

2pm

21/4/17

**Indian Institute of Engineering Science and Technology Shibpur**  
**B.Tech. & M.Tech Dual Degree (CST) 6<sup>th</sup> Semester Examination, 2017**  
**Computer Network and Distributed Systems (CS 602)**

Time: 3 hours

Full Marks: 70

*Attempt question 1 and any 8 from the rest*  
*All parts of the same question must be answered together*

1. (a) Find the Class of following IPv4 addresses with explanation

- (i) 10000001 00101011 00001011 11101111
- (ii) 01000001 11000011 00011011 01011111
- (iii) 190.5.50.121
- (iv) 15.33.110.10

[4]

- (b) Each of the following IPv4 addresses belong to a block. Find the first and last address of each block – (i) 27.23.70.18/24 and (ii) 100.33.71.8/28

[3]

- (c) An ISP is granted the block 80.70.56.128/25 IPv4 address. The ISP needs to allocate address among three organizations, Org-1, Org-2 and Org-3 with 60, 28 and 30 IP addresses respectively. For every organization, find the following –

- (i) Network Id, (ii) Netmask, (iii) Range of IP addresses (iv) Directed broadcast IP address

[10]

- (d) A router in an IP network has the following routing table:

Subnet Number	Subnet Mask	Next Hop
140.24.176.0	255.255.240.0	eth1
140.24.128.0	255.255.192.0	R2
140.24.192.0	255.255.192.0	R3
204.96.0.0	255.255.192.0	R4
Default	0.0.0.0	R1

- Find the next hop for packets having the following destination IP addresses (with justification):  
 (i) 140.24.223.67 (ii) 204.96.16.234 (iii) 140.24.181.98 (iv) 204.96.130.186

[8]

- (e) A router received an IPv4 datagram containing 5000 bytes of payload. It is also observed that DF flag in IPv4 header is set to zero (0). The datagram has to be forwarded to next-hop over an Ethernet LAN. Ethernet frames may carry data up to 1500 bytes (i.e. MTU=1500 bytes) and note that the size of IP header is 20 bytes (*there is no option field in the IP header*).

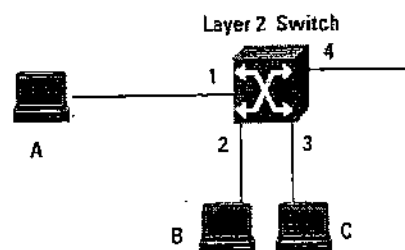
- (i) How many total number of IP fragments will be transmitted? (ii) Mention the value of MF and Fragment-Offset of IPv4 header of each fragment. Answer with justification.

[5]

2. Explain 'p-persistent CSMA'. Discuss the effects of the choice of the 'p' value on the performance of p-persistent CSMA. Which type of CSMA is used in Ethernet LAN (802.3)?  
[4+1 = 5]
3. In CSMA/CD network, why there is a restriction on the minimum and maximum frame size? What is the minimum frame size in case of 10Mbps Ethernet LAN (802.3)?  
[4+1 = 5]
4. What is Packet Switched network? Mention the advantages and disadvantages of Virtual Circuit and Datagram approaches in Packet Switched network.  
[2+3 = 5]
5. In the context of framing, explain "bit stuffing" technique. What is "piggybacking"?  
[3+2 = 5]
6. In the context of Distance Vector Routing, explain the algorithm used by a router A to update its routing tables on receiving the distance vector from another router B. The RIP protocol can be used as a reference to explain the algorithm.  
[5]
7. Explain the use of SYN and FIN flags of TCP header in the context of TCP connection establishment and termination, describing the segments transmitted by each side.  
[5]
8. What is flooding based routing protocol? How flooding technique is optimized in Link State routing while distributing Link State Packets (LSP) among the routers?  
[2+3 = 5]
9. What is Count-to-Infinity problem? Mention few approaches to avoid it.  
[3+2 = 5]
10. In the context of resolving DNS queries, explain (i) Recursive resolution, (ii) Iterative resolution with suitable examples.  
[5]
11. Illustrate with an example how TCP achieves flow control when a receiver application reads data at a rate slower than the rate at which the sending application sends data.  
[5]

12. Three hosts A, B and C are connected to a layer-2 switch. Assume that the switch does not know about any of the hosts initially (empty lookup table). The first few frames are transmitted in the given order: A to C, A to B, B to A, B to C, A to B, C to B and C to O (other than A, B, C).

Which of these frames are broadcast by the switch and which frames are unicast? Answer with explanation.



[5]