

Invigilator's Signature : .....

CS/M.Tech/ME (CSE/IT)/SEM-2/PGCSE-201/PGIT-202/2010 2010

## ADVANCED COMPUTER NETWORKS (CSE) & ADVANCED TOPICS IN NETWORK & COMPUTER SECURITY (IT)

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

## **GROUP – A**

- 1. Answer any *five* of the following :  $5 \times 2 = 10$ 
  - i) What is the actual bit sequences transmitted over a link with a protocol supporting bit stuffing when the bit sequence is 11001011111001011111001011111101 ? Mark the stuffed bits if any.
  - ii) Other than their uniqueness, what other property must a scalable network have ? When an address will not be unique ?
  - iii) What happens in a Token bus if a station accepts a token and crashes immediately thereafter ? How does the protocol handle this ?
  - iv) Why does the payload of an Ethernet frame have a variable size ?
  - v) Is fragmentation required in concatenated virtual circuit internets as well as in datagram systems ?
  - vi) Find the class of each address ;
    - a) 193.14.56.87
    - b) 70.12.100.128. Give reason.
  - vii) If hosts *A* and *B* are assigned the same IP address on the same Ethernet on which ARP is used, and *B* starts up after *A*, then what will happen ?

30501 (M.TECH)

[ Turn over



- 2. Which TCP/IP Layers are associated with the following ?
  - a) Assignation of a hardware address to the packet
  - b) Connect two networks using different protocols
  - c) Arranges the sessions
  - d) Initiates a connection oriented delivery of packets
  - e) Chooses the logical address of the packet.

Justify in brief.

5

- 3. What are the different synchronisation techniques adopted by a computer network ? In BISYNC framing protocol the last 2 bytes are DLE and ETX. Which synchronisation technique does it use ? What is the role the DLE ? 3 + 1 + 1
- 4. How does the TCP Layer introduce another level of multiplexing ? Why is this multiplexing needed ? What is a socket ? What are the parameters needed to set up a socket connection ?
- 5. What are the common properties of the transport protocol ? What are the limitations of the underlying 'Best Effort' Network ? Does UDP satisfy all the requirements of the Transport Protocol ? Does it have any advantage ? 2 + 1 + 1 + 1

6. What are the issues addressed by single message security ? What are the limitations of using secret key encryption ?

3 + 2

30501 (M.TECH)



Answer any *three* of the following.  $3 \times 15 = 45$ 

- 7. The Data Link Layer is made up of two sub-layers. What are they ? What are their respective responsibilities ? How does FDDI protocol handle access of the link ? Calculate the total time required to transfer a 1200-KB file in the following cases, assuming RTT of 100 ms, a packet size of 1 KB data and an initial  $2\times$ RTT of 'handshaking' before data is sent. The bandwidth is 1.5 Kbps and data packets are sent continuously. The bandwidth is 1.2 Kbps but after we finish sending each data packet we must wait one RTT before sending the next. Explain the principle on which data transfer depends. 1+2+2+1+3+3+3
- 8. What are the responsibilities which are common to both Transport and Data Link layers ? In what respects do they differ ? How does the IP layer address the problem of heterogeneity ? A 1500 byte long packet from an Ethernet network has to be delivered via a point-to-point network. How does the inter-network handle this packet ? Why is it necessary to have one IP address per network rather than one per host ? A host with IP address 137.23.56.23 sends a packet to a host with IP address 142.3.6.9. Is the delivery direct or indirect ? In a class *B* subnet one of the hosts has an IP address : 125.134.112.66 and Mask : 255.255.224.0. Find the first address. Can a single host have more than one IP addresses ? Explain. 3 + 2 + 1 + 3 + 1 + 1 + 2 + 2

3

30501 (M.TECH)

[ Turn over



- 9. What is ARP ? Why is it needed ? How and in which layer of the TCP/IP architecture is it implemented ? How can IP addresses be assigned to the hosts of a very large network with facility to accommodate more number of hosts than there are IP addresses ? Is this a static or a dynamic method ? What are the inherent limitations of the network resources ? How can they be equitably shared so as to prevent congestion ? In this context discuss the different principles of congestion control. 1 + 2 + 2 + 4 + 1 + 1 + 4
- 10. Which aspect/s of network security is/are addressed by the Firewall and at which TCP/IP layer/s can this be implemented? Describe in detail. Compare a filtering firewall to a proxy firewall in terms of protection against spoofing attacks. What is a common technique to encrypt and authenticate in virtual private networks? Can a virtual private network access the global connectivity? How? What are the limitations of using secret key encryption? In the three-way authentication handshake, why is the server unsure of the client's identity until it receives the third message? 5+2+2+1+2+1+2
- 11. What is Client-Server paradigm ? Describe the process. What is the basic difference between the client and the server programme ? Is the Server programme finite or infinite ? Explain. A client uses UDP to send data of 16 bytes to a server. Calculate the efficiency of transmission as the ratio of useful bytes to total bytes. How can real time applications be handled by a computer network ? How can the Quality of Service be guaranteed ? 3+2+2+2+1+5

30501 (M.TECH)