

## Course Information Sheet

Programme: <b>UG</b>	Degree: <b>B.Tech (ECE)</b>	
Course Code: <b>C214</b>	Course Title: <b>ELECTRONIC DEVICES AND CIRCUITS</b>	
Year: <b>II Sem: I</b> A.Y. : <b>2024-25</b>	Regulation: <b>ISR23</b> University: <b>JNTU Kakinada.</b>	
L T/P/D C: <b>3/0/0/3</b>	Credits: <b>3</b>	Contact Hrs: <b>4</b>
Mid Marks: <b>30</b>	External Marks: <b>70</b>	Total Marks: <b>100</b>
Teaching Hrs:	Exam Duration: <b>3 hrs.</b>	

**Course Pre-Requisites:** 1. Electronic Devices & Circuits 2. Switching Theory and Logic 3. Electronic Circuit Analysis.

Course Code	Course Name	Description	Year-Sem
C214	<b>ELECTRONIC DEVICES AND CIRCUITS</b>	Electronics as the science of how to control the electric energy, energy in which the electrons have a fundamental role. Electronics deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes, integrated circuits, and associated passive electrical components and interconnection technologies. Commonly, electronic devices contain circuitry consisting primarily or exclusively of active semiconductors supplemented with passive elements; such a circuit is described as an electronic circuit.	II ECE Semester -1

**Course outcomes:****Student will able to**

<b>No.</b>	<b>Description</b>	<b>Skill /Bloom's Taxonomy Level</b>
<b>CO1</b>	Apply the basic concepts of semiconductor physics.	Remember Understand TL1/TL2
<b>CO 2</b>	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.	Remember Understand TL1/TL2
<b>CO 3:</b>	Analyze the construction, working principle of Semiconductor Devices and Diode Circuits	Apply/TL3
<b>CO4</b>	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions	Create /TL4
<b>CO5</b>	Apply small signal low frequency transistor amplifier circuits using BJT and FET in different configurations	Design/TL 6

**Course Articulation Matrix:**

**Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSO's):**

Course Outcomes (CO)	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO3	3	1	1	-	-	-	-	-	-	-	-	-	3	3
CO4	3	1	1	-	-	-	-	-	-	-	-	-	3	3
CO5	3	1	1	-	-	-	-	-	-	-	-	-	3	2
Overall	2.8	1.2	1.1	-	-	-	-	-	-	-	-	-	2	2

**Level:** 1- Low correlation (Low), 2- Medium correlation (Medium), 3-High correlation (High)

## Syllabus / Lesson Plan:

		No. of	Tentative	Actual	Teaching	TB and
S.No.	Topics to be covered	Classes Required	Date of Completion	Date of Completion	Learning Methods	Page
<b>UNIT-1</b>						<b>Number</b>
1	Mobility and Conductivity, Intrinsic and extrinsic semiconductors	1	01-08-2024	01-08-2024	Chalk & Talk	TB-1
2	Continuity equation, law of junction, Fermi Dirac function,	1	03-08-2024	03-08-2024	Chalk & Talk	TB-1
3	Fermi level in intrinsic and extrinsic Semiconductors.	1	04-08-2024	04-08-2024	Chalk & Talk	TB-1
4	Energy band diagram of PN junction Diode, Open circuited p-n junction	1	05-08-2024	05-08-2024	Chalk & Talk	TB-1
5	Biased p-n junction, p-n junction diode	1	06-08-2024	06-08-2024	Chalk & Talk	TB-1
6	Current components in p-n junction Diode, Diode equation	1	08-08-2024	08-08-2024	Chalk & Talk	TB-1
7	V-I Characteristics, temperature dependence on V-I characteristics	1	10-08-2024	10-08-2024	Chalk & Talk	TB-1
8	Diode resistance, Diode capacitance.	1	11-08-2024	11-08-2024	Chalk & Talk	TB-1
9	Problems in Unit-1	1	12-08-2024	12-08-2024	Chalk & Talk	TB-1
10	class test on Unit -1	1	13-08-2024	13-08-2024	PAPER TEST	
<b>UNIT-2</b>						
11	Zener Diode, Breakdown mechanisms	1	17-08-2024	17-08-2024	Chalk & Talk	TB-1
12	Zener diode applications, Varactor Diode	1	18-08-2024	18-08-2024	Chalk & Talk	TB-1
13	LED, Photodiode, Tunnel Diode	1	20-08-2024	20-08-2024	Chalk & Talk	TB-1
14	UJT, PNP Diode, SCR	1	22-08-2024	22-08-2024	Chalk & Talk	TB-1
15	The Diode as a circuit element	1	24-08-2024	24-08-2024	Chalk & Talk	TB-1
16	The Load-Line concept, The Piecewise Linear Diode model	1	25-08-2024	25-08-2024	Chalk & Talk	TB-1
17	Clipping circuits, Clipping at Two Independent Levels	1	26-08-2024	26-08-2024	Chalk & Talk	TB-1
18	Peak Detector, Clamping circuits	1	27-08-2024	27-08-2024	Chalk & Talk	TB-1
19	Comparators, Sampling Gate	1	29-08-2024	29-08-2024	Chalk & Talk	TB-1

20	Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier	1	01-09-2024	01-09-2024	Chalk & Talk	TB-1
21	derivations of characteristics of rectifiers	1	02-09-2024	02-09-2024	Chalk & Talk	TB-1
22	Filters, Inductor filter, Capacitor filter, $\pi$ -section Filter	1	03-09-2024	03-09-2024	Chalk & Talk	TB-1
23	Comparison of various filter circuits in terms of ripple factors	1	05-09-2024	05-09-2024	Chalk & Talk	TB-1
24	Revision on unit-2	1	07-09-2024	07-09-2024	PPT	
25	class test on Unit -2	1	08-09-2024	08-09-2024	PAPER TEST	
<b>UNIT-3</b>						
26	Junction transistor, transistor current components	1	09-09-2024	09-09-2024	Chalk & Talk	TB-1
27	Transistor equation in CB configuration, transistor as an amplifier	1	10-09-2024	10-09-2024	Chalk & Talk	TB-1
28	characteristics of transistor in Common Base, Common Emitter and Common Collector configurations	1	12-09-2024	12-09-2024	Chalk & Talk	TB-1
29	Ebers-Moll model of a transistor, punch through/ reach through	1	14-09-2024	14-09-2024	Chalk & Talk	TB-1
30	Photo transistor, typical transistor junction voltage values.	1	15-09-2024	15-09-2024	Chalk & Talk	TB-1
31	Need for biasing, operating point, load line analysis, BJT biasing-methods	1	16-09-2024	16-09-2024	Chalk & Talk	TB-1,R2
32	Fixed bias, collector to base bias, self bias	1	17-09-2024	17-09-2024	Chalk & Talk	TB-1,R2
33	Bias compensation, Stability factors	1	19-09-2024	19-09-2024	Chalk & Talk	TB-1
34	Thermal runaway, Thermal stability	1	21-09-2024	21-09-2024	Chalk & Talk	TB-1
35	Stabilization against variations in $V_{BE}$ , $I_c$ , and $\beta$	1	22-09-2024	22-09-2024	PPT	
36	Revision on unit-3	1	23-09-2024	23-09-2024	PPT	
37	class test on Unit -3	1	24-09-2024	24-09-2024	PAPER TEST	
<b>UNIT-4</b>						
38	Two port network	1	10-10-2024		Chalk & Talk	TB-1
39	Transistor hybrid model	1	12-10-2024		Chalk & Talk	TB-1
40	Determination of h-parameters, conversion of h-parameters	1	13-10-2024		Chalk & Talk	TB-1
41	Generalized analysis of transistor amplifier model using h-parameters	1	14-10-2024		Chalk & Talk	TB-1,R1
42	Generalized analysis of transistor	1	15-10-2024		Chalk &	TB-1,R1

	amplifier model using h-parameters				Talk	
43	Analysis of CB, amplifier	1	17-10-2024		Chalk & Talk	TB-1
44	Analysis CE and CC amplifiers	1	19-10-2024		Chalk & Talk	TB-1
45	Comparison of transistor amplifiers	1	20-10-2024		Chalk & Talk	TB-1
46	Revision on unit-4	1	21-10-2024		PPT	
47	class test on Unit -4	1	22-10-2024		PAPER TEST	
<b>UNIT-5</b>						
48	FET types, JFET operation	1	26-10-2024		Chalk & Talk	TB-1
49	Characteristics, small signal model of JFET.	1	27-10-2024		Chalk & Talk	TB-1,R1
50	MOSFET Structure, Operation of MOSFET	1	28-10-2024		Chalk & Talk	TB-1,R1
51	Operation in triode region, operation in saturation region	1	29-10-2024		Chalk & Talk	TB-1,R1
52	MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET	1	31-10-2024		Chalk & Talk	TB-1,R1
53	MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET	1	02-11-2024		Chalk & Talk	TB-1
54	MOS device models: MOS small signal model	1	03-11-2024		Chalk & Talk	TB-1
55	PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices.	1	04-11-2024		Chalk & Talk	TB-1
56	General Considerations, Common Source Stage	1	05-11-2024		Chalk & Talk	TB-1
57	Common Gate Stage, Source Follower	1	07-11-2024			TB-1
58	Comparison of FET amplifiers	1			Chalk & Talk	TB-1
59	Revision on unit-5	1	09-11-2024		PPT	
60	class test on Unit -5	1	10-11-2024		PAPER TEST	

**Text books (T) / Reference books (R)/Additional text books (A):**

<b>T/R/A</b>	<b>Book Title/Author/Publication</b>
<b>T1</b>	Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015
<b>T2</b>	Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
<b>T3</b>	Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.
<b>R1</b>	Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015
<b>R2</b>	Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.
<b>R3</b>	Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022

**Web References:**

<b>W</b>	<b>Web References</b>
<b>W1</b>	<a href="https://www.rfwireless-world.com/Terminology/CB-vs-CE-vs-CC-transistor-configurations.html">https://www.rfwireless-world.com/Terminology/CB-vs-CE-vs-CC-transistor-configurations.html</a>
<b>W2</b>	<a href="http://www.faadooengineers.com/online-study/post/ece/analog-electronics/557/fet-as-a-voltage-variable-resistor-vvr">http://www.faadooengineers.com/online-study/post/ece/analog-electronics/557/fet-as-a-voltage-variable-resistor-vvr</a>
<b>W3</b>	<a href="https://www.tutorialspoint.com/basic_electronics/basic_electronics_special_purpose_diodes.htm">https://www.tutorialspoint.com/basic_electronics/basic_electronics_special_purpose_diodes.htm</a>
<b>W4</b>	<a href="http://ggn.dronacharya.info/ECEDept/Downloads/QuestionBank/VIIsem/oc_C-Unit-3-LED_Structures.pdf">http://ggn.dronacharya.info/ECEDept/Downloads/QuestionBank/VIIsem/oc_C-Unit-3-LED_Structures.pdf</a>

### ASSESSMENT METHODOLOGIES-DIRECT

<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

### ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

**Prepared by**

**Approved by**