In the Name of Allah, the Most Beneficent, the Most Merciful.

OPTIMAL
IT JOB SOLUTION

QUESTION BANK

2011-2025

COMPUTER SCIENCE AND ENGINEERING

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******************** **CTI PATTERN** *******************

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******************* **DU PATTERN** *******************

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Bangladesh Satellite Company Limited
Assistant Engineer (CSE) 2025
Exam Taker: BUET Exam Date:23/08/2025
Exam Time: 1 Hour

1. Write a function to find minimum number from an array, return minimum value as argument.
Ans:

```
int findMin(int arr[], int n) {
    int min = arr[0];
    for (int i = 1; i < n; i++) {
        if (arr[i] < min) {
            min = arr[i];
        }
    }
    return min;
}
```

2. 10Mbps bandwidth, average packet length 1500 bytes, what is maximum packet arrival rate supported without causing congestion .
Ans:
Bandwidth: 10 Mbps = 10×10^6 bits/sec

Packet size: 1500 bytes = $1500 \times 8 = 12{,}000$ bits

Maximum rate:

$$\text{Max packets/sec} = \frac{10,000,000}{12,000} \approx 833\, pps$$

Answer is About 833 packets per second (pps) can be handled without congestion.

3. Write Concepts of coupling and cohesion with example .
Ans:
Cohesion refers to how closely the tasks within a single module are related. A highly cohesive module focuses on one specific responsibility, making it easier to understand and maintain.
For example, a function named calculateSalary() should only handle salary calculations.

Ans:

CPU scheduling is the process by which an operating system decides the order in which processes will use the CPU. This helps in efficiently managing the tasks that need to be processed.

Two examples of CPU scheduling algorithms are:

1. **First-Come, First-Served (FCFS)**: Processes are handled in the order they arrive.
2. **Round Robin (RR)**: Each process gets a fixed amount of time to run, and then the CPU moves to the next process in line.

4. **What is CMS (Content Management System)? Name two popular CMS platforms.**

Ans:

A **Content Management System (CMS)** is a software tool that helps you create and manage website content without needing to know how to code. It makes it easy to update and organize your website.

Two popular CMS platforms are:

1. **WordPress**
2. **Joomla**

5. **Write a PHP program to load data from a database.**

Ans:

```
<?php
$servername = "localhost";
$username = "root";
$password = "";
$dbname = "test_db";

// connection
$conn = new mysqli($servername, $username, $password, $dbname);

// Check connection
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}
// Fetch data
$sql = "SELECT id, name, email FROM users";
$result = $conn->query($sql);
```

Northern Electricity Supply Company Limited (NESCO)
JAM (ICT)
Exam Taker: BUET Exam Date: 31/12/2021

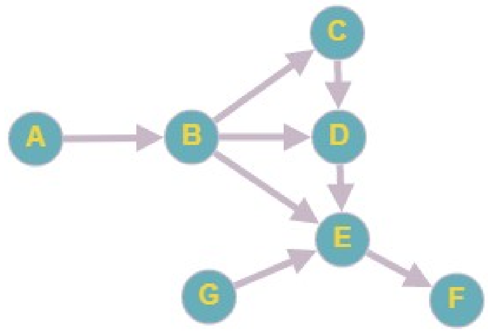
1.Write function of DNS Server and DHCP server.
Ans:

DNS	DHCP
DNS stands for Domain Name System.	DHCP stands for Dynamic Host Configuration Protocol.
DNS Server works on port number 53.	DHCP Server works on ports 67 and 68.
UDP and TCP protocols supported.	Only UDP protocol supported.
DNS is a decentralized system.	DHCP is a centralized system.
DNS Server translates domain names to IP addresses and vice versa.	DHCP Server is used to configure hosts mechanically.
The protocol supported by DNS are: UDP and TCP.	While in this only UDP protocol is used.
Eliminate the need to remember the IP address; instead, the domain name is used for the web address.	Relieable method of configurating and assigning IP adresses

2. Difference between Circular queue and Priority queue.
Ans:

Circular Queue	Priority Queue
As the name suggests, a circular queue is circular in storing the elements in it.	In the priority queue, elements are inserted and deleted on the basis of their priority.
Also known as a ring buffer.	Also known as a simple queue.
Elements can be enqueued or dequeued from the queue in O(1) time.	Three main operations are insert, delete and display.
Both the front and rear pointer wrap around to the beginning of the array.	It does not allow elements in sorted array.
It conquers the problem of linear queue.	It allows duplicate elements.
Less memory is required.	More Memory is required.
More efficient.	Less Efficient.

3. How does work HTTP.



Ans:

Adjacency Matrix:

	A	B	C	D	E	F	G
A	0	1	0	0	0	0	0
G	0	0	0	0	1	0	0

Adjacency List:

-

<table>
<tr><th>Adjacency Matrix</th><th>Adjacency List:</th></tr>
<tr><td>
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th></tr>
<tr><td>A</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
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<tr><td>D</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>E</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>F</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>G</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
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A: B
B: C, D, E
C: D
D: E
E: F
F: (none)
G: E

</td></tr>
</table>

3. **Write properties that are suited to you for me the divide and conquer whether dynamic programming is preferable. Explain this using merge sort and Fibonacci problem.**

   Ans:

   Divide and conquer: In this the problem is divided into the small sub-problems and solve this sub-problems and then merge it into main problem. Here we are not storing the answer of the sub=problems for future use.

   Dynamic programming: In this we are saving the answer of each sub problem for future use with the help of any data structure. If we are getting same sub problem then instead of calculating the value again we use the value from saved answer. DP is fast as compare to divide and conquer.

Divide and conquer	Dynamic programming

46th BCS
Technical Cadre
Exam Taker: BPSC Exam Date: 20.08.2025
Exam Time: 4 Hours
Total marks: 200 Written (IT)

<u>Subject Code (CSE-971)</u>

1. (a) Mention two basic differences between 'call by value' and 'call by Reference'. Write a program in c/c++ Programming language to swap two integer values using 'call by Reference'.
(b) Consider the following code snippet in a C like Programming language-

```
int a = 5, b = 18, c = 27;
a = b++ + ++c;
b = a++ - c--;
c = a++ + b--;
```

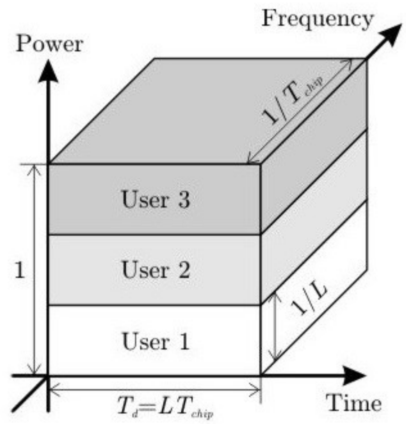
What will be the output of a, b, and c after execution of the above statements? Explain your answer.
(c) What is polymorphism? Write a Java program to demonstrate the compile time and run time polymorphisms.
(d) What is Just In Time (JIT) compiler? How does it support machine independent programming?

Ans:
(a) Call by Value and Call by Reference:

Call by Value	Call by Reference
Passes a copy of the actual value to the function.	Passes the address/reference of the actual variable to the function.
Changes made inside the function do not affect the original variable.	Changes made inside the function directly affect the original variable.
Requires more memory (due to value copying).	Requires less memory (works on existing data).
Function works with simple data types.	Uses pointers (C/C++) or references (C++, Java, Python).
Actual and formal parameters are stored in different memory locations.	Actual and formal parameters share the same memory location.
Slightly slower due to copying overhead.	Generally faster, especially with large data structures.
Supported by languages like C, C++, C#, PHP, Visual Basic NET, Java (primitives)	Supported by languages like C++ (via references), Python (mutable types), Java (object references)

Code-Division Multiple Access (CDMA)

In CDMA, all the stations can transmit data simultaneously. It allows each station to transmit data over the entire frequency all the time. Multiple simultaneous transmissions are separated by unique code sequence. Each user is assigned with a unique code sequence.



Advantages:

- CDMA has an extremely high spectral capacity, allowing it to accommodate a large number of users over a wide bandwidth.
- Synchronization is not required in CDMA operation.
- CDMA channels present decoding challenges, enhancing the security of cellular communication.
- It improves transmission security.
- Dropouts occur only when the user is twice the distance from the base station.

Disadvantages:

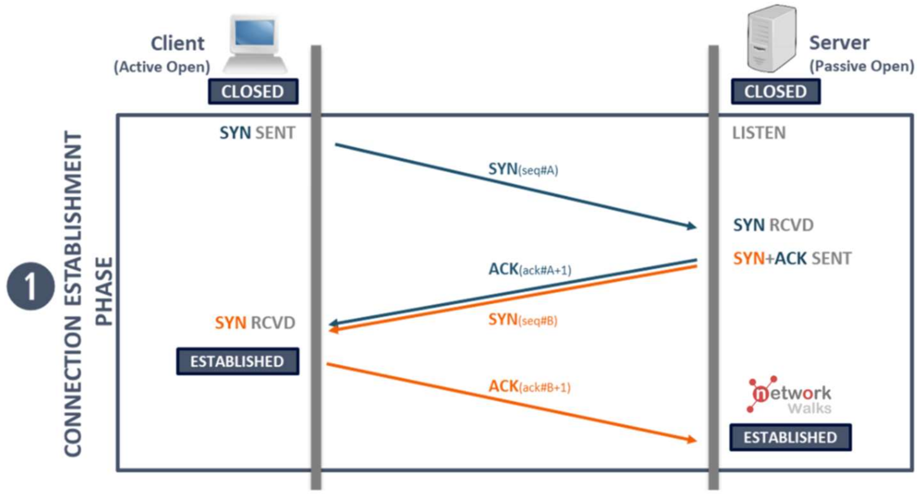
- Channel pollution is a key issue in the CDMA system, which occurs when a user's phone connects to many cell sites with various intensities, but only one site is powerful.
- CDMA, as a newer technology than GSM, lacks the same level of maturity as an organization.
- Time synchronization is required for CDMA.
- The CDMA system's performance degrades as the number of users increases.
- The cost is high due to the need for extensive equipment.

(b) Channel capacity of a noisy channel:

Here,

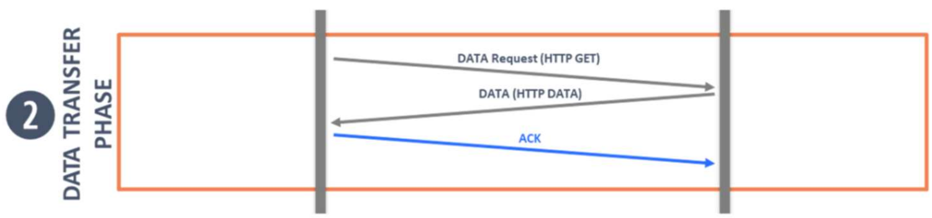
SNR = 0.1

B = 2.4 GHz = 2.4 × 109 Hz



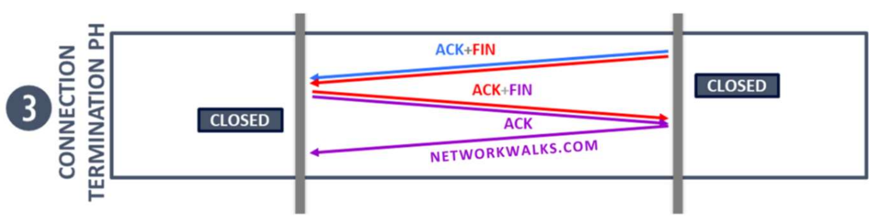
Step-2 (SYN + ACK):

In the second step, Server responds to the client request with SYN-ACK signal bits set. Acknowledgement(ACK) signifies the response of segment it received and SYN signifies with what sequence number it is likely to start the segments with.



Step3 (ACK):

In the last step, client acknowledges the response of server by ACK message. Status on both sides change to ESTABLISHED and both get ready to start the actual data transfer.



The steps 1 and 2 establish the connection parameter (seq nos.) for one direction and it is acknowledged. The steps 2 and 3 establish the connection parameter (seq nos.) for the other direction and it is acknowledged. After the whole process, a full-duplex communication is established.