Enrollment No._____

GANPAT UNIVERSITY

M. Tech SEMESTER-I Information Technology

Regular Examination December- 2013

3IT101: Advanced Topics in Networks

Time: 3 Hours] **[Total Marks: 70**

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 the impact of cost on the design of wireless networks. Differentiate the wired and wireless networks. **(06)**

Q.1 B If a total of 33 MHz of bandwidth is allocated to a particular cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell for a frequency reuse factor of : (a) 4-cell (b) 7-cell (c) 12 cell. If 1 MHz of the allocated spectrum is dedicated to control channels, determine reasonable distribution of control channels and voice channels is each cell for each of the above three systems a, b and c. **(06)**

OR

Q.1 A Describe GSM architecture in details. **(05)**

Q.1 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 4, 7 and 12 cell reuse pattern. Write your conclusion on the number of channels/cell **(04)**

Q.1 C Explain the concept of error protection in GSM. **(03)**

Q.2 A Explain the differences between CDMA, TDMA and FDMA. Which ones can be combined? What would be the advantages and disadvantages of such combinations? **(04)**

Q.2 B Why we need wireless networks? Describe the types of wireless networks. **(03)**

Q.2 C A system uses the "stop – and – wait" ARQ protocol. If each packet carries 5000 bits of data, how long does it take to send 1 million bits of data if the distance between the sender and receiver is 36000 km and the propagation speed is 3*10^8 meter/second? Ignore transmission, waiting, and processing delays. We assume no data or control frame is lost or damaged. **(04)**

OR

Q.2 A 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. **(04)**

a. If the connection is in slow-start?
b. If the connection is in congestion avoidance phase?

Q.2 B Can we use CSMA/CD for wireless networks? Justify your answer. **(04)**

Q.2 C Differentiate proactive and reactive routing protocols for MANETs. **(03)**

Q.3 A Suppose there are 3 stations S1, S2 & S3 wants to send the packet of size 400 bytes, 1600 bytes & 1300 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? **(04)**

Q.3 B Explain the exposed terminal problem and describe the solution to the problem. **(04)**

Q.3 C Describe the concept of Mobile IP in details. **(04)**

SECTION-II

Q.4 A 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: (06)

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.

Q.4 B Describe TCP Reno in details. How it differs from New Reno? (06)

OR

Q.4 A Describe the need of SACK approach. Explain receiver reneging issue in SACK. (06)

Q.4 B Differentiate the approach of New Reno & TCP vegas. Describe TCP vegas in details. (06)

Q.5 A Calculate the latency (total delay from first bit sent to last bit received) for the following: (04)

A. Sender and receiver are separated by two 10-Gigabit/s links and a single switch. The packet size is 50000 bits, and each link introduces a propagation delay of 100 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 four switches and five links.

Q.5 B Explain DSDV in details. (04)

Q.5 C Discuss the wireless network parameters that affect the performance of TCP in details. (03)

OR

Q.5 A Consider the following chain topology: (04)

A ---- B ----- C ---- D ---- E ---- F---- G---- H

A is sending packets to H 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 H?
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.5 B Describe the transport layer enhancement that can give the performance independent of the RTT. (04)

Q.5 C Describe RREQ & RREP messages in AODV. (03)

Q.6 A Calculate the total time required to transfer a 1000 KB file in the following cases assuming an RTT of 100 ms, a packet size of 1 KB, and an initial 2xRTT of "handshaking" before data is sent: (05)

i. The bandwidth is 1.5 Mbps, and data packets can be sent continuously
ii. The bandwidth is 1.5 Mbps, but after we finish sending each data packet we must wait for one RTT before sending the next.
iii. The bandwidth is "infinite", meaning that we take transmit time to be zero, and up to 20 packets can be sent per RTT.

Q.6 B Discuss the DSR routing algorithm in brief. (04)

Q.6 C What do you mean by routing overhead in context of ad hoc networks? Describe the expanding ring search mechanism in AODV. (03)

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