

# College of Engineering, PUNE - 05

Department of **Computer Engineering** and Information Technology

END SEMESTER EXAMINATION YR 2011-12

Sub: **Multimedia Communication System** Course Code: CT 326

Class: VI Semester B Tech IT

Max Marks: 50

Date: 13<sup>th</sup> May, 2012

Time: 2.00PM to 5.00 PM

**NOTE: All questions compulsory.**

**Use of calculator is allowed**

- Q1: a. List the names of types of Video Transitions. Write and explain pseudo code for slide video transition. **(3 marks)**  
b. What is raster graphics? How it helps scaling to any extent? **(2 marks)**
- Q2: a. Suppose a signal contains tones at 1, 10, and 21 kHz and is sampled at the rate 12 kHz and then processed with an antialiasing filter limiting output to 6 kHz. What tones are included in the output? *Hint: Most of the output consists of aliasing.* **(2 marks)**  
b. What are the two main kinds of MIDI messages? In terms of data, what is the main difference between the two types of messages? Within those two categories, list the different subtypes. **(3 marks)**
- Q3 Using DPCM, **(3 marks)**  
i. encode the signal values given below:  

f1	f2	f3
130	190	200

  
ii. Decode the values generated in i above
- Q4: a. Suppose we have available 24 bits per pixel for a color image. However, we notice that humans are more sensitive to R and G than to B — in fact, 1.5 times more sensitive to R or G than to B. How could we best make use of the bits available? **(1 mark)**  
b. What do you mean by Dithering? Explain with suitable example **(3 marks)**
- Q5: a. What is Discrete Cosine Transform? Write a mathematical expression. In JPEG where it is used? What are the advantages of it? **(3 marks)**  
b. Explain H.261 Encoder and decoder in details. **(5 Marks)**
- Q6: a. What is Hierarchical search for motion vectors? Write a pseudo code to generate MV using hierarchical search. Also explain Mean absolute difference (MAD) **(5 marks)**  
b. TheMPEG-1 standard introduced B-frames, and the motion-vector search range has accordingly been increased from [-15; 15] in H.261 to [-512; 511.5]. Why was this necessary? Calculate the number of B-frames between consecutive P-frames that would justify this increase. **(3 marks)**
- Q7: a. UDP does not provide end-to-end flow control, but TCP does. Explain how this is achieved using sequence numbers. Give an example where a packetized message sent using UDP is received incorrectly, but when using TCP it is received correctly under the same circumstances (without channel errors). **(5 marks)**  
b. When should RTP be used and when should RTSP be used? Is there an advantage in combining both protocols? **(4 marks)**
- Q8: a. State and explain the factors to be considered for deciding the bandwidth requirement for Unicast and multicast video conferencing. **(2 marks)**  
b. Write short Note on **ANY TWO (6 Marks)**  
i. H.322 standards for packet switched network  
ii. Internet Telephony  
iii. Video-on-Demand broadcasting protocol

END

Comp:

**COLLEGE OF ENGINEERING, PUNE**  
**(An Autonomous Institute of Govt. of Maharashtra)**  
**End-Semester Examination**  
**( CT 330 ) INFORMATION SYSTEMS**  
**Class: - T.Y. B.Tech**

**Year: - 2011-12**  
**Duration: - 3 hrs.**

**Semester: - VI**  
**Max. Marks: - 50**

**Instructions:**

1. *Attempt any Five Questions only.*
  2. *Assume suitable data whenever necessary.*
  3. *Draw neat figures wherever required*
  4. *Figures to right indicate full marks*
- 

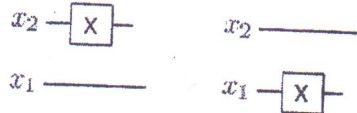
- Q.1** A) "The future belongs to knowledge workers." Justify the statement with the help of two real time examples. [4]
- B) Discuss the role of Management Information System at different levels of management. Suggest a suitable structure for MIS clearly giving the desirable characteristics of MIS. [6]
- Q.2.** A) "Modern day management activities involve use of many Information Systems." Defend your answer with the help of two examples. [4]
- B) Differentiate between Decision Support System, Management Information System and Executive Information System. [6]
- Q.3.** A) Explain the concept of the System Development Life Cycle. Describe various phases of System Development Life Cycle. [5]
- B) Suppose you want to develop a system for Online Store Management. How you will carry out the development using the phases of SDLC. [5]
- Q.4.** A) What is the need of IT ACT 2000. Discuss the important points from IT ACT 2000 in detail. [4]
- B) Describe the payment schemes in E-Commerce. Do you think that existing systems are secure enough? Justify. [6]
- Q.5.** A) Explain the E-Commerce System Architecture in detail. [4]
- B) Draw an Entity Relationship Diagram for Sports Event Management [6]
- Q.6.** A) "Planning looking ahead and control looking back." Prove this statement with suitable examples. [4]
- B) Explain the concepts behind Virus, Trojan horse, worms and logic bombs. [3]
- C) Define Computer Crime. Enlist and describe various types of computer crime. [3]



Note: Pauli Matrices are  $X = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ ,  $Y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$  and  $Z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

1. [9 × 2 = 18 Marks] Answer the following questions:

- What is the average value of  $Z$  operator if the state of a qubit is  $\frac{1}{\sqrt{5}}(|0\rangle + 2|1\rangle)$ ?
- What are the possible outcomes of a measurement if the measurement operator is  $X$ ?
- What is the density matrix of a state  $(3|0\rangle + 4|1\rangle)/5$ ?
- Determine if  $\rho = \frac{1}{4} \begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$  is a pure state or a mixed state.
- Show that  $\frac{1}{\sqrt{2}}(|00\rangle + |11\rangle)$  cannot be written as a tensor product of two one-qubit states.
- Suppose  $P$  and  $P'$  are two diametrically opposite points on the Bloch sphere. Show the states corresponding to these points are orthogonal.
- Show that  $XR_y(\theta)X = R_y(-\theta)$  where  $R_y$  is the rotation operator.
- Write down  $4 \times 4$  matrix for each circuit shown below.



- Compute von Neumann entropy of state  $\rho = \frac{1}{3} \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$

2. [8 Marks] Show that every unitary every operator can be written as

$$U = e^{i\theta} AXBXC$$

where  $ABC = I$  and  $X$  is the Pauli operator. Construct an equivalent circuit for controlled- $U$  gate using only single qubit gates and CNOT gate.

- [8 Marks] Explain in detail parallelism in quantum computation using the Deutsch algorithm for one bit functions.
- [6 Marks] State Shannon's noiseless coding theorem and briefly sketch its proof.
- [6 Marks] Define von Neumann entropy. Show that the von Neumann entropy,  $S$ , is additive that is for given states  $\rho$  and  $\sigma$ ,

$$S(\rho \otimes \sigma) = S(\rho) + S(\sigma).$$

- [4 Marks] Compute von Neumann entropy of an ensemble  $\mathcal{A} = \{|00\rangle, |11\rangle, \frac{1}{\sqrt{2}}(|00\rangle + |11\rangle)\}$  with probabilities  $1/4, 1/4$  and  $1/2$  respectively.

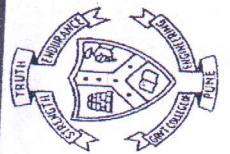
CT317

Software Engineering  
T Y B Tech – Computer Engineering  
and Information Technology

11-May-2012

Open Book Examination

Marks – 40; Time 3 Hours

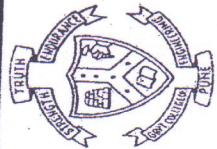


College of Engineering Pune (COEP)  
Forerunners in Technical Education



## PART 2: Solve any two questions – 5 Marks each

1. You are developing a conference management system. PI identify all the objects that will be required for the system (1 Mark). Draw a class diagram (2 Marks). PI identify any four relationships in the objects / classes (2 Marks).
2. A. The Defects data of a company for last 12 months is as follows; 8, 3, 7, 7, 9, 8, 9, 7, 11, 8, 6, 12. The company is about to sign a Service Level Agreement (SLA) with the customer. What is the USL-LSL the company should negotiate with the customer? (1 Mark) PI comment on stability of the process if sigma is 2.05. (1 Mark)  
B. PI prove that a process with two points will be never unstable. (3 Marks)
3. A. A new application that is deployed at your customer site is crashing twice a month. In a month, an important business deal is going to be discussed with the customer. What are the probabilities of more than 1 crash happening before the discussion (4 Marks).  
B. Give an example where using geometric mean makes sense. (1 Mark)





# College of Engineering, Pune

## End Semester Exam – May 2012

### T.Y. B. Tech. (Computer Engineering)

#### (CT-315)- (Operating Systems)

Day & Date- Sunday, 6<sup>th</sup> May 2012

Maximum Marks: 50

Time: - 2 pm to 5 pm

Duration – 3 hrs

#### Instructions:

1. All questions are compulsory. Numbers in the right-most column indicate marks.
2. Write indented and commented code.
3. This is an open book exam. Only one textbook is permitted and no exchange of books is allowed.
4. Make suitable assumptions if required, and state them in your answer.
5. All diagrams must be neat and clean. You may use pencil for drawing diagrams.

Q 1	Write answers in few words or one line as asked. Draw diagrams whenever possible.	1 * 10
A	Which of the following file systems support journaling feature? ext2, ext3, ext4	
B	For a 32 bit processor generating 32 bit logical addresses, if 15 bits are used for page offset, then the size of page table will be:	
C	Which of the following components of a program state are shared across threads in a multi-threaded process? Register values, heap memory, Global variables, Stack memory.	
D	Average memory access time, when page fault rate is 0.01%, memory access time is 100 ns and disk access time for serving page faults is 3 ms, is:	
E	(Including initial page faults) Number of page faults for the reference string 2 1 0 1 3 4 2 1, with 3 page frames using LIFO replacement is:	
F	Which one of the following does not decide the size of a file: Entries for data blocks in the inode, total no. of blocks in the file system, size of a directory entry, size field in the inode.	
G	Linux kernel is based on which of the following design schemes: Monolithic, Microkernel, Layered	
H	For each of the RAID schemes mentioned ahead, mention for each scheme whether it guarantees concurrency and/or reliability: RAID-0, RAID-1, RAID-1+0	
I	Which of the following scheduling algorithms could result in starvation? First come first serve, Shortest Job first, Round Robin, Priority	
J	How many processes are created by the following code? main() { fork(); fork(); fork(); fork(); }	
Q2	Write all answers in 2-3 sentences each.	2 * 10
A	Following program does not result in a segmentation fault on accessing a[64] most of the times. Explain the possible reasons. main() { int a[64], i; for(i = 0; ; i++) printf("%d ", a[i]); }	
B	Inverted page tables can result in recursive page faults. Comment.	
C	Hard links can not span across partitions, but soft links can. Explain the reason.	
D	A process does not get killed immediately after pressing Control-C using the shell. Write the possible reasons.	
E	Write any possible reasons: Why Linux supports almost every file system, while Windows	



		supports only FAT32 and NTFS																			
	<b>F</b>	Dynamic linking improves security of the system. Comment.																			
	<b>G</b>	What is the meaning of read, write, execute permissions applied to a directory on UNIX/Linux?																			
	<b>H</b>	Suppose a disk drive has 2000 cylinders, numbered 0 to 1999. The disk drive is currently serving request at cylinder 143 and moving towards 1999. The queue of requests in FIFO order is: 86, 1470, 913, 1774, 948. What is the total distance the disk arm will move to satisfy all pending requests for first come first serve algorithm?																			
	<b>I</b>	<p>What is the turnaround time of each process for each of the following scheduling algorithms: SJF, non preemptive priority (0 is highest priority, 5 lowest); for the following set of processes having arrived in the order P1, P2, P3, P4, P5 all at time 0.</p> <table border="1"> <thead> <tr> <th>Process</th> <th>Burst Time</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>10</td> <td>3</td> </tr> <tr> <td>P2</td> <td>1</td> <td>1</td> </tr> <tr> <td>P3</td> <td>2</td> <td>3</td> </tr> <tr> <td>P4</td> <td>1</td> <td>4</td> </tr> <tr> <td>P5</td> <td>5</td> <td>2</td> </tr> </tbody> </table>	Process	Burst Time	Priority	P1	10	3	P2	1	1	P3	2	3	P4	1	4	P5	5	2	
Process	Burst Time	Priority																			
P1	10	3																			
P2	1	1																			
P3	2	3																			
P4	1	4																			
P5	5	2																			
	<b>J</b>	<p>Given a pure demand paging system, page size of 4 kb, and the following program. Find the total number of page faults generated when the program control is at line A. Assume row major storage of 2-D arrays.</p> <pre> int a[100][100]; int main() {     int i;     for(i = 0; i &lt; 100; i++)         for(j = 0; j &lt; 50; j++)             a[i][j] = i + j;     i = 200; /* line a */     return 0; } </pre>																			
<b>Q3</b>	<b>A</b>	<p>Design a file system which has the following characteristics:</p> <ul style="list-style-type: none"> <li>Has only one directory and can contain upto 100 files .</li> <li>Each filename can be 32 bytes long .</li> <li>Maximum size of files can be 4 TB .</li> <li>Hard Links are allowed, but soft links are not .</li> </ul> <p>Write the structure definitions of various metadata components in C. Draw a diagram of the file system layout, with the details shown clearly.</p>	<b>5</b>																		
	<b>B</b>	<p>Write code for solving the sleeping barber problem. Just write the barber() and customer() functions explaining the logic of both, using appropriate synchronization mechanisms. Write code for initializing synchronization variables also.</p> <p><b>Sleeping Barber problem:</b> A barbershop consists of a waiting room with n chairs and a barber room with one chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber.</p>	<b>5</b>																		
	<b>C</b>	Write a single C program using system calls, which does the following: Creates two processes. First process generates random integers less than 1000 and feeds into second process by using a pipe. The second process prints only those random integers which are less than 100.	<b>5</b>																		
	<b>D</b>	Write a concurrent program using pthreads, for computing $nCr = \frac{n!}{r!(n-r)!}$ . Try to add concurrency wherever possible. Assume large values of n and r. Also assume that integers are 64 bit.	<b>5</b>																		

**COLLEGE OF ENGINEERING PUNE**  
**COMPUTER ENGINEERING & IT DEPARTMENT**

**End Semester Exam**  
**CT-324:Language Processors**

**Class & Branch : TYIT**

**Max marks: 50**

**Sem:VI**

**Time: 3 hrs**

**Instructions:**

1. Assume suitable data if necessary and mention your assumptions clearly.
2. Figures to right indicate max marks.
3. Draw neat diagrams.

- 
1. a) Draw block diagram of a two pass assembler . Show and explain various data structures used during both passes. 5M  
b) What is an activation record. What are its contents and its significance. 5M
  2. Construct CLR parsing table for the following grammar:  
S->L=R | R  
L->\*R | id  
R->L  
Show the computation of FIRST/FOLLOW, and rules for constructing CLR parsing table neatly. 10M
  3. a) Compare SLR, CLR, LALR parsing methods. 5M  
b) Explain Lex and Yacc. Show how to change the associativity and precedence in Lex/Yacc. 5M
  4. Given the following translation scheme : 10M  
E-> E1 or M E2  
{  
    backpatch ( E1.faselist, M.quad);  
    E.truelist = merge(E1.truelist, E2.truelist);  
    E.faselist= E2.faselist  
}  
E->E1 and M E2  
{  
    backpatch ( E1.truelist, M.quad);  
    E.truelist = E2.truelist  
    E.faselist= merge(E1.faselist, E2.faselist)  
}  
E-> id1 relop id2  
{  
    E.truelist = makelist ( nextquad);  
    E.faselist = makelist(nextquad + 1);  
    emit( if id1.place relop id2.place goto\_)  
    emit(goto\_);  
}



```

M -> e
{
    M.quad = nextquad
}
S -> If E then M1 S1 N else M2 S2
{
    backpatch ( E.truelist, M1.quad);
    backpatch(E.falselist,M2.quad);
}
S -> whileM1 E then 2 S1
{
    backpatch ( S1.nextlist, M1.quad);
    backpatch(E.truelist,M2.quad)
}
N -> e    { emit(goto__); }

```

Using this translation scheme translate following statements to three address code. Show the annotated parse tree for the translation and show how backpatching is done:

```

while A < B do
  if C < D then
    X = X + 1;
  else
    X = X - 1;

```

5. Answer any two of the following:

5M+5M

- What are the different code optimization techniques explain them in detail with appropriate examples.
- Explain absolute loader and bootstrap loader.
- Explain nested macros.
- Explain operator precedence parsers.

**College of Engineering, Pune**  
**Dept of Computer Engineering & Information Technology**  
**END SEMESTER EXAMINATION – May 2012**  
**Third Year B.Tech Computer Engineering**  
**Computer Networks (CT 316)**

Date: 8/05/2012

Time: 2pm-5pm

Durations: 3 hrs

Max. Marks- 100

**Instructions:**

1. Answer any 5 complete questions.

		Marks
Q. 1 a.	An Ethernet MAC sublayer receives 1510 bytes of data from the upper layer. How many frames are needed to be sent and what is the size of data in each frame?	6
b.	<p>Suppose two Ethernet LANs are interconnected by a box that operates as follows. The box has a table that tells it the physical addresses of the machines in each LAN. The box listens to frame transmissions on each LAN. If a frame is destined to a station at the other LAN, the box retransmits the frame onto the other LAN, otherwise the box does nothing</p> <ol style="list-style-type: none"> <li>i. Is the resulting network still a LAN? Does it belong in the data link layer or the network layer?</li> <li>ii. Can the approach be extended to connect more than two LANs? If so, what problems arise as the number of LANs becomes large?</li> </ol>	8
c.	<p>Draw the timeline for sliding window protocol with <math>SWS = RWS = 3</math> frames for the following situations. Use a timeout interval of about <math>2 \times RTT</math></p> <ol style="list-style-type: none"> <li>i. Frame 4 is lost</li> <li>ii. Frames 4-6 are lost</li> </ol>	6
Q 2 a.	Why do bridges have to build a spanning tree whereas routers do not?	4
b.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Fig 1</p> </div> <div style="text-align: center;"> <p>Fig 2</p> </div> </div>	10



Consider the internetworked LAN shown in fig 1. Assume that hosts a and b are on LAN1, c is on LAN2 and d is on LAN8. Initially tables in all bridges are empty and the spanning tree shown in fig 2 is used. Show how the tables of bridges change after each of the following events happen in sequence

- i. a sends to d
- ii. c sends to a
- iii. d sends to c
- iv. d moves to LAN 6
- v. d sends to a

One consequence of using a spanning tree to forward frames in an extended LAN is that some bridges may not participate at all in forwarding frames. Identify three such bridges in Fig. 2. Is there any reason for keeping these bridges, even though they are not used for forwarding?

c. Consider sending a series of packets from a sending host to a receiving host over a fixed route. List the delay components in the end-to-end transfer for a single packet. Which of these delays are constant and which are variable? Which of these delays depend on the packet size? Justify

Q 3 a. Consider a five-router subnet given in Fig 3. Assume that the link cost is considered to be the number of hops and the routers execute Distance Vector Routing protocol. Suppose that at some time router A goes down. Explain the count-to-infinity problem of the routing protocol by considering this network as an example.



Fig 3

Explain one of the solutions to come out of this problem on this example network.

b. Suppose that Link State packets from various nodes as given in Fig 4 arrive at a node B. Find the routing table formed at B. Show all the intermediate steps of formation of the table.

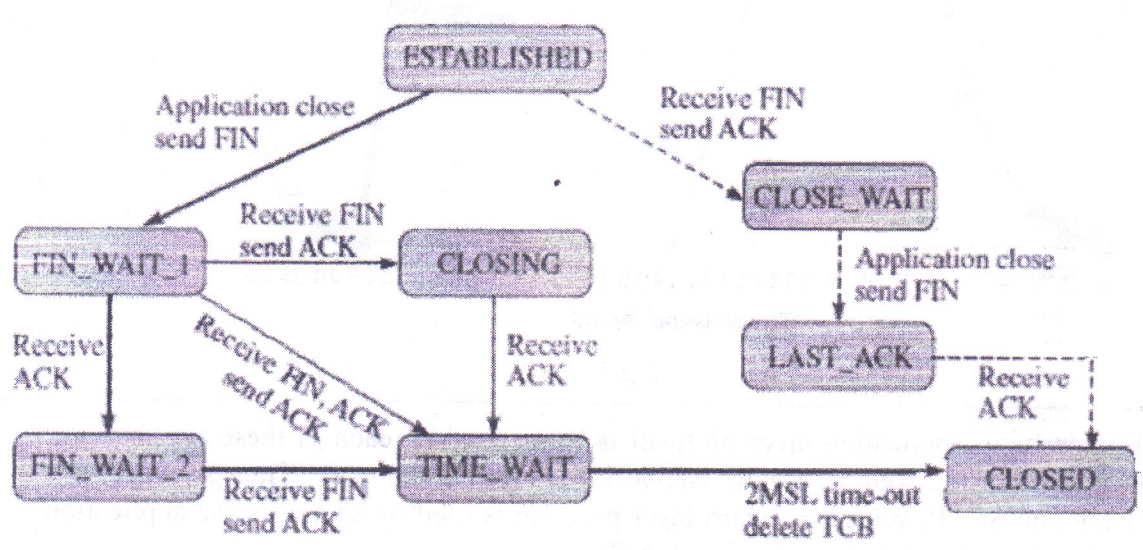
A	B	C	D	E	F	G
B/4	A/4	B/1	C/4	C/2	E/2	A/2
G/2	C/1	D/4	E/1	D/1	G/2	F/2
		E/2		F/2		

Fig 4

c. Every IPv6 system (other than routers) is able to build its own unicast address. Explain the process of configuring a link local address for a host with MAC address of 00:1D:BA:06:37:64 and with the network prefix of 2001:0000:0000:0002 using EUI-64 algorithm. Express the resulting address in the abbreviated form



Q 4 a.	<p>Consider a packet-by-packet fair queuing system with three logical queues 1, 2, and 3 and with service rate of one unit/second. Show the sequence of transmissions for this system for the following packet arrival pattern.</p> <p>Queue 1: arrival at time <math>t = 0</math>, length 2; arrival at <math>t = 4</math>, length 1.</p> <p>Queue 2: arrival at time <math>t = 1</math>, length 3; arrival at <math>t = 2</math>, length 1.</p> <p>Queue 3: arrival at time <math>t = 3</math>, length 5.</p> <p>What will be the sequence of transmission, if this is a weighted fair queuing system having weights 2, 3, and 5 respectively for the queues 1, 2 and 3?</p>	10
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b.	<p>A Graceful Close happens with TCP when the station at each side of the connection requests for independent termination. Simultaneous Close happens when the two stations issue closes at nearly the same time. The TCP state transition diagram which includes both situations is given in Fig 5. Draw and explain the sequence of segment exchanges to show the sequence of states that are followed by the two stations in these cases.</p>  <p style="text-align: center;">Fig 5</p>	10
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Q 5 a.	<p>Consider the TCP procedure for estimating RTT. Let SampleRTT1 is the most recent RTT, let SampleRTT2 be the next most recent sample RTT and so on.</p> <ol style="list-style-type: none"> <li>For a given TCP connection, suppose four acknowledgements have been returned with corresponding sample RTTs, SampleRTT4, SampleRTT3, SampleRTT2 and SampleRTT1, express EstimatedRTT in terms of four sample RTTs.</li> <li>Generalize your formula for n sample RTTs</li> </ol>	10
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b.	<p>Consider the plot of TCP window size as a function of time given in Fig 6. Answer the following questions. In all cases, provide a short discussion justifying your answer.</p> <ol style="list-style-type: none"> <li>Identify the intervals of time when TCP slow start is operating</li> <li>Identify the intervals of time when TCP congestion Avoidance is operating.</li> <li>After 16<sup>th</sup> transmission round, is segment loss detected by 3 duplicate ACKs. or by</li> </ol>	10
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a time out?

- iv. After 22<sup>nd</sup> transmission round, is segment loss detected by 3 duplicate ACKs or by a time out?
- v. What is the initial value of threshold at the first transmission round?
- vi. What is the initial value of threshold at the 18<sup>th</sup> transmission round?
- vii. What is the initial value of threshold at the 24<sup>th</sup> transmission round?
- viii. During what transmission round is the 70<sup>th</sup> segment sent?
- ix. Assume a packet loss is detected after the 26<sup>th</sup> round by receipt of 3 duplicate ACKs, what will be the value of congestion window size and threshold?

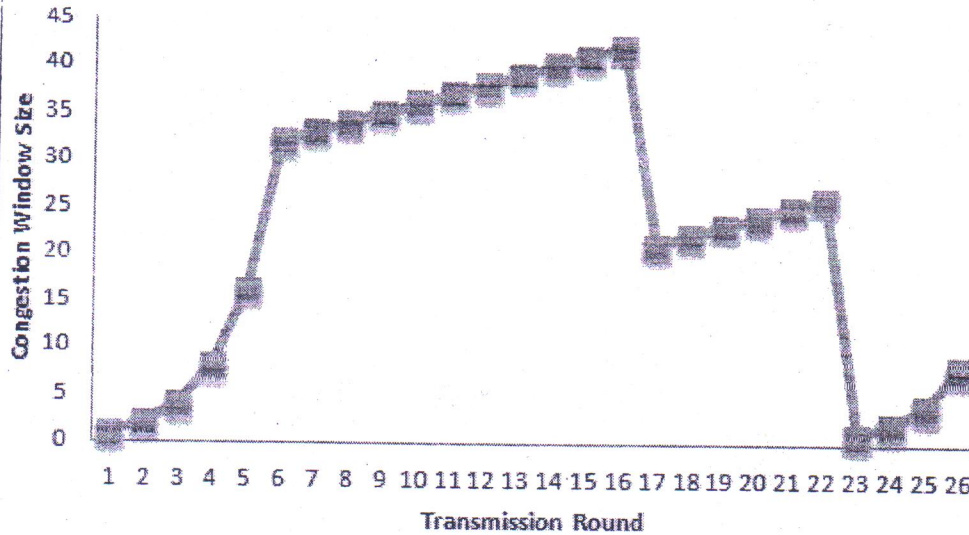


Fig 6

Q 6 a.	Which underlying application layer protocol is being used by each of these applications: WWW, File Transfer, Remote Login, Network Management, e-mail? Transport layer has TCP, UDP and SCTP. Which transport layer protocol is used by each of these application layer protocols? Why is such a selection done?	10
b.	DNS can use either TCP or UDP with the well-known port of 53. How does a particular DNS query or response message decide to use TCP based or UDP based communication? Briefly explain with example scenarios.	5
c.	Suppose Alice with a web based email account sends a message to Bob, who accesses his mail from his mail server. Discuss with a proper diagram how the message gets from Alice host to Bob's host. Be sure to list the series of application protocols that are used to move the message between the two hosts.	5