No. of Printed Pages : 4

MCS-218

MASTER OF COMPUTER APPLICATIONS (MCA) (NEW)

Term-End Examination

December, 2021

MCS-218 : DATA COMMUNICATION AND COMPUTER NETWORKS

Time : 3 Hours *Maximum Marks : 100*

Note : *(i) Question No. **1** is compulsory and carries 40 marks.*

*(ii) Attempt any **three** questions from the rest.*

1. (a) Find the CRC for the data polynomial $x^9 + x^7 + x^5 + x^2 + 1$, with the generator polynomial $x^3 + x + 1$. 3

(b) What is a Local Area Network (LAN) ? What are the typical characteristics of a LAN ? 5

(c) Write the characteristics of transmission and propagation delays. 4

(d) Differentiate between congestion control and flow control. 4

(e) Compare layer 2 and layer 3 switches. 5

(f) Explain key generation algorithm for RSA. Explain its process with an example. 6

(g) Discuss the QAM (Quadrature Amplitude Modulation) technique. Draw 8-QAM constellation diagram. 7

(h) Draw IPv4 header structure and explain the significance of flags. 6

2. (a) Which frequency bands are used for AM, FM and Radar bands ? Write the relationship between tower height and distance between repeaters. 5

(b) Explain why PAM is a necessary pre-requisite to PCM ? What would be the minimum sampling interval needed for reconstructing a signal with highest frequency of 1 kHz ? 5

(c) Explain the concept of circuit and packet switching, with a suitable example. 5

(d) Compare star and tree topology in detail with a suitable diagram. 5

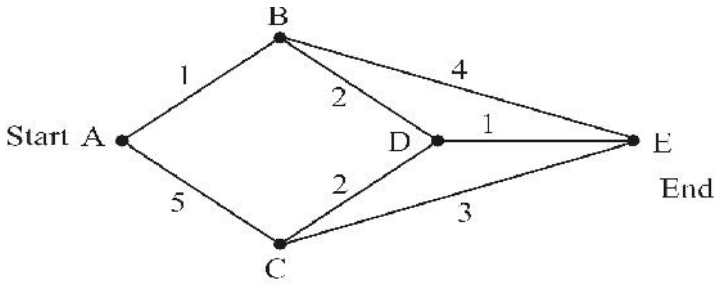
3. (a) What is a Hamming Code ? How many redundant bits are required to identify errors in a character of 7 bits. Also mention the specified positions for inserting these redundant bits. 5

(b) What is meant by pure ALOHA ? Calculate the throughput of slotted ALOHA protocol. 5

(c) Discuss IEEE 802.11 protocol in detail with a suitable diagram. 10

4. (a) With reference to connection oriented services, what are the steps in connection establishment and termination ? 5

(b) What is Dijkstra's algorithm for shortest path ? Find the best route between points 'A' and 'E' using Dijkstra's algorithm. 10



(c) What are the classes in IP addressing ? Explain the rules to determine the address class. 5

5. (a) What is Multiplexing ? Show the upward multiplexing with the help of a diagram. 5

(b) Discuss the contents of a digital certificate. Explain the importance of digital certificate. 5

(c) Explain the concept of RPC in detail. Draw a diagram to explain RPC. 10

MASTER OF COMPUTER APPLICATIONS (MCA-NEW)

Term-End Examination

June, 2022

MCS-218 : DATA COMMUNICATION AND COMPUTER NETWORKS

Time : 3 hours *Maximum Marks : 100*

Note : *Question no.* ***1*** *is* ***compulsory*** *and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) What is meant by CRC ? Write the following bitstring in polynomial representation : *4*

"1100010"

(b) What are Wireless LANs ? Discuss the disadvantages of using radio transmitters. *5*

(c) What is Transmission Media ? Compare optical fiber with copper wire. *5*

(d) What is meant by burst error ? How can burst errors be corrected ? *5*

(e) Explain the three types of internetwork addresses with a suitable example for each. *5*

(f) Explain the concept of Diffie-Hellman key generation. Generate public and private key pairs using RSA algorithm using 7 and 11 as two prime numbers. *6*

(g) Differentiate between PSK and FSK modulation techniques. Explain the term "Quantization". *5*

(h) Draw IPv4 header structure and explain the significance of Fragment offset. *5*

2. (a) What is encoding ? Explain digital-to-digital encoding with an example. *5*

(b) Explain the characteristics of Wide Area Network (WAN). Differentiate between client-server and peer-to-peer architecture. *10*

(c) Discuss the importance of multiplexing. List the basic multiplexing techniques. *5*

3. (a) What is checksum ? Explain the features of sliding window protocol. *5*

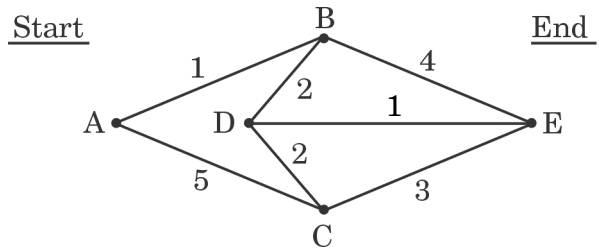
(b) What is pipelining ? Explain stop and wait ARQ when 'ACK' is lost, with the help of a diagram. *5*

(c) Briefly discuss the terms CSMA and CSMA/CD. Explain Ethernet frame format IEEE 802.3. *5*

(d) Explain the utility of Spanning Tree and Source Routing Bridges in computer networks. *5*

4. (a) What is a MAC address ? Compare virtual circuit and datagram subnets. *5*

(b) Find the shortest route between points 'A' and 'E' in the graph given below : *7*



(c) Explain Token Bucket Traffic Shaper with a suitable diagram. *3*

(d) What is meant by fragmentation ? Compare Interior and Exterior gateway routing protocols. *5*

5. (a) Define handshaking protocol. What are the types of services provided by the transport layer ? *5*

(b) What is Nagle's Algorithm ? Explain TCP connection establishment in normal operation. *5*

(c) What is a Feistel network ? Write short notes on Modes of Operation (CBC and OFB). *5*

(d) What is a Virtual Private Network (VPN) ? Write the salient features of X.509 certificates. *5*

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MASTER OF COMPUTER APPLICATIONS (MCA) (NEW)

Term-End Examination

December, 2022

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Time : 3 Hours *Maximum Marks : 100*

Note : *(i) Question No.* ***1*** *is compulsory and carries 40 marks.*

(ii) Attempt any ***three*** *questions from the rest.*

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1. (a) Why bit stuffing is advantageous over character stuffing ? Write the bit sequence after bit stuffing for the data stream "110001111111100001111100". 2+3

(b) Differentiate between simplex, half duplex and full duplex modes of data transmission. 5

(c) What is data encoding ? Explain *three* different ways in which encoding of analog signal with analog information is performed. 2+3

(d) What is Pipelining ? Explain selective repeat ARQ. 2+3

(e) Write short notes on hidden station and exposed station problem. 5

(f) Explain shortest path routing algorithm with a suitable example. 5

(g) What is remote procedure call ? Mention some important features of UDP. 2+3

(h) Define a cyber threat. List some common threats in a user's system. 2+3

2. (a) What are synchronous, asynchronous and isochronous communication techniques ? 5

(b) What is Phase Modulation ? Why is Amplitude Modulation (AM) the most susceptible to noise ? 2+3

(c) Define multiplexing and switching. What are the differences between ADSL and cable ? 3+2

(d) What is Internetworking ? Differentiate between star and ring topologies of networking. 2+3

3. (a) Find the CRC for the data polynomial $x^4 + x^2 + x + 1$, where generator polynomial is $x^3 + 1$. 5

(b) Explain stop and wait ARQ in normal operation and when frame is lost. 5

(c) What is slotted ALOHA protocol ? Explain its throughput calculation. 5

(d) Explain 802.11 protocol stack. What are source routing bridges ? 3+2

4. (a) Compute the end to end delay for circuit switching for a network having 5 hops to switch a message of 1200 bits. Here all the

links have a data rate of 4800 bps. Size of packet is 1024 bits with a header of 32 bits. Assume 0.5 sec as a call setup time and hop delay as 0.2 sec and there is no processing delay. 8

(b) What is distance vector routing ? Explain the count to infinity problem. 3+3

(c) Differentiate between congestion control and flow control. Explain congestion control in packet switched networks. 3+3

5. (a) Explain the connectionless and connection oriented services provided by the transport layer. 5

(b) What are important features of UDP ? Why is it not considered as a reliable service ? 5

(c) What is a digital signature algorithm ? Explain the basis of ElGaml public key cryptosystem. 5

(d) What is a Firewall ? Explain the working of intrusion detection system. 5

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MCS–218

MASTER OF COMPUTER APPLICATIONS (MCA–NEW)

Term-End Examination

June, 2024

MCS-218 : DATA COMMUNICATION AND COMPUTER NETWORKS

Time : 3 Hours *Maximum Marks : 100*

Note : *(i) Question No. **1** is compulsory and carries 40 marks.*

*(ii) Attempt any **three** questions from the rest.*

1. (a) Differentiate between Analog and Digital signals. Draw the diagrams for both. 5

   (b) Define vulnerable period. Give an expression of throughput in pure ALOHA. Also differentiate pure ALOHA with slotted ALOHA. 5

(c) Define bridge. In which scenario bridge should be used ? What are the characteristics of it ? 5

(d) Describe transmission and propagation delays. Explain the working of a fibre-optic cable. 5

(e) List and explain the functionalities of various layers in OSI reference model. 5

(f) Explain count to infinity problem with the help of an example. 5

(g) Explain the features of M2M communication. Differentiate between Leaky bucket and Token bucket shaper. 5

(h) Define cryptography, encryption, decryption and block-cipher. Give an example of modulo function. 5

2. (a) Describe Automatic Repeat Request (ARQ). Also discuss the following methods for flow and error control : 12

(i) Stop and Wait ARQ

(ii) Selective Repeat ARQ

(b) Explain circuit and packet switching. Give an example where circuit switching should be applied. 8

3. (a) What do you mean by error detection ? Cyclic Redundancy Check (CRC) is used to detect which type of error ? Determine CRC for the bit sequence 1101011011 where the generator polynomial key is 10011. 7

(b) Explain Wireless LAN protocols. What are the features of MACAW which extends MACA to improve the performance ? 6

(c) What is Multiplexing ? Explain synchronous time division multiplexing. 7

4. (a) Explain the concept of congestion and routing in networks. Draw the graph for throughput and delay in poor and good routing. 5

(b) Explain the working of Dijkstra's algorithm. 5

(c) Define Hierarchical Routing. In which scenario, it is more advantageous ? Explain Reverse Path forwarding mechanism. 5

(d) Explain the mechanism on which open loop algorithm work. How is congestion controlled in packet switched network ? 5

5. (a) Describe the services required by application layer from transport layer. 5

(b) Enlist important features of UDP. Give an example where it can be used. 5

(c) Explain Remote Procedure Cell (RPC) with the help of an appropriate block diagram. 5

(d) Find the secret key using Diffie Hellman for the case, where : 5

User 1 : Public Key = 33, Private key = 3

User 2 : Public key = 8, Private key = 8.

And User 1 is sender, User 2 is receiver.