst case of quick sort occurs? How it can be solved using randomized version of quick sort? [5]

(b) Write an algorithm to solve coin change problem using greedy design technique. Give its time complexity. And show the case of coin change problem in which greedy algorithm fails. [5]

Q – 5 (a) What is a minimum spanning tree? Find minimum spanning tree from following graph using prims' algorithm. Also write its time complexity. [5]



(b) Consider instance of the 0/1 knapsack problem as below with P depicting the value and W depicting the weight of each item whereas M denotes the total weight carrying capacity of the knapsack. Find optimal answer using greedy design technique. [5]

P = [40 10 5030 60] W = [8010 40 20 90] M = 110

OR

Q – 5 (a) Write bellman-ford algorithm for single source shortest path problem. Discuss its time complexity. [5]

(b) How backtracking strategy can beapplied to solve the subset sum problem? Let S = {1, 3, 4, 5, 6} and M=7. Find all possible subset of S, whose sum is equivalent to M. [5]

Q – 6 (a) Prove that Vertex-Cover $\equiv_P$ Independent-Set. [5]

(b) What do you mean by inversions in list? What is the complexity of counting inversion using brute force technique? Count the number of inversions on following data using divide and conquer method. And also indicates the time complexity of algorithm. [5]

99, 70, 25, 2, 5, 9, 14, 6, 3

----- END OF PAPER -----

Exam No: _____

GANPAT UNIVERSITY

M. TECH SEM- I (CE) REGULAR EXAMINATION DEC 2014 – JAN 2015

3CE104: Distributed Computing

MAX. TIME: 3 HRS MAX. MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

SECTION: I

Q.1 **Answer the following.**

(A) Define the following terms: [5]
(i) Distributed Computing.
(ii) Middleware.

(B) Discuss the architecture of DCE RPC and SUN RPC in brief. [5]

OR

Q.1 **Answer the following.**

(A) Discuss the role of Port mapper and RMI registry with an appropriate diagram. [5]

(B) Explain the role of IDL and Stub in RPC programming. [5]

Q.2 **Answer the following.**

(A) Compare CORBA architecture with Java RMI architecture in brief. [5]

(B) Write various steps to implement Remote message service using Java RMI. [5]

OR

Q.2 **Answer the following.**

(A) Why Process migration is required? Define various models for Code Migration. [5]

(B) Describe the steps for developing a CORBA application. [5]

Q.3 **Answer the following.**

(A) Describe the role of Virtualization in distributed systems. How we can achieve it? [5]

(B) Explain different methods of Code mobility in distributed systems. [5]

[P.T.O]

SECTION: II

Q.4 **Answer the following.**

(A) Explain Lamport's Clock Synchronization algorithm for logical clock. [5]

(B) Discuss design principles of Coda file system. [5]

OR

Q.4 **Answer the following.**

(A) Compare various Election algorithms of Distributed systems in brief. [5]

(B) Define Clock Synchronization principles and explain Christian's algorithm. [5]

Q.5 **Answer the following.**

(A) Explain REST-based Web services in detail. [5]

(B) Define Network File System (NFS) and explain the basic NFS architecture for UNIX system. [5]

OR

Q.5 **Answer the following.**

(A) Describe the steps required to implement SOAP-based Web services. [5]

(B) Compare various Mutual Exclusion algorithms of Distributed systems. [5]

Q.6 **Answer the following.**

(A) Discuss design principles of Google File system. [5]

(B) Explain Web Service Architecture model in detail. [5]

----------**END OF PAPER**----------

GANPAT UNIVERSITY
M. TECH. SEM. - I COMPUTER ENGINEERING
REGULAR EXAMINATION DECEMBER - 2014
3CE105: CRYPTOGRAPHY AND NETWORK SECURITY

Time: 3 Hours] [Total Marks: 60

Instructions:

1. Figures to the right indicate full marks.
2. Each section should be written in a separate answer book.
3. Be precise and to the point in your answer.

SECTION - I

Q.1 **(a)** Discuss about following: **(4)**
1) Repudiation 2) Snooping

(b) Decrypt the following Encrypted message using playfair Cipher Technique. **(3)**
(**Note:** put j and i both combine as a single field)
Encrypted Message: tmazinyamtluazinekla
Keyword: india is my country

(c) Find out the multiplicative inverse of 83 in Z_{3230}. **(3)**

OR

Q.1 **(a)** Discuss about CBC and CFB algorithm modes with suitable diagram. **(4)**

(b) Find the inverse of e = 19 for RSA where p = 101 and q = 199 **(4)**

(c) If there are 233 users in the network then how many key pairs is required in symmetric cryptography operation? **(2)**

Q.2 **(a)** Perform mix column transformation of AES on following column matrix. **(6)**
Required constant matrix is given below.

Column matrix: $\begin{matrix} 4D \\ 90 \\ 4A \\ D8 \end{matrix}$ **Constant matrix:** $\begin{bmatrix} 02 & 03 & 01 & 01 \\ 01 & 02 & 03 & 01 \\ 01 & 01 & 02 & 03 \\ 03 & 01 & 01 & 02 \end{bmatrix}$

(b) Solve the Linear Congruence: $3x+2y \equiv 5 \pmod 7$ **(4)**
$4x+6y \equiv 4 \pmod 7$

OR

Q.2 **(a)** Decrypt the following Cipher Text message using 3x3 Hill Cipher. **(6)**
Cipher Text: edxphy **Key Matrix:** $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 1 & 2 \\ 1 & 0 & -2 \end{bmatrix}$

(b) Discuss about mathematical theory behind the Diffe Hellman key exchange Algo. **(4)**

Q.3 **(a)** Show how the byte **13** is transformed to **7D** by subbyte routine in AES using *GF* (2^8). Required constant matrix for calculation is given below. **(6)**

Constant Matrix: $\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 \end{bmatrix}$ **Constant column matrix:** $\begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}$

(b) Perform the Primality Test using Fermat's theorem. **(4)**
1) 43 2) 31

SECTION-II

Q.4	(a)	Discuss Vigenere Cipher algorithm and encrypt the message "She is listening" using the 6-character keyword "PASCAL".	(5)
	(b)	Explain about Digital Envelope method with suitable diagram.	(5)

OR

Q.4	(a)	Alice and Bob want to establish a secret key using the diffie-hellman key exchange protocol. Assuming the values as n = 23, g = 5, x = 6, y = 8, Find out the values of A, B and the secret key K1 and K2.	(5)
	(b)	Solve the following Equation using Chinese Remainder Theorem. $X \equiv 3 \bmod 7$ $X \equiv 3 \bmod 13$ $X \equiv 0 \bmod 12$	(5)
Q.5	(a)	Discuss about Message Digest in brief with suitable Diagram.	(4)
	(b)	Discuss about Problem of Key Distribution or Key exchange in symmetric key cryptography.	(4)
	(c)	What is Base-64 bit Encoding Scheme of PGP?	(2)

OR

Q.5	(a)	Discuss about Network Address Translation with Example.	(4)
	(b)	Discuss about Static and Dynamic Packet Filter Firewall.	(4)
	(c)	Solve the ø(360) using Euler's Totient Function.	(2)
Q.6	(a)	Discuss about Rabin Cryptosystem with suitable Example.	(4)
	(b)	Given the super increasing Tuple b= [7, 11, 23, 43, 87,173,357] and modulus n = 1001, encrypt the letter 'g' using knapsack Cryptosystem. Use [7, 6, 5, 1, 2, 3, 4] as the permutation table. (note: ASCII value of 'g' is 1100111)	(6)

END OF PAPER

Exam No: _____

GANPAT UNIVERSITY
M. TECH SEM- I (Information Technology) REGULAR EXAMINATION– NOV-DEC-2014
3IT101: Advanced Topics in Networks

MAX. TIME: 3 HRS

MAX. MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

SECTION: I

Q.1 A Consider the following chain topology: **(04)**

A ---- B ----- C ---- D

A is sending packets to D using a reliable transport protocol. Each link above can transmit one packet per second. There are no queues or other sources of delays at the nodes (except the transmission delay of course).

A. What is the RTT between A and D?
B. What is the throughput of a stop-and-wait protocol at A in the absence of any losses at the nodes?
C. If A decides to run a sliding window protocol, what is the optimum window size it must use? What is the throughput achieved when using this optimum window size?

Q.1 B How SACK can improve the performance? Explain with an example. **(04)**
Q.1 C Explain the concept of priorities in 802.11 **(02)**

OR

Q.1 A Describe TCP New Reno. **(04)**
Q.1 B Describe Hidden terminal & Exposed terminal problems. Discuss the solutions to it. **(04)**
Q.1 C A system uses the "stop – and – wait" ARQ protocol. If each packet carries 1500 bytes of data, how long does it take to send 1 MB of data if the distance between the sender and receiver is 6000 km and the propagation speed is 2*10^8 m ? Ignore transmission, waiting, and processing delays. We assume no data or control frame is lost or damaged. **(02)**

Q.2 A Describe the concept of Mobile IP **(04)**
Q.2 B Explain the issues of wireless networks that affect the performance of TCP. **(03)**
Q.2 C At time t, a TCP connection has a congestion window of 6000 bytes. The maximum segment size used by the connection is 1000 bytes. What is the congestion window after it sends out 6 packets and receives acks for all of them? Suppose there is one ack per packet. **(03)**
a. If the connection is in slow-start?
b. If the connection is in congestion avoidance phase?

OR

Q.2 A Explain Slow start, Congestion avoidance, Fast retransmission and Fast recovery mechanism of TCP. **(05)**
Q.2 B A cellular system uses FDMA with spectrum allocation of 12.5 MHz in each direction, a guard band at the edge of the allocated spectrum of 10 kHz and a channel bandwidth of 30 kHz. What is the number of available channels? **(03)**

Q.2 C Explain receiver reneging with an example **(02)**

Q.3 A Suppose there are 3 stations S1, S2 & S3 wants to send the packet of size 500 bytes, 1600 bytes & 1400 bytes at time 0, 110 & 250 µs respectively. Assume Slot Time of 20µs, SIFS Time of 10µs, RTS Threshold of 1300 bytes, Fragmentation Threshold of 2400 bytes and RTS, CTS & ACK of 100 bytes. Each station can Transmit 200 bytes per Slot Time. When does data transfer complete for all stations? Write any assumptions if required. (04)

Q.3 B Explain AODV with an example. (04)

Q.3 C Describe Path MTU discovery and TCP for transaction. (02)

SECTION: II

Q.4 A Describe GSM architecture in detail. **(05)**

Q.4 B Suppose in a cellular system total bandwidth available is 33 Mhz and need to allocate 25Khz in each direction per channel for the voice communication. Calculate the number of channels allocated per cell if we use 4 & 7 cell reuse pattern. Write your conclusion on the number of channels/cell. **(03)**

Q.4 C Differentiate wired and wireless networks. **(02)**

OR

Q.4 A Describe GPRS architecture in detail. **(05)**

Q.4 B Suppose in a cellular system total bandwidth available is 66 Mhz and need to allocate 50 Khz in each direction per channel for the voice communication. Calculate the number of channels allocated per cell if we use 7 & 12 cell reuse pattern. Write your conclusion on the number of channels/cell. **(03)**

Q.4 C Explain Error protection mechanism in GSM. **(02)**

Q.5 A Describe the proactive routing approach for MANET. Explain DSDV with an example. **(05)**

Q.5 B Consider two nodes, A and B. Suppose the network path from A to B has a bandwidth of 5 KBytes/s (5,000 bytes per second) and a propagation time of 120 ms. The path in the reverse direction, from B to A, has a bandwidth of 10 KBytes/s and a propagation time of 80 ms. Let data packets have a size (including all headers) of 500 bytes and acknowledgment packets a size of 100 bytes. Answer the following: **(05)**

a. Calculate the throughput A can achieve in transmitting to B using Stop-and-Wait. You can treat a 500-byte data packet as transferring 500 bytes of useful data.
b. Calculate the size of the window, in terms of number of data packets that A must use in order to transfer its data as fast as possible, if A instead uses Sliding Window.

OR

Q.5 A Describe the reactive routing approach for MANET. Explain DSR with an example. **(05)**

Q.5 B Calculate the total delay from first bit sent to last bit received for the following: **(05)**

A. Sender and receiver are separated by two 1-Gigabit/s links and a single switch. The packet size is 50000 bits, and each link introduces a propagation delay of 50 microseconds. Assume that the switch begins forwarding immediately after it has received the last bit of the packet and the queues are empty.
B. Same as (A) with three switches and four links.

Q.6 A Explain CSMA/CA with an example. **(04)**

Q.6 B Describe TCP's flow control mechanism using window size field of the TCP header. How Window size field lengths affect the performance of TCP? Suggest the solution for the same. **(04)**

Q.6 C Differentiate WLAN and Ad-hoc Networks **(02)**

----------END OF PAPER----------

Seat No._____

GANPAT UNIVERSITY
M. Tech Sem-I, Information Technology
Regular Examination Dec-Jan 2014
3IT102: Computational Intelligence

Max Time: 3 Hours] **[MaxMarks: 60**

Instructions: 1. Figures to the right indicate full marks of the question.
2. All questions are compulsory.
3. Each section should be written in a separate answer book.

SECTION: I

Q:1 (a) Classify the following problems using AI problem characteristics. [8]
(i) Missionary and Cannibals (ii) N Queen (iii) 8 Puzzle
(iv) Monkey- Banana

(b) Define Backtracking. [2]

OR

Q:1 (a) Explain Best first search procedure with an example [6]

(b) Briefly discuss Hill climbing and also show its weaknesses. [4]

Q:2 (a) You are given 3 Jugs A, B and C of capacity 10 liters, 7 liters and 3 liters. Jug A is completely filled with water while rest jugs are empty. Initial State is (10, 0, 0). You are required to obtain 5 liters of water in Jug A and B. exchange of water between the jugs is only permitted. Obtain the Goal State and also draw the state space. Suggest the appropriate strategy also. [8]

(b) Discuss the characteristics of control strategy. [2]

OR

Q:2 (a) You are given 2 jugs of capacity 7 lites and 5 liters. Obtain 1 liter of water in 7 liters of jug. There are no measuring markers on both the jugs. Obtain the Goal State and also draw the state space. Suggest the appropriate strategy also. [6]

(b) Define 'Heuristic' and also write few heuristics for the 8-Puzzle and N Queen Problem. [4]

Q:3 (a) Solve the following crypt arithmetic puzzle. Every Letter must be assigned unique digit. [6]

	S	E	V	E	N
+	S	E	V	E	N
+			S	I	X
T	W	E	N	T	Y

(b) Discuss Overestimation and Underestimation in A* algorithm [4]

SECTION: II

Q:4 (a) Discuss α-β pruning with an example [7]

(b) Compare Perceptron vs ADALINE [3]

OR

Q:4 (a) Explain Pocket algorithm in brief. [6]

(b) Prove that Given training samples of two linearly separable classes, Perceptron terminates after finite number of steps. [4]

Q:5 (a) Apply the ADALINE using given parameters on following data sets. Continue up to 2 epochs. Learning rate, Initial weights and bias are initialized as 1. [8]

Class 1: (3, 1), (4, 2)

Class 2: (2, 2), (1, 3)

(b) Define Unsupervised learning. [2]

OR

Q:5 (a) Explain the issues related with parameters of Backpropagation algorithm in detail. [8]

(b) Define computational Intelligence and soft computing [2]

Q:6 (a) What are the results obtained using the network of given below in figure 1 if the initial output vectors are (0.5, 0.9, 1, 1, 0.9)? What would be a more desirable value ? Suggest a modification of maxnet that gives the desirable answer. Self excitation weight θ=1 and mutual inhibition magnitude ε < 1/(No of nodes). [6]

(b) Describe various applications of Neural networks [4]

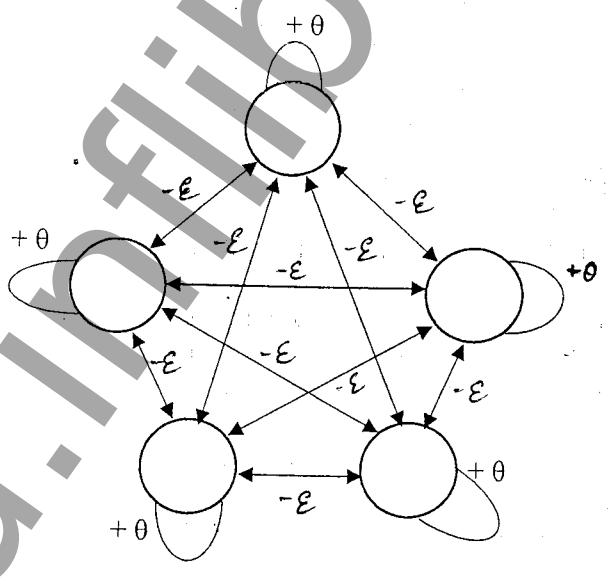


Figure 1 Maxnet: competitive network

----------**END OF PAPER**----------

Exam No: _____

GANPAT UNIVERSITY

M. Tech Sem. I (Information Technology) Regular Examination NOV/DEC – 2014

3IT103:COMPUTER ALGORITHMS

Max. Time: 3 hours **Max. Marks: 60**

Instructions: 1. This Question paper has two sections. Attempt each section in separate answer book.
2. Figure to the right indicates full marks.
3. Be precise and to the point in answering the descriptive questions.

SECTION – I

Q – 1 (a) Write sequential search algorithm and analyze it for worst case time complexity using tabular method. Represent its time complexity using big-oh (O) notation. **[5]**

(b) State whether the following statements are true or false. Justify the answer: **[5]**

1. $n*\log n + 1000 = \Omega(n)$
2. $n^2 + 80 = O(n)$
3. $n! + n + 20 = \Omega(2^n)$
4. $20n^2 + 5 = O(n^3)$

OR

Q – 1 (a) Express complexity of following functions using theta (Θ) notation. Clearly indicates value of constants C1, C2 and n_0. **[4]**

1. $f(n) = 6*4^n + 20$
2. $f(n) = 7n^3 + 30n$

(b) Let $t_A(n)$ and $t_B(n)$ denote the running times of two programs A and B respectively. For following pairs find which program runs faster and for what value of n. **[4]**

1. $t_A(n) = 10n$, $t_B(n) = n^2$
2. $t_A(n) = 2n^2 + 100n$, $t_B(n) = n^3$

(c) Prove that $\log\sqrt{n} = O(\log n)$. **[2]**

Q – 2 (a) Solve the recurrence $T(n) = 3T(n/4) + n*\lg n$ **[4]**

(b) Write recurrence relation of worst case of quicksort and solve it to represent its answer using big-oh (O) notation. **[4]**

(c) Solve the recurrence $T(n) = T(2n/3)+1$ **[2]**

OR

Q – 2 (a) Solve the recurrence: $T_n = \begin{cases} 0 & , n=0 \\ 3T_{n-1} + 2^2 + 2^n & , n>0 \end{cases}$ **[4]**

(b) Write recurrence relation of best case of merge sort and solve it to represent it answer using big-oh notation. **[3]**

(c) Solve the recurrence $T(n) = 16T(n/4) + n^3$ **[3]**

Q – 3 (a) Arrange the following functions from the lowest to highest asymptotic order: **[3]**
$O(n)$, $O(n2^n)$, $\Omega(n \log n)$, $O(\log n)$, $O(n!)$, $\Omega(2^n)$, $O(n^3)$

(b) Prove that $2^{n+1} = O(2^n)$ but $2^{2n} \neq O(2^n)$ **[3]**

(c) Write binary exponent algorithm and show working of this algorithm to calculate 2^{11}. Also indicates its time complexity. **[4]**

SECTION – II

Q – 4 (a) Find the longest common subsequence for the following two sequences using dynamic programming: [6]

X = 100101001

Y = 101001

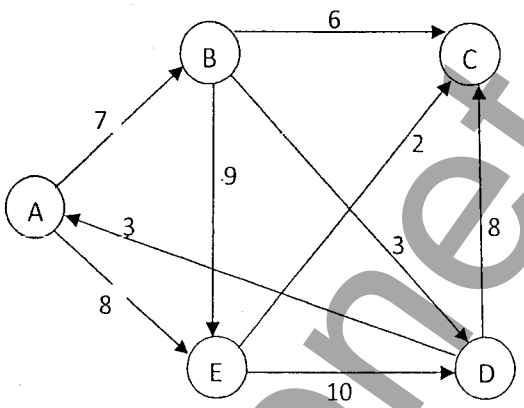
(b) Discuss graph representation techniques with example. Also discuss space complexity of each technique. [4]

OR

Q – 4 (a) Show the overlapping of sub problem in calculation of Binomial Coefficient with recursive algorithm. Also write dynamic programming version of finding Binomial Coefficient. [5]

(b) State the knapsack problem. Write an algorithm to find optimal solution of knapsack problem using greedy design techniques. [5]

Q – 5 (a) What is minimum spanning tree? Find minimum spanning tree from following graph using kruskal's algorithm. [6]



(b) State decision and optimization version of Hamiltonian cycle and bin packing problem. [4]

OR

Q – 5 (a) Show that Clique of a graph is a NP problem. [5]

(b) What is sum of subset problem? Show the solution of sum of subset problem using backtracking. [5]

Q – 6 (a) Find the optimal way of multiplying following matrices using dynamic programming. [5]

A:20 x 5, **B:** 5 x 10, **C:**10 x 60, D: 60 x 30

(b) Write non comparison based sorting algorithm. Show its working on data: [5]

10,2,5,3,2,3,1,0,1,3,5,4,1

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