

Premier University
Department of Computer Science and Engineering
+10 3rd Semester (B.Sc.) Final Examination, October 2025
Session: Spring 2025

Course Code: CSE 3233

Time: 3 Hours

NB: Answer any of four (4) from following six (6) questions. Each question carries equal marks.

Course Title: Software Engineering

Full Marks: 40

- Q.1** A team is developing a hospital management system. Modules like billing, appointments, and reports are tightly connected, small code changes often cause unexpected issues in other parts.
a. How can applying abstraction and separation of concerns help reduce this complexity? Give a brief example. **5 CLO3**
b. Using the idea of modularity vs. cost tradeoff, explain why creating too many small modules may not always be cost-effective. Support your answer with the modularity-cost relationship. **5 CLO3**
- Q.2** A company is developing an e-commerce platform that must handle product catalogs, manage customer orders and process payments.
a. As a software architect, which architecture style would you select between layered, and MVC for this system? Justify your choice. **5 CLO3**
b. Briefly explain the suitability, pros, and cons of these two architecture styles (data-centered, pipe-and-filter) in the context of this e-commerce system. **5 CLO3**
- Q.3** A software team is developing a banking application. To ensure the system's reliability, the QA lead asks the team to apply systematic testing methods before release.
a. Explain how Black-Box Testing can be applied to test the logic of the banking application. **5 CLO4**
b. Briefly compare the top-down, bottom-up, and continuous integration approaches of integration testing. **5 CLO4**
- Q.4** A startup is building a ride-sharing mobile application. The project team wants to deliver features quickly, handle frequent changes in requirements, and ensure smooth deployment without delays.
a. Explain how Agile Practices can help the team manage changing requirements effectively. **5 CLO2**
b. Describe how adopting DevOps with CI/CD pipelines can improve deployment speed and reduce friction between development and operations teams. **5 CLO2**

- Q.5** a. Use the COCOMO II model to estimate the effort required to build software for a simple ATM that produces 12 screens, 10 reports, and will require approximately 80 software components. Assume average complexity and average developer/environment maturity. Use the application composition model with object points, and 10% reuse of object points. **5 CLO5**
- b. Assume a project involves new technology, a large budget, and tight deadlines, which could introduce significant risks. Explain how you would apply the steps of risk management to handle these risks effectively. **5 CLO6**
- Q.6** A team is developing an e-commerce website. The codebase has grown large, and developers notice that some modules depend heavily on each other, making updates risky. At the same time, users complain that the checkout process is confusing and takes too long.
- a. Explain how improving cohesion and reducing coupling in the modules can make the system easier to maintain. Give a brief example. **5 CLO3**
- b. Based on the Golden Rules of User Interface Design, suggest improvements that could make the checkout process more user-friendly. **5 CLO3**

Premier University
Department of Computer Science & Engineering
6th Semester (B.Sc.) Final Exam, October 2025
Session: Spring 2025
Course Title: Computer Networks
Course Code: CSE-3567

Total Marks: 40

Time: 3 Hours

Answer any four set of questions. Write in chronological order.

- Q.1 a** Given the circuit-switched network in Fig. 1 with circuit switches A, B, C, and D. 5 CLO1
 Suppose there are 12 circuits between A and B, 12 circuits between B and C, 11 circuits between C and D, and 12 circuits between D and A.

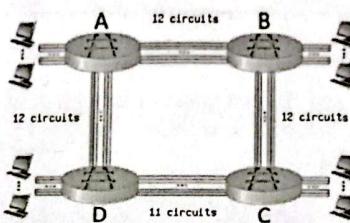


Fig. 1: A Circuit-Switched Network

- i) Suppose that every connection requires 2 consecutive hops, and calls are connected clockwise. For example, a connection can go from A to C, from B to D, from C to A, and from D to B. With these constraints, what is the maximum number of connections that can be ongoing in the network at any one time?
- ii) Suppose that 15 connections are needed from A to C, and 11 connections are needed from B to D. Can we route these calls through the four links to accommodate all 26 connections? Why or why not?

- b** Differentiate between segmentation and fragmentation. Describe the IPv4 datagram format. 3+ CLO2
 2

- Q.2 a** Assume that a user wants to access www.puc.ac.bd, but the browser does not know the website's IP address. Describe the sequence of steps involved in both iterative and recursive DNS queries that are required to obtain the IP address of the website. Which type of query is considered best practice: Iterative or Recursive? 4 CLO1

- b** Define Non-persistent HTTP and web caching. 2 CLO1

- c** In the home network given in Fig. 2, host 192.168.5.3 sends a HTTP request to a web server of IP address 128.110.40.10, and receives a HTTP response. 4 CLO3

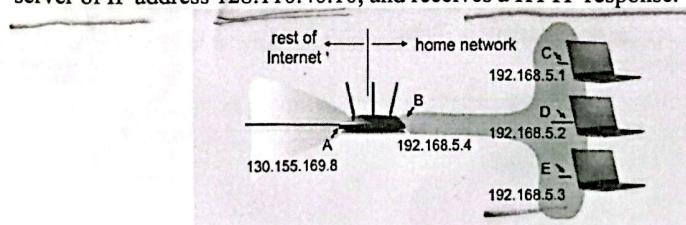


Fig. 2: A home network

Relating to this request, the NAT table at the home router has the following entry:

WAN side address	WAN side port	LAN side address	LAN side port
130.155.169.8	2050	192.168.5.3	1025

Complete the following table to show what you would observe at the home router's WAN interface point A and host 192.168.5.3's network interface point E.

Datagram	Observed at	Source IP address	Source port	Destination IP address	Destination port
HTTP request	point E			192.168.5.3	1025
HTTP request	point A				80
HTTP response	point A				
HTTP response	point E				

- Q.3**
- a Briefly describe different types of access networks. 3 CLO1
 - b Consider the router and the two attached subnets A and B in Fig. 3. The number of hosts is also shown below. The subnets share the 23 high-order bits of the address space: 10.168.164.0/23 5 CLO3

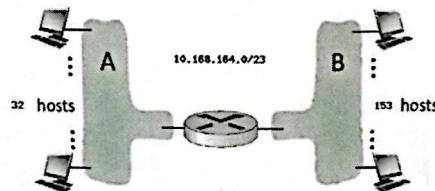


Fig. 3: A network topology

Assign subnet addresses to the subnets such that the amount of address space assigned is minimal, and at the same time leaving the largest possible contiguous address space available for assignment if a new subnet were to be added. Then answer the questions below.

- i. How many hosts can there be in this address space?
 - ii. What are the subnet address and broadcast address of subnet A?
 - iii. What is the usable IP address range of subnet A?
 - iv. What are the subnet address and broadcast address of subnet B?
 - v. What is the usable IP address range of subnet B?
- c Write a short note on TCP fast retransmit. 2 CLO2

- Q.4**
- a Given the scenario in Fig. 4, suppose the initial value of the TCP sender->receiver sequence number is 199 and the first 4 segments each contain 391 bytes. The delay between the sender and receiver is 7-time units. 2 of the 4 segment(s) are lost between the segment and receiver. 3 CLO2

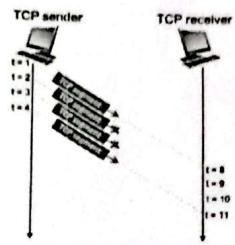


Fig. 4: A TCP sender-receiver scenario

- i. Give the sequence numbers associated with each of the 4 segments sent by the sender.
- ii. Give the ACK numbers the receiver sends in response to each of the segments. If a segment never arrives use 'x' to denote it.

b Differentiate between intra-AS and inter-AS routing protocols with appropriate examples. 2 CLO2

c Given the network topology in Fig. 5, use Dijkstra's algorithm to find the least cost path from u to each other node. 5 CLO3

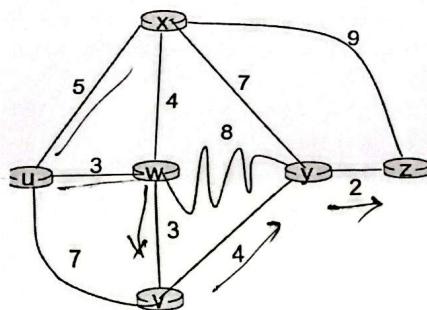


Fig. 5: A network topology

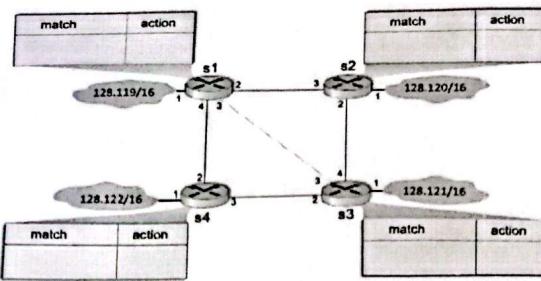
Q.5 a The following table shows three prefixes and MAC unabbreviated IPv6 addresses; convert these to the shortest possible abbreviated IPv6 address using EUI-64 model. 3 CLO3

Prefix	MAC Address
2001:0DB8:9283:0102::/64	000C.1234.5678
3000:D0D0:0D0D:BEEF::/64	0003.0303.0303
2001:0DB8:0000:0000::/64	0C00.BEEF.CAFE

b Write a short note on slotted ALOHA random access protocol. How can you use RTS-CTS messages to avoid collision in infrastructure wireless network? 4 CLO2

c Suppose that the 4-bit generator (G) is 1001, that the data payload (D) is 10011100 and that $r = 3$. What are the CRC bits (R) associated with the data payload D ? 3 CLO2

Q.6 a Consider the following scenario where packet forwarding is controlled by flow tables (using SDN controller), implement the following behavior of packets: 4 CLO3



Packets coming from the source network attached to s3 and destined to the network attached to s2 should be forwarded along the path: s3 \rightarrow s1 \rightarrow s2. Assume that at s2 that only TCP traffic is allowed to enter the network. UDP packets coming from the source network attached to s3 and destined to the network attached to s2 should be forwarded along the different path: s3 \rightarrow s4 \rightarrow s1 \rightarrow s2.

For router s1, s2, s3, and s4, find out the values of 'IP Src', 'IP Dst', 'Src Port', 'Dst Port', 'IP Protocol', action of the rule, and forwarding interface.

- b** Write a brief note on the various types of packet scheduling techniques used for transmitting packets over an output link. 4 CLO2
- c** Differentiate between beaconing and probing association approaches 2 CLO2

Premier University
Department of Computer Science and Engineering
6th Semester (B.Sc.) Final Examination, October 2025
Session: Spring 2025

Course Title: Computer and Cyber Security
Time: 3 hours

Course Code: CSE 3637
Marks: 40

NB: Answer any of four (4) from the following six (6) questions. Each question carries equal marks.

- 1 (a) P and Q are two prime numbers. P = 3 and Q = 11. Take public key E = 5 CO2
3. If plain text value is 59, then what will be cipher text value and private key value according to RSA algorithm? Again calculate plain text value from cipher text.
(b) Q = 23, alpha = 5, X_A = 6, X_B = 15. Determine public key and shared 5 CO2 key for both users using diffie-hellman key exchange algorithm.

- 2 (a) Using the **Chinese Remainder Theorem (CRT)**, determine the smallest 5 CO2 positive integer x that satisfies the following system of congruences:

$$x \equiv 12 \pmod{17}$$

$$x \equiv 25 \pmod{31}$$

$$x \equiv 8 \pmod{43}$$

- (b) Explain the encryption process of the AES algorithm. Write the 5 CO1 sequential steps involved, describe the role of the main functions, and illustrate the round structure with a neat flow chart.

- 3 (a) A bank wants to transmit a **financial transaction record (M)** securely to 5 CO3 its head office. To ensure **authenticity, integrity, and confidentiality**. **Considering the triad, Draw a schemea using hashing method.**
(b) In **Triple DES (3DES) using two keys (K1,K2)**, the encryption of a 5 CO2 plaintext block P is done. Explain why decryption works correctly with the same two keys.

- 4 (a) Encrypt the message 'CCS' using a 3×3 Hill Cipher with the key derived 5 CO2 from the keyword 'COMPUTERS'; show the key matrix, numeric conversion of plaintext, and ciphertext.
(b) A ciphertext has been encrypted using a simple substitution cipher. 5 CO1 Assuming the key space consists of all possible permutations of the 26 English letters, estimate the total number of possible keys. Explain the

- feasibility of a brute-force attack on this cipher and discuss the factors that affect the time required to recover the plaintext.
- 5 (a) Explain the differences between symmetric key algorithms and asymmetric key algorithms in terms of key usage, speed, scalability, and security. Provide at least one real-world application where each is most suitable. 5 CO1
- (b) A government agency needs to send classified reports to its regional offices over the internet. The reports must remain confidential and also prove the sender's identity. Describe how encryption can be combined with digital signatures to achieve both confidentiality and authentication. 5 CO2
- 6 (a) During a product launch, a company notices unusual network traffic, employees receiving fake executive emails requesting credentials, sudden workstation crashes, hidden programs exfiltrating data, and their website overwhelmed by traffic. Identify the types of attacks, explain their execution, and suggest measures to prevent them. 5 CO3
- (b) A company sends software updates to its users. To ensure the files aren't tampered with, they generate a SHA-256 hash. To verify the updates come from the company and are untampered, they use an HMAC with a secret key. Explain the difference between hashing and MAC in this scenario and why each is used. 5 CO3

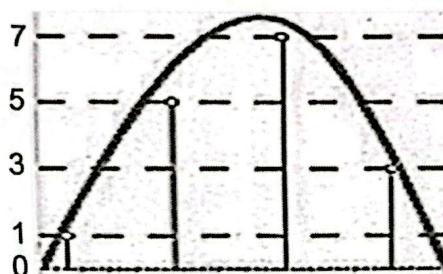
Premier University
Department of Computer Science and Engineering
6th Semester (B.Sc.) Final Examination, October 2025
Session: Spring 2025

Course Code: CSE 4427
Time: 3 Hours

Course Title: Data Communication
Full Marks: 40

NB: Answer any four (4) from the following six (6) questions. Each question carries equal marks.

- Q-1** a. Convert the following analog to digital signal using Pulse Code Modulation (PCM) technique with Bipolar AMI encoding. 6 CO2



- b. Differentiate between synchronous and asynchronous transmission, and support your answer with suitable examples. 4 CO2

- Q-2** a. Explain ASK and FSK with block diagrams, waveform, advantages, disadvantages, and applications. 6 CO2

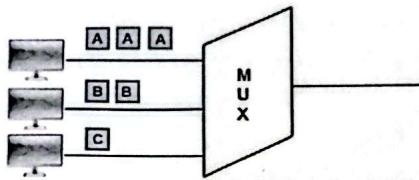
- b. Two channels, one with a bit rate of 100 kbps and another with a bit rate of 200 kbps, are to be multiplexed. How this can be achieved? What is the frame rate? What is the frame duration? What is the bit rate of the link? 4 CO2

- Q-3** a. Differentiate between circuit switching and packet switching, and illustrate your answer with suitable diagrams. 5 CO3

- b. Construct the Hamming code for the bit sequence 1001110. 5 CO4

- Q-4** a. Compare synchronous and asynchronous Time Division Multiplexing (TDM). 4 CO2

- b. Write the output using the synchronous and asynchronous TDM with the frame size 3. 3 CO2



- c. In an FDM system with a total bandwidth of 1 MHz, 10 channels are required. If guard bands of 1 kHz are used between channels, calculate the bandwidth allocated to each channel.

3 CO2

- Q-5**
- a. A code has a minimum Hamming distance of 3. A code word 11011 is transmitted, but the received code word is 11101.
 - i. Determine the Hamming distance between transmitted and received code words.
 - ii. Can the error be detected and corrected?
 - b. i. Briefly explain the different flow control techniques used in data communication.
ii. Show the mapping table for 4B/5B coding and identify which 5-bit codes are unused. Why are these unused codes important?

4 CO3

3+3 CO3

OR

- b. A bit stream 10010101 is transmitted using the standard CRC method. The generator polynomial is $x^4 + 1$. (a) What is the actual bit string transmitted? (b) Suppose any of the transmitted bit changed during transmission. How will receiver detect this error? Explain with necessary computation.

6 CO3

- Q-6**
- a. Explain how QPSK can be viewed as a combination of two BPSK signals, illustrate your explanation with a necessary block diagram.
 - b. What are the advantages of modulation in long-distance communication?

7 CO2

3 CO2

Premier University
Department of Computer Science and Engineering
6th Semester (B.Sc.) Final Examination, October 2025
Session: Spring 2025

Course Title: Project Management and Entrepreneurship
Time: 3 Hours

Course Code: MGT 3301
Full Marks: 40

NB: Answer any four (4) from the following six (6) questions. Each question carries equal marks.

1. (a) What do you mean by the feasibility study of a project? Write down the steps involved in the feasibility study. 05 CLO2
(b) Briefly explain 'Porter's five forces' of competitiveness analysis. 05
2. (a) Briefly explain the qualitative demand forecasting tools. 08 CLO5
(b) Briefly explain the work breakdown structure (WBS). 02
3. (a) What do you mean by the project planning? 02 CLO4
(b) Briefly explain the steps in project planning process. 08
4. The Laurenster Corporation is getting into the construction business. A list of activities and their optimistic, most likely, and pessimistic completion times are given in the following table for the next construction project. 10 CLO6

Activities	Days			Predecessors
	Optimistic (a)	Most Likely (m)	Pessimistic (c)	
A	3	6	9	-
B	2	4	6	-
C	1	2	3	-
D	6	7	8	C
E	2	4	6	B,D
F	6	10	14	A,E
G	1	2	6	A,E
H	3	6	9	F
I	10	11	12	G
J	14	16	21	G
K	2	8	11	H,I

Required:

- (a) Develop a project network for this problem.
- (b) What is the probability that this project will finish in 38 days or less?

5. Mr. X wants to develop a new product. A similar type of product is available in the market. Mr. X somehow managed the past demand of the existing product. Now, following the past demand, estimate the demand of the new product that will be launched by Mr. X for the year 2021, 2022, 2023, 2024, and 2025 by trend projection method.

10 CLO5

Year	Units Sold (Thousands)
2011	18
2012	19
2013	17
2014	21
2015	13
2016	26
2017	14
2018	25
2019	18
2020	19

6. Explain the steps involved in environmental impact assessment (EIA) of a project.

10 CLO3