

0 1 2 3 0 1 2 3 | 0 1 2 3 0 1 2 3 0

THE LNM Institute of Information Technology

III Year, II Semester, 2015

Exam: Mid Term

COMPUTER NETWORKS

(Duration: 1.5 hour)

NOTE: Answer ALL questions. Do not write on question paper except Name and Roll number.

1. [Marks 9] Stations A and B exchange frames using sliding window flow control. The acknowledgments are piggybacked on the data frames. Each station has five frames to transmit. The window size 3 and modulo 4 counting is used. Fill x by the appropriate sequence number in the control field of the frame shown below. Also show the status of the window in each step for both stations. Assume that there are no errors.

Station A

Station B

- (a) 0 0 →
(b) x x →
(c) ← 0 x
(d) ← x x
(e) x x →
(f) x x →
(g) ← x x
(h) ← x x
(i) ← x x
(j) x x →
(k) ← RR x

Note: RR- Repeat Request.

2. [Marks 2 + 2 + 2 + 3]

- (a) A device is sending a file of 1,00,000 characters at the rate of 2000bps. How long device takes to send?
- (b) If the receiver receives following sequence, which is encoded by Hamming code (odd parity). Find the actual bit sequence sent by the sender.

100010011100

- (c) Draw the graph of the 2B1Q scheme for the following bit stream.

00110011010100

- (d) Octets of an Ethernet frame in hexadecimal are given below. The preamble and start delimiter octets are not included. Identify the various fields. Is it an IEEE 802.3 frame or Ethernet(DIX) frame?

00 00 66 33 B5 49 00 00 A7 12 36 B7 00 60 AA AA 03 00 00 00 08 00 48 45 4C 4C

3. [Marks 6 x 2] Explain in brief.

- (a) List out the differences between OSI reference model and TCP/IP protocol stack.
- (b) In Internet environment, which of the following applications are sensitivity to delay?
- (i) surfing the Internet
 - (ii) copying a file
 - (iii) sending an e-mail
- (c) If the physical destination address is corrupted during the transmission in bus topology. What happens to the frame? How can the sender be informed about the situation?
- (d) What service does the Network layer in the OSI reference model expect from the layer below? And what service does it provide to the layer above?
- (e) Is it possible that a router implements several types of data link layers?
- (f) Which of the four type of delay (transmission, propagation, processing, queuing) depends on the packet size?

The LNM Institute of Information Technology

III Year, II Semester, 2015

Exam: End Term

IT WORKSHOP

(Duration: 45 Min)

NOTE: Answer ALL questions.

Max. Marks: 10

Section A

1. [Marks 1 + 1 = 2]

- (a) What is the use of Computer Networks?
(b) List-out performance evaluation methods used in computer network.

2. [Marks 1.5 + 1.5 = 3]

- (a) In the carrier sense networks if the prevailing condition is a *channel busy*, what will happen next in the following technique i) non-persistent, ii) 1-persistent and iii) p-persistent

(b) Analyse HDLC frame: initial bit sequence of the frame is as follows
01111110 11111111 10110110

3. [Marks 1 x 5 = 5] Briefly explain difference with example.

- (a) Physical Topology vs Logical Topology
(b) Connection-oriented vs Connection-less
(c) Packet Switching vs Circuit Switching
(d) Latency vs Throughput vs Goodput
(e) Service vs Interface vs Protocol

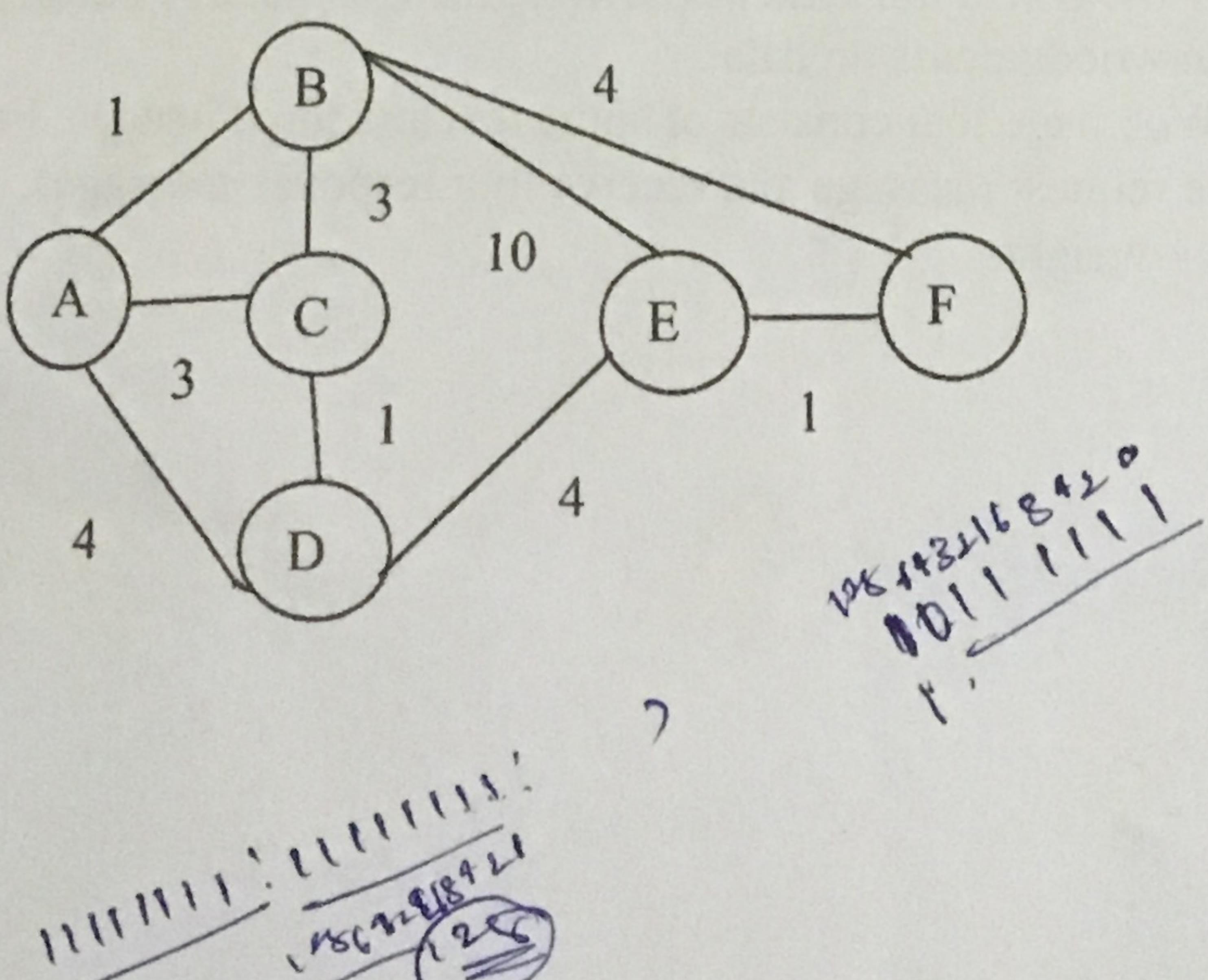
The LNM Institute of Information Technology
Computer Networks, Section B
End Semester Exam (6th Semester 2015)
Max marks: 35, Time 2.15 Hrs

1. Answer the following questions: [10*2= 20 marks]

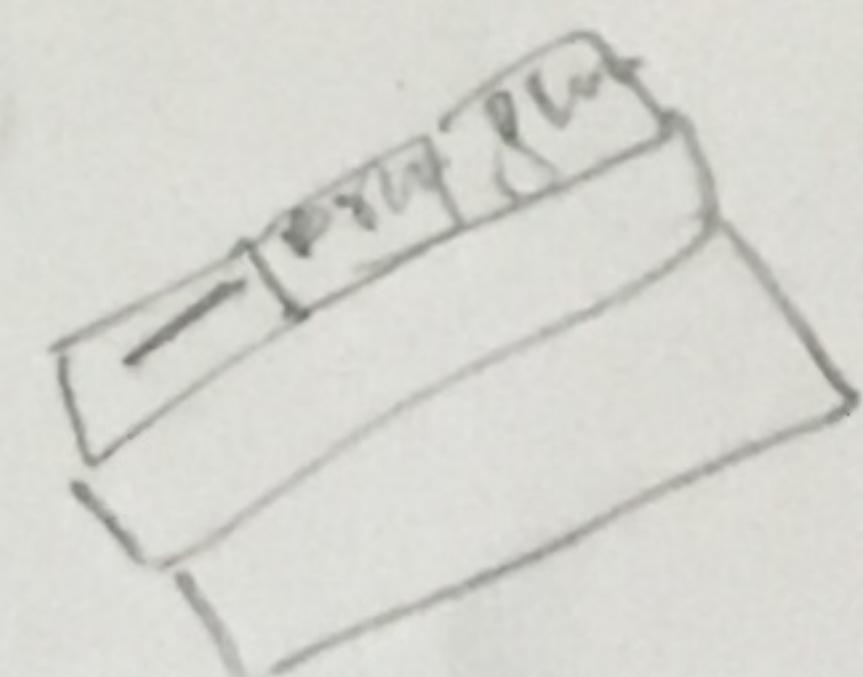
- a. Why does UDP exist? Would it not have been enough to just let user processes send raw IP packets in order to communicate?
- b. Why is the transmission of information between two peer processes in the OSI Model called virtual transmission?
- c. The Protocol field used in the IPv4 header is not present in the fixed IPv6 header. Why not?
- d. What is the need for ICMP? Mention any four ICMP message and their purpose.
- e. Write a short note on IMAP, Telnet.
- f. Consider a subnet with prefix 128.119.40.128/26. Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network. Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?
- g. Difference between Routing and Forwarding?
- h. Suppose Host A sends two TCP segments back to back to Host B over a TCP connection. The first segment has sequence number 90; the second has sequence number 110.
 - i. How much data is in the first segment?
 - ii. Suppose that the first segment is lost but the second segment arrives at B. In the acknowledgement that host B sends to host A, what will be the acknowledgement number?
- i. What is the difference between a group-shared tree and a source-based tree in the context of multicast routing?
- j. Can a computer have two DNS names that fall in different top-level domains? If so, give a plausible example. If not, explain why not.

2. Consider the network shown below. [5 marks]

- a. Show the operation of Dijkstra's (Link State) algorithm for computing the least cost path from F (the rightmost node in the figure below) to all destinations. Also explicitly list all the shortest path routes from F to all destinations that are the result of the algorithm's computation.
- b. Show the distance table that would be computed by the distance vector algorithm in B.

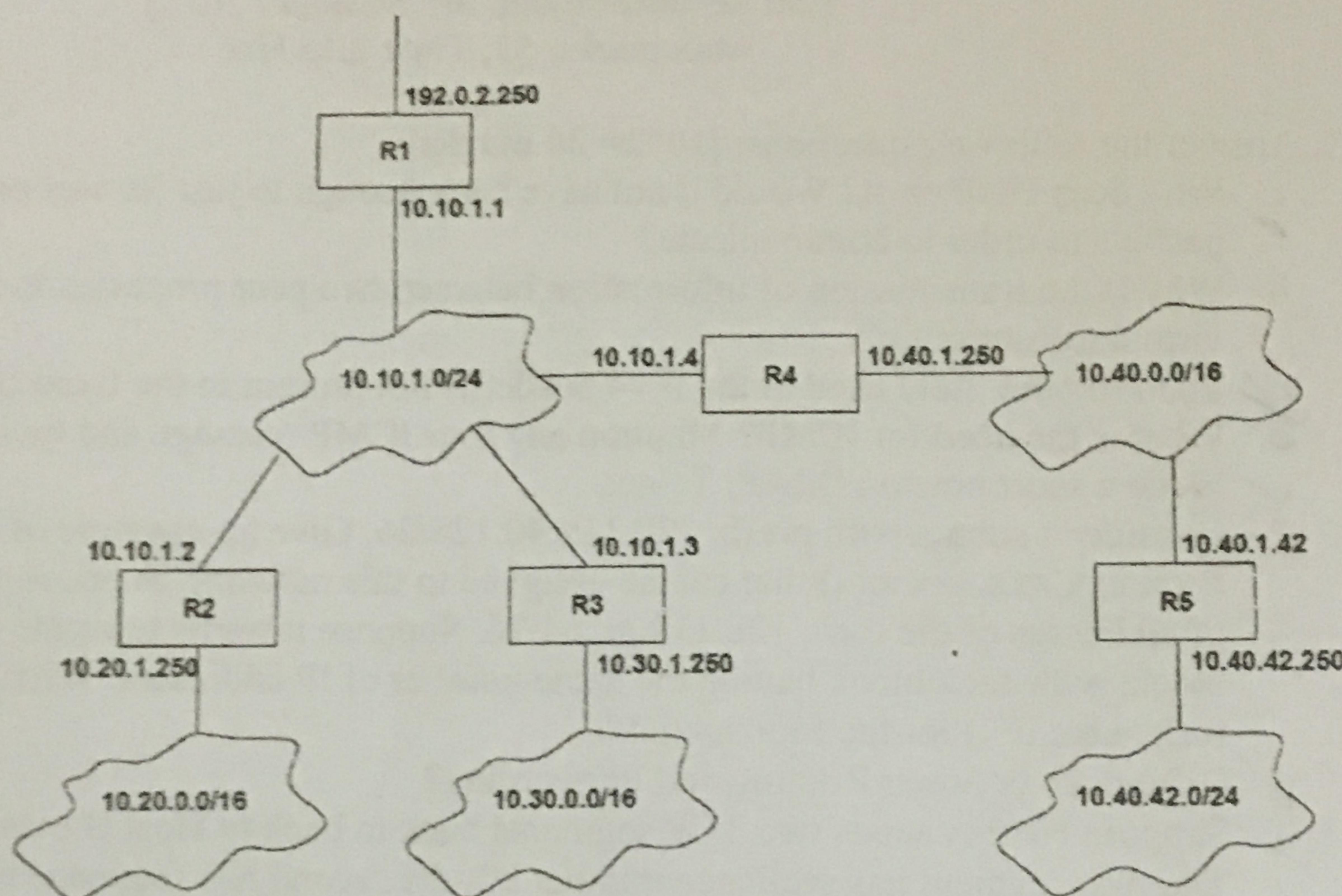


128.119.40.84 20
01111111
1



1111
1000...

3. Consider the following IPv4 network topology. [5 marks]



Router R1 is connected to the Internet and forwards all out-bound traffic to the address 192.0.2.12. Determine the forwarding tables for the routers R1, R2, R3, R4, and R5. Keep the number of forwarding table entries as small as possible while routing packets along shortest paths.

4. Indicate which of the following statements are correct or incorrect. Briefly justify your answers. No marks for simply writing True or False. (1 mark for correct answer and -0.25 for incorrect answer [5 marks]

- a. It is the network layer's responsibility to forward packets reliably from the source to the destination.
- b. Suppose you access a web page from your computer. When you examine a packet resulting from this access on an Ethernet link, you find first the HTTP header, followed by the TCP header, followed by the IP header, followed by the Ethernet header.
- c. Host A is sending a large file to host B over a TCP connection. Assume host B has no data to send to host A. Host B will not send acknowledgments to host A because host B cannot piggyback the acknowledgments on data.
- d. A user requests a Web page that consists of some text and three images. For this page, the client will send one request message and receive four response messages.
- e. BGP exchanges link weights?

THE LNM Institute of Information Technology

III Year, II Semester, 2014

Exam: I Mid Term

COMPUTER NETWORKS

(Duration: One hour)

NOTE: Answer ALL questions. Do not write on question paper.

1. [Marks 7 x 2] Explain in brief.

(a) List out five component of data communication.

(b) What service does the Network layer in the OSI reference model expect from the layer below? And what service does it provide to the layer above?

(c) Is it possible that a router implements several types of data link layers?

(d) When you examine a packet resulting from web access on an Ethernet link, Is the order of headers correct? Why or why not?

First the application layer header, followed by the transport layer header, followed by the network layer header, followed by the Ethernet header, followed by data.

(e) Which of the four sources of delay (transmission, propagation, processing, queuing) depend on the packet size?

(f) There are two options for sending a large message through a network. Either message as a unit, or to break it up into much smaller packets. In the second option, which components of end-to-end delay (transmission, propagation, processing, queuing) are reduced? Explain.

(g) In a virtual circuit network, are the resources (link capacity, buffer space) allocated by routers to every circuit?

2. [Marks 3 + 3]

(a) The following bit stream is encoded using two-dimensional parity check. Detect the error present in this. Can the errors be corrected? Assume even parity.

1100 1010 0001 0111 1000 0110 0110 0110 0010 0110 0001 0101 1000 1101 1000 1011

(b) If the CRC code is 10100010111100 and generating polynomial is $X^4 + X^3 + X^2 + 1$, check if there is any error in the code word.

CONTINUED

3. [Marks 5] If window size is 7 and modulo 8 counting is used in sliding window control. Assume A needs to transmit 10 frames to B. show the exchange of frames under following steps:

- (a) A send first four frames to B
 - (b) B acknowledges first two frames
 - (c) B rejects third frame due to error
 - (d) A sends up to eighth frame
 - (e) B acknowledges up to eighth frame
 - (f) acknowledgment of seventh frame lost
 - (g) A sends up to tenth frame
 - (h) B acknowledges up to tenth frame
-

The LNM Institute of Information Technology

III Year, II Semester, 2014

Exam: End Term

COMPUTER NETWORKS

(Duration: Two hours)

NOTE: Answer ALL questions. Do not write on question paper.

1. [Marks 1 + 1.5 + 2.5 + 2.5 + 2.5 = 10] The following is the contents of an Ethernet frame in hexadecimal, in the standard format normally used in this unit:
08 00 09 05 1d 03 00 00 0c 46 ff bc 08 00 45 90 90 2a 04 80 00 00 3b 06 27 75 95 90 14 7c
95 90 14 3d 07 81 00 17 54 90 58 6c 44 54 32 e7 50 10 0b 68 b8 4d 00 00 6c 73 00 00 00 00
 - (a) How can you tell that this frame encapsulates an IP datagram?
 - (b) Give the source IP address of the datagram.
 - (c) This IP datagram encapsulates a TCP segment. Is this segment traveling from the client to the server, or vice versa? How can you tell?
 - (d) What is the value of the length field of this IP datagram? Is the length of the actual datagram consistent with the value given in the length field? Explain.
 - (e) What is the value of the "Window size" field of this TCP segment? How is the content of this field interpreted by the recipient of the segment?
2. [Marks 4] A laptop has the following IP configuration: IP address: 172.22.1.5, mask: 255.255.255.0, default gateway: 172.22.0.1, DNS Server 1: 172.22.1.200, DNS server 2: 203.187.192.15. Suppose there is a request for telnet to the IP address: 202.68.145.210. Which of the following scenarios is/are possible with respect to ARP? and why?
 - (a) ARP query for 202.68.145.210
 - (b) ARP query for 203.187.192.15
 - (c) ARP query for 172.22.1.200
 - (d) ARP query for 172.22.0.1
 - (e) ARP query for 172.22.1.5
 - (f) No ARP query

CONTINUED

The Exam

2

3. [Marks 2.5 + 2.5 = 5]

- (a) A TCP connection is opened with slow start. Estimate the number of round trip time required to send n TCP segment. Explain your answer.
- (b) Determine the maximum length of the cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s.

4. [Marks 2 x 13 = 26] Explain in one or two sentences

- (a) What is the main difference between HDLC and PPP?
- (b) Assume we send packets of some fixed size through a network, and assume routes do not change but packets reached to the destination in variable source to destination delay. Explain what would be the reason?
- (c) Suppose you access a very small web page using HTTP from your browser. The lowest delay you can hope for between the moment when your browser issues the request until the page is on your screen is how many times of the RTT?
- (d) How is path vector protocol different from the distance vector protocol? What are the disadvantages of this protocol?
- (e) There are a number of static routing algorithms of which "shortest path routing" is an example. Here it builds a graph of the subnet, with each node of the graph representing a router and each arc of the graph representing a communication link. State five (5) metrics ~~on which~~ the weight of the arcs.
- (f) A DNS acts not only as a server, but also as a client under certain circumstances. What are these circumstances? What is the essential difference between a recursive and an iterative DNS query?
- (g) An IP packet is "encapsulated" into an Ethernet frame for delivery within the network. How will this encapsulation differ in the case where the packet is sent to a router for "Internet Delivery", compared to IP "local delivery"?
- (h) Some data-link layer protocols use a sliding window so why does the TCP/IP family have to use it at the transport service layer (TCP)?
- (i) Draw a network diagram illustrating a generic hierarchically structured OSPF AS. Make sure you show all the types of routers that can exist in such an AS.
- (j) Give two (2) reasons to why both the IP address and Ethernet MAC address are used in identifying a host computer.
- (k) TCP header has acknowledgment field and ACK flag bit. What would happen if the ACK flag bit were not provided(0)?
- (l) HTTP header consists of three header: general header, request/response header and entity header. Why there is the need of three different headers instead of only one header?
- (m) Is IGMP a multicast routing protocol? Explain your answer.

The LNM Institute of Information Technology

III Year, II Semester, 2014
Exam: II Mid Term

COMPUTER NETWORKS

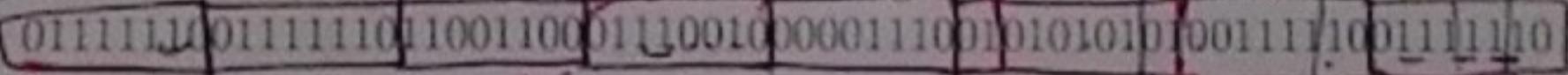
(Duration: One hour)

NOTE: Answer ALL questions. Do not write on question paper.

1. [Marks $5 \times 2 = 10$] Explain in one or two sentences.

- (a) Can we use CSMA/CD for wireless networks? Why or Why not?
- (b) Is NAT table contains the mappings between IP address and MAC address?
- (c) Why IPv6 is required? What are the enhancements offed by the IPv6?
- (d) A packet traverse 10 intermediate routers between source and destination. Which fields of the IPv4 header changes from router to router?
- (e) Is virtual circuit packet switching good for congestion control?

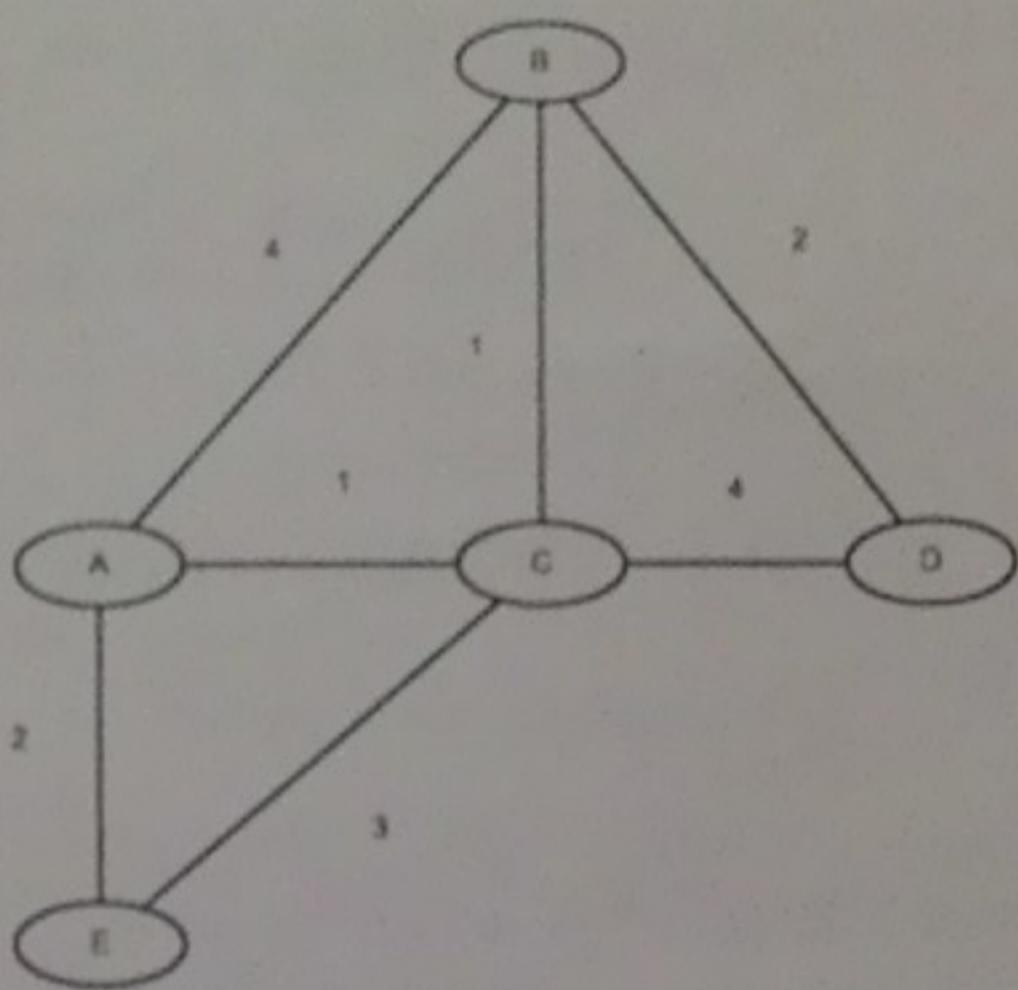
2. [Marks $2 + 2 + 2 + 4 = 10$]

- (a) Calculate the minimum frame size of the 10Mbps ethernet frame required, if the round trip time of the bus is 480ms.
- (b) Locate an HDLC frame from the following bit streams and identify its various fields:

- (c) An organization want to use IP addressing scheme for their network. They need pool of 699 addresses. Can organization form a supernet for their requirement by following set of IP address blocks? Show your calculation also.
192.168.32.0; 192.168.33.0; 192.168.34.0; 192.168.35.0
- (d) Suppose a TCP message contains 2048 octets of data and 20 octates of TCP header. The message is passed through two IP networks N1 and N2. N1 has MTU size 1024 octets and N2 has MTU size 512 octets. Give the Offset value, flag bits, and total size of sequence of the fragments delivered to the destination. Assume IP header to be 20 octets long.

CONTINUED

→ ~~check~~ (after specific time interval)
→ ~~NT~~ (check frequently, then & frequency)

- 2 -



3. [Marks 4] Write the routing table of the node A under the Link state routing (Dijkstra Algorithm). Also determine the shortest path from node A to rest of nodes of the internetwork for above figure.

4. [Marks 6] Write the full form of the following terms and Explain in one or two sentences.

- (a) MACA
- (b) PPP
- (c) TCP
- (d) SDU
- (e) CHAP
- (f) FDMA

