

**COURSE TITLE** : COMMUNICATION SYSTEMS  
**COURSE CODE** : 6042  
**COURSE CATEGORY** : A  
**PERIODS PER WEEK** : 5  
**PERIODS PER SEMESTER** : 75/6  
**CREDITS** : 5

**TIME SCHEDULE**

MODULE	TOPIC	PERIODS
1	Microwave communication	19
2	Satellite communication	19
3	Optical fibre communication	18
4	Mobile communication	19
<b>TOTAL</b>		<b>75</b>

Course General Outcome :

MODULE	GO	On completion of the study of this course the students will be able :
1	1	To understand the working of microwave devices
	2	To understand the function of microwave transmission system
2	3	To understand the satellite communication system
	4	To know the transmission devices in satellite communication system
3	5	To understand fibre optics communication system
	6	To understand the working of fibre optic devices
4	7	To understand mobile communication system
	8	To understand various mobile technologies

*GO - General Outcome*

On completion of the study of this course the students will be able :

**MODULE I MICROWAVE COMMUNICATION**

**1.1.0 To understand the working of microwave devices**

- 1.1.1 To explain the concept of microwave communication
- 1.1.2 To explain the working of reflex klystron, magnetron and TWT
- 1.1.3 To explain the working of gunn diode and tunnel diode
- 1.1.4 To describe the function of wave guides and horn antenna



### **1.2.0 To understand the function of microwave transmission system**

- 1.2.1 To explain the function of microwave transmitter
- 1.2.2 To explain microwave repeater
- 1.2.3 To explain microwave receiver

## **MODULE II SATELLITE COMMUNICATION**

### **2.1.0 To understand the satellite communication system**

- 2.1.1 To explain the principle of satellite communication with block diagram
- 2.1.2 To explain FDMA, TDMA and CDMA
- 2.1.3 To compare FDMA, TDMA and CDMA
- 2.1.4 To write the advantages and disadvantages of FDMA, TDMA and CDMA
- 2.1.5 To describe communication satellite orbit
- 2.1.6 To describe geostationary satellite

### **2.2.0 To know the transmission devices in satellite communication system**

- 2.2.1 To explain various equipments used in satellite earth station
- 2.2.2 To describe dish antenna
- 2.2.3 To list applications of satellite
- 2.2.4 To explain direct-to-home (DTH) satellite television
- 2.2.5 To describe direct broadcast services (DBS)
- 2.2.6 To describe GPS navigation system
- 2.2.7 To describe geographic information system (GIS)

## **MODULE III OPTICAL FIBRE COMMUNICATION**

### **3.1.0 To understand fibre optics communication system**

- 3.1.1 To explain the block diagram of fibre optic communication system
- 3.1.2 To list advantages of fibre optic communication
- 3.1.3 To explain acceptance angle and numerical aperture
- 3.1.4 To explain single mode, multimode and graded index fibres
- 3.1.5 To explain cable losses

### **3.2.0 To understand the working of fibre optic devices**

- 3.2.1 To explain optical sources; LED and Lasers
- 3.2.2 To explain the working of PIN diode and avalanche diodes as optical receivers
- 3.2.3 To explain the application of fibre optics in data communication

## **MODULE IV MOBILE COMMUNICATION**

### **4.1.0 To understand mobile communication system**

- 4.1.1 To write the advantages and applications of mobile communication
- 4.1.2 To explain the concept of cell, frequency reuse
- 4.1.3 To explain the operation of cellular network
- 4.1.4 To explain handoff strategies and channel fading
- 4.1.5 To explain the GSM network architecture

### **4.2.0 To understand various mobile technologies**

- 4.2.1 To describe the GSM standards
- 4.2.2 To explain CDMA technology
- 4.2.3 To compare GSM and CDMA
- 4.2.4 To describe RFID
- 4.2.5 To explain the concept of Wi-Fi
- 4.2.6 To explain Wi-Max
- 4.2.7 To list the features and applications of Wi-Max
- 4.2.8 To compare Wi-Fi and Wi-Max
- 4.2.9 To describe Bluetooth
- 4.2.10 To describe 3G and 4G mobile technologies

## **CONTENT DETAILS**

### **MODULE I Microwave communication**

Introduction to microwave communication - characteristics - frequency bands - transit time effect - microwave devices - reflex klystron - magnetron- TWT - gunn diode - tunnel diode - wave guides - types - horn antennas - microwave transmitter - microwave repeater - receiver

### **MODULE II Satellite communication**

Satellite communication block diagram up-link and down-link transponder - modulation - FDMA, TDMA, CDMA - communication satellite orbits - concepts of geo stationary synchronous satellite - earth station - block diagram explanation of earth station - dish antenna - applications of satellite systems - direct-to-home (DTH) satellite television - direct broadcast services (DBS) - GPS navigation system - geographic information system (GIS)

### **MODULE III Optical fibre communication**

Fiber optic system - block diagram, advantages - optical fibers - refraction, acceptance angle, numerical aperture - single mode vs multimode - grade index fiber, cable losses - optical sources - LED, LASERS - optical detectors - PIN diodes - avalanche diodes - application in data communication

## **MODULE IV Mobile communication**

Mobile communication - advantages - applications - operation of cellular networks - concept of cell, frequency reuse - handoff strategies and channel fading - GSM network architecture - GSM standards - CDMA technology - RFID - concept of Wi-Fi - Wi-Max - features and applications Wi-Fi and Wi-Max comparison - bluetooth - principles of operation - 3G and 4G mobile technologies - comparison

### **Text Book**

1. Microwave Devices & Circuits- Samuel Y. Liao – 3<sup>rd</sup> Edition - PHI
2. Optical Fiber Communication - John Senior - 3<sup>rd</sup> Edition - PHI
3. Wireless Communication - Theodore S. Rappaport – 2<sup>nd</sup> Edition - PHI
4. Mobile communication - Jochen Schiller – Pearson

### **Reference**

1. Electronic communication systems - George Kennedy, Robert J Schoenbeck
2. Electronic communication - Roy Blake - 2nd Edition - Thomson and Delmar
3. Satellite Communication - Roddy
4. Satellite Communication - Timothy Pratt
5. Fiber-Optic Communication Systems- 3<sup>rd</sup> Edition – Govind P. Agrawal - Wiley
6. Mobile and personal communication systems and service - Raj Pandya