

PAPER ID—14902

**Master of Computer Application-II
EXAMINATION, 2023**

(First Semester)

**DATA COMMUNICATION AND COMPUTER
NETWORKS**

Code : MCA-104

Time : 3 Hours

Maximum Marks : 80

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt Five questions in all, selecting one question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

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P.T.O.

1. (i) Differentiate between analog and digital signals.
- (ii) What is the significance of ARPANET to modern Internet ?
- (iii) Differentiate between Nyquist and Shannon theorems.
- (iv) Why do we need more redundant bits for error correction than in error detection ?
- (v) Do we require MAC sublayer for communication through a dedicated channel ? Justify.
- (vi) Define the Optimality principle in routing.
- (vii) Differentiate between POP and IMAP.
- (viii) Can a protocol connect Transport layer with Application layer ? Justify your answer. In case your answer is yes, then name one such protocol. **8×2=16**

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Unit I

2. (i) Define Computer Network and list their advantages over stand-alone computers. How will you classify computer networks based on their size ? Discuss. **8**
- (ii) Compare (not more than four points per part) : **8**
 - (a) Connection Oriented Service v/s Connectionless Service.
 - (b) Noiseless v/s noisy channel
 - (c) Switch v/s Hub
 - (d) Throughput v/s Latency
3. Why do we divide network models into layers ? Discuss disadvantages of choosing too small or too high number of layers while proposing a model. Enlist atleast two functions of each layer comprising an OSI model. Compare and contrast OSI model with TCP/IP model. **16**

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Unit II

4. (i) Describe working principle of Fiber Optics communication. Differentiate between cat-5 and cat-6 cables. Which one offers higher data rate and why ? Why fiber-optical cables are preferred over coaxial cables ? **10**
- (ii) Compare and contrast multiplexing from switching. Define various types of multiplexing (or switching) techniques used in data communication. **6**
5. (i) Compare and contrast error detection with error correction. Define Hamming distance. Find minimum Hamming distance for a set of codewords (10101010, 11111010, 11101110, 11101011). If this comprised a set of valid codewords for a communication, then how many bit errors can be detected.

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Also specify maximum number of bit errors that can be corrected while using this set. Justify your answer. **11**

- (ii) What does the term 'sliding windows' refer to in Sliding Window Protocols. Give one advantage and one disadvantage for each of the following sliding window protocols : **5**
- One bit protocols.
 - Go-Back-N.
 - Selective repeat.

Unit III

6. (i) What does the term 'carrier sense' refers in CSMA ? Compare persistent CSMA with non-persistent CSMA protocols. Describe CSMA/CD. What is the major difference between collision free and limited contention protocols ? **8**

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- (ii) What is a wireless LAN ? Discuss hidden terminal and exposed terminal problems in them. How are they different from Virtual LANs. Suggest four QoS parameters (metrics) for evaluating voice call service offered by your mobile service provider (like BSNL, Airtel, Jio etc). **8**

7. (i) Compare adaptive routing algorithms with non-adaptive routing algorithms. Write a short note on one example of each type. Describe Count to Infinity problem. **8**
- (ii) Differentiate between Classful and Classless IP addressing. Identify class of following IPv4 addresses (Classful Addressing) and corresponding subnet mask : **8**
- 131.16.17.18
 - 192.168.10.10

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Unit IV

8. (i) Write a short note on the service provided by the Transport layer to the upper layers. What do you understand from Transport Service Primitives, explain with the help of two examples. **8**
- (ii) Compare and contrast UDP from TCP. Can we term SCTP as next generation TCP ? Justify. **8**
9. Write short notes on any *four* of the following : **4×4=16**
- Domain Name System (DNS)
 - Electronic Mail Architecture
 - Difference between HTTP and FTP
 - Congestion control in TCP
 - Connections in TCP