B. Tech. ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE – VR25
I B. Tech. – I Semester

S.No	Course Code	Course	L	T	P	Credits
1	25MA101BS	Matrices and Calculus	3	1	0	4
2	25PH102BS	Advanced Engineering Physics	3	0	0	3
3	25ME103ES	Engineering Drawing and Computer Aided Drafting	2	0	2	3
4	25EE104ES	Introduction to Electrical Engineering	2	0	0	2
5	25CS105ES	Programming for Problem Solving	3	0	0	3
6	25EN106HS	English for Skill Enhancement	3	0	0	3
7	25PH107BS	Advanced Engineering Physics Lab	0	0	2	1
8	25CS108ES	Programming for Problem Solving Lab	0	0	2	1
9	25EN109HS	English Language and Communication Skills Lab	0	0	2	1
		Total	**16**	**1**	**8**	**21**

I B.Tech. - II Semester

S.No	Course Code	Course	L	T	P	Credits
1	25MA201BS	Ordinary Differential Equations and Vector Calculus	3	0	0	3
2	25CH202BS	Engineering Chemistry	3	0	0	3
3	25ML203ES	Python Programming	3	0	0	3
4	25EE204ES	Network Analysis and Synthesis	3	0	0	3
5	25CS205ES	Data Structures	3	0	0	3
6	25CH206BS	Engineering Chemistry Lab	0	0	2	1
7	25CS207ES	Data Structures Lab	0	0	2	1
8	25ML208ES	Applied Python Programming Lab	0	0	2	1
9	25ME209ES	Engineering Workshop	0	0	2	1
10	25EE210ES	Basic Electrical Engineering Lab	0	0	2	1
		Total	**15**	**0**	**10**	**20**

Note: L - Theory T - Tutorial P - Practical C - Credits

25EC104ES **VR25**

ELECTRONIC DEVICES AND CIRCUITS

B.Tech. I Year I Sem - CSE. **L T P C**
3 0 0 3

Course Overview: This course introduces fundamental semiconductor devices and their behavior, including diodes, BJTs, and FETs. It covers their characteristics, applications, and the analysis of basic electronic circuits. The course also explores rectifiers, voltage regulation, amplifier design, and advanced semiconductor technologies like Fin FETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics.

Course Outcomes: By the end of this course, students will be able to:
CO1: Analyze the electrical characteristics and models of semiconductor diodes and apply the min rectifier and clipping circuits.
CO2: Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics.
CO3: Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.
CO4: Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations.
CO5: Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies.

Course Articulation Matrix

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	1	1	-	-	-	-	-
CO2	3	3	2	2	1	-	-	-	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	1
CO5	3	3	2	2	2	1	-	-	-	-	2

Syllabus:

UNIT-I:

Diode Characteristics and Applications: PN junction diode – I-V characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear), Rectifiers – Half-wave, Full-wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and clampers, Zener diode –I-V characteristics and voltage regulation.

UNIT-II:

Bipolar Junction Transistor(BJT): Structure and working principle of BJT, Current components and transistoraction,Configurations:CommonBase(CB),CommonEmitter(CE),CommonCollector(CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

UNIT-III:

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT-IV:

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

UNIT-V:

Special Purpose Diodes: Principle of Operation of- SCR, Tunnel Diode, Varactor Diode, Photo

Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes –Structure, operation, and characteristics, Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXTBOOKS:

1. Millman, Jacob, and Christos C. Halkias. *Electronic Devices and Circuits*. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. *Electronic Devices and Circuit Theory*. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. *Microelectronic Circuits*. Oxford University Press, 7th ed., 2014.

REFERENCEBOOKS:

1. Bell, David A. *Electronic Devices and Circuits*. Oxford UniversityPress,5thed.,2008.
2. Neamen, Donald A. Electronic Circuit Analysis and Design.McGraw-Hill,2nded.,2001.
3. Salivahanan,S.,andN.SureshKumar.*ElectronicDevicesandCircuits*.McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad.Fundamentals *of Microelectronics*.Wiley,2nded.,2013.
5. Taur, Yuan, and Tak H. Ning. *Fundamentals of Modern VLSI Devices*. Cambridge University Press, 2nd ed., 2009.

25EC204ES **VR25**

ELECTRONICDEVICESANDCIRCUITS

B.Tech. I Year II Sem – CSE(DS)/IT/AIML. **L T P C**
3 0 0 3

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CO3	3	3	3	2	1	-	-	-	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	1
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