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**First Semester M.Tech. Degree Examination, December 2011**  
**Computer Networks**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1
  - a. With appropriate details of process models and message buffers, explain how the inefficiency of socket interface can be overcome. (08 Marks)
  - b. Suppose a 128 kbps point – to – point link is set up between earth and a rover on Mars. The distance from earth to Mars is approximately 55 GM and data travels over the link at the speed of light =  $3 \times 10^8$  m/ sec.
    - i) Calculate the minimum RTT for the link
    - ii) Calculate the delay  $\times$  band width product of the link
    - iii) A camera on the rover takes pictures of its surroundings and sends these to earth. How quickly after a picture is taken can it reach earth? Assume 5 MB image size. (06 Marks)
  - c. What are the various considerations concerning hardware building blocks such as nodes and links for constructing a computer network? (06 Marks)
  
- 2
  - a. Compare and contrast various network switching methodologies such as source routing, virtual circuit and datagram models. (08 Marks)
  - b. Explain with an example, the spanning tree algorithm for bridges in a LAN. (08 Marks)
  - c. Suppose a work station has an I/O bus speed of 1 Gbps and memory bandwidth of 2 Gbps. Assuming DMA in and out of main memory, how many interfaces to 45 Mbps T3 links could a switch based on this workstation handle? (04 Marks)
  
- 3
  - a. Consider a TCP message that contains 2048 bytes of data and 20 bytes of TCP header. It is passed to IP for delivery across two networks of the internet (host to router to another host). The first network uses 14 byte headers and has an MTu of 1024 bytes; the second uses 8 byte headers with an MTu of 512 bytes. Each network's MTu girrs the size of the largest IP datagram that can be carried in a link layer frame. Give the sizes and off sets of the sequence of fragments delivered to the network layer at the destination host. Assume all IP headers are 20 bytes. If path MTu is the smallest MTu of any link in the current path between 2 hosts, what is the path MTu? With this path MTu, calculate the sizes and offsets of the sequence of fragments delivered to the network layer at the destination host. (08 Marks)
  - b. Explain Dijkstra's algorithm for route calculation and forward searching. (08 Marks)
  - c. With the forwarding tables given below for nodes A and F, in a network with link cost = 1, draw the diagram of the smallest network, consistent with these tables.

Node A		
Node	Cost	Next hop
B	1	B
C	1	C
D	2	B
E	3	C
F	2	C

Node F		
Node	Cost	Next hop
A	2	C
B	3	C
C	1	C
D	2	C
E	1	E

(04 Marks)

- 4 a. What is the principle of MPLS? Illustrate the working of MPLS enabled routing based on destination based forwarding. (07 Marks)
- b. Explain how the sliding window algorithm ensures
- i) reliable and ordered delivery
  - ii) flow control
  - iii) protection against wrap around (09 Marks)
- c. Let a TCP operate over a 1 Gbps link. Answer the following :
- i) Assuming TCP could utilize the full bandwidth continuously, how long would it take the sequence numbers to wrap around completely?
  - ii) Suppose an added 32 bit time stamp field increments 1000 times during the wrap around time you have found above. How long would it take for the stamp to wrap around? (04 Marks)
- 5 a. Compare the various multicast routing algorithms, highlighting the key features of each of them. (10 Marks)
- b. Illustrate the steps of forwarding ATM cells along a tunnel in a UPN. (05 Marks)
- c. How does the RTP design meets the needs of different applications? (05 Marks)
- 6 a. Explain the FIFO and fair queuing algorithms. (06 Marks)
- b. Describe the various congestion avoidance mechanisms. (10 Marks)
- c. Write the key features of differentiated services and list their advantages. (04 Marks)
- 7 a. With a neat diagram, explain the internet message access protocol. (10 Marks)
- b. Explain with illustrations, the various request and response messages of HTTP protocol and world wide web. (10 Marks)
- 8 a. With an illustrative example, describe the various steps of name resolution. (10 Marks)
- b. Explain the WSDL and SOAP standards for protocols. (05 Marks)
- c. What are the key features of SIP and H.323 protocols? (05 Marks)

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