2014

Computer Networks

Time Alloted : 3 Hours *Full Marks : 70*

The figure in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following: **10x1=10**

i) Match with suitable option

LIST - I

(A) Node-to-Node delivery
(B) Reassembly of data packets
(C) Bit representation
(D)Encryption

LIST-II

(1) Physical Layer
(2) Application Layer
(3) Data Link Layer
(4) Transport Layer

a) A - 4, B - 3, C - 1, D - 2

b) A - 3, B - 4, C - 1, D - 2

c) A - 2, B - 3, C - 4,D - 1

d) A - 4, B - 4,C - 3, D - 3

ii) In Ethernet when Manchester encoding is used, the bit rate is

a) Half the baud rates

b) Twice the baud rate

c) Same as the baud rate

d) none of these

iii) Error detection and correction at the data link level is achieved by

a) bit stuffing

b) cyclic redundancy codes

c) Hamming codes

d) Equalization

iv) Match the following list: Sequence number is 5 bits

	Protocol		W_s, W_R
(A)	Stop-N-Wait ARQ	(1)	31, 1
(B)	Go-Back-N ARQ	(2)	16,16
(C)	Selective repeat ARQ	(3)	1, 1

W_s: Sender Window Size

W_R: Receiver Window size

a) A-3, B-1, C-2

b) A - 1,B - 3, C - 2

c) A-2, B-1, C-3

d) A-3, B-2,C-1

v) IPv6 addresses are _____ bytes long.

a) 6
b) 16
c) 32
d) 128

vi) Let in an IPv4 datagram, total length is 461 bytes and length of data is 433 bytes. What is the header size in bytes

a) 28
b) 894
c) 36
d) 27

vii) IP address in the B class is given by

a) 125.123.123.2
b) 192.023.21.54
c) 191.128.32.56
d) 10.14.12.34

viii) Given IP address is 180.25.21.172 and the subnet mask 225.225.192.0, then what is the subnet address?

a) 180.25.21.0
b) 180.25.0.0
c) 180.25.8.0
d) 180.0.0.0

ix) UDP is

a) connection-oriented

b) connection-less

c) both (a) and (b)

d) none of these.

x) Which of the following is an interior routing protocol?

a) RIP

b) OSPF

c) BGP

d) both (a) and (b).

GROUP - B
(Short Answer Type Questions)

Answer any *three* of the following. 3x5=15

2. (a) A telephone line normally has BW of (300-3300 Hz) assigned for data communication. The signal to noise rate is 3162. Find the channel capacity.

   (b) Compare virtual circuit network and datagram network.

   [2+3=5]

3. a) What is the purpose of multiplex? FDM is for analog signals, TDM is for digital signals.Explain why?

   b) What should be the link capacity to multiplex 3 input signals each of 300 bits per sec speed using 2 bitslsec framing rate?

   (1.5x 2) + 2

4. (a) N routers are to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-

speed line, a medium-speed line, a low-speed line, or no line. If it takes t unit of computer time to generate and inspect each topology, how long will it take to inspect all of them?

(b) For following situations state which type of network architecture is appropriate

i) No. of users 50
ii) Data and resources need to be restricted
iii) No. network administrator required
iv) All users with equal priority

[3+2=5]

5. (a) What is the purpose of the "Time to live" field in the IP header?

(b) If the IP header is 28 bytes long, what will be the value of the "HLEN" field (in Binary)?

(c) Write the advantages of ICMP over the IPV4.

[2+2+ 1=5]

6. a) What is the purpose of providing two separate protocols UDP and TCP in the transport layer of TCP IIP architecture?

b) Physical address operates in a local domain whereas logical address has a global domain. Explain. Define bandwidth of a media.

[2 + (2 + 1)=5]

GROUP - C
(Long Answer Type Questions)

Answer any *three* of the following. 3x15=45

7. a) Explain the utility of layered network architecture.

b) Assume a layered networking architecture. The packet structure in this architecture, as seen at the lowest (physical) layer, is as follows:

AICTE Header	WBUT Header	INSTITUTE Header	STUDENT data

Sketch the layered protocol model that applies to the given architecture (i.e. packet) by labeling each layer in the figure below with the appropriate layer name. Your choices are AICTE, WBUT, INSTITUTE and STUDENT data.

---------- Layer
---------- Layer
---------- Layer
---------- Layer

c) A 10 bit data bit block 0111010111 is to be sent using hamming code for error detection and correction. Show how the receiver corrects an error that occurs in 6th bit position from right.

d) In a packet switched network, packets are routed from source to destination along a single path having two intermediate nodes. If message size is 24 bytes and each packet contains a header of 3 bytes, then find the optimum packet size.

[2+4+6+3]

8. a) What are random access & controlled access?

b) What are the differences between pure ALOHA & slotted ALOHA?

c) Describe ALOHA with flowchart.

d) Derive the expression of throughput for ALOHA

e) What are non-persistence. I-persistence & p-persistence strategies?

[(1+1)+2+4+4+(1+1+1)]

9. (a) What is working operation of stop and wait ARQ for Lost

Acknowledgement

b) The address 43:7B:6C:DE:10:00 has been shown as the source address in an Ethernet frame. The receiver has discarded the frame. Why?

c) Compare and contrast CSMA/CA with CSMA/CD.

d) What is transparent bridge? How does a repeater extend the length of a LAN?

[2+3+4+(2+4)]

10. a) The following network (Figure 1) uses a distance vector routing protocol. Once the routes have stabilized, the distance vectors at different nodes are as following:

N1: (0,1,7,8,4) N2: (1,0,6,7,3) N3: (7,6,0,2,6)

N4: (8,7,2,0,4) N5: (4,3,6,4,0)

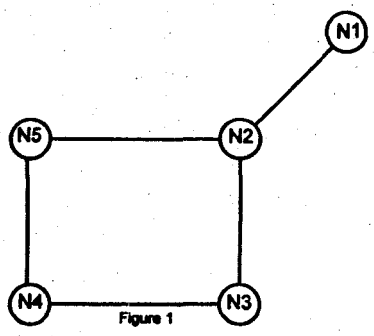

Figure 1

(i) The cost of link N2-N3 reduces to 2 in both directions. After next round of updates, what will be the new distance vector at node, N3?

(ii) After the updates in the previous questions, the link N1 - N2 goes down. N2 will reflect this change immediately in its distance vector as cost∞, After the next round of update, what will be the cost to N1 in distance vector of N3?

b) A router has the following RIP routing table:

Net 1	4	B
Net 2	2	C
Net 3	1	F
Net 4	5	G

What would be the contents of the table if the router receives the following RIP message from Router C?

Net 1	2
Net 2	1
Net 3	3
Net 4	7

c) A Host S opens a TCP connection using an initial sequence number (ISN) of 14,535. Other party R opens the connection with an ISN of 21,732. Show the three TCP segments during the connection establishment.

[5+4+6 = 15]

11. a) What are the differences between Symmetric key cryptography and Asymmetric key cryptography?

b) Explain RSA algorithm with an example.

c) An organization is granted the block 211.17.180.0124. The administrator wants to create 32 subnets.

i) Find the subnet mask.

ii) Find the number of addresses in each subnet.

iii) Find the first and last address in the first subnet.

iv) Find the first and last address in the last subnet

[3 + 6 + 6 = 15]