Nirma University

Institute of Technology

Semester End Examination (RPR), May - 2016

B. Tech. in Computer Engineering, Semester-V

2IT321 Computer Networks

Roll / Exam No. _____ Supervisor's Initial with Date _____

Time: 3 Hours Max Marks: 100

Instructions:
1. Attempt all questions.
2. Figure to right indicate full marks.
3. Assume suitable assumptions and specify them.
4. Section-wise separate answer book to be used.

SECTION - I

Q.1 Answer the following. [18]

A. What are the two reasons for using layered protocols? Discuss any one disadvantage of using layered protocols. **02**

B. A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers? **02**

C. A bit string, 0111101111101111110, needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing? **02**

D. What will be the address space in each of the following systems (two symbols 0 and 1 are used in system)? **02**
1. a system with 8-bit addresses
2. a system with 64-bit addresses

E. Why networks might use an error-correcting code instead of error detection and retransmission? Justify. **02**

F. The distance from earth to a distant planet is approximately 9×10^{10} m. What is the channel utilization if a stop-and-wait protocol is used for frame transmission on a 64 Mbps point-to-point link? Assume that the frame size is 32 KB and the speed of light is 3×10^8 m/s. **04**

G. Critically compare IPv4 and IPv6. **04**

Q.2 Answer the following. [16]

A. An address space uses three symbols: 0, 1, and 2 to represent addresses. If each address is made of 10 symbols, how many addresses are available in this system? **02**

B. If bit rate is 10kbps, propagation delay is 40ms then for what frame size does stop-n-wait protocol give efficiency of 50%? **04**

C. A bit stream 10011101 is transmitted using the standard CRC method described in the text. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. Suppose that the third bit from the left is inverted during transmission. Show how this error is detected at the receiver's end? **04**

D. Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention? Justify. **06**

OR

D. Show the unabbreviated colon hex notation for the following IPv6 addresses: **06**

1. An address with 64 0s followed by 32 two-bit (01)s.
2. An address with 64 0s followed by 32 two-bit (10)s.
3. An address with 64 two-bit (01)s.
4. An address with 32 four-bit (0111)s.

Q.3 Do as directed. **[16]**

A. Suppose that instead of using 16 bits for the network part of a class B address originally, 20 bits had been used. How many class B networks would there have been? **02**

B. A computer on a 6-Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the full 6 Mbps? **04**

C. Find the network addresses of the following IP addresses: **04**

1. 123.56.77.32/29
2. 200.17.21.128/27
3. 17.34.16.0/23
4. 180.34.64.64/30

D. An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. **06**

1. Find the subnet mask.
2. Find the number of addresses in each subnet.
3. Find the first and the last address in the first subnet.
4. Find the first and the last address in the last subnet (subnet 32).

OR

D. Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation? **06**

SECTION – II

Q.4 Do as directed. **[16]**

A. Suppose you want to send a file of size 255,000 bytes over a 2 Mbps link using TCP. The maximum segment size (MSS), which represents the size of TCP payload, is 1,000 bytes. TCP Threshold = 130 packets. How many TCP transmissions are required? **08**

B. Justify, which is a "better" protocol (UDP or TCP) for the following applications: **08**

1. Domain Name System
2. Multimedia application
3. File transfer application
4. E-mail application

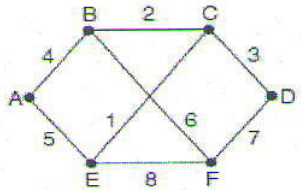
Q.5 Do as directed. **[18]**

A. If a DNS packet is lost, there is no automatic recovery. Does this cause a problem, and if so, how is it solved? **04**

B. Compare and contrast the Go Back N ARQ with Selective Repeat ARQ. **04**

C. Discuss about count-to-infinity problem with suitable example. **04**

D. Consider the network given in figure below. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The cost of the links from C to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the cost. **06**



OR

D. Discuss about the architecture of web. **06**

Q.6 Answer the following. **[16]**

A. The value of Total Length field in an IP datagram is 21 octets. How many option bytes are present? **02**

B. Datagram fragmentation and reassembly are handled by IP and are invisible to TCP. Does this mean that TCP does not have to worry about data arriving in the wrong order? Justify. **04**

C. If costs are recorded as 8-bit numbers in a 50-router network, and distance vectors are exchanged twice a second, how much bandwidth per (full-duplex) line is chewed up by the distributed routing algorithm? Assume that each router has three lines to other routers. **04**

D. A router is blasting out IP packets whose total length (data plus header) is 1024 bytes. Assuming that packets live for 10 sec, what is the maximum line speed the router can operate at without danger of cycling through the IP datagram ID number space? **06**

OR

D. Station A uses 32 byte packets to transmit messages to Station B using a sliding window protocol. The round trip delay between A and B is 80 milliseconds and the bottleneck bandwidth on the path between A and B is 128 kbps. What is the optimal window size that A should use? **06**