VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (C.S.E.) III Year II-Semester Advanced Supplementary Examinations, June/July-2017

Computer Networks

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. List the protocols of Network layer, Transport layer and Application layer of TCP/IP model.

2. A router can process 2 million packets/sec. The load offered to it is 1.5 million packets/sec on average. If a router from source to destination contains 10 routers, how much time is spent being queued and serviced by the router?

3. Which fields of the IP header change from router to router? Justify your answer.

4. UDP is a message –oriented protocol. TCP is a byte-oriented protocol. If an application needs to protect the boundaries of its message, which protocol should be used, UDP or TCP? Justify your answer.

5. What are all the files involved in Remote Procedure Call? Give the steps of executing a RPC program by Sun rpcgen with a flow diagram.

6. List five ways of I/O Multiplexing and give the system calls used in each way.

7. Write html code to display image as hyperlink?

8. What are the types (formats) of digital audio and video over Internet? Which protocols support such transfer formats.

9. With reference to DES answer the following:
   i) Size of S-box and range of elements   ii) number of input bits and key bits

10. List characteristics, types, and limitations of firewalls.

Part-B (5 × 10 = 50 Marks)

11. a) Explain Distance Vector routing and Link state routing algorithms with examples. [5]

    b) A datagram network allows routers to drop packets whenever they need to. The [5] probability of a router discarding a packet is *P*. Consider the case of a source host connected to the source router, which is connected to the destination router, and then to the destination host. If either of the routers discards a packet, the source host eventually times out and tries again. If both host-router and router-router lines are counted as hops, what is the mean number of
    i)   hops a packet makes per transmission?
    ii) transmissions a packet makes?
    iii) hops required per received packet?

12. a) Outline how Remote Procedure Call(RPC) fits into OSI reference model. Which header [5] fields of TCP are used in connection management? Give their significance.

    b) Suppose an organization has been given IP address starting from 150.30.0.0. In that [5] organization department 1 requests 500 IP addresses, department 2 requests 4000 IP addresses and department 3 requests 2000 IP addresses. Give the starting and ending IP addresses of each department along with their subnet masks. Allocate addresses in sequence if possible.

13. a) Vasavinetd Super Server: Vasavinetd super server is similar to inetd super server except [4] on the limit of maximum number of clients for a particular service.

Assume that Vasavinetd server provides services S1, S2, S3 on ports 1, 2, 3. The Vasavinetd server can accept a maximum of 15 clients for S1 service on port 1, maximum of 18 clients for S2 service on port2 and a maximum of 27 clients for S3 service on port3. Once the maximum limit reaches on a port, Vasavinetdrejects the connection requests until the running S1, S2, S3 server processes exit after servicing some of the clients. At any time, Vasavinetd maintains the number of serving processes is less than the total maximum number of server processes in the system is 15+18+27. Suppose at a moment 15 clients are being served by 15 server processes of S1. Then Vasavinetd keeps pending of connection requests for port 1. Now, if any one S1 server process completes its service and exits, then Vasavinetd can accept one client for S1 service on port1.

Write the flowchart of Vasavinetd super server program only using socket system calls.

(No need of S1, S2, and S3 service server program flowcharts. Hint: After all, the Service server processes are children of Vasavinetd super server process.)

b) Illustrate Connection-less concurrent server process with help of flow chart and write [6] syntax for system calls.

14. a) Explain architecture modules in Domain Name Systems (DNS). [4]

b) Write an XML page for a university registrar listing multiple students, each having a [6] name, an address, and a GPA.

15. a) Give the architectural diagram of IPSec. Draw the various packet formats in transport [5] mode and tunnel mode. Briefly discuss about ESP.

b) The Diffie-Hellman key exchange is being used to establish a secret key between Alice [5] and Bob. Alice sends Bob (227, 5, 82). Bob responds with (125). Alice's secret number, x, is 12, and Bob's secret number, y, is 3. Show how Alice and Bob compute the secret key.

16. a) Demonstrate Routing in Ad hoc networks. [4]

b) Illustrate OSPF and IP v6 addressing. [6]

17. Answer any *two* of the following:

    a) SOCK_RAW, socket options. [5]

    b) Mobile Web [5]

    c) Cipher modes. [5]

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