RAMAIAH
Institute of Technology

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

SEMESTER END EXAMINATIONS – JULY / AUGUST 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)	Discuss the functionalities of layers in the TCP/IP protocol suite with a neat figure.	CO1	(08)
	b)	Discuss star and bus topology with suitable figures.	CO1	(06)
	c)	Explain HTTP response message format with example.	CO1	(06)
2.	a)	Differentiate between DNS recursive queries and DNS iterative queries with suitable figures.	CO1	(08)
	b)	Discuss why FTP is called out-of-band protocol. List few FTP commands and replies.	CO1	(06)
	c)	With a neat diagram, illustrate how an e-mail is sent from one user to another. Discuss all the protocols involved during the process.	CO1	(06)

UNIT – II

3.	a)	Illustrate connection oriented multiplexing and demultiplexing with two clients using the same port number (80) to communicate with the same web server application with an example.	CO2	(06)
	b)	Draw the TCP segment structure and discuss the use of flag bits in TCP segment structure.	CO2	(08)
	c)	With suitable formulas illustrate estimation of round trip time and timeout interval.	CO2	(06)
4.	a)	Write an algorithm that shows three major events related to data transmission and retransmission on the TCP sender site.	CO2	(06)
	b)	Illustrate slow start TCP congestion control mechanism with neat figure.	CO2	(06)
	c)	Discuss the operation of selective repeat protocol with neat figure.	CO2	(08)

UNIT – III

5.	a)	An ISP is granted the block 80.70.56.0/21. The ISP needs to allocate addresses for two organizations each with 500 addresses, two organizations each with 250 addresses, and three organizations each with 50 addresses.	CO3	(08)
		i. Find the number and range of addresses in the ISP block.		
		ii. Find the range of addresses for each organization and the range of unallocated addresses.		

b) Explain the fields related to fragmentation in IP header. A packet has arrived in which the offset value is 100, the value of HLEN is5, and the value of the total length field is 100. What are the numbers of the first byte and the last byte? — CO3 (06)

c) Explain the Bellman Ford equation. What is count to infinity problem? Discuss how is this problem solved. — CO3 (06)

6. a) Discuss how the inter-autonomous system routing is done using BGP. — CO3 (08)

b) Create the shortest-path tree and the forwarding table for node B in the network given below using Dijkstra's routing algorithm. — CO3 (06)
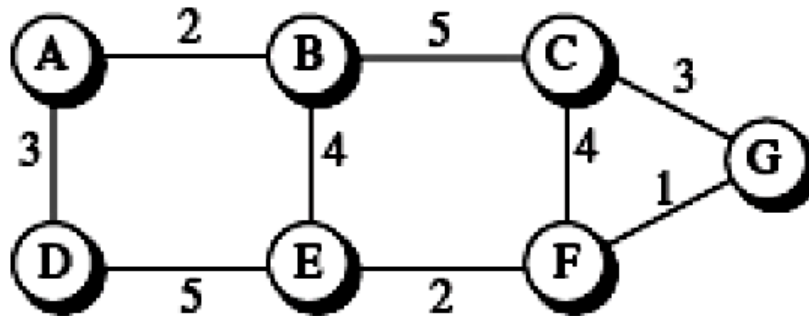
c) An ISP is granted the block 16.12.64.0/20. The ISP needs to allocate addresses for eight organizations, each with 256 addresses — CO3 (06)
   i. Find the number and range of addresses in the ISP block.
   ii. Find the range of addresses for each organization and the range of unallocated addresses.

UNIT – IV

7. a) Discuss the variable size framing techniques. Unstuff the following frame payload:
   00011111000001111101110100111011111000001111 — CO4 (07)

b) Discuss the design of CRC encoder and decoder. Also discuss the performance of CRC. — CO4 (07)

c) Discuss how to handle the collision in Carrier sense multiple access with collision detection (CSMA/CD). — CO4 (06)
   A network using CSMA/CD has a bandwidth of 10 Mbps. If the maximum propagation time (including the delays in the devices and ignoring the time needed to send a jamming signal, as we see later) is 25.6 µs, what is the minimum size of the frame?

8. a) Discuss the hamming distance. How important it is for error detection. Find the Hamming distance d (10101, 11110). — CO4 (06)

b) Describe each field in the format of a Point-to-Point Protocol (PPP) frame with neat diagram. — CO4 (06)

c) How the actual unicast, multicast, and broadcast transmissions are distinguished from each other in standard Ethernet? — CO4 (08)
   Define the type of the following destination addresses:
   i. 4A:30:10:21:10:1A
   ii. 47:20:1B:2E:08:EE
   iii. FF:FF:FF:FF:FF:FF
   Discuss the Four popular standard Ethernet implementations.

UNIT – V

9. a)   i. If the peak voltage value of a signal is 20 times the peak voltage value of the noise, what is the SNR? What is the SNR_{dB}?   CO5   (06)

      ii. We have a channel with 4-kHz bandwidth. If we want to send data at 100 kbps, what is the minimum SNR_{dB}? What is the SNR?

   b) Differentiate between amplitude modulation, frequency modulation and phase modulation.   CO5   (08)

   c) Discuss three processes of pulse code modulation with neat figure.   CO5   (06)

10. a) i) We need to send 265 kbps over a noiseless channel with a bandwidth of 0KHz. How many signal levels do we need?   CO5   (06)
ii) What are the propagation time and transmission time for a 5 Mbyte message if the bandwidth of a network is 1Mbps? Assume that the distance between sender and receiver is 12,000 km and light travels at 2.4×10^8 m/s.

   b) Identify the three causes of impairments during data transmission? Explain.   CO5   (08)

   c) Discuss Nyquist bit rate and Shannon Capacity with suitable formula.   CO5   (06)

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