SRM Institute of Science and Technology
College of Engineering and Technology

DEPARTMENT OF ECE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-23 (EVEN)

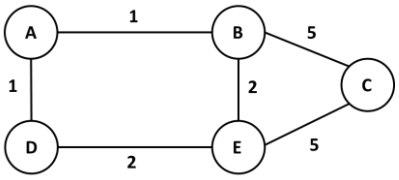
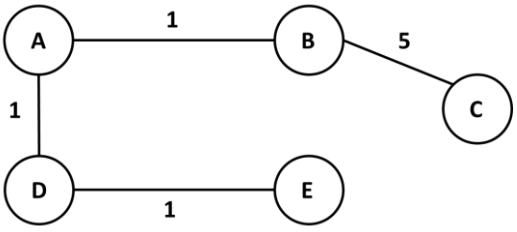
Batch 2
SET B

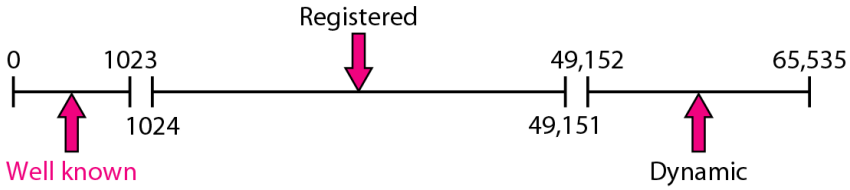
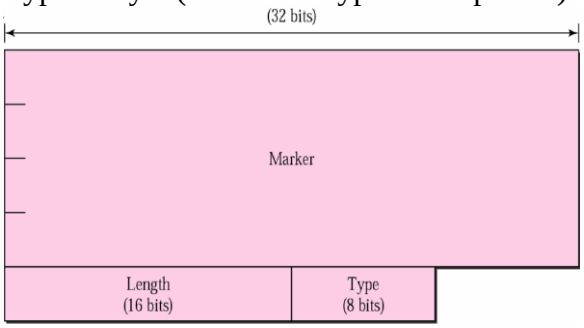
Test: CLAT-3 **Date: 05.05.2023**
Course Code & Title: 18ECC303J & COMPUTER COMMUNICATION NETWORK **Time: 10:30 AM to 12:10 PM**
Year & Sem: III & VI **Max. Marks: 50**

Course Articulation Matrix:

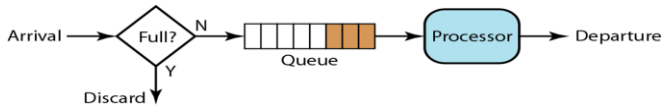
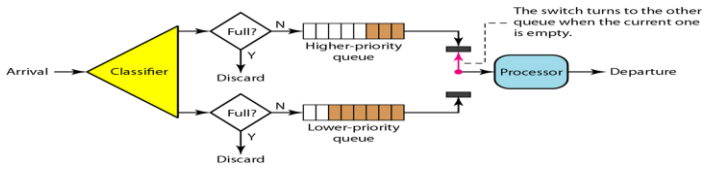
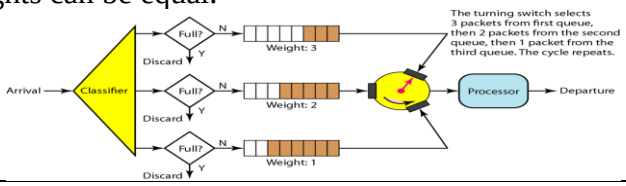
CO	18ECC303J - Computer Communication Networks	Program Outcomes (POs)												PSO		
	Course Outcomes (COs)	Graduate Attributes														
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Express the basic services and concepts related to internetworking.	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-
2	Define the basic OSI model architecture and its lower layer functions.	-	-	2	-	-	-	1	-	-	-	-	-	-	-	3
3	Apply the various Network Layer concepts, mechanisms and protocols.	-	-	3	-	-	1	2	-	-	-	-	-	-	-	-
4	Analyze the services and techniques of Transport Layer.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	3
5	Produce the various services and protocols in Application Layer.	-	-	2	-	-	-	-	-	-	-	-	-	-	-	3
6	Evaluate the various Networking concepts and Routing protocols.	-	-	-	-	1	-	-	-	-	-	-	2	-	-	3

Q. No	PART – A (10 X 1 = 10 Marks) Answer all the questions	Mark	BL	CO	PO
1	Which one is not used as a timer in Routing Information Protocol (RIP)? a. Periodic timer **b. Bus timer** c. Expiration timer d. Garbage College timer	1	1	3	7
2	How many types of links are used in OSPF? a. Two **b. Four** c. Six d. Link not required	1	1	3	7
3	Which port number is used for echo server? a. 4 b. 5 c. 6 **d. 7**	1	2	4	7
4	Which of the following is used for calculating the UDP Length? a. IP Length * IP header's length **b. IP Length - IP header's length** c. IP Length + IP header's length d. 1 + IP header's length	1	1	4	7
5	The combination of an IP address and a port number is called as _____ a. Switch address **b. Socket address** c. Alternate IP address	1	1	4	7

	d. MAC address				
6	Backpressure is what type of congestion control? **a. node-to-node** b. source-to-node c. source-to-source d. signal-to-source	1	1	4	7
7	In ___ congestion control, policies are applied to prevent congestion before it happen. a. Closed loop **b. Open loop** c. Both closed and open loop d. Open circuit loop	1	1	4	7
8	To use a Simple Network Management System, we need_____ a. Servers b. IP c. Protocols **d. Rules**	1	1	5	3
9	SIP is _____ layer protocol. **a. Application** b. Transport c. Network d. Data link	1	2	5	3
10	The applications of the client and server model are; **a. World Wide Web** b. SIP c. SNMP d. FTP	1	1	5	3
	PART – B1 (2 X 4 = 8 Marks)				
11	Implement Dijkstra algorithm for the below figure. Find the shortest path to all vertices considering A as the root node?  **Answer:** **[Marks: 4]**  	4	2	3	3
12	(a) Discuss different types of ports and their ranges decided by IANA (Internet Assigned Number Authority). **Answer:** **[Marks: 2+2]** IANA (Internet Assigned Number Authority) has divided the port numbers into three ranges: well-known, registered, and dynamic (or private). • Well-known ports. The ports ranging from 0 to 1023 are assigned and controlled by IANA. These are the well-known ports.	4 4	1 1	4 4	7 7

	• Registered ports. The ports ranging from 1024 to 49,151 are not assigned or controlled by IANA. They can only be registered with IANA to prevent duplication. • Dynamic ports. The ports ranging from 49,152 to 65,535 are neither controlled nor registered. They can be used by any process. These are the ephemeral ports. •  **OR** (b) Explain Queues in user datagram protocol (UDP). **Answer:** **[Marks: 4]** Queues in UDP: • At the client site, when a process starts, it requests a port number from the operating system. • If a process wants to communicate with multiple processes, it obtains only one port number and eventually one outgoing and one incoming queue. • The queues opened by the client are identified by ephemeral port number. • The queues function as long as the process is running. When the process terminates, the queues are destroyed.				
	PART – B2 (2 X 4 = 8 Marks)				
13	Discuss the Header format used in Border Gateway Protocol (BGP) packets with requisite diagram. **Answer:** **[Marks: 2+2]** All BGP packets share the same common header Header format: • Marker: 16-bit (Reserved for authentication) • Length: 2-bytes (Define the length of the total message, including the header) • Type: 1-byte (Define the type of the packet)  	4	2	3	7

14	(a) Explain loss less compression and lossy compression. **Answer:** **[Marks: 2+2]** Loss Less Compression: • In lossless data compression, the integrity of the data is preserved. • The original data and the data after compression and decompression are exactly the same. • This is because, in these methods, the compression and decompression algorithms are exact inverses of each other: no part of the data is lost in the process. • Redundant data is removed in compression and added during decompression. • Lossless compression methods are normally used when we cannot afford to lose any data. Lossy Compression: • Our eyes and ears cannot distinguish subtle changes. • In such cases, we can use a lossy data compression method. • These methods are cheaper—they take less time and space when it comes to sending millions of bits per second for images and video. • Several methods have been developed using lossy compression techniques. • JPEG (Joint Photographic Experts Group) encoding is used to compress pictures and graphics • MPEG (Moving Picture Experts Group) encoding is used to compress video • MP3 (MPEG audio layer 3) for audio compression. **OR** (b) Discuss the role of socket and socket address in client server interaction. **Answer:** **[Marks: 2+2]** Socket: To use the communication channel, an application program (client or server) needs to request the operating system to create a socket. The application program then can plug into the socket to send and receive data. For data communication to occur, a pair of sockets, each at one end of communication, is needed. Socket Address: An application can communicate with a remote process by exchanging data with TCP/IP by knowing the combination of IP address, and port number **IP address** | **Port Number**	4 4	2 2	5 5	3 3

	PART – C (2 X 12 = 24 Marks)				
15	(a) Explain the below scheduling techniques used for Quality of Service (QoS); • FIFO Queuing • Priority Queuing • Weighted Fair Queuing	12	1	4	7
	Answer: **[Marks: 12]** <u>FIFO Queuing:</u> • In first-in, first-out (FIFO) queuing, packets wait in a buffer (queue) until the node (router or switch) is ready to process them. • If the average arrival rate is higher than the average processing rate, the queue will fill up and new packets will be discarded. • A FIFO queue is familiar to those who have to wait for a bus at a bus stop.  <u>Priority Queuing:</u> • In priority queuing, packets are first assigned to a priority class. Each priority class has its own queue. • The packets in the highest-priority queue are processed first. Packets in the lowest-priority queue are processed last. • The system does not stop serving a queue until it is empty. • A priority queue can provide better QoS than the FIFO queue because higher priority traffic, such as multimedia, can reach the destination with less delay.  <u>Weighted Fair Queuing:</u> • The packets are still assigned to different classes and admitted to different queues. • The queues, however, are weighted based on the priority of the queues; higher priority means a higher weight. • The system processes packets in each queue in a round-robin fashion with the number of packets selected from each queue based on the corresponding weight. • If the system does not impose priority on the classes, all weights can be equal.  	3+9	3	4	7

OR

(b)
(i) List all services offered by Transmission Control Protocol (TCP)
(ii). Explain the following numbering system w.r.t. Transmission Control Protocol (TCP), with suitable examples.

- Byte Number
- Sequence Number
- Acknowledgement Number

Answer: **[Marks: 3+9]**

(i) TCP services:

- Process to Process Communication
- Stream Delivery Service
- Sending and receiving buffers
- Segments
- Full – duplex communication
- Multiplexing and Demultiplexing
- Connection-Oriented Service
- Reliable service

(ii)
Byte Number:

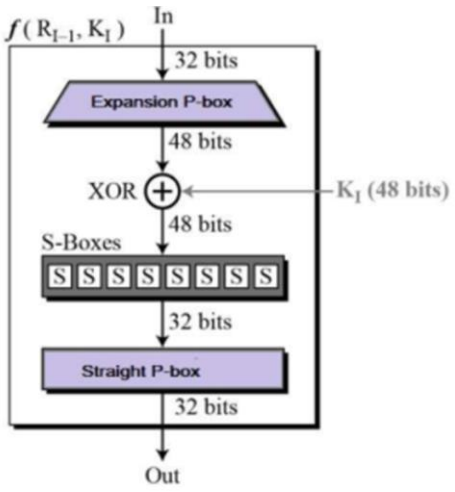
- TCP numbers all data bytes that are transmitted in a connection
- When TCP receives bytes of data from a process it stores them in the sending buffer and numbers them
- The numbering does not start from 0
- TCP generates a random number between 0 and 232 -1 for the 2 number of the first byte
- For Example, the random number is 1,057 and total data to be sent is 6,000 bytes
- The bytes are numbered from 1057 to 7056

Sequence Number:

- After the bytes have been numbered, TCP assigns a sequence number to each segment that is being sent.
- The sequence number for each segment is the number of the first byte carried in that segment.
- The following shows the sequence number for each segment.

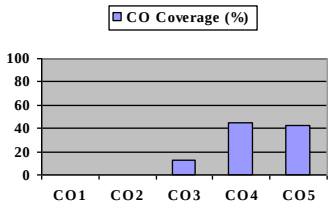
Acknowledgment Number:

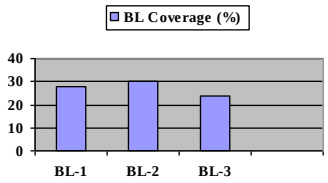
- Each party uses an acknowledgement number to confirm the bytes it has received
- Ack number defines that the number of the next byte that the party expects to receive
- The ack number is cumulative which means that party takes the number of the last byte that it has received safe

	and sound, adds 1 to it, and announces this sum as the acknowledgement number • For example: if a party uses 5,643 as an ack number, i.e. it has received all bytes from the beginning up to 5,642. • This does not mean that the party has received 5,642 bytes because the first byte number does not have to start from 0				
16	(a) Explain the concept of DES round key generation with necessary diagram? **Answer:** **[Marks: 12]** • The DES function applies a 48-bit key to the rightmost 32 bits to produce a 32-bit output. The function is made up of four sections. • Expansion P-box: Since right input is 32-bit and round key is a 48-bit, we first need to expand right input to 48 bits. • XOR (Whitener): After the expansion permutation, DES does XOR operation on the expanded right section and the round key. The round key is used only in this operation. • Substitution Boxes: The S-boxes carry out the real mixing (confusion). DES uses 8 S-boxes, each with a 6-bit input and a 4-bit output. • Straight Permutation − The 32 bit output of S-boxes is then subjected to the straight permutation  **OR** (b) In an RSA cryptosystem, a particular A uses two prime numbers, 13 and 17, to generate the public and private keys. If the public of A is 35. Then find the private key of A? **Answer:** **[Marks: 12]** Step 1: in the first step, select two large prime numbers, p and q. p = 13 q = 17 Step 2: Multiply these numbers to find n = p x q, where n is called the modulus for encryption and decryption. First, we calculate	12	2	5	3

	n = p x q n = 13 x 17 n = 221 Step 3: Choose a number e less that n, such that n is relatively prime to (p - 1) x (q -1). It means that e and (p - 1) x (q - 1) have no common factor except 1. Choose "e" such that 1<e < φ (n), e is prime to φ (n), gcd (e, d (n)) =1. Second, we calculate φ (n) = (p - 1) x (q-1) φ (n) = (13 - 1) x (17 - 1) φ (n) = 12 x 16 φ (n) = 192 g.c.d (35, 192) = 1 Step 3: To determine the private key, we use the following formula to calculate the d such that: Calculate d = de mod φ (n) = 1 d = d x 35 mod 192 = 1 d = (1 + k.φ (n))/e [let k = 0, 1, 2, 3……] Put k = 0 d = (1 + 0 x 192)/35 d = 1/35 Put k = 1 d = (1 + 1 x 192)/35 d = 193/35 Put k = 2 d = (1 + 2 x 192)/35 d = 385/35 d = 11 The private key is <d, n> = (11, 221) Hence, private key i.e. d = 11				

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Course Coordinator

Name of the Student: **Register No.:**

Part- A (10 x 1= 10 Marks)					
Q. No	**CO**	**PO**	**Maximum Marks**	**Marks Obtained**	**Total**
1	CO3	7	1		
2	CO3	7	1		
3	CO4	7	1		
4	CO4	7	1		
5	CO4	7	1		
6	CO4	7	1		
7	CO4	7	1		
8	CO5	3	1		
9	CO5	3	1		
10	CO5	3	1		
Part- B1 (2 x 4= 8 Marks)					
11	CO3	3	4		
12(a)	CO4	7	4		
12(b)	CO4	7	4		
Part- B1 (2 x 4= 8 Marks)					
13	CO3	7	4		
14(a)	CO5	3	4		
14(b)	CO5	3	4		
Part – C (2 X 12 = 24 marks)					
15(a)	CO4	7	12		
15(b)	CO4	7	12		
16(a)	CO5	3	12		
16(b)	CO5	3	12		

CO	Maximum	Marks
3	10	
4	37	
5	35	
Total	82	

PO	Maximum	Marks
3	39	
7	43	
Total	82	

Signature of the Question paper setter **Academic Advisor**