National Institute of Technology, Delhi

Name of the Examination: B.Tech.

Branch	: ECE	Semester	: 6th
Title of the Course	: Computer Networks	Course Code	: CSB 342

Time: 3 Hours   Maximum Marks: 50

Note :*Make necessary assumptions wherever needed.*

Guidelines:

1. The question paper is divided into three sections A, B and C and each section has following type of questions

   a. Section A: Contains 10 questions of 01 mark each and all parts are compulsory.

   b. Section B: Contains Five (05) questions of 5 marks each and any four (04) are to be attempted.

   c. Section C: Contains Three (03) questions of ten (10) marks each and any two (02) are to be attempted.

Section – A

All questions are compulsory in this section.   (1*10=10)

1. Which protocol assigns IP address to the client connected in the internet?
a) DHCP   b) IP   c) RPC   d) none of the mentioned

2. Which one of the following protocol is not used in internet?
a) HTTP   b) DHCP   c) DNS   d) None of the mentioned

3. Is ARP response by server properly secured?

4. The main advantage of UDP is
a) more overload   b) Reliable   c) Less overload   d) Fast

5. . DNS database contains...........................

6. . ICMP is primarily used for......................

7. You want to implement a mechanism that automates the IP configuration, including IP address, subnet mask, default gateway, and DNS information. Which protocol will you use to accomplish this?
(a)ARP   (b) DHCP   (c) SMTP   (d) SNMP

8. If one link fails, only that link is affected. All other links remain active. Which topology does this?

9. Switching at the network layer in the Internet uses the datagram approach to:-
(a) Message switching   (b) packet switching   (c) circuit switching

10. Bytes of data being transferred in each connection are numbered by TCP. These numbers starts with a
a) Random number   b) Zero   c) One   d) Sequence of zero's and one

Section B

Do any 4 questions .   (4*5=20)
Question 1. (A) Consider an IP packet with a length of 4,500 bytes that includes a 20-byte IPv4 header ans 40-byte TCP header. The packet is forwarded to an IPv4 router that supports a Maximum Transmission Unit (MTU) of 600 bytes. Assume that the length of the IP header in all the outgoing fragments of this packet is 20 bytes. Assume that the fragmentation offset value stored in the first fragment is 0. The fragmentation offset value stored in the third fragment is ....

(B) . Explain connection establishment procedure in TCP/IP at transport layer.   (2.5 + 2.5 marks).

Question 2.(A) The values of parameters for the Stop-and-Wait ARQ protocol are as given below: -Bit rate of the transmission channel = 1Mbps, Propagation delay from sender to receiver = 0.75 ms, Time to process a frame = 0.25 ms, Number of bytes in the information frame = 1980, Number of bytes in the acknowledge frame = 20, Number of overhead bytes in the information frame = 20. Assume there are no transmission errors. Then, the transmission efficiency of the Stop-and-Wait ARQ protocol for the above parameters is _____ .

(B) In an IPv4 datagram, the M bit is 0, the value of HLEN is 10, the value of total length is 400 and the fragment offset value is 300. The position of the datagram, the sequence numbers of the first and the last bytes of the payload, respectively are.............................   (3+2 marks)

Question 3. (A)An ISP is granted a block of address starting with 120.60.4.0 /20 .The ISP wants to distribute these blocks to 100 organizations with each organization receiving 8 addresses only .Design the sub-blocks and give the slash notation for each sub-block . Find out how many addresses are still available after these allocations.   (3 marks)

(B) In an IP packet the value of HLEN is 1000 in binary .How many bytes of options are being carried by this packet.   (2 marks)

Question 4.(A) Explain ICMP error messages and query messages in detail.   (4 marks)
(D) If an Ethernet destination address is 07:01:02:03:06:08,what is the type of the address (unicast, multicast ,or broadcast).   (1 mark)

Question 5.(A) Explain packet switching technique in detail .   (2 marks)
(B) Suppose that it takes 1 unit of time to transmit a packet (of fixed size) on a communication link. The link layer uses a window flow control protocol with a window size of N packets. Each packet causes an ACK or a NAK to be generated by the receiver, and ACK/NAK transmission times are negligible. Further, the round trip time on the link is equal to N units. Consider time i>N. If only ACKs have been received till time i(no NAKs), then the good-put evaluated at the transmitter at time i (in packets per unit time) is........................   (3 marks)

Section C

(Do any 2)   (10*2=20)

Question 1.(A) Compare the contrast between DHCP and ARP in detail with their application.

(B)   Consider the GBN and SR protocols .Suppose the sequence number space is of size k .What is the largest allowable sender window that will avoid the occurrence of problems such as that in SR and GBN manner ,for each of these protocols?

(C) Why is it necessary for the server to use a special initial sequence number (ISN) in the TCP/IP connection establishment /termination .

(D) In the network 200.10.11.144/27 , the fourth octet (in decimal) of the last IP address of the network can be assignment to a host is ………………..   (3+2+2+3)

Question 2 (A) . Consider a broadcast channel with N nodes and a transmission rate of R bps .Suppose the broadcast channel uses polling for multiple access. Suppose the amount of time from when a node completes transmission until the subsequent node is permitted to transmit is d_{poll} .Suppose that within a polling round a given node is allowed to transmit at most Q bits. What is the maximum throughput of the broadcast channel?   (3 marks)

(B). Why might a mesh topology be superior to base station topology for communication in natural disaster? Explain.   (2 marks)

(C) Consider a TCP connection in a state where there are no outstanding ACK. The sender sends two segments back to back. The sequence numbers of the first and second segments are 230 and 290 respectively. The first segment was lost, but the second segment was received correctly by the receiver. Let X be the amount of data carried in the first segment (in bytes), and Y be the ACK number sent by the receiver, then the values of X and Y is…………………

(D) If two systems are situated in the same network, what is the role of network layer?

                                                                                            (3+2 marks)

Question 3. (A) Explain these protocols in detail - 1. FTP   2. SMTP   (2 marks)

(B)   Explain the term 'exponential backoff ' in reference to CSMA/CD ,also explain how does the CSMA/CD algorithm improve on CSMA algorithm.   (3 marks)

(c) With a suitable example explain Distance Vector Routing algorithm. What is the serious drawback of Distance Vector Routing algorithm? Explain.   (5 marks)