

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**B.Sc. III Year - Electronics – Semester – V**

w.e.f. 2017-18 ADMITTED BATCH

**PAPER – 6 [Code: EL6202]**

**ELECTRONIC COMMUNICATION SYSTEMS**

**3 Hours/Week [Total: 45 hrs]**

**Credits: 3**

### **Course Learning Outcomes**

The subject aims:

- This course provides a thorough introduction to the basic principles and techniques used in analog and digital communications.
- The course will introduce analog and digital modulation techniques.
- Communication receiver and transmitter design, baseband and band pass communication techniques, line coding techniques, noise analysis, and multiplexing techniques.
- The course also introduces analytical techniques to evaluate the performance of communication systems.

### **Learning Outcomes:**

Students will be able to:

- The student can gain good knowledge on analog and digital communication.
- Understand basic elements of a communication system.
- Conduct analysis of baseband signals in time domain and in frequency domain.
- Demonstrate understanding of various analog and digital modulation and demodulation techniques techniques.
- Analyse the performance of modulation and demodulation techniques in various transmission environments

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**Syllabus**

**UNIT –I (12Hrs)**

**MODULATION:**

**Amplitude modulation:** Need for modulation, amplitude modulation-frequency spectrum of AM wave, representation of AM, power relations in the AM wave. Generation of AM – Diode modulators. Suppression of carrier, suppression of one side band- phase shift method.

**Frequency modulation:** Theory of FM, frequency spectrum of FM wave, narrow band FM, wide band FM, power contents of the carrier and sidebands, Generation of FM signals.

**UNIT –III (7Hrs)**

**Basic receiver circuits:**

Super heterodyne Receiver block diagram, FM receiver, discriminators- slope, and balanced slope & Ratio detector

**UNIT –IV (10Hrs)**

**Radio wave propagation:** Communication bands, Electromagnetic waves - properties and applications.

**Pulse modulation:** Introduction, Sampling theorem, PAM, PWM, PPM.

**UNIT –V (8Hrs)**

**Digital Communications:**

Advantages of digital over analog communications. Advantages of shift keying over digital communication, Types of shift keying, ASK ,FSK.

**Unit VI ( 8 Hrs)**

**Cellular Mobile Communications:**

Basic concept, frequency bands, SIM number, IMEI number, need for data encryption, block diagram of mobile communication network, idea of GSM, CDMA, and Technologies

**TEXT BOOKS:**

1. Electronic Communications - George Kennedy
2. Antennas and Wave Propagation – G.S.N.Raju – PHI
3. Principles of communication system –Herbert Taub & D.L.Schilling

**REFERENCES:**

1. Electronic Communications – Roody & Colen
  2. Communication Systems – Hayken --- 4th Edition
  3. Advance Electronic communication system ---Tomasi wayne
  4. Modern digital and analog communication system –B.P.lathi
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**Model Question Paper**

**Note:** - Set the question paper as per the blue print given at the end of this model paper.

TIME: 2 1/2 Hrs

Max Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6 x 5 M = 30M
Total	14	9	60M

**Blue Print**

Chapter Name	Essay Questions 10 marks	Short Questions 5 marks	Programs 5 marks	Marks allotted
Modulation-I	1	1	2	25
Basic receiver circuits	1	1	---	15
Radio wave propagation	1	2	---	20
Digital communications	1	1	---	15
Cellular mobile communications	1	2	---	20
<b>Total Marks</b>				95

**SEM-V                      PAPER – 6**  
**ELECTRONIC COMMUNICATION SYSTEMS**  
**QUESTION BANK**  
**ESSAY QUESTIONS**

**UNIT-I**

1. Define amplitude modulation. Derive the voltage equation of an AM wave. What are side band frequencies?
2. Explain the need for modulation. Discuss the frequency spectrum of AM wave. Explain the working of a diode modulator.
3. Draw and explain Diode modulators and power relations in the AM wave.
4. Draw and explain Theory of FM, frequency spectrum of FM wave.

**UNIT-II**

5. Draw and explain Superheterodyne Receiver block diagram.
6. Draw and explain FM receiver.

**UNIT-III**

7. Explain Electromagnetic waves, properties and applications.
8. Derive the Sampling theorem.
9. Draw and explain PAM and PWM.
10. Draw and explain PWM and PPM.

**UNIT-IV**

11. Draw and explain Amplitude Shift Keying.
12. Draw and explain Frequency Shift Keying.

**UNIT-IV**

13. Draw and explain the block diagram of mobile communication network.
14. What is the concept of communication and explain the GSM.
15. What is concept of communication and explain CDMA Technologies.

**SHORT ANSWER TYPE QUESTIONS**

**UNIT-I**

16. Explain Need for modulation.
17. Explain Suppression of carrier.
18. Explain power contents of the carrier and sidebands,
19. Give brief explanation of Generation of FM signals.
20. Explain narrow band FM, wide band FM.
21. Draw and explain suppression of one side band- phase shift method.

**UNIT-II**

22. Explain slope, and balanced slope.
23. Explain Ratio detector.

### UNIT-III

24. Explain Communication bands
25. Explain PAM.
26. Explain PPM.
27. Explain PWM.

### UNIT-IV

28. Write the advantages of digital over analog communications.
29. Write the advantages of shift keying over digital communication.

### UNIT-V

30. Explain the frequency bands,
31. Explain the SIM number.
32. Explain the IMEI number.
33. Explain the need for data encryption.

### PROBLEMS

34. An AM wave is represented by the expression  $(e_c)_{AM} = 7.5 (1 + 0.6 \cos 6280 t) \cos (10^6 \pi t)$  V Calculate the maximum and minimum amplitude of AM wave.
35. The antenna current of an AM transmitter is 8 A when only the carrier is sent but it increases to 8.93 A when the carrier is modulated. Find percent modulation.
36. The load current in the transmitting antenna of an unmodulated AM transmitter is 6amp. What will be the antenna current when modulation is 60%?
37. A carrier wave of 1000W is subjected to 100% modulation. Calculate:
  - (1) Power of modulated wave
  - (2) Power in USB
  - (3) Power in LSB
38. In an amplitude modulated wave, the audio signal and carrier signal are given by  $20 \sin 2\pi (1500t)$  and  $100 \sin 2\pi (10^5t)$ . Find the frequencies of signal and carrier wave and Percentage modulation.