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Quiz 1 solution
CSE232 Computer Networks
Duration-30min, 9 Marks

September 17, 2024

Q.1. TCP/IP model comprises 5 layers. ISO-OSI model comprises 7 layers. Is the statement "OSI model provides additional communication features compared to TCP/IP model" true or false? Justify your answer. No marks without correct justification. **[1]**

Solution: False. The ISO-OSI model provides better modularity compared to TCP/IP, as the number of layers only defines task distribution across layers.

Q.2. Consider a TCP client-server program. Identify the correct sequence of server steps and client steps. Choose the correct option. **[1]**

A. Server: socket(), listen(), bind(), accept() Client: socket(), connect()
B. Server: socket(), listen(), bind(), accept() Client: socket(), bind(), connect()
C. Server: socket(), bind(), listen(), accept() Client: socket(), connect()
D. Server: socket(), bind(), accept(), listen() Client: socket(), connect()

Solution: (C)

Q.4. Suggest using the appropriate switching technique, circuit or packet switching, for the following scenarios. Give a short justification. **[2]**

	Scenario	Requirement	Solution
a	Every connection requires a large amount of data transfer (in Gb), and the number of concurrent connections is very small	Improve performance	Circuit switching; low overhead
b	Every connection requires a large amount of data transfer (in Gb), and the number of concurrent connections is large	Provide fair performance across connections	Packet switching; sharable bandwidth allows concurrency
c	Every connection requires short data transfers, and the number of concurrent connections is very small	Improve performance	Packet switching; reduced overheads
d	Every connection requires short data transfers, and the number of concurrent connections is very large	Improve channel efficiency	Packet switching; reduced overheads and shared links

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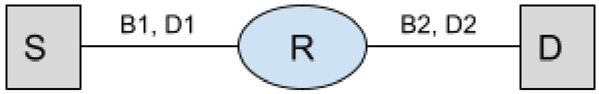
Q.3. Suppose the sender “S” communicates with the receiver “D” via the router “R”. As shown in the figure, the bandwidth and propagation delay across the links S–R and R–D are denoted by (B1, D1) and (B2, D2), respectively. **[2 + 3]**



(a) Suppose **S–R =10Mbps,1msec** & **R–D=100Mbps,1msec**, what is the **average throughput** to send packets of size 1Kb (i.e., 1000 bits)? Assume no errors/packet losses/ACKs or processing/queueing delays exist.
Solution:
Since “S” does not expect an acknowledgment, it can continuously send data (the bits reach the receiver continuously; i.e., the pipe is FULL). Therefore, the average throughput is given by the **bottleneck bandwidth [1] , i.e., 10Mbps [1]**

(b) Suppose “S” sends a **1Mb packet** to “D” and **waits for an ACK** from “D’ before sending the next packet. Assume **S–R =10Mbps,10msec** & **R–D=10Mbps,10msec** (B1,D1 and B2,D2 are equal). What is the **bandwidth-delay product (BDP)**? Ignore errors/packet losses or processing/queueing delays.
Solution:
L=10^6 bits
Maximum achievable throughput is given by **bandwidth-delay product (BDP).**

BDP = Bandwidth * T, where T=Time between sending the packet and receiving an ACK **[1]**

T= d_trans_S-R + d_prop_S-R + d_proc_S + d_trans_R-D + d_prop_R-D + d_prop_D-R + d_proc_S + d_prop_R-S **[1]**

d_trans_S-R = d_trans_R-D = L/R = (10^6)/(10*10^6)= 0.1 sec = 100 msec **[0.5]**

T = 100 + 10 + 0 + 100 +10 + 10 +0 + 10 = 240 msec

BDP = (10*10^6) * (240*10^-3) = **2.4 Mbits [0.5]**

—--- THE END —--