Question Paper

Exam Date & Time: 24-Jun-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH. (INFORMATION TECHNOLOGY) DEGREE EXAMINATIONS - JUNE 2024
SUBJECT: ICT 2224/ICT_2224 - COMPUTER NETWORKS

COMPUTER NETWORKS [ICT 2224]

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

Answer all the questions.

1A)	Consider an organization granted with a block of addresses containing an address 92.16.3.2. The organization needs three subblocks of addresses to assign as follows: i) First subblock: Requires 95 addresses. ii) Second subblock: Requires 280 addresses. iii) Third subblock: Requires 15 addresses. Assign the IP addresses efficiently for each subblock in the same order as shown above. Find the valid host IP address and broadcast address for each subblock.	(5)
1B)	Design 16 input and 16 output packet switch based on banyan switching fabric. Draw the configuration diagram. Explain the verification of for input port 12 and output port 5.	(3)
1C)	Compute the subnet mask for each subnet, determine the network address for each subnet, and find the broadcast address for each subnet based on the scenario given below: A university has been allocated the block 192.168.5.0/24. The Computer Science department needs two subnets with the following host requirements: i) First subblock: Requires 60 hosts. ii) Second subblock: Requires 30 hosts.	(2)
2A)	Show all the steps of forwarding process if a packet arrives at R1 in Fig. 2a below with the destination address 180.70.65.140.	(5)

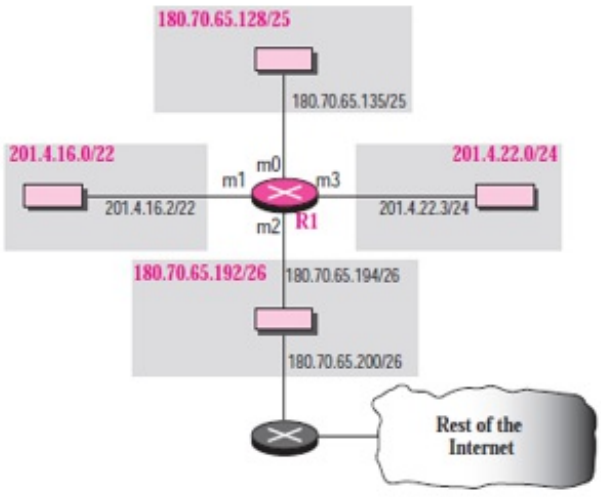

Fig. 2a

2B)	Consider an ICMP message transmitted in a network with original time stamp as 46, receive timestamp as 59, transmit time stamp as 60 and return time as 67. Compute sending time, receiving time and round-trip time.	(3)

2C)	Show the request and response message format for differentiating ARP and RARP.	(2)
3A)	A project manager is assessing task dependencies and durations in a project. The tasks are represented as a directed graph with six nodes, where edges represent dependencies and weights represent days to complete: i) Task 1 -> Task 2: 2 days ii) Task 1 -> Task 3: 5 days iii) Task 2 -> Task 4: 1 day iv) Task 3 -> Task 4: -1 day v) Task 3 -> Task 5: 4 days vi) Task 4 -> Task 6: 3 days vii) Task 5 -> Task 6: 6 days Compute the minimum number of days required to complete each task from Task 1 using the Bellman-Ford algorithm.	(5)
3B)	Illustrate with a suitable block diagram how the receiver treats a lost packet. Provide explanations for the same.	(3)
3C)	Ravi has a file of size 1.5MB to send to Bob. The TCP connection uses a maximum segment size (MSS) of 1.5KB. The round-trip time (RTT) is 20ms. Assume that the TCP always uses slow start to increase the window size. There is no congestion, no packet loss and the initial congestion window size (CWND) is 1 MSS. How much time will be required to transfer the entire file? Show the detailed process.	(2)
4A)	TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732. i) Show the three TCP segments during the connection establishment. ii) Show the contents of the segments during the data transmission if the initiator sends a segment containing the message "Hello dear customer" and the other party answers with a segment containing "Hi there seller." iii) Show the contents of the segments during the connection termination.	(5)
4B)	The following is a dump of a UDP header in hexadecimal format. **CB84000D001C001C** i) What is the source port number? ii) What is the destination port number? iii) What is the total length of the user datagram? iv) What is the length of the data? v) Is the packet directed from a client to a server or vice versa? vi) What is the client process?	(3)
4C)	Compare and contrast the delays in connectionless and connection-oriented services. Which service creates less delay if the message is large? Which service creates less delay if the message is small?	(2)
5A)	A DNS client is looking for the names of the computer with IP address 132.1.17.8 and 128.5.17.5. Show both the query and response messages assuming that the names are ***mail.google.com*** and ***ict.mit.manipal.edu*** respectively.	(5)
5B)	A host with IP address 150.43.63.10 and physical address B2:34:55:10:22:10 has a packet to send to another host with IP address 150.43.55.15 and physical address A4:6E:F4:59:83:AB (which is unknown to the first host). The two hosts are on the same Ethernet network. Show the ARP request and reply packets encapsulated in Ethernet frames.	(3)
5C)	Describe the roles of the Manager and Agent components in the context of SNMP (Simple Network Management Protocol). Explain how these components interact to facilitate network management tasks.	(2)

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