

Sri Venkateswara University, Tirupati

Model Syllabus for 4-Year UG Honours 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

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
			Computer Network Practical Course	2	1
III	V	11	Cellular Mobile Communication	3	3
			Cellular Mobile Communication Practical Course	2	1
		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
	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 or if set 'B' is chosen, It is to be chosen as 12 B, 13 B, 14 B and 15 B 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.

T. Ashuraman

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. 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)

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: (9 Hrs)

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: (9 Hrs)

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: (9 Hrs)

Nonvolatile Memory Device. Optoelectronic Devices: solar cell, photo detectors, LEDs, laser diodes. Nano structures and concepts: quantum wells, super lattice structures, nanorod, quantum dot, CNTs, 2D materials: graphene, BN, MoS₂ etc, metamaterials.

UNIT-V: (9 Hrs)

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, 3rdedn.McGraw-Hill (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. Hussa, 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

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.

T. Reddeman

4- Year UG Honours, Major
Syllabus
(2025-26)
Semester-II

Model Question Paper

Time : 3hrs

Marks:75

Part-A

Answer any Five Questions. Each Question carries 3 Marks.

5x3=15

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

Answer the following questions. Each question carries 12 Marks

5x12=60

11. a) Unit-I
(Or)
b) Unit-I

12. a) Unit-II
(Or)
b) Unit-II

13. a) Unit-III
(Or)
b) Unit-III

14. a) Unit-IV
(Or)
b) Unit-IV

15. a) Unit-V
(Or)
b) Unit-V