Date: 01/01/2016

Seat No _____

GANPATUNIVERSITY
M.Tech. Semester I (CE) Examination
NOV - December-2015
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 Calculate the probability of node encounter P_e and expected delay **Randomize routing** delay : network area =4900,transmission range = 5, no. of nodes = 25, P= 0.5

B Compute and Compare Expected hitting time ET_{RD} and ET'_{RD} Network Area =1600 x 1600 , K = 10, T = 200, v = 4 m/sec T_{stop} = 4 p_m = 0.8 .

[OR]

Q-1 **10**

A Compute **expected hitting time** $ET^{(out)}_{comm}$ until a node A, moving according to the community model, encounters a static node B, who lies outside A's community, is given by:
Network Area =1000 x 1000 , K = 10, T_L = 200 sec, v = 3 m/sec T_{stop} = 5 sec p_m = 0.6, L_c= 12.5.

B Compute the expected delay for optimal algorithm (single copy) **ED_{opt}(mm)** : Network area =4900,transmission range = 5, no. of nodes = 10.

Q-2

A Compute delivery delay of **Source spray and wait routing** for Random walk mobility model. Area = 1800x1800 , M =9, K =5 , L = 4 **5**

B Calculate Hitting time for **(small) community** based random direction model : **5**

Area= 500 x 500 , Pl= 0.4 Pr=0.6, Tl = 150, K =10, $\overline{v} = 1$

[OR]

Q-2

A Compute pairwise meeting rate p for RD &RWP and packet forwarding rate for n-epidemic routing : Avg. relative speed = 4 m/sec, Area = 1600x1600, transmission range = 10, battery energy = 2000 units/node, energy consumed =4 unit transmit/receive, number of forwards =4, neighbors=4. **3**

B Using taylor series find L_{min} for a =5 and M =120 **3**

C Perform the analytical calculation to compute expected delay of epidemic routing under contention using following equation for single step : Network Area =1000 x 1000 , K = 10, T = 200, v = 3 m/sec T_{stop} = 5 p_m =0.6, M = 5 m $p^{epid}_{success}$ = 0.6: **4**

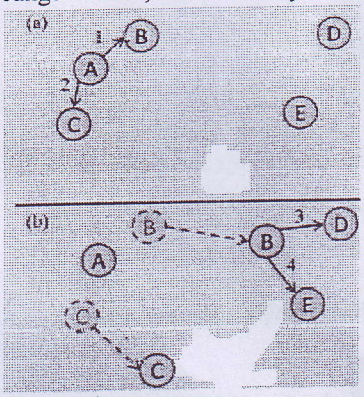
$$ED_{epid} = \sum_{i=1}^{M-1} \frac{1}{M-1} \sum_{m=1}^{i} \frac{EM_{rd}}{m(M-m)p^{epid}_{success}}.$$

where $p^{epid}_{success} = 1-(1-p^{epid}_{tcs})^{Er_{rd}}$.

Q-3

A 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

B 3



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 Using **Dynamic Spray & Wait** find no. of messages forwarded from Node A to Node B and from B to A, if $Q_{oldA} = 0.8$ $Q_{oldB} = 0.9$, $\alpha = 0.15$, $Avg_{KA} = 7.5$ $Avg_{KB} = 8.2$, **Node A has M1= 5 Node B has M2 = 7 .** 4

SECTION – II

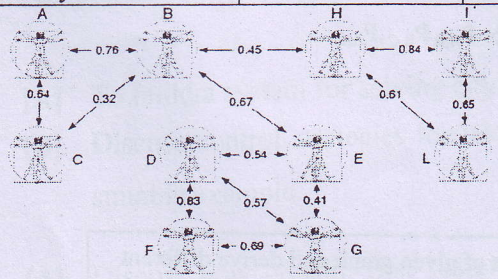
Q-4

A How to make Encounter based routing protocol secure? Discuss **Time stamp protocol** with suitable example & diagram. 3

B Show the **classification** of Mobility models. Fill up details in following table in terms of YES / NO with justification. 3

	Temporal dependency	Spatial Dependency	Geographic restriction
Random way point			
RPGM			
Freeway			

C 4



For given social network, prepare **interaction** and **connectivity** matrix for threshold =0.20. Identify at least **two communities** from connectivity matrix and **write** an equation to compute social attraction index.

[OR]

Q-4

A Show the classification chart of mobility models and Identify the mobility model type for each scenario presented below with short justification: 3

1.Police officers attempting to catch escaped criminal
2.Group of children walking in single line to their classroom
3.Cellular network

B 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.

C Prove expected delay of epidemic routing with d degree is derived using: 4

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

Q.5

A **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 3

B Write pseudo code to implement: MOFO drop and COIN forwarding policy. 5

C Why ADHOC/MANET routing protocols fails in DTN environment? 2

OR

Q-5

A Draw schematic diagram of ONE simulator along with routing and movement package classification. 3

B Explain and Write the pseudo code for N-drop and TSMF forward policy implementation. 5

C Show the algorithmic steps to implement n-Epidemic routing. 2

Q.6

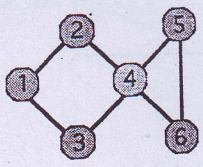
A Compute EV_A&EV_B for given CWC_A=10, CWC_B=20, $\acute{\alpha}$= 0.75, EV_A=4 & EV_B=8 using encounter based routing. Suppose node A has 8 copies of Message M1 and 16 copies of message M2. How many copies of each **messages** node A transmits to Node B and node B Transmits to Node A? 4

B Compute the **delivery predictability** new values for $P_{A,B}$ $P_{B,C}$,$P_{A,C}$ 3

P_{init} =0.80 ,β =0.20

From/To	B	C
A	0.65	0.35
B	0.5	0.5

C 3



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

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