Question Paper

Exam Date & Time: 30-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

V SEMESTER B.TECH. (COMPUTER & COMMUNICATION ENGINEERING)
MAKE-UP EXAMINATIONS, DECEMBER 2022

NETWORK PROGRAMMING AND ADVANCED COMMUNICATION NETWORKS [ICT 3173]

Marks: 50 **Duration: 180 mins.**

Descriptive Questions

Answer all the questions. Section Duration: 180 mins

Missing data, if any may be suitably assumed.

1) A) How do the components in a Domain Name Server (DNS) communicate with each other to resolve a domain name? Exemplify with a neat diagram. Also, show how DNS is realized through UNIX socket programming (with appropriate snippets). (5)

B) Answer the following with respect to RAW socket. (3)

a. Write the syntax to create a RAW socket and explain the its parameters.

b. What are the three main capabilities of RAW Socket that cannot be provided by normal TCP or UDP socket?

c. Mention some of its major limitations owing to which it is not popularized (Any 2).

C) Illustrate the fundamental building blocks of a Multiprotocol Label Switching (MPLS) network. (2)

2) A) What are the modifications required to enable InterServ in a router? Compare and contrast the services introduced by InterServ Model. Justify how InterServ model fails to offer scalability. (5)

B) Answer the following with respect to Multiprotocol Label Switching (MPLS). (3)

a. What is the significance of labels in a MPLS network? With a neat diagram show the constituents of a Shim header.

b. Describe in brief the need for Penultimate hopping.

C) Illustrate the significance of a non-blocking socket. Outline with suitable snippet how a server can be made non-blocking. (2)

3) A) With a schematic diagram, describe the working principle that facilitates an IPv4 client to communicate with an IPv6 Server. What are possible scenarios which can be considered in interoperability? (5)

B) Distinguish minimum six features of client-server system calls in Unix socket using connection-oriented and connectionless services. (3)

C) Why do we need the *address conversion function* in a Unix socket? Write the appropriate syntax for it. (2)

4) A) Write the appropriate server-side socket program to demonstrate the following connection oriented scenario. The server displays the local and peer socket details using *getsockname*() and *getpeername*(). While communicating with its peer device server establishes concurrency. The parent process in the server side reads the client message, reverses it and changes the case of the characters as shown in the example. The child process in the server side reads the client message and finds the total frequency of each vowel in the message. Both the processes communicate their results back to the client. (5)

Example :

Input : Np ExAm Is HeRe

Output :

Parent: ErEh Si MaXe Pn

Child: Vowels : E - 3, A-1, I -1

B) Suppose the arrival rate of packets to a buffer is 3,600 packets per hour, with 120 packets being served by the server per hour, and the expected number of packets in the system are 20. Compute the following questions based on Queuing theory. (3)

a. Maximum utilization of the system.

b. Average time spent by the packet in the queuing booth.

c. Mean time between arrival.

C) List and explain the boundary conditions TCP-ECHO CLIENT and SERVER. (2)

5) Assume that the continuous 12 km long optical fiber link has a loss of 1.5 dB/km. (5)

A)

a. What is the minimum optical power level that must be launched into the fiber to maintain an optical power level of 0.3 µW at the receiving end?

b. What is the required input power, if the fiber has a loss of 2.5 dB/km?

c. The optical power is launched into a 10 km length of fiber cable is 12 µW. Calculate the overall signal attenuation for a 10 km optical fiber link with splices at 1 km intervals, each split in fiber introduces an attenuation of 1 dB.

B) Consider a client is sending message "Computer Networks" to the server. Here, client sends with exactly 280ms delay between each character and RTT is 700ms. The server sends back the echo along with the ACK for each character sent by the client. Calculate and compare the total time taken in this communication for TCP_NODELAY enable and disable. Write Nagle algorithm to prove that it reduces the number of packets communicated in a communication. (3)

C) Assuming that the *Wavelength Division Multiplexer*(WDM) is not used in optical fiber, then what are the consequences that have to be faced by the network operators? (2)

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