B.E. (Computer Engineering)
DESIGN & ANALYSIS OF COMPUTER NETWORKS
(2008 Course) (410444B) (Elective - I) (Sem. - I)

Time : 3 Hours] [Max. Marks : 100

Instructions to the candidates:
1) Answers 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) There are three classes of messages in a system : [10]
    Batch (low priority) : 1000 characters; 10 msg/sec
    Interactive (medium priority) : 100 characters; 100 msg/sec.
    Control (high priority): 20 characters; 10 msg/sec
    i) What is the average time in the system for each type of message?
    ii) What is the average time in the system overall?
    Why this is different than in part i)?

b) What is Jackson’s theorem. How it is applied to the network of queues. [8]

OR

Q2) a) A communication line capable of transmitting at a rate of 50 kbits/sec will be used to accommodate 10 sessions each generating poisson traffic at a rate 150 packets/min. Packet lengths are exponentially distributed with mean 1000 bits. For each session, find the average number of packets in queue, the average number in the system, and the average delay per packet when the line is allocated to the sessions by using :
   i) 10 equal-capacity time-division multiplexed channels.
   ii) Five of the session transmit at a rate of 250 packets/min while the other five transmit at a rate of 50 packets/min. [10]

b) Explain little’s theorem and its applications in computer networks. [8]
Q3) a) Explain in brief various optimization techniques like multiplexing parallelism, virtualization, soft state etc used in system design.  [10]
b) What is the largest purely output queued ATM switch, we can build if we use 80 ns. 4 byte wide DRAM with a zero cell loss requirement? Assume input lines are 155 Mbps. How large can the switch be with cell - wide access? If we decide to run the output at only 0.4 N times the input lines (instead of N times faster than the input lines), how big a switch can we build?  [6]

OR

Q4) a) Explain the steps for performance analysis and tuning. How performance of a system is tuned?  [6]

Q5) a) Explain TCP Tahoe & TCP vegas in details.  [8]
b) Explain in brief the requirements that a scheduling discipline must satisfy.  [8]

OR

Q6) a) Explain the WFQ discipline for scheduling the best effort applications.  [8]
b) Explain open loop flow control mechanism. Explain and compare the common descriptors used for open loop flow control schemes.  [8]

SECTION - II

Q7) a) What is admission control? Explain in brief admission control policies in CBR, VBR and best effort applications.  [10]
b) State and explain different traffic models.  [8]

OR

[4064]-589  2
Q8) a) What is signaling mechanism? Explain IETF signaling (RSVP). 

b) What are the different time scales and mechanisms used at these time scales for traffic management. Explain in brief.

Q9) a) Explain random early detection (RED) scheme for packet scheduling.

b) What are the implementation principles of router architecture and algorithms?

OR

Q10)a) Explain the methods for traffic matrix computation.

b) Explain Lulea compressed tries scheme in detail.

Q11)a) Discuss the security issues at network layer with suitable examples and possible solutions.

b) What is subnetting? Explain in detail. When host on following two IP addresses will be on the same network?

   i) 192.168.6.30.
   ii) 192.168.7.29

OR

Q12)a) What are the roles and responsibilities of the network administrator? Explain in detail.

b) How bandwidth management is done? How does bandwidth management tools help?