

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Bachelor of Technology (Computer Engineering) SEMESTER - 6 Summer 2025 (Regular)

Course :Bachelor of Technology (Computer Engineering) Branch : Engineering and Technology

Semester : SEMESTER - 6

Subject Code & Name: BTCOC602 - COMPUTER NETWORKS

Time : 3 Hours]

[Total Marks : 60

Instructions to the Students:

1. Each question carries 12 marks.
 2. Question No. 1 will be compulsory and include objective-type questions.
 3. Candidates are required to attempt any four questions from Question No. 2 to Question No.6
 4. Use of non-programmable scientific calculators is allowed.
 5. Assume suitable data wherever necessary and mention it clearly.
-

Q1. Objective type questions. (Compulsory Question)

12

- 1 Which of the following best describes the difference between a protocol and a service in layered network design?
 - a. A protocol defines what a service does, while a service defines how it is implemented.
 - b. A protocol defines how services are implemented, whereas a service defines the interface between layers.
 - c. A protocol is implemented at the physical layer, whereas a service is only logical.
 - d. A service operates independently of any protocol
- 2 Consider a satellite communication link with a bandwidth of 10 Mbps and a round-trip delay of 500 ms. What is the bandwidth-delay product, and what does it signify in terms of performance?
 - a. 2.5 Mbits; amount of data that can be sent per second
 - b. 5 Mbits; total data in transit
 - c. 0.5 Mbits; latency
 - d. 10 Mbits; speed of transmission
- 3 Which of the following technologies is best suited for long-distance broadband wireless access in rural areas?
 - a. Wi-Fi (802.11)
 - b. Bluetooth (802.15.1)
 - c. WiMAX (802.16)
 - d. RFID
- 4 How does the token ring protocol prevent collisions in a network?
 - a. By detecting collisions after they occur
 - b. By assigning fixed time slots to each station
 - c. By using CSMA/CD
 - d. By allowing only the token holder to transmit
- 5 In the context of error detection, what is the role of the cyclic redundancy check (CRC)?
 - a. It corrects bit errors using redundancy.
 - b. It prevents packet loss.
 - c. It detects errors by performing polynomial division.
 - d. It provides flow control.
- 6 A frame uses a 4-bit checksum and is received as 10110010. The expected checksum is 1011. What can you conclude?
 - a. Error is corrected.
 - b. No error is detected
 - c. Error is detected
 - d. It is a broadcast frame.
- 7 Which routing algorithm uses periodic updates and can suffer from the count-to-infinity problem?
 - a. Link State Routing
 - b. Distance Vector Routing
 - c. Dijkstra's Algorithm
 - d. Path Vector Routing

- 8 If a network experiences variable delay and jitter, which congestion control technique is most appropriate?
- Token bucket
 - Leaky bucket
 - Flow-based admission control
 - Traffic shaping with priority scheduling
- 9 Which of the following statements best distinguishes between public key and private key cryptography?
- Both use symmetric encryption
 - Public key is faster than private key
 - Public key cryptography uses two keys, one for encryption and one for decryption
 - Private key cryptography requires certification authorities
- 10 Why is it important to implement firewalls at both the network and application levels?
- To increase system performance
 - To allow unrestricted access from the internet
 - To enforce multi-layered security policies
 - To simplify routing tables
- 11 Which HTTP method should be used when a client wants to update a specific resource without creating a new one?
- GET
 - POST
 - PUT
 - DELETE
- 12 A company's email system uses SMTP for sending emails and POP3 for receiving them. A user reports that sent emails are visible in the "Sent" folder but incoming messages are missing. Which layer or protocol is most likely misconfigured?
- HTTP
 - DNS
 - SMTP
 - POP3

Q2. Solve the following.

- Compare OSI and TCP/IP reference models with a suitable example. 6
- A network engineer is designing a new protocol. Evaluate the design issues they must consider at each layer of the OSI model. 6

Q3. Solve the following.

- Explain how Resilient Packet Ring (IEEE 802.17) combines the benefits of ring topology and packet switching. 6
- A college campus wants to deploy wireless connectivity over a large area. Which LAN technologies would you recommend and why? 6

Q4. Solve Any Two of the following.

- Explain the design issues of the Data Link Layer with suitable examples. 6
- Given a 7-bit message 1011001 and a 4-bit CRC generator polynomial 1101,
 - Compute the CRC code and form the transmitted message. 6
 - If the received data is 1011001010, detect whether an error has occurred during transmission using CRC.
- Explain in detail three different framing methods with the help of examples. 6

Q5. Solve Any Two of the following.

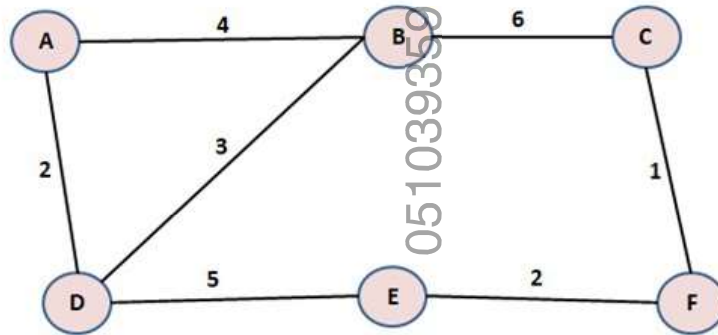
- Compare IPv4 and IPv6 in terms of address space, header structure, and security. 6

- B) Given the following network graph with nodes **A, B, C, D, E, and F** and their respective edge weights: **Edge Weights:** 6

1. A-B = 4 2. A-D = 2 3. B-D = 3 4. B-C = 6
2. C-F = 1 6. D-E = 5 7. E-F = 2

Task:

1. Apply Dijkstra's algorithm to compute the shortest path from source node **A** to all other nodes.
2. Show the final distance table and interpret the shortest path and cost from **A** to each node.



- C) Explain the basic working principle of the **Leaky Bucket** algorithm and how it enforces a constant output rate. 6

Q6. Solve Any Two of the following.

- A) Explain the role of DNS and describe how name resolution is performed. 6
- B) Explain why AES is considered more secure than DES. List at least three reasons with justification. 6
- C) Evaluate the role of digital certificates, public/private key cryptography, and firewalls in securing online banking transactions. 6

***** End *****