

GANPAT UNIVERSITY
M. Tech SEMESTER-I Information Technology
Regular Examination January 2013
3IT101: Advanced Topics in Networks

Time: 3 Hours]

Instructions:

[Total Marks: 70

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** Describe the GPRS architecture in details. (06)
- Q.1 B** Answer the following with reference to GSM architecture. (06)
- a. What happens when MS powers up?
 - b. Describe the steps involved to handle the incoming call.
- OR**
- Q.1 A** Explain the cellular architecture in brief. Describe the radio resource management in cellular architecture. (06)
- Q.1 B** Suppose in a cellular system total bandwidth available is 33 Mhz and need to allocate 25 KHz 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 (06)
- Q.2 A** Answer the following. (09)
- i. Differentiate wired & wireless networks.
 - ii. Explain Error protection in GSM.
 - iii. Describe the concept of Mobile IP.
- Q.2 B** List the different ways of increasing the capacity of a cellular system (02)
- OR**
- Q.2 A** At time t, a TCP connection has a congestion window of 4000 bytes. The maximum segment size used by the connection is 1000 bytes. What is the congestion window after it sends out 4 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** 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? (04)
- Q.2 C** Explain the concept of hard handoff & soft handoff. (03)
- Q.3 A** Describe Hidden & Exposed terminal problem. Discuss the solution of both the problems in brief. (04)
- Q.3 B** Suppose there are three stations S1, S2 & S3 wants to send the packet of size 600 bytes, 1800 bytes & 1300 bytes at time 0, 120 & 250 μ s respectively. Assume Slot Time of 20 μ s, SIFS Time of 10 μ s, RTS Threshold of 1200 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 C To transmit a 1 bit, a station sends its chip sequence. To transmit a 0 bit, it sends the complement of its chip sequence. Fig-1 shows the binary chip sequences assigned to four stations. Fig-2 shows them in bipolar notation. Fig-3 shows six examples of one or more stations transmitting at the same time. Find the chip sequences for all six examples. Show that receiver is able to recover the station C's signal. (04)

A: 00011011
 B: 00101110
 C: 01011100
 D: 01000010

Fig-1

A: (-1 -1 -1 +1 +1 -1 +1 +1) 1 -- 1- C
 B: (-1 -1 +1 -1 +1 +1 +1 -1) 2 - 1 1 - B + C
 C: (-1 +1 -1 +1 +1 +1 -1 -1) 3 1 0 -- A + B'
 D: (-1 +1 -1 -1 -1 -1 +1 -1) 4 1 0 1 - A + B + C

Fig-2

5 1 1 1 1 A + B + C + D
 6 1 1 0 1 A + B + C' + D

Fig-3

SECTION-II

Q.4 A Discuss the TCP issues in wireless networks. (06)
Q.4 B Discuss & differentiate the TCP Reno & New Reno in details. (06)

OR

Q.4 A Discuss the satellite characteristics that affect the performance of TCP. (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 1-Gigabit/s links and a single switch. The packet size is 5000 bits, and each link introduces a propagation delay of 10 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.5 B Differentiate proactive & reactive routing approaches for MANETs. (04)
Q.5 C How to give priorities in 802.11? (03)

OR

Q.5 A Consider the following chain topology: (04)
 A ---- B ---- C ---- D ---- E

A is sending packets to E 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 E?
- 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 Explain ZRP in brief. (04)

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

Q.6 Answer the following. (12)

- i. Discuss the DSR routing algorithm in brief.
- ii. Describe CSMA/CA mechanism with an example.
- iii. Differentiate DSR & AODV. Describe expanding ring search mechanism in AODV.

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