RAMAIAH Institute of Technology

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(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A+' Grade

MAKEUP / SUPPLEMENTARY SEMESTER EXAMINATIONS – SEPTEMBER 2022

Program	:	**B.E. : Computer Science and Engineering**	**Semester**	:	**IV**
Course Name	:	**Data Communication and Networking**	**Max. Marks**	:	**100**
Course Code	:	**CS44**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- Write figures where ever necessary.

UNIT- I

1.	a)	Identify the problems involved in centralized design of DNS server and explain the interaction between various DNS servers using Recursive approach.	CO1	(08)
	b)	Differentiate between mesh topology and star topology with suitable example.	CO1	(06)
	c)	Discuss the steps involved in transferring a Web page from server to client using non-persistent connections with suitable URL.	CO1	(06)
2.	a)	With neat figure explain the layers of TCP/IP protocol suite and identify the identical objects at every layer.	CO1	(06)
	b)	Illustrate how conditional GET operates in HTTP and show how GET messages are different from conditional GET messages.	CO1	(06)
	c)	Discuss the file distribution using BitTorrent with an example and write the suitable formulas used for distributing file using client server approach and point-to-point approach.	CO1	(08)

UNIT – II

3.	a)	Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A. i) In the second segment sent from Host A to B, what are the sequence number, source port number, and destination port number? ii) If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number, the source port number, and the destination port number?	CO2	(08)

iii) If the second segment arrives before the first segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number?

iv) Suppose the two segments sent by A arrive in order at B. The first acknowledgment is lost and the second acknowledgment arrives after the first timeout interval. Draw a timing diagram, showing these segments and all other segments and acknowledgments sent. (Assume there is no additional packet loss.) For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment that you add, provide the acknowledgment number.

b) Describe UDP datagram format. How does UDP perform error detection? CO2 (06)

c) What is fast retransmit? Describe the psuedocode of a simplified TCP sender that incorporates fast retransmit. CO2 (06)

4. a) Illustrate with neat figures the sequence of TCP states visited by the TCP client and TCP server. Explain the events that make the client and server to transition into these states. CO2 (08)

b) What is meant by multiplexing and demultiplexing. Explain with neat diagram transport layer multiplexing and demultiplexing. CO2 (06)

c) Suppose that the two measured *Sample RTT* values are 106 ms, and 115 ms. Compute the *Estimated RTT* after each of these *Sample RTT* values is obtained, using a value of $\alpha = 0.125$ and assuming that the value of *Estimated RTT* was 100 ms just before the first of these two samples were obtained. Compute also the *Dev RTT* after each sample is obtained, assuming a value of $\beta = 0.25$ and assuming the value of *Dev RTT* was 5 ms just before the first of these two samples was obtained. Last, compute the TCP *Time out Interval* after each of these samples is obtained. CO2 (06)

UNIT – III

5. a) Assume we have an internet with a 12-bit address space. The addresses are equally divided between eight networks (N0 to N7). The internetwork communication is done through a router with eight interfaces (m0 to m7). Show the internet outline and the forwarding table (with two columns: prefix in binary and the interface number) for the only router that connects the networks. Assign a network address to each network. CO3 (06)

b) Write Dijkstra's algorithm, with any suitable weighted graph show the link state database for weighted graph. CO3 (08)

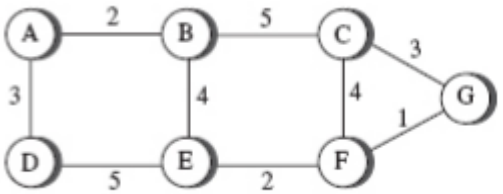
c) Differentiate between intradomain routing protocol RIP and OSPF protocol with respect to performance. CO3 (06)

6. a) A large organization with a large block address (12.44.184.0/21) is split into one medium-size company using the block address (12.44.184.0/22) and two small organizations. If the first small company uses the block (12.44.188.0/23), what is the remaining block that can be used by the second small company? Explain how the datagram destined for the two small companies can be correctly CO3 (08)

routed to these companies if their address blocks still are part of the original company.

b) Illustrate OSPF with an example using an autonomous system and show the forwarding tables in OSPF for simple autonomous system. CO3 (06)

c) Draw the forwarding table for all nodes and show the updated vectors using bellman ford algorithm for node B after receiving the vectors from node A and E. Create the tree and distance vector for node B. CO3 (06)



UNIT – IV

7. a) Discuss any two controlled access protocols for media access. CO4 (08)
   b) Given the dataword 101001111 and the divisor 10111, show the generation of the CRC codeword at the sender site (using binary division). CO4 (06)
   c) Explain Ethernet Frame format with a neat diagram. CO4 (06)

8. a) Explain CSMA/CD with a neat flow diagram. CO4 (08)
   b) Differentiate between bit stuffing and byte stuffing with suitable examples. CO4 (06)
   c) Explain the addressing mechanism of IEEE 802.11 protocol. CO4 (06)

UNIT – V

9. a) Compare the techniques used to allow the simultaneous transmission of multiple signals across a single data link. CO5 (06)
   b) When an entire message needs to transfer from source to destination, how long it takes to completely receive the message at the destination from the time the first bit is sent out from the source.
   What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4 ×108m/s. CO5 (08)
   c) Discuss the three techniques of digital to digital conversion in brief. CO5 (06)

10. a) Identify and discuss the causes of transmission impairment. The loss in a cable is defined as (dB/Km). If the signal at the beginning of a cable with -0.3dB/km has a power of 2 mW, Compute the power of the signal required at 5Km? CO5 (08)
    b) Compare analog signal and digital signals. CO5 (06)
    c) Discuss the components of pulse code modulation (PCM), which is used to change an analog signal to digital data (digitization). CO5 (06)

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