Semester: I/II			
Course Title	Communication Technologies	**CIE Marks**	50
Course Code	BECETC105/205F	**SEE Marks**	50
Course Type	Theory	**Total Marks**	100
Course Category	ETC	**SEE Duration**	03 hrs
Hours Per Week	3L : 0T : 0P	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives
This course will enable the students to understand
● Basics of satellites and orbits.
● Tracking and controlling of satellites from earth station.
● GSM standards and basics of Cellular Systems.
● Architecture of GSM.
● 5G standards and specifications.
Pre-Requisites
● Communication principles

Module-1	**(8 hrs)**
Introduction to Satellites: What is a satellite, Evolution of satellites and launch vehicles, Future trends, Definition of orbit and trajectory, Orbiting satellites: Basic principles, Orbital parameters, Types of satellite orbits, Problems on orbital parameters. (**Text Book 1:** 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.5)	
Module-2	**(8 hrs)**
Space and Earth Segment: Satellite subsystems, Tracking Telemetry & Control Subsystem, Payload, Earth station, Types of Earth stations, Earth station architecture, Frequency bands, Basic elements of a satellite communication system, Satellite vs. Terrestrial networks. (**Text Book 1:** 4.1, 4.7, 4.8, 8.1, 8.2, 8.3, 9.3, 9.4, 9.5)	
Module-3	**(8 hrs)**
Global System for Mobile (GSM) overview and Standards: Introduction, OSI model, 1G, 2G, 3G systems, GSM. **(Text Book 2:** 1.1, 1.5, 1.6,1.7, 1.8, 2.3) **Cellular Communications Fundamentals:** Introduction, Cellular Systems. (**Text Book 2:** 4.1, 4.2)	
Module-4	**(8 hrs)**
GSM Architecture: GSM frequency bands, GSM PLMN, Objectives of a GSM PLMN, GSM PLMN services, GSM Subsystems and Entities. (**Text Book 2:** 5.2, 5.3, 5.4, 5.5, 5.6, 5.6.1)	
Module-5	**(8 hrs)**
5G Standards and Specifications: ITU-R and IMT-2020 - Capabilities, Usage Scenarios, Use Cases, Evaluation. **ITU-T and IMT-2020** - Requirements, Network Slicing, Fixed Mobile Convergence, IMT-2020 Core Network Framework. **3GPP** - Releases, Detailed Requirements. (**Text Book 3:** 2.1, 2.2, 2.3)	

Text Books:	
1.	"Satellite Communications", Anil K. Maini and Varsha Agarwal, Wiley, 2010
2.	"Principles and Applications of GSM", Vijay K. Garg and Joseph E. Wilkes, Pearson
3.	"5G Wireless: a Comprehensive Introduction", Dr. William Stallings, Addison-Wesley, 2021

Course Outcome Statements: After the successful completion of the course, the student will be able to	
CO1	Explain the fundamentals of communication system.
CO2	Explain the design principles of communication system.
CO3	Analyze the architecture of satellite, GSM & 5G.
CO4	Analyze the case studies on satellite-based communication.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	-	-	-	2	2	-	2
Avg.	**2**	**1**	-	-	-	-	-	-	**2**	**2**	-	**2**

3: High, 2: Medium, 1: Low

Suggested Activity Based Assessment (ABA) Methods

- Case study on Chandrayana-3 mission
- Case study on Aditya L1 mission