

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - THEORY EXAMINATION (2025 - 2026)

Subject: Computer Networks

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

1-a. List the topology providing highest reliability is (CO1,K1)

1

- (a) Bus
- (b) Star
- (c) Ring
- (d) Mesh

1-b. State the communication where one device only sends and another only receives is (CO1,K1)

1

- (a) Simplex
- (b) Half Duplex
- (c) Full Duplex
- (d) Unicast

1-c. Name the type of error when several consecutive bits are flipped.(CO2,K1)

1

- (a) Single-bit
- (b) Burst
- (c) Multiple-bit
- (d) None

1-d. Record the Vulnerable time in Pure ALOHA is equal to: (CO2,K1)

1

- (a) ½ frame time
- (b) 1 frame time
- (c) 2 frame times
- (d) None

- 1-e. List the protocol responsible for Network reachability verification of a host. (CO3,K1) 1
- (a) FTP
 - (b) SMTP
 - (c) ICMP
 - (d) ARP
- 1-f. The core aim behind routing algorithm implementation. (CO3,K1) 1
- (a) Assign MAC
 - (b) Determine path
 - (c) Encrypt data
 - (d) Assign IP
- 1-g. In TCP congestion control, the slow start phase begins with (CO4,K1) 1
- (a) One segment
 - (b) Two segments
 - (c) Half of previous window size
 - (d) Maximum window size
- 1-h. Quality of Service (QoS) primarily focuses on (CO4.K1) 1
- (a) Data encryption
 - (b) Minimizing delay and maximizing throughput
 - (c) Routing packets efficiently
 - (d) Improving bandwidth cost
- 1-i. Select the following user provided services to make the process of sending or receiving a message easier. (CO5,K1) 1
- (a) Mail Transfer Agent
 - (b) Mail Delivery Agent
 - (c) User Agent
 - (d) None of the above
- 1-j. Select incorrect out of the following (CO5,K1) 1
- (a) Application layer protocols are used by both source and destination devices during a communication session
 - (b) HTTP is a session layer protocol
 - (c) TCP is an application layer protocol
 - (d) All of the above
2. Attempt all parts:-
- 2.a. Compute the number of links required for a Mesh topology with $n = 5$ nodes (CO1,K2) 2
- 2.b. Compute the efficiency of Stop-and-Wait protocol given transmission and propagation delay. (CO2,K2) 2
- 2.c. Analyze the impact of routing loops and how they are prevented. (CO3,K4) 2
- 2.d. Discuss the statement "Window size adjustment influences data transmission efficiency". (CO4,K2) 2

2.e.	Differentiate the term stateful and stateless firewalls.(CO5, K2)	2
SECTION-B		30
3.a. Answer any <u>one</u> of the following:-		
3.a.(i)	Explain the working and differences between network devices: hub, switch, router, and gateway with suitable example. (CO1,K2)	6
3.a.(ii)	Examine the key factors that affect network performance such as bandwidth, latency, and throughput.(CO1,K3)	6
3.b. Answer any one of the following:-		
3.b.(i)	A smart factory LAN suffers from collisions using Pure ALOHA. Examine the cause and suggest an alternative multiple access protocol. (CO2,K3)	6
3.b.(ii)	A university campus LAN needs to scale from 50 to 500 devices. Evaluate the use of bridges vs switches in terms of performance and scalability. (CO2,K4)	6
3.c. Answer any one of the following:-		
3.c.(i)	Construct a subnetting plan for an organization with 3 departments needing 50, 30, and 20 hosts. (CO3,K3)	6
3.c.(ii)	Simulate a scenario where DHCP fails and suggest alternate IP assignment methods. (CO3,K3)	6
3.d. Answer any one of the following:-		
3.d.(i)	Discuss the main QoS parameters that influence network performance.(CO4,K2)	6
3.d.(ii)	Describe the process and conditions for terminating a connection in the transport layer using a diagram (CO4,K2)	6
3.e. Answer any one of the following:-		
3.e.(i)	Discuss the concept of symmetric and asymmetric key cryptography with an example. (CO5,K2)	6
3.e.(ii)	Explain the two mail access protocol in brief : POP3 and IMAP (CO5,K2)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
4-a.	Explain the OSI reference model layer by layer with its functions and services. (CO1,K2)	10
4-b.	Compare guided and unguided transmission media in terms of cost, bandwidth, and applications.(CO1,K2)	10
5. Answer any <u>one</u> of the following:-		
5-a.	For dataword 1010000 and divisor x^3+1 , Compute the CRC codeword step-by-step. (CO2,K3)	10
5-b.	Given a LAN cable of 2 km, propagation speed 2×10^8 m/s, frame size 512 bits, bandwidth 10 Mbps, Compute minimum frame size for CSMA/CD efficiency.(CO2,K3)	10
6. Answer any <u>one</u> of the following:-		
6-a.	Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer, the data link layer, physical layer during a transmission from S to D through a sketch. (CO3, K3)	10

- 6-b. Construct a routing table using distance vector routing and show how updates affect it.(CO3,K3) 10
7. Answer any one of the following:-
- 7-a. Differentiate between UDP and TCP based on reliability, connection type, and overhead. (CO4,K4). 10
- 7-b. Differentiate between two and three-way handshake used for TCP connection establishment with suitable diagram, connection establishment, data transfer and connection termination. (CO4,K4) 10
8. Answer any one of the following:-
- 8-a. Explain how does e-mail reaches to destination. Explain in brief SMTP emphasizing the role and function of User Agent (UA) and Mail Transfer Agent(MTA).(CO5,K2) 10
- 8-b. Explain a Virtual Private Network (VPN), and its working. Also discuss the advantages and disadvantages of using a VPN. (CO5,K2) 10

REG_JULY_DEC_2025