

**GANPAT UNIVERSITY**  
**M. Tech Semester - II Computer Engineering**  
**Regular Examination -July, 2013**  
**3CE205: Satellite Networking (Elective II)**

Time: 3 Hours]

Instructions:

[Total Marks: 70

1. Attempt all questions.
2. Figures to the right indicate full marks
3. Each section should be written in a separate answer book

**SECTION-I**

- Q-1. (A) Explain a satcom system. Discuss the reason for the selection of uplink and downlink frequencies. [ 4 ]
- (B) Explain the following equation and each term of the equation:  
 $D = t_t + t_{up} + t_i + t_{down} + t_s + t_q$   
 Calculate  $t_t$  to transmit an ATM cell at a 6 Mbit/s link. [ 4 ]
- (C) Explain the differences between satellites with transparent and onboard switching techniques. [ 4 ]

**OR**

- Q-1. (A) Discuss the differences between satellite networking & terrestrial networking issues. [ 4 ]
- (B) Suppose 24 independent analog voice channels are connected to the input of a TDM. The multiplexer samples the first channel and converts this analog sample into an equivalent digital signal of 8 bits and this procedure is repeated for total 24 channels. Each frame consists of 24 channels sampled and 1 extra framing bit. If TDM have the frame rate of 8000 frames per second, then what is the bit rate for this TDM in Mbps? [ 4 ]
- (C) Assume that you have to design a satcom system for the applications which may generate bursty traffic and content could be simple text or multimedia. Suggest the modifications required at each layer of the network protocol stack with different options for underlying technologies. In your opinion, what would be the best design option? [ 4 ]
- Q-2. (A) What do you mean by burst error? Discuss the impact of satellite burst errors on the ATM layer. [ 4 ]
- (B) Suppose host A is sending a large file to host B over a TCP connection. The two end hosts are 20 msec apart (40 msec RTT) connected by a 1 Gbps link. Assume that they are using a packet size of 1000 bytes to transmit the file. Also assume for simplicity that ACK packets are extremely small and can be ignored. [ 4 ]
- i. At least how big would the window size (in packets) have to be for the channel utilization to be greater than 80%.
  - ii. Assuming infinite initial threshold, no losses and competing traffic, approximately how long (in seconds) would it take for the normal slow start mechanism to achieve 80% utilization?
- (C) Differentiate Geosynchronous & Non-Geosynchronous orbit in details [ 3 ]

**OR**

- Q-2. (A) Differentiate Synchronous & Asynchronous transfer mode. [ 3 ]
- (B) A data link protocol has the following characteristics: [ 4 ]
- |                              |           |
|------------------------------|-----------|
| Data length                  | 200 bytes |
| Header length                | 8 bytes   |
| Channel capacity             | 4 Mbit/s  |
| Acknowledgement frame length | 8 bytes   |
| Service & propagation delay  | 0.30 ms   |
- i. Estimate the maximum possible efficiency of this system if the protocol operates in a simple 'stop & wait' manner using positive acknowledgments.
  - ii. In order to maximize link efficiency the stop & wait protocol is to be changed into a sliding window protocol. Estimate an appropriate window size.



- (C) Describe in brief: [ 4 ]
- i. tcp
  - ii. tcpdump
- Q-3. **Answer the following** [12]
- (A) Suppose the distance between satellite earth station & earth receiver through GEO satellite is 36000 kms. Calculate the total time required to transmit the segment of 1500 bytes on 8 Mbps link. Assume that ACK indicates the successful transmission of the segment.
- (B) Describe the concept of BER & PER in relation to the length of the packet.
- (C) Differentiate the following:
- i. Time domain and Frequency domain
  - ii. Multiplexing and Multiple Access

### SECTION-II

- Q-4. (A) Can we use standard TCP for satellite networks? Justify your answer. [ 4 ]
- (B) Differentiate TCP Reno and New Reno in details. Discuss the performance issues of both the protocols for the satellite link. [ 6 ]
- (C) Describe receiver reneging issue in brief. [ 2 ]
- OR
- Q-4. (A) Describe TCP characteristics that affect the performance on satellite link. [ 6 ]
- (B) Differentiate Tahoe & Reno in brief. Discuss the performance of both the flavor in presence of multiple losses. [ 6 ]
- Q-5. (A) Explain TCP enhancement for satellite networks based on the slow start algorithm. [ 6 ]
- (B) Discuss the concept of SACK. Explain the performance of TCP with SACK & without SACK. [ 5 ]
- OR
- Q-5. (A) What is the need to design the TCP westwood. Discuss the performance issues of TCP westwood for satellite link. [ 5 ]
- (B) Explain a bandwidth estimation technique. [ 4 ]
- (C) What is the difference between TCP spoofing & TCP splitting. [ 2 ]
- Q-6. **Answer the following.**
- (A) Describe the approach of TCP Hybla. What are the performance issues with TCP Hybla? [ 4 ]
- (B) Describe a transport layer enhancement for the satellite network which does not maintain the end-to-end semantic. [ 4 ]
- (C) Define friendliness and fairness issues at transport layer. [ 2 ]
- (D) Suppose TCP sender wants to detect the reason for the segment loss. The loss of the segment can be due to the congestion or link error. Suggest a mechanism or an approach to detect the reason for the loss of the segment. [ 2 ]

END OF PAPER