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Question Paper Code : 81233

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fourth Semester

Electronics and Communication Engineering

EC 3401 — NETWORKS AND SECURITY

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is meant by network model?
2. Write any two characteristics of IEEE 802.11 (Wireless LAN).
3. State the purpose of transition from IPv4 to IPv6?
4. List any two functions of the Network Layer.
5. Give the features of RED in networking?
6. Mention any two protocols used in electronic mail.
7. Give one example of a security mechanism at the network layer.
8. Mention the role of digital signatures in network security.
9. What is the importance of hardware security in embedded systems?
10. List the countermeasures against side-channel attacks.

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain the OSI reference model with a neat diagram. Discuss the function of each layer in detail.

Or

- (b) Explain the architecture and working of Wireless LAN (IEEE 802.11). Mention its advantages and limitations.

12. (a) Describe IPv4 addressing. Explain the types of IPv4 addresses and subnetting with examples.

Or

- (b) A city is deploying an IoT network with thousands of sensors for traffic and environmental monitoring.
- (i) Which IP version is suitable for addressing all devices and why? (5)
 - (ii) Suggest a routing protocol to manage communication between sensors efficiently. (5)
 - (iii) How will ICMP help in network troubleshooting? (3)
13. (a) Describe transition from connection establishment to termination in TCP with the state diagram.

Or

- (b) Compare TCP and UDP in terms of reliability, connection, and usage with an example.
14. (a) Explain challenges in implementing network security and ways to mitigate them. Give example.

Or

- (b) Illustrate the steps involved in Advanced Encryption Standard (AES) working key sizes, and applications.
15. (a) (i) Enumerate the possible hardware attacks on the controllers. (7)
- (ii) Discuss the role of secure cryptographic hardware modules in industrial control systems. (6)

Or

- (b) (i) Explain how Design for Security ensures integrity of blockchain transactions. (7)
- (ii) Identify any potential side-channel attacks and suggest mitigation techniques. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the use of digital signatures and secure hash functions for email integrity and verification with suitable examples.

Or

- (b) A research station communicates with a satellite using a point-to-point link.
- (i) Which protocol would be better suited here? Justify with reasons. (5)
 - (ii) Discuss how error detection and correction would be applied in such a long-distance communication. (5)
 - (iii) Which flow control technique should be implemented to handle varying transmission delays? (5)
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The first part of the report is a summary of the findings of the study. The second part is a discussion of the results and their implications. The third part is a conclusion and a list of references.

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