

**DR VS KRISHNA GOVERNMENT DEGREE COLLEGE VISAKHAPATNAM**  
**B.Sc. PHYSICS SYLLABUS UNDER CBCS**  
**III Year BSC Physics: V Semester**  
**ELECTIVE EA-3 : COMMUNICATION ELECTRONICS**  
**( (Elective), Credits: 04)**

**Work load: 60 hrs per semester**

**4 hrs/week**

**COURSE OBJECTIVES:**

- This paper aims to describe the concepts of electronics in communication and communication techniques based on Analog Modulation, Analog and digital Pulse Modulation.
- Communication and Navigation systems such as GPS and mobile telephony system are also introduced.
- This paper will essentially connect the text book knowledge with the most popular communication technology in real world.

**COURSE LEARNING OUTCOME :**

At the end of the course the student is expected to have an idea/concept of the following,

- Electromagnetic spectra and different frequency bands.
- Modulation, different types of modulation and about super heterodyne receivers.
- Concept of sampling, sampling theorem and multiplexing.
- Digital transmission, encoding and decoding.
- Satellite communication including uplinking and downlinking.
- Mobile communication/telephony and concepts of cell telephony.
- 2G, 3G, 4G and 5G (Quantitative).
- Apply the theory that they have learned in the theory class to gain hands on experience in building modulation and demodulation circuits; Transmitters and Receivers for AM and FM. Also to construct TDM, PAM, PWM, PPM and ASK, PSK and FSK modulator and verify their results.

**BROAD CONTENTS OF THE COURSE:**

- Electromagnetic spectra and different frequency bands.
- Modulation, different types of modulation and super heterodyne receivers.
- Sampling, sampling theorem and multiplexing.
- Digital transmission, encoding and decoding.
- Satellite communication
- Mobile communication/telephony and concepts of cell telephony.
- 2G, 3G, 4G and 5G (Quantitative).



### SKILLS TO BE LEARNED:

- Learn the skills to understand the basic concepts of communication.
- Learn the techniques of different types of modulation of electromagnetic signals like
  - Amplitude Modulation
  - Frequency Modulation
  - Phase Modulation
  - Analog Pulse Modulation Digital Pulse Modulation
- Learn basics of satellite communication.
- Learn concepts and application of mobile telephony system.

**DR VS KRISHNA GOVERNMENT DEGREE COLLEGE VISAKHAPATNAM**  
**B.Sc. PHYSICS SYLLABUS UNDER CBCS**  
**III Year BSC Physics: V Semester**  
**ELECTIVE EA-3 : COMMUNICATION ELECTRONICS**  
**( (Elective), Credits: 04)**

**Work load: 60 hrs per semester**

**4 hrs/week**

### DETAILED CONTENTS OF THE COURSE:

#### UNIT-I

**Introduction to communication** – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio. **(8 Lectures)**

---

#### UNIT-II

**Analog Modulation:** Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver. **(12 Lectures)**

---

#### UNIT-III

**Analog Pulse Modulation:** Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing. **(7 Lectures)**

**Digital Pulse Modulation:** Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK). **(8 Lectures)**



#### UNIT-IV

**Mobile Telephony System** – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only).

(7 Lectures)

#### UNIT-V

**Satellite Communication**– Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink. (8 Lectures)

GPS navigation system (qualitative idea only)

#### REFERENCE BOOKS:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
3. Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.
4. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
5. Communication Systems, S. Haykin, 2006, Wiley India
6. Electronic Communication system, Blake, Cengage, 5th edition.
7. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press.