



S.R.R. & C.V.R. GOVT. DEGREE COLLEGE (A)

VIJAYAWADA, N.T.R. DT.

(NAAC Accredited with 'A' Grade-IV Cycle)

AFFILIATED TO KRISHNA UNIVERSITY, MACHILIPATNAM

DEPARTMENT OF PHYSICS & ELECTRONICS

ADMITTED BATCHES FROM THE ACADEMIC YEAR 2025-26

Composition of the Board Of Studies (BoS) of ELECTRONICS as Per UGC Guidelines

Members of Board of studies

Members of the Board of Studies of Department of Electronics met on 18 -09-2025 at 2.00 PM in the Department of Physics & Electronics staff room.

S.No	Name of the faculty	Designation
1	Smt.P.Sailaja, In- Charge, Department of Physics & Electronics SRR & CVR GDC (A), Vijayawada	Board of studies chairperson
2	Dr.Ch.Srinivasa Rao, Andhra Loyola College (A), Vijayawada	University Nominee
3	Sri T.V.Rambabu, Lecturer in Physics SCIM GDC, Jangareddygudem, Eluru Dist. Mob:9490823654	Subject Expert
4	Dr.P. Gopi Krishna, Asst. Professor, Dept of ECM K.L. Education Foundation, Vaddeswaram, Guntur Ph:9963696066	Subject Expert
5	N. Vara Prasad, CEO, ARETE IT Services Pvt. Ltd Mob:8885591199	Industrialist
6	T.Pujitha, M.Sc Mob:7799467493	Alumni
7	1. Smt. T.V.Vakula Priya, Lecturer in Physics& Electronics 2. Dr. J.Nageswara Rao , Lecturer in Physics& Electronics 3. Dr. A. Asirvadam, Lecturer in Physics& Electronics 4. Sri.T.Devender Reddy, Lecturer in Physics& Electronics 5. Sri G.V.Gangadhara Rao, Lecturer in Physics& Electronics 6. Smt. Sk.Jubeda, Lecturer in Physics& Electronics 7. Smt.S.Kiranmayi, Lecturer in Physics& Electronics	Members of the Department
8	1. Ch. Keerthesh III B.Sc Electronics (Honours) 2. I. Harshitha Sri II B.Sc Electronics (Honours)	Students



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DEPARTMENT OF PHYSICS & ELECTRONICS

ADMITTED BATCHES FROM THE ACADEMIC YEAR 2025-26

Members of the Board of Studies of Department of Electronics met on 18 -09-2025 at 2.00 PM in the Department of Physics & Electronics staff room Under chairmanship of Smt. P.Sailaja, In-charge of the Department, with the following agenda.

AGENDA:

1. Review of minutes of BOS.
2. To apprise and approve Departmental Vision and mission.
3. To discuss and approve curriculum structure suggested by APSCHE and from feedback of students and different stakeholders with modifications not exceeding 20% on demand of local needs and to be implemented from the year 2025-26, admitted batches from the academic year 2025-26.
4. To approve blue print and Model Question paper for theory and practical examinations.
5. Review of evaluation of Internal and External Examinations.
6. To Suggest Methodologies and innovative teaching practices.
7. To discuss and approve panel of Examiners.
8. To suggest and approve student study projects, Extension activities curricular, co-curricular activities and to discuss about certificate course.
9. Any other with the permission of the chairperson.

**Model Syllabus for 4-Year UG Honors in B.Sc. (Electronics) as Major in consonance
with Curriculum framework w.e.f. AY 2025-26**

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
		2	Circuit theory and Electronic Devices	3	3
			Circuit theory and Electronic Devices Practical Course	2	1
	II	3	Semiconductor Devices and Materials	3	3
			Semiconductor Devices and Materials Practical Course	2	1
		4	Digital Electronics	3	3
			Digital Electronics Practical Course	2	1
II	III	5	Analog Circuits and Communication	3	3
			Analog Circuits and Communication Practical Course	2	1
		6	Microprocessor System	3	3
			Microprocessor System Practical Course	2	1
		7	Electrical and Electronics Instrumentation	3	3
			Electrical and Electronics Instrumentation Practical Course	2	1
	IV	8	Electronic Communication System	3	3
			Electronic Communication System Practical Course	2	1
		9	Microcontroller and Interfacing	3	3
			Microcontroller and Interfacing Practical Course	2	1
		10	Computer Network	3	3
			Computer Network Practical Course	2	1
III	V	11	Cellular Mobile Communication	3	3
			Cellular Mobile Communication Practical Course	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
		12 A	Industrial Electronics	3	3
			Industrial Electronics Practical Course	2	1
		OR			
		12 B	Embedded System Design	3	3
			Embedded System Design Practical Course	2	1
		13 A	Digital System Design	3	3
			Digital System Design Practical Course	2	1
		OR			
		13 B	Consumer Electronics	3	3
			Consumer Electronics Practical Course	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
III	VI	14 A	Power Electronics	3	3
			Power Electronics Practical Course	2	1
		OR			
		14 B	VLSI Design	3	3
			VLSI Design Practical Course	2	1
		15 A	Principles and Utility of Electronic Domestic Applications	3	3
			Principles and Utility of Electronic Domestic Applications Practical Course	2	1
		OR			
		15 B	Digital Signal Processing	3	3
			Digital Signal Processing Practical Course	2	1

Note:

In the III Year (during the V and VI Semesters), students are required to select a pair of electives from one of the Two specified domains. For example: if set 'A' is chosen, courses 12 to 15 to be chosen as 12 A, 13 A, 14 A and 15 A. To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.

VISION

To be a Physics education centre of excellence, promote and disseminate knowledge and meet the personal development agenda of the students and staff.

MISSION

The goal of the Physics Department is to become an organization that is proactive in expanding and developing knowledge through teaching as well as basic and applied research. The Physics Department aims to produce graduates who are competent in the disciplines of Physics, Competitive and Innovative environment and persons with Ethical values. Our students in turn will be equipped to provide expert services to the country and internationally.

SEMESTER-I

COURSE 1: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Theory

Credits: 3

3 hrs/week

Course Objectives:

The students will learn:

1. Basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter,
2. Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and
3. Transistor and its three modes of operation, h-parameter model of a transistor and the frequency response of an amplifier.

UNIT-I (9 Hrs)

Part (A): Electrostatics: Electric charges - Coulomb's law - Electric field - Electric intensity and electric potential - Relation between electric potential and intensity - Electric potential due to a uniform charged conducting sphere at a point outside and inside the conductor.

Part (B): Electric dipole - Dipole moment - Intensity and potential due to a dipole: On the perpendicular bisector of a dipole – Statement and proof of Gauss law - Application of Gauss law: Electric field due to uniformly charged solid sphere.

UNIT-II (9 Hrs)

Part (A): Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Capacitance of a capacitor with dielectric - Capacitors in series and parallel - Energy stored in a charged capacitor - Loss of energy on sharing of charges between two capacitors.

Part (B): Force of attraction between plates of charged parallel plate capacitor - Kelvin's attracted disc electrometer - Measurement of potential and dielectric constant.

Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

UNIT-III (9 Hrs)

Part (A): Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of voltmeters - Calibration of ammeter.

Part (B): Magnetic Effect of Current: Biot-Savart's law - Force on a conductor carrying current placed in a magnetic field – Ampere's Law - Principle, construction and theory of a moving coil ballistic galvanometer.

UNIT-IV (9 Hrs)

Part (A): Diode circuits and power Supplies: Junction diode characteristics - Half and full wave rectifiers.

Part (B): Expression for efficiency and ripple factor - Bridge rectifier - Filter circuits - Zener Diode - Characteristics - Regulated power supply using Zener diode.

UNIT-V (9 Hrs)

Part (A): Transistor circuits: Characteristics of a transistor in CE modes - Relative merits Graphical analysis in CE configuration - Transistor as an amplifier - RC coupled amplifier - Frequency response - h parameters.

Part (B): Binary number system, decimal to binary and Binary to decimal conversion, Basis logic gates AND, OR, and NOT - Construction of basic logic gates.

Text Books :

1. Electricity and Magnetism - *M. Narayana moorthi and Others*, National Publishing Co., Chennai.
2. Electricity and Magnetism - *R. Murugesan*, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.
3. Principles of Electronics - *V.K. Mehta*, S. Chand & Co., 4/e, 2001.
4. Basic Electronics - *B.L. Theraja*, S. Chand & Co., 4/e, 2001.

Reference Books :

1. Electricity and Magnetism - *Brijlal & Subrahmanyam*, Ratan Prakashan Mandir, Agra.
2. Fundamentals of Electricity and Magnetism - *B.D. Duggal & C.L. Chhabra*, Shoban Lal Nagin Chand & Co., Jallundur.
3. Physics, Vol. II - *Resnick, Halliday & Krane*, 5/e, John Wiley & Sons, Inc.,
4. Basic Electronics - *B. Grob*, McGraw - hill, 6/e, NY, 1989.
5. Elements of Electronics - *Bagde & Singh*, S. Chand

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

SEMESTER-I
COURSE 1: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Practicals

Credits:1

2 Hours/Week

Course Objectives:

The students will learn:

1. Basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter,
2. Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and
3. Transistor and its three modes of operation, h-parameter model of a transistor and the frequency response of an amplifier.

List of Experiments :

1. Kirchoff's verification
2. Logic Gates – Verification of Truth Tables
3. PN Junction Diode – V-I Characteristics
4. Zener Diode – V-I Characteristics
5. Zener Diode as a Voltage Regulator
6. Carey- Fasters Bridge.
7. Series and Parallel Combination of Resistors
8. Series and Parallel Combination of Capacitors
9. Bridge Rectifier – L and π filters

S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS) Honours
SEMESTER-1

COURSE 1: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Time:3 hours

Max marks: 60M

COURSE 2: BLUE PRINT

Unit	Essay answer questions	Short answer questions	Numerical problems
Unit I	2 (with internal choice)	2	0
Unit II	2 (with internal choice)	2	0
Unit III	2 (with internal choice)	2	0
Unit IV	2 (with internal choice)	2	0
Unit V	2 (with internal choice)	2	0

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

(ELE M 2303-1)
S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS)
SEMESTER-2

MODEL QUESTION PAPER
COURSE 1: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Time: 3 hours

Max marks: 60M

SECTION-A

Answer Any Five of the following Questions.

5X4=20 Marks

1. Derive the Intensity of electric field due to a dipole.
2. Define Electric field intensity and electric potential.
3. Find the resultant capacity when Capacitors connected in series.
4. Find the resultant capacity when Capacitors connected in parallel.
5. Describe the Force on a conductor carrying current placed in a magnetic field.
6. Compare the dead-beat Galvanometer and ballistic galvanometer.
7. Explain Clipper and Clamper using diodes.
8. How to work Zener diode as Voltage regulator.
9. Explain Transistor as an amplifier.
10. Binary number system

SECTION-B

Answer All Questions.

5X8=40 Marks

11. Statement and proof of Gauss law of electrostatics.
OR
12. Derive the Electric field due to a uniformly charged solid sphere using Gauss law.
13. Derive the Capacitance of a capacitor with dielectric.
OR
14. Explain the construction of Kelvin's attracted disc electrometer - Measurement of potential and dielectric constant.
15. Determination of specific resistance using Potentiometer.
OR
16. Explain the Principle, construction and theory of a moving coil ballistic galvanometer
17. Explain the working of Bridge rectifier
OR
18. Describe the VI Characteristics Of Zener Diode
19. Explain the construction and working of RC Coupled amplifier.
OR
20. Describe about Basis logic gates AND, OR, and NOT

SEMESTER-II
COURSE 1: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS
UNIT-I
QUESTION BANK

ESSAY QUESTIONS

1. Determine the Electric potential due to a uniform charged conducting sphere at a point outside, on, and inside the conductor
2. Derive the relation for intensity of electric field on the perpendicular bisector of a dipole.
3. Derive the intensity of Electric field due to a uniformly charged solid sphere using Gauss law.

SHORT ANSWER QUESTIONS

1. Derive the Relation between electric potential and intensity
2. Statement and proof of Gauss law of electrostatics.
3. Determine intensity of electric field due to point charge.
4. Determine electric potential due to point charge.

UNIT-II

ESSAY QUESTIONS

1. Derive the Capacitance of a parallel plate capacitor with dielectric.
2. Explain the construction of Kelvin's attracted disc electrometer - Measurement of potential and dielectric constant.
3. Explain the Construction and working of Mica capacitor, Electrolytic capacitors, and Variable air capacitor:

SHORT ANSWER QUESTIONS

1. Explain Energy stored in a charged capacitor
2. Force of attraction between plates of charged parallel plate capacitor
3. Find the resultant capacity when Capacitors connected in series.
4. Find the resultant capacity when Capacitors connected in parallel.

UNIT-III

ESSAY QUESTIONS

1. Determine the specific resistance using Carey-Foster bridge.
2. Explain the Calibration of voltmeters using Potentiometer.
3. Explain the Principle, construction and theory of a moving coil ballistic galvanometer

SHORT ANSWER QUESTIONS

1. Explain the Calibration of Low range ammeter
2. State and explain Biot-Savart's law
3. Describe the Force on a conductor carrying current placed in a magnetic field
4. State and prove Ampere's Law..

UNIT-IV

ESSAY QUESTIONS

1. Describe the construction and working of Half wave rectifier.

2. Describe the construction and working of full wave rectifier.
3. Explain the working of Bridge rectifier

SHORT ANSWER QUESTIONS

1. Expression for efficiency and ripple factor
2. Explain V-I characteristics Junction diode.
3. Describe the VI Characteristics Of Zener Diode
4. How to work Zener diode as Voltage regulator.

UNIT-V

ESSAY QUESTIONS

1. Explain Characteristics of a transistor in CE configuration.
2. Explain RC coupled Single stage amplifier
3. Describe about Basis logic gates AND, OR and NOT.

SHORT ANSWER QUESTIONS

1. Transistor as an amplifier
2. Covert the following binary numbers into decimal numbers i) $(110110)_2$ ii) $(11101)_2$
3. Covert the following decimal numbers into binary numbers. I) $(78)_{10}$ ii) $(125)_{10}$
4. Describe about Basis logic gate NOT.

Course Objectives :

1. To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
2. To analyze circuits in time and frequency domain.
3. To synthesize the networks using passive elements.
4. To understand the construction, working and VI characteristics of electronic devices.
5. To understand the concept of power supply.

UNIT-1:(9Hrs)

SINUSOIDAL ALTERNATING WAVEFORMS:

Part (A): Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Phase relation of R.

Part (B): Phase relation of L and C. Differences between A.C and D.C.

UNIT-II: (9Hrs)

PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):

Part (A): Branch current method, Nodal Analysis, Superposition Theorem, Thevenin's Theorem.

Part (B): Norton's Theorem, Maximum Power and Reciprocity theorems.

UNIT-III:(9Hrs)

RC, RL AND RLC CIRCUITS:

Part (A): Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits.

Part (B): Series resonance and parallel resonance circuits, Q – Factor.

UNIT-IV: (9 Hrs) BJT, FET and UJT:

Part (A): BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor,

Part (B): FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT. UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

UNIT-V:(9Hrs)

POWERSUPPLIES&PHOTOELECTRICDEVICES

Part (A): General theorem of feedback, Barkhausen criterion for oscillations, Phase shift oscillator.

Part (B): Three terminal fixed voltage I.C. regulators (78XX and &79XX). Light Emitting Diode – Photo diode and LDR.

TEXTBOOKS:

1. Introductory circuit Analysis(UBS Publications)-RobertL. Boylestad.
2. Electronic Devices and Circuit Theory -RobertL. Boylestad& Louisashelsky.
3. Circuit Analysis by P. Gnanasivam- Pearson Education
4. Electronic Devices and Circuit Theory-RobertL. Boylestad & LouisNashelsky.
5. Electronic Devices and Circuits I–T.L.Floyd- PHI Fifth Edition

REFERENCE BOOKS:

1. Engineering Circuit Analysis By: Hayt&Kemmerly- MG.
2. Networks and Systems–D.Roy Chowdary.
3. Unified Electronics (Circuit Analysis and Electronic Devices) by Agarwal- Arora
4. Electric Circuit Analysis-S.R.Paranjothi-New Age International.
5. Integrated Electronics–Millmam & Halkias.
6. Electronic Devices & Circuits–Bogart.
7. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

SEMESTER-I
COURSE2: CIRCUIT THEORY AND ELECTRONIC DEVICES

Practicals	Credits:1	2 Hours/Week
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Course Outcomes:

1. Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
2. Apply time and frequency concepts of analysis.
3. Synthesize the network using passive elements.
4. Know about amplifier circuits, switching circuits and oscillator circuits their design and use in electronics.
5. Design and construction of powerplay.

List of Experiments:

1. Thevenin's Theorem-verification
2. Norton's Theorem-verification
3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. BJT input and output characteristics
6. FET Output and transfer characteristics
7. UJT VI characteristics
8. LDR characteristics
9. IC regulated power supply (IC-7805)

Lab experiments are to be done on bread board and simulation software and output values are to be compared and justified for variation.

S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS)Honours
SEMESTER-1
COURSE2: CIRCUITTHEORY AND ELECTRONICDEVICES

Time:3 hours

Max marks: 60M

COURSE 2: BLUE PRINT

Unit	Essay answer questions	Short answer questions	Numerical problems
Unit I	2 (with internal choice)	2	0
Unit II	2 (with internal choice)	2	0
Unit III	2 (with internal choice)	2	0
Unit IV	2 (with internal choice)	2	0
Unit V	2 (with internal choice)	2	0

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

(ELEM2303-2)
S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS)
SEMESTER-2
MODEL QUESTION PAPER
CIRCUIT THEORY AND ELECTRONIC DEVICES

Time: 3 hours

Max marks: 60M

SECTION-A

Answer Any Five of the following Questions. 5X4=20 Marks

1. Derive the average value of A.C. during half cycle .
2. Write any four differences between A.C and D.C.
3. State and prove Maximum Power transfer theorem.
4. State and prove Reciprocity theorem.
5. Explain R-L circuit as integrating circuit.
6. Explain Q –Factor.
7. Explain advantages of FET over BJT.
8. Explain UJT as a Relaxation oscillator.
9. Explain Photo diode.
10. Explain LDR.

SECTION-B

Answer All Questions. 5X8=40 Marks

11. Explain Phase relation of R
OR
12. Explain Phase relation of C.
13. State and prove Norton's Theorem.
OR
14. State and prove Superposition Theorem.
15. Explain the frequency response of RC lowpass filters.
OR
16. Describe parallel resonance circuit and derive the expression for resonant frequency.
17. Describe Construction, working and characteristics of Transistors in CE configuration.
OR
18. Construction, working and characteristics of MOSFET.
19. Explain the construction and working of Phase shift oscillator
OR
20. Describe the characteristics of Light Emitting Diode.

SEMESTER-II
COURSE2: CIRCUIT THEORY AND ELECTRONIC DEVICES

UNIT-I

ESSAYQUESTIONS

1. Explain Phase relation of R.
2. Explain Phase relation of L.
3. Explain Phase relation of C.

SHORTANSWERQUESTIONS

1. Derive the average value of A.C. during half cycle
2. Write any four differences between A.C and D.C.
3. Explain the effective (R.M.S) value of current.

UNIT-II

ESSAYQUESTIONS

1. State and prove Superposition method.
2. State and prove Thevenin's Theorem
3. State and prove Norton's Theorem,

SHORTANSWERQUESTIONS

1. Explain the Mesh current method
2. State and prove Maximum Power transfer theorem
3. State and prove Reciprocity theorems
4. Explain the NodeVoltage method.

UNIT-III

ESSAYQUESTIONS

1. Explain the Frequency response of Resistance-capacitance (RC) circuit
2. Explain the Frequency response of Resistance–Inductance (RL) circuit
3. Describe Series resonance circuit and derive the expression for resonant frequency.
4. Describe parallel resonance circuit and derive the expression for resonant frequency.

SHORTANSWERQUESTIONS

1. Describe Passive differentiating circuits.
2. Describe Passive integrating circuits.
3. Explain Q –Factor.

UNIT-IV

ESSAYQUESTIONS

1. Explain Construction, working, and characteristics of BJT in CE Configuration.
2. Describe Construction, working and characteristics of JFET.
3. Construction, working and characteristics of MOSFET

SHORTANSWERQUESTIONS

1. Explain advantages of FET over BJT.
2. Explain characteristics of UJT.
3. Explain UJT as a Relaxation oscillator.
4. Draw hybrid equivalent circuit of CE Transistor and define h-parameters.

UNIT-V

ESSAYQUESTIONS

1. Describe the Phase shift Oscillator
2. Explain Three terminal fixed voltage I.C. regulators (78XXand79XX).
3. Describe the characteristics of Light Emitting Diode.

SHORTANSWERQUESTIONS

1. Explain General theorem of feedback
2. Explain Barkhasen condition
3. Explain Photo diode
4. Explain LDR

SEMESTER-II
COURSE 3: SEMICONDUCTOR DEVICES AND MATERIALS

Theory

Credits: 3

3 hrs/week

Course Outcomes:

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.
3. Pre-requisites: Basic understanding of semiconductors.

Learning Objectives:

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

Unit I: (9 Hrs)

Part (A): Organic Semiconductors: Energy bands, carrier transport, mobility, drift- diffusivity, excess carrier, injection and recombination of the excess carriers, carrier statistics;

Part (B): High field effects: velocity saturation, hot carriers and avalanche breakdown.

Unit II: (9 Hrs)

Part (A): Majority carrier Devices: MS contacts rectifier and non-rectifier, MIS structures, MESFET, hetero-junction.

Part (B): HEMT and band diagrams, I-V and C-V characteristics.

Unit III: (9 Hrs)

Part (A): MOS structures: Semiconductor surfaces; The ideal and non-ideal MOS capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states.

Part (B): MOSFET: Structures and Device Characteristics, Short-Channel effects. Charge coupled Devices (CCDs), application to VLSI.

Unit IV: (9 Hrs)

Part (A): Nonvolatile Memory Device. Optoelectronic Devices: solar cell, photo detectors, LEDs, laser diodes.

Part (B): Nano structures and concepts: quantum wells, super lattice structures, nanorod, quantum dot, CNTs, 2D materials: graphene, BN, MoS₂ etc, metamaterials.

UNIT-V: (9 Hrs)

Part (A): Multistage Amplifiers: BJT at high frequencies, frequency response of RC coupled amplifiers.

Part (B): Transformer coupled amplifier.

Reference Books :

1. Donald A. Neamen, Semiconductor Physics and Devices Basic Principles, 3rdedn.McGraw-Hil (2003)
2. B.G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6thEdn., Prentice Hall, 2006.
3. S. M. Sze and Kwok K. Ng Physics of Semiconductor Devices, Wiley (2013).
4. M. Husa, A. Dimoulas and A. Molle, 2D Materials for Nano Electronics, CRC press (2016)
5. M .S. Tyagi, Introduction to Semiconductor Materials and Devices, Willey, Student Edition

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

SEMESTER-II
COURSE 3: 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.

S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS) Honours
SEMESTER-2
COURSE 3: SEMICONDUCTOR DEVICES AND MATERIALS

Time:3 hours

Max marks: 60M

COURSE 2: BLUE PRINT

Unit	Essay answer questions	Short answer questions	Numerical problems
Unit I	2 (with internal choice)	2	0
Unit II	2 (with internal choice)	2	0
Unit III	2 (with internal choice)	2	0
Unit IV	2 (with internal choice)	2	0
Unit V	2 (with internal choice)	2	0

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

(ELE M 3303-5)
S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS)
SEMESTER-3

MODEL QUESTION PAPER

COURSE 3: SEMICONDUCTOR DEVICES AND MATERIALS

Time: 3 hours

Max marks: 60M

Section-A

Answer any Five of the following Questions

5X4=20 Marks

1. What is Velocity Saturation?
2. Explain mobility in Organic Semiconductors.
3. Non-Rectifying MS Contacts (Ohmic Contacts)
4. HEMT (High Electron Mobility Transistor) and Band Diagrams
5. Discuss the short-channel effects in MOSFET.
6. Write applications to VLSI.
7. Discuss the structure of CNTs.
8. Explain the structure of grapheme, BN, MoS₂
9. BJT at high frequencies
10. Explain multi stage amplifiers

SECTION-B

Answer all questions

5X8=40 Marks

11. Define Drift Diffusivity. What are Factors Affecting Drift Diffusivity.
Or
12. Discuss Velocity saturation in Organic Semiconductors
13. Explain the construction and working of MESFET. Draw V-I characteristics of a MESFET.
Or
14. Draw I-V characteristics of HEMT.
15. Describe MOS capacitor. Explain the C-V Characteristic Curve of a MOS capacitor.
Or
16. Discuss the construction and working of N-Type Depletion MOSFET.
17. Discuss the structure of CNTs and Graphene.
Or
18. What is LED? Explain the principle, construction and working of LED.
19. Discuss the Frequency response of RC coupled amplifiers
Or
20. Explain the construction and working of Transformer coupled amplifier.

SEMICONDUCTOR DEVICES AND MATERIALS

QUESTION BANK

Unit-I

Short Answer Questions

1. Briefly discuss Carrier Transport in Organic Semiconductors.
2. What is Velocity Saturation?
3. Explain mobility in Organic Semiconductors.
4. Discuss about Energy Bands in Organic Semiconductors.

Essay Type Questions

1. What is Drift Diffusivity? What are the Factors Affecting Drift Diffusivity?
2. Discuss Excess Carriers in Organic Semiconductors
3. Explain Hot Carriers and avalanche break down in Organic Semiconductors.

Unit-II

Short Answer Questions

1. Briefly explain Rectifying MS Contacts (Schottky Diodes).
2. Discuss about MIS structure.
3. Explain the HEMT (High Electron Mobility Transistor) Band Diagrams.
4. Briefly explain about Heterojunctions.

Essay Type Questions

1. Explain the construction and working of MESFET. Draw V-I characteristics of a MESFET.
2. Explain the HEMT construction. Draw I-V characteristics of HEMT.
3. Explain the operation of HEMT. Draw C-V characteristics of HEMT.

Unit-III

Short Answer Questions

1. Discuss the short-channel effects in MOSFET.
2. Discuss the Energy Band Diagram of MOS Structure.
3. Describe the construction of a MOSFET.
4. Write applications to VLSI.

Essay Type Questions

1. Describe MOS capacitor. Explain the C-V Characteristic Curve of a MOS capacitor.
2. Discuss the operation and transfer characteristics of N-Type Depletion MOSFET.
3. Explain the construction and working principle of CCD.

Unit IV

Short Answer Questions

1. Discuss the structure of MoS₂.
2. Explain the structure of Nanorods.
3. Explain the structure of BN.
4. Explain the structures of quantum dot.

Essay Type Questions

1. Discuss the structure of CNTs and Graphene.
2. Explain the principle, construction and working of Solar Cell
3. Discuss the Construction and operation of Photodetector.
4. What is LED? Explain the principle, construction and working of LED.

Unit -V

Short Answer Questions

1. BJT at high frequencies
2. Explain multi stage amplifiers

Essay Type Questions

1. Discuss the Frequency response of RC coupled amplifiers
2. Explain the construction and working of Transformer coupled amplifier.

SEMESTER-II
COURSE 4: DIGITAL ELECTRONICS

Theory

Credits: 3

3 hrs/week

Course Objectives :

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

Unit – I (9 Hrs)

Part (A): NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal. Codes: BCD, Gray codes- code conversions: Decimal to Binary and Binary to Decimal, Binary to Hexa decimal and Hexa decimal to Binary.

Part (B): Addition of binary numbers, Complements (1's, 2's, 9's and 10's), Subtraction using 1's complement method.

Unit- II (9 Hrs)

Part (A): BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital logic gates: X-OR gate and Universal Logic gates, NAND & NOR gates.

Part (B): Minimization Techniques (Karnaugh Map Method: 2,3 variables).

Unit-III (9 Hrs)

Part (A): COMBINATIONAL DIGITAL CIRCUITS: Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1) and Demultiplexers (1:4).

Part (B): Encoder (8- line-to-3- line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic.

UNIT-IV (9 Hrs)

SEQUENTIAL DIGITAL CIRCUITS:

Part (A): Flip Flops: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables.

Part (B): Registers:- Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-Mod-8,Mod- 10, Synchronous-4-bit &Ring counter.

UNIT- V (9 Hrs) MEMORY DEVICES:

Part (A): General Memory Operations, ROM, RAM (Static and Dynamic).

Part (B): PROM, EPROM, EEPROM, EAROM.

TEXT BOOKS:

1. M. Morris Mano, “ Digital Design “ 3rd 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.*

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

COURSE 4: DIGITAL ELECTRONICS

Practicals

Credits: 1

2

hrs/week

Course Outcomes:

1. Develop a digital logic and apply it to solve real life problems.
2. Analyze, design and implement combinational logic circuits.
3. Classify different semiconductor memories.
4. Analyze, design and implement sequential logic circuits.
5. Simulate and implement combinational and sequential logic circuits using VHDL

List of Experiments:

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

S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS) Honours
SEMESTER-2
COURSE 4: DIGITAL ELECTRONICS

Time:3 hours

Max marks: 60M

COURSE 2: BLUE PRINT

Unit	Essay answer questions	Short answer questions	Numerical problems
Unit I	2 (with internal choice)	2	0
Unit II	2 (with internal choice)	2	0
Unit III	2 (with internal choice)	2	0
Unit IV	2 (with internal choice)	2	0
Unit V	2 (with internal choice)	2	0

Note: Select one essay question from part-A and another Essay question from Part-B in every unit.

(ELE M 3303-6)
S.R.R & C.V.R. GOVERNMENT DEGREE COLLEGE (A) VIJAYAWADA
B.Sc (ELECTRONICS)
SEMESTER-3
MODEL QUESTION PAPER
COURSE 6: DIGITAL ELECTRONICS

Time: 3 hours

Max marks: 60M

Section-A

Answer any Five of the following Questions

5X4=20 Marks

1. Convert a Hexa decimal number to Binary number with an example.
2. Binary to decimal conversion with at least two examples.
3. Explain in detail about X-OR gates with truth tables
4. Explain in detail about NAND and NOR gates with truth tables.
5. Explain the construction and working of Magnitude Comparator.
6. Briefly explain Multiplexers.
7. Explain construction and working of D -type Flip-flop.
8. Describe the Mod-8 Asynchronous Counters.
9. Briefly explain PROM.
10. Briefly explain EPROM.

SECTION-B

Answer all questions

5X8=40 Marks

11. Binary to decimal conversion with the following two examples. i) $(11011)_2$ ii) $(10011)_2$
Or
12. Explain the binary subtraction in 1's complement method.
i) $(11011)_2 - (1111)_2$.
13. State and prove De-Morgan laws.
Or
14. Explain Minimization Techniques Karnaugh Map Method with 3 variables.
i) $Y = ABC + AB\bar{C} + \bar{A}BC + \bar{A}\bar{B}C + A\bar{B}\bar{C}$.
15. Explain about full subtractor.
Or
16. Briefly explain Decoder.
17. Explain construction and working of J-K Flip-flop.
Or
18. Describe the Mod-10 Asynchronous Counters.
19. Describe the construction and working of ROM.
Or
20. Describe PROM, EPROM.

COURSE 6: DIGITAL ELECTRONICS

QUESTION BANK

UNIT-1

Short Essay Questions

- 1 Convert a Binary number to Hexa decimal with an example. i) 1101 1110 1111 1010
- 2 Convert a Hexa decimal number to Binary number of the following i) 1A5F ii) A0D1
- 3 Binary to decimal conversion with at least two examples. i) $(11011)_2$ ii) $(10011)_2$
- 4 Explain in detail about BCD and Gray code.

Essay type Questions

- 1 Problems on binary addition with two examples.
i) $(11010)_2 + (10101)_2$ ii) $(1101)_2 + (1011)_2$
- 2 Decimal to binary conversion with at least two examples.
i) $(75)_{10}$ ii) $(205)_{10}$ iii) $(160)_{10}$
- 3 Problems on binary subtraction in 1's complement method.
i) $(11011)_2 - (1111)_2$ ii) $(1001)_2 - (111)_2$

UNIT-2

Short Essay Questions

- 1 Explain Boolean theorems.
- 2 Explain in detail about X-OR gates with truth tables.
- 3 Explain in detail about NAND and NOR gates with truth tables.
- 4 Show that NAND and NOR gates are universal gates.

Essay type Questions

- 1 State and prove De-Morgan laws.
- 2 Explain Minimization Techniques Karnaugh Map Method with 3 variables.
i) $Y = ABC + AB\bar{C} + \bar{A}BC + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C}$
- 3 Explain Minimization Techniques Karnaugh Map Method with 2 variables.
i) $Y = AB + A\bar{B} + \bar{A}B + \bar{A}\bar{B}$

UNIT-3

Short Essay Questions

- 1 Describe the Half subtractor.
- 2 Describe the Half adder.
- 3 Explain the construction and working of Magnitude Comparator.
- 4 Briefly explain Multiplexers
- 5 Briefly explain Demultiplexer.

Essay type Questions

- 1 Describe Full adder.
- 2 Describe the full subtractor.
- 3 Briefly explain Encoder
- 4 Briefly explain Decoder.

UNIT-4

Short Essay Questions

- 1 Explain construction and working of T-Flip-flops.
- 2 Explain construction and working of D -type Flip-flop.
- 3 Describe the Mod-8 Asynchronous Counters.

Essay type Questions

- 1 Explain construction and working of S-R Flip-flop.
- 2 Explain construction and working of J-K Flip-flop.
- 3 Describe the Mod-10 Asynchronous Counters.
- 4 Describe the 4-Bit synchronous Counters.

UNIT-5

Short Essay Questions

- 1 Briefly explain RAM.
- 2 Briefly explain types of RAMs.
- 3 Briefly explain EEPROM

Essay type Questions

- 1 Describe the General Memory Operations.
- 2 Describe the construction and working of ROM.
- 3 Describe PROM, EPROM.



S.R.R. & C.V.R. GOVT. DEGREE COLLEGE (A)

VIJAYAWADA, N.T.R. DT.

(NAAC Accredited with 'A' Grade-IV Cycle)

AFFILIATED TO KRISHNA UNIVERSITY, MACHILIPATNAM

DEPARTMENT OF PHYSICS & ELECTRONICS

ADMITTED BATCHES FROM THE ACADEMIC YEAR 2025-26

After thorough Discussion the following Resolutions are made:

1. It is resolved to follow the same syllabus prescribed by the APSCHE, Andhra Pradesh for UG students of B.Sc (Electronics) honors in all semesters with effect from the Academic Year 2025-26 admitted from the academic year 2025-26 under single major programme with some additional inputs and some deletions.
2. It Is resolved to Approve the syllabus of Semester I and semester II.
3. Resolved and approved the model question paper pattern for all semester examinations.
4. It is resolved to take 40%marks are eligible to treat as pass both in internal and external examinations.
5. It is resolved to take 60% of marks for external examinations and 40% for internal examinations.
6. It is approved blueprint for theory and practical examinations.
7. It is resolved to consider 25 Marks for External evaluation and 25 marks for internal evaluation in Practical examination in all semesters from admitted batches 2025-26.
8. It is resolved to suggested student study projects, Extension activities, and Fieldtrips, curricular and co-curricular activities.

Signatures of the BOS members Attended:

1. Smt.P. Sailaja, In-Charge, Dept. Of Physics & Electronics :
(Board of studies chairperson)
2. Dr.Ch.Srinivasa Rao, (University Nominee) :
Professor, Andhra Loyola College (A), Vijayawada
3. Sri T.V.Rambabu, Lecturer in Physics (Subject Expert) :
GDC, Jangareddygudem, Eluru Dist., Adikavi Nannaya university,
4. Dr.P. Gopi Krishna, Asst. Professor, (Subject Expert) :
Dept. of ECM, KLUUniversity (Deemed to be)
5. Sri N.Vara Prasad (Industrialist) :
6. T.Pujitha, M.Sc (Alumni) :

Members of the Department:

1. Smt. T.V.Vakula Priya, Lecturer in Physics & Electronics :
2. Dr.J. Nageswara Rao, Lecturer in Physics & Electronics :
3. Dr. A. Asirvadam, Lecturer in Physics & Electronics :
4. Sri. T. Devender Reddy, Lecturer in Physics & Electronics :
5. Sri G.V. Gangadhara Rao, Lecturer in Physics & Electronics :
6. Smt. Sk.Jubeda, Lecturer in Physics & Electronics :
7. Smt.S.Kiranmayi, Lecturer in Electronics :

Student members:

1. Ch. Keerthesh III B.Sc Electronics (Honours) :
2. I. Harshitha Sri II B.Sc Electronics (Honours) :