

**Premier University, Department of CSE**  
**Fall 2024, 6<sup>th</sup> Semester, Assignment, February 2025**

**Course Title: Data Communication**

**Course Code: CSE 364**

**Course Outcome: CO3, Total Marks: 10**

Imagine you are designing a communication system for a densely populated urban area. The system must support multiple users simultaneously while ensuring efficient utilization of the available bandwidth. The environment is prone to high levels of electromagnetic interference due to the presence of numerous electronic devices and communication systems. Discuss how you would implement multiplexing and demultiplexing techniques in this scenario. Consider the selection of multiplexing schemes based on the specific challenges of the environment. Additionally, provide insights into the choice of multiplexing techniques, bandwidth allocation strategies, and how the system can handle interference and ensure reliable communication for all users.

**Objectives:**

The following are the objectives of the solution:

- i. To identify/choose the appropriate multiplexing and demultiplexing techniques to establish efficient data communication in a bandwidth-constrained and interference-prone environment
- ii. To illustrate and analyze the chosen multiplexing technique, including its advantages and limitations in the given scenario

**Investigation:**

The investigation of the problem involves the selection of appropriate multiplexing and demultiplexing techniques that ensure efficient bandwidth utilization and reliable communication for multiple users. **Evaluation:**

Students need to demonstrate their understanding of multiplexing and demultiplexing techniques, their ability to allocate bandwidth efficiently, and their capability to analyze the system's performance in a high-interference environment. The solution must be concise, comprehensive, and well-reasoned.

**Design:**

Students' solutions must satisfy the need for appropriate multiplexing and demultiplexing techniques to establish efficient and reliable communication in the given scenario. Their reasoning and analysis of the chosen techniques must align with the challenges of the environment, including bandwidth constraints and interference.

**Deliverables:**

A printed assignment reporting the following tasks:

- (i) A broad description of the appropriate multiplexing and demultiplexing techniques in the provided scenario.
- (ii) A diagram illustrating the chosen multiplexing technique and an analytic description of its advantages and limitations.

(iii) Briefly address the complex problem-solving questions:

- a. Does the solution need in-depth engineering knowledge?
- b. Does the solution involve wide-ranging or conflicting technical, engineering, and other issues?
- c. Is the solution well-known, or does it require abstract thinking and analysis to formulate?
- d. Does the solution involve infrequently encountered issues?
- e. Does the solution need adherence to standards and codes of practice?
- f. Does the solution involve stakeholders with conflicting technical requirements?
- g. Does the solution involve interdependence between sub-problems or parts?

**Rubrics for Assignment marking:**

Task	Criteria	Good (4-5)	Moderate (2-3)	Poor (1)
i.	Problem solution	Properly designed diagrams including all functionalities	Appropriate solution for some cases	Inappropriate or no solution
ii.	Problem analysis	In-depth analysis	Shallow analysis	Incomplete analysis