Seat No_____

GANPAT UNIVERSITY
M.Tech. Semester I Examination
Jan-2013
3CE101: Advanced Topics in Networks

Max Time : 3 Hour] **[Total Marks : 70**

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 **12**

[A] Derive and prove an equation for an oracle based optimal algorithm giving lower bound delay for single copy scheme. **4**

[B] Using taylor series find L_{min} for a =4 and M =100 **4**

[C] Calculate the delay of **Randomize routing** for area =6400,transmission range = 5, no. of nodes = 25, P= 0.5 **4**

[OR]

Q-1 **12**

[A] Prove expected delay for utility based routing based on markov chain as: **4**

$$p(r;r+i)=\begin{cases} p_e p_{tx}(r \to r+i), & \text{if } |i| \le K, |i| \neq 1, \\ \frac{1}{2}p_{rw} + p_e p_{tx}(r \to r+i), & \text{if } |i| = 1, \\ 0, & \text{otherwise.} \end{cases}$$

[B] Compute delivery delay of **Binary spray and wait** routing for Random walk mobility model. Area = 400x400 , Nodes =16, communication range =10 , message copies = 8 **4**

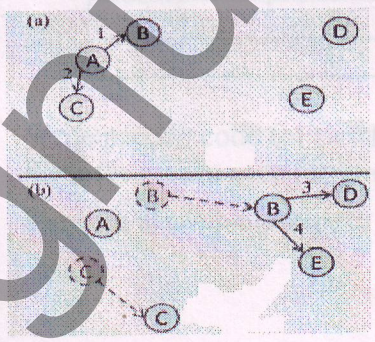
[C] Derive an equation to compute upper bound of delay for source spray and wait. **4**

Q-2 **11**

[A] Prove expected delay of epidemic routing with d degree is derived using: **4**

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

[B] **4**



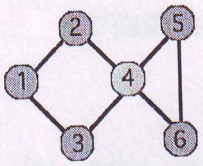
Apply **fuzzy spray** technique to figure (a) & (b) for preparing the table showing distribution of **CDM, FTC and HOP** count values. Further compute accuracy of FTC and accuracy of Hop Count. Assume initial value of Hop count and FTC 1.

[C] Analytically compute AER(encounters/min) for random way point mobility model : Communication range= 100m, Node Density = 50, Average Speed = 30 m/s and time = 10 sec **3**

[OR]

11

Q-2

[A] 

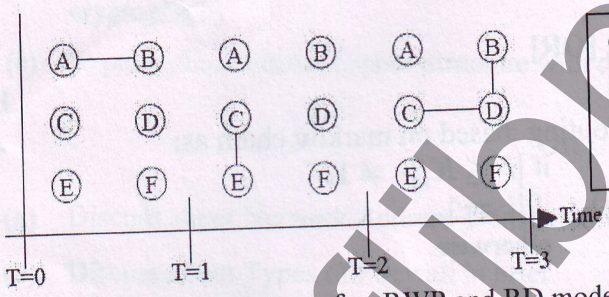
Find **articulation points** of given graph and derive different sub-graphs. Write pseudo code for **ANBR** **4**

[B] Compute pairwise meeting rate p for RD & RWP and packet forwarding rate for n-epidemic routing : Avg. relative speed = 3 m/sec, Area = 500x500, transmission range = 10, battery enegery = 1000 units/node, energy consumed =4 unit transmit/receive, number of forwards =5, neighbours=3. **4**

[C] 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 **3**

12

Q-3

[A] 

Compute temporal path length for all nodes and show steps of matrix building. **3**

[B] **Calculate** inter contact rate for RWP and RD model for following values : Communication range =5, relative speed 10 m/s , area = 1600, w = 1 for RD and 1.3683 for RWP using following equation **3**

$$\lambda \approx \frac{2\omega r E[V^*]}{L^2}$$

[C] **Compute expected delay** for direct transmission given random walk mobility model, Network area = 1600, transmission range = 5, no. of nodes = 20 **3**

[D] Draw schematic diagram for **Custody transfers** between Source and Destination with appropriate protocol **stacks, custodian and persistent storage.** **3**

SECTION – II

Q-4 **12**

[A] Compute EV_A & EV_B for given CWC_A=10, CWC_B=20, ά= 0.85, EV_A=2 & EV_B=4 using encounter based routing. Suppose node A has 10 copies of Message M1 and 6 copies of message M2. How many copies of each **messages** node A transmits to Node B ? **4**

[B] Show the **classification** of Mobility models. Fill up details in following table in terms of YES / NO with justification. **4**

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

[C] Write the pseudo code to improve PROPHET as PROHET+ with buffer, bandwidth and energy. **4**

[OR]

Q-4 **12**

[A] Show the classification chart of mobility models and Identify the mobility model type for each scenario presented below with short justification: **4**

1.Police officers attempting to catch escaped criminal
2.Group of children walking in single line to their classroom
3.Cellular network
4.Class of student touring an art museum

[B] **Compute Quality of Node** Q for : **4**

Smoothing factor =0.25, Q_{old}= 1 , k1=100, k2=200, T=2500, Δt=3000

[C] How to make Encounter based routing protocol **secure**? Discuss **Time stamp protocol** with suitable example & diagram. **4**

Q.5 **11**

[A] Following table shows the current message vectors for Node A and Node B respectively. Show respective message vector's contents after encounter with each other for epidemic routing. **3**

Node A	
Dest Id	**Seq.No**
D	1
G	1
F	1

Node B	
Dest ID	**Seq No**
D	0
E	0
F	0
F	1

Write pseudo code for two hop routing protocol.

[B] Write the pseudo code for N-drop and MOFO drop policy implementation. **4**

[C] Show the algorithmic steps to implement n-Epidemic routing **4**

[OR]

Q-5

[A] Write pseudo code to implement : TSMF and COIN forwarding policy **11**

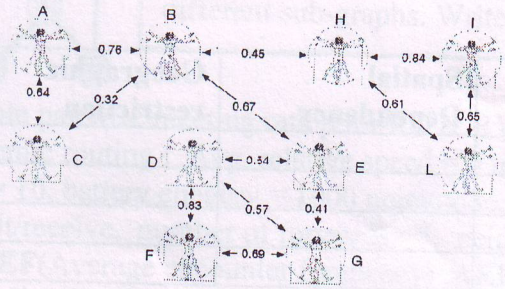
[B] Show the algorithmic steps to implement Epidemic with immunity. **4**

[C] Find **average delivery predictabilities** from node A to node B after second encounter . [For Spray & wait with prophet] $P_{init} = 0.7$, t1=30 , t2=60 **4**

3

Q.6

[A] **12**



For given social network, prepare **interaction** and **connectivity** matrix for threshold =0.30. Identify at least **two communities** from connectivity matrix and **write** an equation to compute social attraction index. **4**

[B] Draw schematic diagram of ONE simulator along with routing and movement package classification. **4**

[C] Compute the **delivery predictability using PROPHET** for $P_{A,B}$ $P_{B,C}$,$P_{A,C}$ P_{init} =0.85 ,β =0.15 **4**

From/To	B	C
A	0.6	0.4
B	0.3	0.7

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