

Dr. V S KRISHNA GOVERNMENT DEGREE COLLEGE  
VISAKHAPATNAM

B.Sc. PHYSICS SYLLABUS UNDER CBCS

[2023-24 Batch onwards]

Course Code: 23(ELE)M31

II Year B.Sc (Hons.)-ELECTRONICS

SEMESTER-III

**COURSE 5: SEMICONDUCTOR DEVICES AND MATERIALS**

Theory

Credits: 3

3 hrs/week

**Course Objective:**

1. To provide basic knowledge and concepts of Semiconductor materials and devices.
2. To facilitate students learn on the physical principles and operational characteristics of Semiconductor devices and some of its important applications. Pre-requisites: Basic understanding of semiconductors.

**Course Outcomes:**

- Ability to apply basic concepts of Inorganic and Organic Semiconductor materials for electronic device application in modern electronic industry.
- Detailed knowledge of various classifications and applications to VLSI, LEDs and solar cells.
- Holistic view of the latest progress in two-dimensional (2D)-one-dimensional (1D) and nano materials.
- Emphasis on nano-electronic applications such as Schottky barrier transistors, flexible Electronics.

**Unit I:**

**INORGANIC AND ORGANIC SEMICONDUCTOR:** Energy bands, carrier transport, mobility, drift- diffusivity, excess carrier, injection and recombination of the excess carriers, carrier statistics; High field effects: velocity saturation, hot carriers and avalanche breakdown.

**Unit II:**

**MAJORITY CARRIER DEVICES:** MS contacts rectifier and non-rectifier, MIS structures, MESFET, hetero-junction, HEMT and band diagrams, I-V and C-V characteristics.

**Unit III:**

**MOS STRUCTURES: SEMICONDUCTOR SURFACES;** The ideal and non-ideal MOS capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states. MOSFET: Structures and Device Characteristics, Short-Channel effects. Charge coupled Devices (CCDs), application to VLSI.

#### **Unit IV:**

**NONVOLATILE MEMORY DEVICE.** Optoelectronic Devices: solar cell, photo detectors, LEDs, laser diodes. Nano structures and concepts: quantum wells, supper lattice structures, nanorod, quantum dot, CNTs, 2D materials: grapheme, BN, MoS<sub>2</sub> etc, matamaterials.

#### **UNIT-V:**

**MULTISTAGE AMPLIFIERS:** BJT at high frequencies, frequency response of RC coupled amplifiers and transformer coupled amplifier.

#### **Reference Books:**

1. Donald A. Neamen, Semiconductor Physics and Devices Basic Principles, 3<sup>rd</sup>edn. McGraw-Hil (2003)
2. B.G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6<sup>th</sup>Edn., Prentice Hall, 2006.
3. S. M. Sze and Kwok K. Ng Physics of Semiconductor Devices, Wiley (2013).
4. M. Hussa, A. Dimoulas and A. Molle, 2D Materials for NanoElectronics, CRC press (2016)
5. M.S.Tyagi, Introduction to Semiconductor Materials and Devices, Willey, Student Edition

Course Code: 23(ELE)M31P

**SEMESTER-III**

**COURSE 5: SEMICONDUCTOR DEVICES AND MATERIALS**

Practical

Credits: 1

2 hrs/week

List of Experiments

1. To study the Hall Effect: determine the Hall coefficient, type of semiconductor and carrier concentration in the given semiconductor sample.
2. To study the four probe method: calculate the resistivity and energy band gap of given semiconductor sample.
3. To determine the resistivity of the given semiconductor specimen using Vander Pauw method.
4. To design a MOSFET as switching regulator for given duty cycle and plot the current- voltage (I-V) characteristic of MOSFET using Keithley.
5. To design a phase controlled rectifier using SCR and plot the I-V characteristic of SCR using Keithley.
6. To design a relaxation oscillator using UJT and plot the I-V characteristic of UJT using Keithley.
7. I-V characteristics measurement of a p-n diode/LEDs using Keithley - calculate its ideality factor.

**Dr V.S.Krishna Govt. Degree College(A),  
Visakhapatnam 2023-2024**

**Course Code: 23(ELE)M31**

**BLUE PRINT (:: SEMICONDUCTOR DEVICES AND MATERIALS)**

**IIB.Sc. (Hons.) Electronics- SEM-III/Course : 5**

**Max Marks-75**

**Time-3Hrs. Credits:3**

|       |      | TOPIC                                        | SECTION-A                      | SECTION-B                    |                |
|-------|------|----------------------------------------------|--------------------------------|------------------------------|----------------|
| S.No. | UNIT |                                              | ESSAY<br>QUESTIONS<br>10 MARKS | SHORT<br>QUESTIONS<br>5MARKS | TOTAL<br>MARKS |
| 1.    | I    | INORGANIC AND<br>ORGANIC<br>SEMICONDUCTOR:   | 2                              | 2                            | 30             |
| 2.    | II   | MAJORITY<br>CARRIER DEVICES                  | 2                              | 2                            | 30             |
| 3.    | III  | MOS STRUCTURES:<br>SEMICONDUCTOR<br>SURFACES | 2                              | 2                            | 30             |
| 4.    | IV   | NONVOLATILE<br>MEMORY DEVICE                 | 2                              | 2                            | 30             |
| 5.    | V    | MULTISTAGE<br>AMPLIFIERS                     | 2                              | 2                            | 30             |
| 6.    |      | TOTAL QUESTIONS                              | 10                             | 10                           | 150            |

[Note: Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 8 marks either in Section-A or Section-B covering all the five units in the syllabus]

**Dr. V S KRISHNA GOVERNMENT DEGREE COLLEGE (A)**  
**VISAKHAPATNAM**

**B.Sc. PHYSICS SEMESTER END EXAMINATION**

**[2023-24 Batch onwards]**

**Course Code: 23(ELE)M31**

**II Year B.Sc (Hons.)-ELECTRONICS**

**SEMESTER-III COURSE 5: SEMICONDUCTOR DEVICES AND MATERIALS**

**Time: 3 hrs.**

**Maxmarks:60**

**SECTION – A**

**Answer all Questions of the following**

**[5 X 8 = 40 ]**

1. a)  
[OR]  
b)
2. a)  
[OR]  
b)
3. a)  
[OR]  
b)
4. a)  
[OR]  
b)
5. a)  
[OR]  
b)

**SECTION – B**

**Answer any FIVE Questions of the following**

**[5 X 4 = 20 ]**

6. a)
7. a)
8. a)
9. a)
10. a)
11. a)
12. a)
13. a)
14. a)
15. a)

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**Dr. V. S. Krishna. Government Degree College (A), Visakhapatnam**

**Programme: B.Sc. Honours in Electronics (Major)**

w.e.f. A.Y. 2023-24

**COURSE STRUCTURE**

**II Year: Semester-III**

**23ELEM32: DIGITAL ELECTRONICS**

Theory

Credits: 3

3 Hrs/Week

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**Course Objectives:** The course on Digital Electronics aims to provide a basic understanding of the principles of Number systems, Combinational and sequential digital circuits as well as Memory devices.

**LEARNING OUTCOMES:**

On successful completion of this course, the students will be able to:

- ❖ To understand the number systems, Binary codes and Complements.
- ❖ To understand the Boolean algebra and simplification of Boolean expressions.
- ❖ To analyze logic processes and implement logical operations using combinational logic circuits.
- ❖ To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines.
- ❖ To understand characteristics of memory and their classification.
- ❖ To implement combinational and sequential circuits using VHDL.

**Unit – I**

**NUMBER SYSTEM AND CODES:** Decimal, Binary, Hexadecimal, Octal. Codes: BCD, Gray and Excess-3 codes- code conversions- Complements (1's, 2's, 9's and 10's), Addition - Subtraction using complement methods.

**Unit- II**

**BOOLEAN ALGEBRA AND THEOREMS:** Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi-level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 2,3 variables).

### Unit-III

**COMBINATIONAL DIGITAL CIRCUITS:** Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1) and Demultiplexers (1:4), Encoder (8- line-to-3- line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic, CMOS Logic families (NAND&NOR Gates).

### UNIT-IV

**SEQUENTIAL DIGITAL CIRCUITS:** Flip Flops: S-R FF, J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers: - Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-, Mod-8, Mod- 10, Synchronous-4-bit & Ring counter.

### UNIT-V

**MEMORY DEVICES:** General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM.

### TEXT BOOKS:

1. M. Morris Mano, "Digital Design" 3<sup>rd</sup> Edition, PHI, New Delhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. G.K. Kharate-Digital electronics-oxford university press
4. S. Salivahana & S. Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

### Reference Books:

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics". McGraw Hill. 1985.
2. S.K. Bose. "Digital Systems". 2/e. New Age International. 1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals & Applications". TMH. 1994.
4. Malvino and Leach. "Digital Principles and Applications". TMG Hill Edition.

### Outcomes: -

- ❖ Develop a digital logic and apply it to solve real life problems.
- ❖ Analyze, design and implement combinational logic circuits.

- ❖ Classify different semiconductor memories.
- ❖ Analyze, design and implement sequential logic circuits.
- ❖ Simulate and implement combinational and sequential logic circuits using VHDL.

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### **SEMESTER-III**

#### **23ELEM32P: DIGITAL ELECTRONICS Practical Course**

Practical

Credits: 1

2 hrs/week

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#### **LAB LIST:**

1. Verification of IC-logic gates.
2. Realization of basic gates using discrete components (resistor, diodes & transistor).
3. Realization of basic gates using Universal gates (NAND & NOR gates).
4. Verify Half adder and full adder using gates.
5. Verify Half subtractor and full subtractor using gates.
6. Verify the truth table Multiplexer and demultiplexer.
7. Verify the truth table Encoder and decoder.
8. Verify the truth table of RS, JK, T-F/F using NAND gates.
9. 4-bit binary parallel adder and subtractor using IC 7483.
10. BCD to Seven Segment Decoder using IC -7447/7448.



**Dr. V. S. Krishna Govt. Degree College (Autonomous)**

**Visakhapatnam-13**

(Affiliated To Andhra University, Visakhapatnam)

**BLUE PRINT FOR SEMESTER END EXAMINATIONS PAPER SETTING**

**SEMESTER – III (II Year)**

**Programme : B.Sc. Honours in Electronics (Major)**

**Course Title : Digital Electronics**

**Course Code : 23ELEM32**

| <b>Learning level wise Weightage</b> |                  |              |                   |                          |
|--------------------------------------|------------------|--------------|-------------------|--------------------------|
| <b>Bloom's Taxonomy level</b>        | <b>Weightage</b> | <b>Marks</b> | <b>Essay type</b> | <b>Short answer type</b> |
| <b>Knowledge/ Remember</b>           | 33 %             | 20           | 2                 | 1 (One out of two)       |
| <b>Understanding/ Comprehension</b>  | 27 %             | 16           | 2                 |                          |
| <b>Application</b>                   | 20 %             | 12           | 1                 | 1 (One out of two)       |
| <b>Analysis</b>                      | 13 %             | 8            |                   | 2 (Two out of four)      |
| <b>Synthesis/ Evaluate</b>           | 7 %              | 4            |                   | 1 (One out of two)       |
| <b>Total</b>                         | 100 %            | 60           |                   | 5 Out of 10 questions    |

| <b>Chapter wise Weightage</b> |                     |                                |                    |                |
|-------------------------------|---------------------|--------------------------------|--------------------|----------------|
| <b>S. No.</b>                 | <b>Module/ Unit</b> | <b>Name of the chapter</b>     | <b>8 Marks</b>     | <b>4 Marks</b> |
| 1                             | Unit – I            | NUMBER SYSTEM AND CODES        | 2 (One out of two) | 2              |
| 2                             | Unit – II           | BOOLEAN ALGEBRA AND THEOREMS   | 2 (One out of two) | 2              |
| 3                             | Unit – III          | COMBINATIONAL DIGITAL CIRCUITS | 2 (One out of two) | 2              |
| 4                             | Unit – IV           | SEQUENTIAL DIGITAL CIRCUITS    | 2 (One out of two) | 2              |
| 5                             | Unit – V            | MEMORY DEVICES                 | 2 (One out of two) | 2              |



Dr. V. S. Krishna Govt. Degree College (Autonomous)

Visakhapatnam-13

(Affiliated To Andhra University, Visakhapatnam)

**SEMESTER END EXAMINATIONS MODEL PAPER**

**SEMESTER – III (II Year)**

**Programme : B.Sc. Honours in Electronics (Major)**  
**Course Title : Digital Electronics**  
**Course code : 23ELEM32**

Time: 3 Hrs

Max. Marks: 60

**PART- A**

Answer any **five** of the following questions. Each question carries **Four** marks.

5 x 4 = 20 Marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**PART- B**

Answer **all the following** questions. Each question carries **Eight** marks

5 x 8 = 40 Marks

11. (a)

(Or)

(b)

12. (a)

(Or)

(b)

13. (a)

(Or)

(b)

14. (a)

(Or)

(b)

15. (a)

(Or)

(b)

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**District Resource Center and Centre for Research Studies**

**Maddilapalem, VISAKHAPATNAM 530013, Andhra Pradesh**

**Programme: B.Sc. Honours in Electronics (Major)**

**w.e.f. AY 2023-24**

**SEMESTER-III COURSE CODE: 23ELEM33: ANALOG ELECTRONICS**

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Theory      Credits:4      5hrs/week

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## **COURSE OBJECTIVES**

- a. The design and working of RC coupled amplifiers, transformer coupled amplifiers and power amplifiers,
- b. The concept of negative and positive feedback, pulse shaping and Schmitt trigger, and the op-amp characteristics, frequency response and its linear and non-linear applications.

## **UNIT-I**

Amplifiers: General principles of small signal amplifiers - Classifications - RC Coupled amplifiers - Gain - Frequency response - Input and output impedance - Multistage amplifiers - Transformer coupled amplifiers - Equivalent circuits at low, medium and high frequencies – Emitter follower.

Class A and Class B power amplifiers - Single ended and push-pull configurations - Power dissipation and output power calculations.

## **UNIT-II**

Feedback Amplifiers: Basic concept of feedback amplifiers - Transfer gain with feedback - General characteristics of negative feedback amplifier - Effect of negative feedback on gain - Gain stability - Distortion and bandwidth - Input and output resistance in the case of various types of feedback - Analysis of voltage and current in feedback amplifier circuits.

### UNIT-III

Operational Amplifiers: Principles - Transfer characteristics - Various offset parameters - Differential gain - CMRR - Slew rate – Bandwidth

### UNIT-IV

Op-amp Circuits: Basic operational amplifier circuits under inverting and non-inverting modes - Adder - Subtractor - Integrator - Differentiator - Comparator - Sine, square and triangular waveform generators - Active filters - Sample and Hold circuits.

### UNIT-V

Oscillators: Positive feedback - Stability issues - Feedback requirement of oscillations - Barkhausen criterion for oscillation - Hartley, Colpitts, Phase shift and Wien bridge oscillators - Condition for oscillation and frequency derivation - Crystal oscillator - UJT relaxation oscillator. Monostable, bistable and astable multivibrators - Schmitt trigger.

#### Text Books

1. Introduction to Integrated Electronics - V. Vijayendran, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2005.
2. Electronic Circuits and Systems - Y.N. Bapat, Tata McGraw Hill Publishing Co. Ltd.

#### Reference Books

1. Electronic Devices and Circuits - G.K. Mithal, Khanna Publishers, Delhi.
2. Hand Book of Electronics - Gupta & Kumar, PragatiPrakashan, Meerut.
3. Electronic Devices and Circuit Theory - R. Boylestad & L. Nashelsky, Prentice Hall of India Private Limited, 6/e.

4.                      Electronic Devices                      and Circuits - *J.P. Agarwal & Amit Agarwal*,  
Prakasam Publishers.
5.                      Linear Integrated Circuits - *D. Roy Choudhury & Shail Jain*, New Age  
International (P) Limited.

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**Maddilapalem, VISAKHAPATNAM 530013, Andhra Pradesh**

**Programme: B.Sc. Honours in Electronics (Major)**

**w.e.f. AY 2023-24**

**SEMESTER-III COURSE CODE: 23ELEM33: ANALOG ELECTRONICS**

**BLUE PRINT**

**Max Marks-60 Time-3Hrs. Credits:4**

**Learning level wise Weightage**

| <b>Bloom's<br/>Taxonomy level</b>       | <b>Weightage</b> | <b>Marks</b> | <b>Essay type</b>                                       | <b>Short answer<br/>type</b>      |
|-----------------------------------------|------------------|--------------|---------------------------------------------------------|-----------------------------------|
| <b>Knowledge/<br/>Remember</b>          | <b>33%</b>       | <b>20</b>    | <b>2(two out of<br/>four)</b>                           | <b>1(one out of<br/>two)</b>      |
| <b>Understanding/<br/>Comprehension</b> | <b>27%</b>       | <b>16</b>    | <b>2(two out of<br/>four)</b>                           |                                   |
| <b>Application</b>                      | <b>20%</b>       | <b>12</b>    | <b>1(one out of<br/>two)</b>                            | <b>1(one out of<br/>two)</b>      |
| <b>Analysis</b>                         | <b>13%</b>       | <b>8</b>     |                                                         | <b>2(two out of<br/>four)</b>     |
| <b>Synthesis/<br/>Evaluate</b>          | <b>7%</b>        | <b>4</b>     |                                                         | <b>1(one out of<br/>two)</b>      |
| <b>Total</b>                            | <b>100</b>       | <b>60</b>    | <b>5(each<br/>question has<br/>internal<br/>choice)</b> | <b>5 outb of 10<br/>questions</b> |

## Chapter wise Weightage

| S.No     | Module/<br>Chapter | Name of the chapter    | 8 marks                                     | 4 marks                  |
|----------|--------------------|------------------------|---------------------------------------------|--------------------------|
| <b>1</b> | <b>I</b>           | Amplifiers             | <b>2(one out of two)</b>                    | <b>2</b>                 |
| <b>2</b> | <b>II</b>          | Feedback Amplifiers    | <b>2(one out of two)</b>                    | <b>2</b>                 |
| <b>3</b> | <b>III</b>         | Operational Amplifiers | <b>2(one out of two)</b>                    | <b>2</b>                 |
| <b>4</b> | <b>IV</b>          | Op-amp Circuits        | <b>2(one out of two)</b>                    | <b>2</b>                 |
| <b>5</b> | <b>V</b>           | Oscillators            | <b>2(one out of two)</b>                    | <b>2</b>                 |
|          |                    | <b>TOTAL QUESTIONS</b> | <b>5(each question has internal choice)</b> | <b>5 out of given 10</b> |

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**Programme: B.Sc. Honours in Electronics (Major)**  
**w.e.f. AY 2023-24**  
**SEMESTER-III COURSE CODE: 23ELEM33: ANALOG ELECTRONICS**

**(MODEL PAPER )**

**DURATION::3 hrsMAX.MARKS :: 60**

**SECTION-A**

**Answer any FIVE questions of the following**

**(5 X 4 = 20 M)**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

SECTION-B

Answer ALL the questions Of the following

(5 X 8 = 40 M)

11. (a)

[OR]

(b)

12 (a)

[OR]

(b)

13(a)

[OR]

(b)

14 (a)

[OR]

(b)

15 (a)

[OR]

(b)



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Maddilapalem, VISAKHAPATNAM 530 013, Andhra Pradesh  
(COURSE CODE: 23ELEM34)



**Dr. VS KRISHNA GOVT. DEGREE COLLEGE (A), VISHAKAPATNAM**

**BLUE PRINT**

**Programme: B.Sc. Honours in Electronics (Major) -2023-2024**

**SEMESTER-III**

**COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS**

**MAX MARKS – 60**

**TIME – 3 HOURS**

**(CREDITS- 3)**

| S.NO | UNIT | TOPIC    | ESSAY TYPE<br>QUESTIONS<br>(SECTION-A)<br>Each one<br>8 marks | SHORT<br>ANSWER<br>QUESTIONS<br>(SECTION-B)<br>Each one<br>4 marks |
|------|------|----------|---------------------------------------------------------------|--------------------------------------------------------------------|
| 1    | I    | UNIT-I   | 1                                                             | 2                                                                  |
| 2    | II   | UNIT-II  | 1                                                             | 2                                                                  |
| 3    | III  | UNIT-III | 1                                                             | 2                                                                  |
| 4    | IV   | UNIT-IV  | 1                                                             | 2                                                                  |
| 5    | V    | UNIT-V   | 1                                                             | 2                                                                  |
|      |      |          | 5<br>(internal<br>choice)                                     | 5<br>(five to be<br>answered<br>out of ten<br>questions)           |

$$\text{Percentage of choice} = \frac{120 - 60}{120} \times 100 = 50\%$$

**Note: one numerical problem should be given in section-A**



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District Resource Centre & Center For Research Studies  
Maddilapalem, VISAKHAPATNAM 530 013, Andhra Pradesh



**(COURSE CODE: 23ELEM34)**

**Programme: B.Sc. Honours in Electronics (Major)**

## **SEMESTER-III**

### **COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS**

Theory

Credits: 3

3 hrs/week

The students will learn:

- a. fundamentals of antenna, their characteristics and types,
- b. amplitude modulation and demodulation and radio wave transmission and reception,
- c. frequency modulation and demodulation and FM radio wave transmission and reception,
- d. Principle of analogue and digital pulse modulation and their applications,
- e. Transmission and detection of digital signals.

#### **UNIT-I**

Antenna - Effective resistance - Efficiency - Directive gain - Bandwidth, Beam width and polarization - Dipole - Folded dipole - Arrays - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas - Ground wave, sky wave and space wave propagation - Skip distance - Maximum usable frequency.

#### **UNIT-II**

Modulation - Needs for Modulation - Types of Modulation - Amplitude Modulation - Generation and detections circuits - Balanced Modulator - DSB/SC and SSB Modulation - VSB modulation. Block diagram of AM Radio transmitter and super heterodyne Receiver.

#### **UNIT-III**

Frequency Modulation - Definition - Derivation of Modulated wave - Generation of FM - Varactor diode and Reactance tube Modulators - Detectors - Balanced slope detector, Foster Seeley discriminator, and ratio detector - Block diagram of FM transmitter and receiver.



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District Resource Centre & Center for Research Studies  
Maddilapalem, VISAKHAPATNAM 530 013, Andhra Pradesh



**(COURSE CODE: 23ELEM34)**

## **UNIT-IV**

Pulse Modulation - Sampling theorem - PAM, PWM, , PCM - quantizing, sampling, coding, decoding, quantization error, delta modulation and adaptive delta modulation.

## **UNIT-V**

Multiplexing - FDM, TDM, CDMA - ASK, FSK, PSK –Advantages of  
Digital Communication - Introduction to Microwave, Fiber optic, Satellite  
Communications  
- RADAR - range equation.

## **Text Books**

1. Electronic Communication Systems - *George Kennedy*, McGraw Hill Book Company, 4/e, 2005.
2. Communication Engineering - *T.G. Palanivelu*, Anuradha Publications, 1/e, 2002.

## **Reference Books:**

1. Communication System - *Roddy & Coolen*, 4/e, Pearson Education, 2005.
2. Principles of Communication Engineering - *Anok Singh*, 4/e, Sathyaprakasam Publications, 2004.
3. Electronic Communication Systems *Wayne Tomasi*, 4/e, Pearson Education, 2004.



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**(COURSE CODE: 23ELEM34)**

**Programme: B.Sc. Honours in Electronics (Major) -2023-2024**

**SEMESTER-III**

**COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS**

**(COURSE CODE: 23ELEM34)**

Theory

Credits: 3

3 hrs/week

**Model Paper**

**Max Marks: 60**

**Section A**

**Answer any five questions from the following ( $4M \times 5 = 20M$ )**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Section B**

**Answer all the questions ( $8M \times 5 = 40M$ )**

11. (A)

(OR)

(B)

12. (A)

(OR)

(B)

13. (A)

(OR)

(B)

14. (A)

(OR)

(B)

15. (A)

(OR)

(B)