

Department of Information Technology (IT)

Course File

ELECTRONIC DEVICES AND CIRCUITS

(Course Code: EC205ES)

I B.Tech II Semester

2023-24

Mrs.K. RAMA KRISHNA
Assistant Professor



ELECTRONIC DEVICES AND CIRCUITS

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(Highlighted parts has to be revised by individual faculty)

ELECTRONIC DEVICES AND CIRCUITS

Int. Marks:40 Ext. Marks:60 Total Marks:100

(Common to ECE, CSE, IT&AIML)

Course Code: EC205ES

UNIT –I: Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics of Diode, Diode as a switch- switching times.

UNIT –II: Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters,

Clippers and Clampers: Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III: Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times.

UNIT -IV: Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT –V: Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

Text Books:

1. Electronic Devices and Circuits - J.Millman, C.C.Halkias, and SatyabrathaJit Tata McGraw Hill, 2nd Ed.,2007.
2. Electronic Devices and Circuits - R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition,2006.
3. Introduction to Electronic Devices and Circuits- Rober T. PaynterPE

Reference Books:

1. Electronic Devices and Circuits - T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition,2004.
2. Principles of Electronic Circuits - S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn...,1998.
3. Microelectronics - Millman and Grabel, Tata McGraw Hill,1988. 4. Electronic Devices and Circuits - Dr. K. Lal Kishore,B.S.



ANURAG ENGINEERING COLLEGE

Ananthagiri(V&M),Suryapet(Dt)-508206 A.P Ph:08683-272555,272456,272221

Academic Year 2023-24

I B.Tech II Semester Consolidated Time Table

w.e.f 02.05-2024

DAY / PERIOD	Branch	I	II	BREAK	III	BREAK	IV	V	BREAK	VI	VII
		09.30 - 10:20	10.20 - 11.10	11.10 - 11.20	11.20 - 12.10	12.10 - 12.50	12.50 - 01.35	01.35 - 02.20	02.20 - 02.30	02.30 - 3.03.15	15 - 04.00
MON	ECE	CAEG				LB UR NE CA HK	ODE	BEE		EDC	Games/Library
	CSE-A	ODE	AP		ESE		EDC	AP		ODE	EDC
	CSE-B	AP	EDC		ES		ODE	ELCS LAB			
	CSE-C	EDC	ODE		AP		ODE	AP		EDC	ESE
	IT	ODE	BEE		EC		EDC	ODE		BEE	EC
	AIML-A	EDC	ODE		AP		ESE	AP/EWS LAB			
	AIML-B	ESE	EDC		ODE		AP	EDC		ODE	AP
TUE	ECE	CAEG				LB UR NE CA HK	EC	EDC		BEE	ODE
	CSE-A	EDC	AP		ODE		ESE	AP/EWS LAB			
	CSE-B	AP/EWS LAB					AP	ODE		EDC	ESE
	CSE-C	ODE	AP		EDC		ES	AP		ESE	EDC
	IT	EDC	ODE		BEE		EC	EC/BEE LAB			
	AIML-A	AP	ODE		EDC		PYTL	AP		ODE	ESE
	AIML-B	ES	CRE		ODE		EDC	ESE		AP	Games/Library
WED	ECE	EC/BEE LAB				LB UR NE CA HK	BEE	ODE		EDC	EC
	CSE-A	AP	CRE		EDC		ODE	PYTL		ES	Games/Library
	CSE-B	AP	EDC		ODE		ESE	AP		ODE	EDC
	CSE-C	CRE	AP		ODE		ESE	AP/EWS LAB			
	IT	BEE	EC		EDC		EDC	BEE		ODE	Games/Library
	AIML-A	ELCS LAB					ES	AP		ODE	ES
	AIML-B	EDC	ODE		AP		CRE	ELCS LAB			
THU	ECE	EDC	ODE		BEE	LB UR NE CA HK	EC	ODE		EC	BEE
	CSE-A	ESE	AP		EDC		CRE	AP		ES	ODE
	CSE-B	ESE	AP		ODE		ES	AP/EWS LAB			
	CSE-C	ELCS LAB					PYTL	ODE		AP	EDC
	IT	EC/BEE LAB					BEE	EC		ODE	COI
	AIML-A	ODE	EDC		AP		EDC	AP		ESE	CRE
	AIML-B	AP/EWS LAB					PYTL	ODE		AP	ESE
FRI	ECE	COI	EC		ODE	LB UR NE CA HK	EDC	EC/BEE LAB			
	CSE-A	ESE	AP		EDC		ODE	AP/EWS LAB			
	CSE-B	EDC	AP		ESE		AP	ODE		EDC	CRE
	CSE-C	ODE	ES		EDC		CRE	AP		ESE	Games/Library
	IT	CAEG					BEE	EDC		EC	ODE
	AIML-A	EDC	ODE		ESE		ES	AP		CRE	Games/Library
	AIML-B	AP/EWS LAB					ESE	ODE		AP	EDC
SAT	ECE	COI	BEE		EC	LB UR NE CA HK	EDC	BEE		ODE	EC
	CSE-A	ESE	AP		ODE		EDC	ELCS LAB			
	CSE-B	ESE	CRE		AP		EDC	ODE		PYTL	Games/Library
	CSE-C	AP/EWS LAB					ESE	ODE		EDC	AP
	IT	EC	ODE		EDC		COI	CAEG			

AIML-A	EDC	AP		<i>ODE</i>	ESE	AP/EWS LAB			
AIML-B	AP	<i>ODE</i>		EDC	ES	ESE		AP	EDC

TIME TABLE

I B.Tech. II Semester IT

Day/Hour	9.30-10.20	10.20-11.10	11.20-12.10	12.10-12.50	12.50-1.35	1.35-2.20	2.30-3.15	3.15-4.00
Monday					EDC-IT			
Tuesday	EDC-IT							EDC-IT
Wednesday					EDC-IT			
Thursday								
Friday						EDC-IT		
Saturday			EDC-IT					

Vision of the Institute

To be a premier Institute in the country and region for the study of Engineering, Technology and Management by maintaining high academic standards which promotes the analytical thinking and independent judgment among the prime stakeholders, enabling them to function responsibly in the globalized society.

Mission of the Institute

To be a world-class Institute, achieving excellence in teaching, research and consultancy in cutting-edge Technologies and be in the service of society in promoting continued education in Engineering, Technology and Management.

Quality Policy

To ensure high standards in imparting professional education by providing world-class infrastructure, top-quality-faculty and decent work culture to sculpt the students into Socially Responsible Professionals through creative team-work, innovation and research.

Vision of the Department

To generate competent professionals to become part of the Industry and Research Organizations at the National and International levels.

Mission of the Department

- To train the students to have in-depth knowledge of the subjects in the field of Computer Science and Engineering.
- To train the students with leadership qualities, team work skills, commitment and ethics thereby making them develop confidence for R & D activities and for placement in multinational and national.

Program Educational Objectives (B.Tech. –IT)**Graduates will be able to**

PEO1: Excel in professional career and/or higher education by acquiring knowledge in mathematical, computing and engineering principles

PEO2: Be able to analyze the requirements of the software, understand the technical specifications, design and provide novel engineering solutions and efficient product designs.

PEO3: Adopt to professionalism, ethical attitude, communication skills, team work, lifelong learning in their profession.

Program Outcomes (B.Tech. –IT)**At the end of the Program, a graduate will have the ability to**

PO 1: Gain an ability to apply knowledge of mathematics, science and engineering fundamentals appropriate to the discipline.

PO 2: Develop the competence to identify, analyze, formulate and solve engineering problems.

PO 3: Acquire an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO 4: Are capable to design and conduct experiments, analyze and interpret data in the field of computer science and engineering.

PO 5: Gain expertise to use the techniques, skills and modern engineering tools with proficiency in basic area of computer science and engineering.

PO 6: An ability to analyze the local and global impact of computing on individuals, organizations, and society.

PO 7: Knowledge of contemporary issues.

PO 8: Sensitive to engage in activities with conscious social responsibility adhering to ethical values.

PO 9: An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.

PO 10: An ability to articulate professional ideas clearly and precisely in making written and oral presentations.

PO 11: Recognition of the need for and an ability to engage in continuing professional development.

PO 12: An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

COURSE OBJECTIVES

On completion of this Subject/Course the student shall be able to:

S.No	Objectives
1	To introduce components such as diodes,.
2	To know the applications of Diode.
3	To understand the characteristics of the BJT.
4	To understand the characteristics of the JFET and MOSFET.
5	To understand the characteristics of the special purpose devices.

COURSE OUTCOMES

The expected outcomes of the Course/Subject are:

S.No	Outcomes
1.	Analyze the PN Junction diode operation and its characteristics
2.	Know the applications of Diode such as clippers and clampers.
3.	Analyze the characteristics of BJT.
4.	Analyze the characteristics of FET.
5.	Understand the concept of special purpose devices

Signature of faculty

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the outcomes.

GUIDELINES TO STUDY THE COURSE / SUBJECT

Course Design and Delivery System (CDD):

- The Course syllabus is written into number of learning objectives and outcomes.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD

Signature of faculty

Date:

Date:

COURSE SCHEDULE (I)

The Schedule for the whole Course / Subject is:

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	Unit-I: Diodes Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics of Diode, Diode as a switch- switching times.	5.2.2024	26.2.2024	14
2.	Unit-II: Diode Applications Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters Clippers and Clampers: Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.	27.2.2024	19.3.2024	13
3.	Unit-III: Bipolar Junction Transistor (BJT) Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times.	26.3.2024	20.4.2024	10
4.	Unit-IV: Junction Field Effect Transistor (FET) Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.	22.4.2024	06.5.2024	11
5.	Unit-V: Special Purpose Devices Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.	07.5.2024	12.6.2024	10

SCHEDULE OF INSTRUCTIONS - COURSE PLAN

Unit No.	Lesson No.	Date	No. of Periods	Topics / Sub-Topics	Objectives & Outcomes Nos.	References (Textbook, Journal)
1.	1	5.2.2024 7.2.2024	2	Introduction to Electronic Devices and Circuits, Classification of semiconductor materials	1 1	Electronic Devices and Circuits - J.Millman
	2	8.2.2024 9.2.2024	2	Unit-I: Introduction to PN Junction Diode, PN junction as a Diode	1 1	Electronic Devices and Circuits - J.Millman
	3	12.2.2024 15.2.2024	2	Working of PN Junction Diode, V-I Characteristics of PN Junction Diode	1 1	Electronic Devices and Circuits - J.Millman
	4	16.2.2024 17.2.2024	2	Diode current equation, Effect of temperature on V-I characteristics of Diode	1 1	Electronic Devices and Circuits - J.Millman
	5	19.2.2024	1	Diode equivalent circuits	1	Electronic Devices and Circuits - J.Millman
	6	21.2.2024	1	Diode resistances: Static & Dynamic resistances	1	Electronic Devices and Circuits - J.Millman
	7	22.2.2024	2	Diffusion capacitance, Transition capacitance	1	Electronic Devices and Circuits - J.Millman
	8	23.2.2024 24.2.2024	2	Diode as a switch, Diode switching times and its characteristics	1 1	Electronic Devices and Circuits - J.Millman
2.	1	26.2.2024 28.2.2024	2	Problems based on Diodes, Unit –II: Introduction to Diode applications	2 2	Electronic Devices and Circuits - R.L. Boylestad
	2	29.2.2024	1	Half wave Rectifier	2 2	Electronic Devices and Circuits - R.L. Boylestad
	3	1.3.2024	2	Center-tapped Full wave Rectifier, Bridge full wave Rectifier	2 2	Electronic Devices and Circuits - R.L. Boylestad
	4	4.3.2024	1	Comparison of Rectifiers,	2	Electronic Devices and

		6.3.2024		Capacitor filter with Rectifiers		Circuits - R.L. Boylestad
	5	7.3.2024 11.3.2024	2	Inductor filter with Rectifiers, Clippers, Classification of clippers	2 2	Electronic Devices and Circuits - R.L. Boylestad
	6	13.3.2024 14.3.2024	1	Series and shunt clipper, Clipping at two independent levels	2 2	Electronic Devices and Circuits - R.L. Boylestad
	7	15.3.2024	2	Clampers, Classification of clampers	2	Electronic Devices and Circuits - R.L. Boylestad
	8	16.3.2024 16.3.2024	2	Negative Clamper, Positive Clamper	2 2	Electronic Devices and Circuits - R.L. Boylestad
	9	18.3.2024 19.3.2024	2	Clamping circuit theorem, Problems based on Diode applications	2 2	Electronic Devices and Circuits - R.L. Boylestad
3.	1	21.3.2024	1	Unit III: Introduction to BJT	3	Electronic Devices and Circuits - J.Millman
	2	22.3.2024	1	Construction and operation of BJT(NPN&PNP)	3	Electronic Devices and Circuits - J.Millman
	3	23.3.2024	2	Common Base Configuration	3 3	Electronic Devices and Circuits - J.Millman
	3	27.3.2024	2	Common Emitter Configuration	3 3	Electronic Devices and Circuits - J.Millman
	4	28.3.2024	2	Common Collector Configuration	3 3	Electronic Devices and Circuits - J.Millman
	5	30.3.2024	1	Relation between Alpha, Beta & Gamma	3	Electronic Devices and Circuits - J.Millman
	6	2.4.2024	2	Mid-I Exam		
	7	18.4.2023	1	Transistor as a switch & switching times	3	Electronic Devices and Circuits - J.Millman
4.	1	19.4.2024	2	Unit IV: Introduction to JFET	4 4	Electronic Devices and Circuits - R.L. Boylestad
	2	22.4.2024 1.5.2024	2	Construction & operation of N-channel JFET, Construction & operation of P-channel JFET	4 4	Electronic Devices and Circuits - R.L. Boylestad
	3	2.5.2024	2	Differences between BJT & FET, Construction & operation of E-MOSFET	4 4	Electronic Devices and Circuits - R.L. Boylestad
	4	3.5.2024 4.5.2024	3	Construction & operation of D-MOSFET, V-I characteristics of D-MOSFET, E-MOSFET	4 4	Electronic Devices and Circuits - R.L. Boylestad
	5	6.5.2024	2	MOSFET as a capacitor	4 4	Electronic Devices and Circuits - R.L. Boylestad

5	1	7.5.2024	1	Unit V: Special Purpose Devices	5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	2	9.5.2024	2	Zener diode and its voltage regulator, Silicon controlled rectifier	5 5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	3	10.5.2024	1	Tunnel diode	5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	4	5.6.2024 6.6.2024	2	Unijunction Transistor, Photo diode and solar cell	5 5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	5	7.6.2024	1	Varactor Diode and Light Emitting Diode	5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	6	10.6.2024	1	Schottky Barrier Diode	5 5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE
	7	12.6.2024	1	Revision	5	Introduction to Electronic Devices and Circuits- Rober T. PaynterPE

Signature of HOD

Signature of faculty

Date:

Date:

Note:

1. Ensure that all topics specified in the course are mentioned.
2. Additional topics covered, if any, may also be specified in bold.
3. Mention the corresponding course objective and outcome numbers against each topic.

LESSON PLAN (U-I)

Lesson No: 01, 02

Duration of Lessons: 1hr 40 min

Lesson Title: Introduction to Electronic Devices

Instructional / Lesson Objectives:

- To make students understand course structure
- To familiarize students on different electronic components
- To understand students different types of materials
- To familiarize students on classification of semiconductor materials.

Teaching AIDS: PPTs, Black board

Time Management of Class :100 minutes

5 mins for taking attendance 10 mins for previous lecture 75 min for the lecture delivery 10 min for doubts session
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Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 03, 04

Duration of Lesson: 1hr40 min

Lesson Title: PN junction as a Diode

Instructional / Lesson Objectives:

- To make students understand formation of PN junction diode
- To understand students different materials are used to form a Diode .

Teaching AIDS :PPTs, Black board

Time Management of Class :100 minutes

5 mins for taking attendance 10 mins for previous lecture 75 min for the lecture delivery 10 min for doubts session
--

Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 05, 06

Duration of Lesson: 1 hr40 min

Lesson Title: V-I characteristics of PN junction Diode

Instructional / Lesson Objectives:

- To familiarize students to draw the characteristics of a Diode
- To understand students the working of PN junction Diode.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min.

5 mins for taking attendance 10 for revision of previous class 75 min for lecture delivery 10 min for doubts session

Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 07,08

Duration of Lesson: 1hr40 min

Lesson Title: Diode Current Equation, Temperature effect of VI characteristics of Diode

Instructional / Lesson Objectives:

- To understand students to analyse Diode current equation
- To understand students to solve problems based on Diode equation
- To familiarize students to draw the temperature effect of vi characteristics of Diode.

To familiarize students

Teaching AIDS: PPTs, Black board

Time Management of Class : 100 min

5 mins for taking attendance 10 min for revision of previous class. 75 min for the lecture delivery 10 min for doubts session
--

Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 09,10

Duration of Lesson: 1hr 40 MIN

Lesson Title: Diode equivalent circuits ,Diode Resistances

Instructional / Lesson Objectives:

- To make students understand the analysis of diode static and dynamic resistances.
- To familiarize students on diode equivalent circuits

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min.

5 mins for taking attendance 10 min for revision of previous class. 75 min for the lecture delivery 10 min for doubts session
--

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 11,12

Duration of Lesson: 1hr40 min.

Lesson Title: Diode Capacitances.

Instructional / Lesson Objectives:

- To make students understand different types of diode capacitances
- To familiarize students on analysis of diffusion capacitance
- To familiarize students on analysis of transition capacitance.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min.

5 mins for taking attendance 10 min for revision of previous class 75 min for the lecture delivery 10 min for doubts session

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 12, 13

Duration of Lesson: 1hrs 40 min.

Lesson Title: Diode as a switch and its switching times.

Instructional / Lesson Objectives:

- To make students understand how the diode acts as a switch
- To familiarize students on diode switching times
- To understand students problems based on PN junction Diode.

Teaching AIDS : PPTs, Black board

Time Management of Class : 100 min.

5 mins for taking attendance 10 min for revision of previous class 75 min for the lecture delivery 10 min for doubts session

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 14, 15,16,17,18

Duration of Lesson: 4 hr10 min

Lesson Title: Diode Applications, Rectifiers.

Instructional / Lesson Objectives:

- To make students understand the applications of diode
- To familiarize students on classification of rectifiers
- To understand students the analysis of halfwave,full wave and bridge rectifiers.
- To provide information on differences between rectifiers.

Teaching AIDS :PPTs, Black board

Time Management of Class : 250 min

15 mins for taking attendance 15 mins for previous lecture 200 min for the lecture delivery 20 min for doubts session
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Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 21,22

Duration of Lesson: 1hr 40 min

Lesson Title: Rectifiers with filters.

Instructional / Lesson Objectives:

- To make students understand the concept and analysis of capacitor filter with full wave rectifier
- To familiarize students on analysis of inductor filter with full wave rectifier.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min

5 mins for taking attendance 10 mins for previous lecture 75 min for the lecture delivery 10 min for doubts session
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Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 23, 24,

Duration of Lesson: 1hr 40 min

Lesson Title: Clippers

Instructional / Lesson Objectives:

- To make students understand classification of clippers
- To familiarize students on series clipper and shunt clipper
- To understand students the concept of clipping at two independent levels.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min

5 mins for taking attendance 10 for revision of previous class 75 min for lecture delivery 10 min for doubts session

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 25

Duration of Lesson: 50 min

Lesson Title: Clampers

Instructional / Lesson Objectives:

- To make students understand the concept of clamper
- To familiarize students on working of negative and positive clamper
- To understand students clamping circuit theorem
- To make students understand the problems based on clippers and clampers.

Teaching AIDS :PPTs, Black board

Time Management of Class : 60 min

5 mins for taking attendance 5 mins for previous lecture 35 min for the lecture delivery 5 min for doubts session
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Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-III)

Lesson No: 26

Duration of Lesson: 50 min

Lesson Title: Introduction to Bipolar junction transistor (BJT)

Instructional / Lesson Objectives:

- To make students understand the construction of BJT(NPN &PNP)
- To familiarize students on functioning of n-p-n and p-n-p transistor.
- To understand students the concept of different working regions in BJT.
- To familiarize students on input and output characteristics of CB,CE,CC configurations.

Teaching AIDS :PPTs, Black board

Time Management of Class : 50 min

5 mins for taking attendance 5 min for revision of previous class. 35 min for the lecture delivery 5 min for doubts session
--

Refer assignment-III & tutorial-III sheets.

Signature of faculty

LESSON PLAN (U-III)

Lesson No: 34,35

Duration of Lesson: 1hr 40 min

Lesson Title: Mid I examination

Signature of faculty

LESSON PLAN (U-III)

Lesson No: 36

Duration of Lesson: 50 min

Lesson Title: Transistor as a switch

Instructional / Lesson Objectives:

- To make students understand the relation between alpha,beta,gamma
- To familiarize students on working of a transistor as a switch
- To understand students the different transistor switching times.

Teaching AIDS :PPTs, Black board

Time Management of Class : 50 min.

5 mins for taking attendance 5 mins for previous lecture 35 min for the lecture delivery 5 min for doubts session
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Refer assignment-III & tutorial-III sheets.

Signature of faculty

LESSON PLAN (U-IV)

Lesson No: 37,38

Duration of Lesson: 1 hr 40 min

Lesson Title: Introduction to JFET

Instructional / Lesson Objectives:

- To make students understand the construction and working of N-channel JFET
- To make students understand the construction and working of P-channel JFET
- To familiarize students on differences between BJT and FET.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min

10 mins for taking attendance 10 min for revision of previous class. 70 min for the lecture delivery 10 min for doubts session

Refer assignment – IV& tutorial-IV sheets

Signature of faculty

LESSON PLAN (U-IV)

Lesson No: 40, 41

Duration of Lesson: 1 hr 40 min

Lesson Title: MOSFET

Instructional / Lesson Objectives:

- To make students understand the classification of MOSFET
- To understand students the construction and operation of E-MOSFET & D-MOSFET
- To familiarize students on V-I characteristics of E-MOSFET & D-MOSFET
- To make students understand the MOSFET as a capacitor.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min

5 mins for taking attendance 10 mins for previous lecture 80 min for the lecture delivery 5 min for doubts session

Refer assignment – IV & tutorial-IV sheets

Signature of faculty

LESSON PLAN (U-V)

Lesson No: 44,45

Duration of Lesson: 1hr40 MIN

Lesson Title: Introduction to special purpose devices, Zener Diode

Instructional / Lesson Objectives:

- To make students understand the working of Zener diode
- To familiarize students on V-I characteristics of Zener diode
- To understand students on how the Zener diode acts as a voltage regulator.

Teaching AIDS :PPTs, Black board

Time Management of Class : 100 min

10 mins for taking attendance 10 mins for previous lecture 70 min for the lecture delivery 10 min for doubts session

Refer assignment – V & tutorial-V sheets

Signature of faculty

LESSON PLAN (U-V)

Lesson No: 49,50,51,52

Duration of Lesson: 3hr 20 min

Lesson Title: SCR, Tunnel Diode, UJT

Instructional / Lesson Objectives:

- To make students understand the operation of silicon controlled rectifier
- To familiarize students on characteristics and operation of Tunnel Diode
- To understand students the concept and characteristics of Uni Junction Transistor.

Teaching AIDS :PPTs, Black board

Time Management of Class : 200 min

10 mins for taking attendance 15 for revision of previous class 160 min for lecture delivery 15 min for doubts session

Refer assignment – V & tutorial-V sheets

Signature of faculty

LESSON PLAN (V)

Lesson No:53,54,55

Duration of Lesson: 2 hr 30 min

Lesson Title: Photo diode, Solar cell, Varactor diode ,LED, Schottky barrier diode

Instructional / Lesson Objectives:

- To make students understand the construction and working of photo diode
- To familiarize students on characteristics of Photo diode
- To understand students the construction and working of Solar cell
- To understand students the construction and working of varactor diode
- To understand students the construction and working of LED
- To understand students the construction and working of Schottky barrier diode.
- To familiarize students on characteristics of LED, Schottky barrier diode.

Teaching AIDS :PPTs, Black board

Time Management of Class : 150 min

10 mins for taking attendance 15 mins for previous lecture 110 min for the lecture delivery 15 min for doubts session
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Refer assignment – V & tutorial-V sheets

Signature of faculty

ASSIGNMENT – 1

This Assignment corresponds to Unit No. 1

Question No.	Question	Objective No.	Outcome No.
1	With neat diagram explain the working of a PN junction diode in forward bias and reverse bias and also show the effect of temperature on its VI characteristics	1	1
2	Derive the expression for transition and diffusion capacitance of a PN junction diode	1	1

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 2

This Assignment corresponds to Unit No. 2

Question No.	Question	Objective No.	Outcome No.
1	Draw and Explain Half wave Rectifier with the help of circuit diagram & waveforms and also derive the following parameters a) DC current b) RMS current c) Ripple factor d) Efficiency e) TUF	2	2
2	Explain the operation of positive and negative clamping circuits	2	2

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 3

This Assignment corresponds to Unit No. 3

Question No.	Question	Objective No.	Outcome No.
1	Explain the construction and operation of PNP and NPN transistor	3	3
2	With neat diagram, explain input-output characteristics of BJT for CE configuration	3	3

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 4

This Assignment corresponds to Unit No. 4

Question No.	Question	Objective No.	Outcome No.
1	Explain the construction & operation of n-channel JFET with its characteristics and explain the different regions in transfer characteristics.	4	4
2	Explain with the help of neat diagrams, the construction and working principle of a n-channel depletion mode MOSFET.	4	4

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 5

This Assignment corresponds to Unit No. 5

Question No.	Question	Objective No.	Outcome No.
1	Explain V-I characteristics of Zener diode with neat diagrams and also explain Zener diode as a voltage regulator.	5	5
2	Draw the symbol and equivalent circuit of a UJT. Explain the operation of UJT with the help of its I-V characteristics.	5	5

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 1

This tutorial corresponds to Unit No. 1 (Objective Nos.: 1, Outcome Nos.: 1)

Q1. What type of impurity ions is present in P-type semiconductor?

A) Donor ions B) Acceptor ions C) Both Donor and acceptor ions D) None of these

Q2. What is built-in potential value of Ge Diode?

A) 0.3v B) 0.1v C) 0.9v D) 0.7v

Q3. In forward bias condition, the rise in temperature how the characteristics of Si diode changes

A) Shift right B) shift left C) Constant D) none of these

Q4. In reverse bias condition, for every 10 degree centigrade rise in temperature, the reverse saturation current is

A) Doubled B) Tripled C) Constant D) None of these

Q5. How many valance electrons are present in semiconductor material?

A) =4 B) <4 C) >4 D) none of these

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 2

This tutorial corresponds to Unit No. 2 (Objective Nos.: 2, Outcome Nos.: 2)

Q1. what is the efficiency of Center tapped full wave Rectifier

- A) 40.5% B) 81.2% C) 27.8% D) 121%

Q2. Clamper circuit is also referred as?

- A) DC cutter B) DC inserter C) DC lifter D) DC leveler

Q3. Which circuit is called the Limiter circuit?

- A) chopper circuit B) clipper circuit C) clamper circuit D) chopping circuit

Q4. Rectifier means

- A) AC to DC converter C) DC to AC converter
B) AC to Pulsating DC D) NONE OF THESE

Q5. How many Diodes used in Bridge Rectifier

- A) 1 B) 2 C) 3 D) 4

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL SHEET – 3

This tutorial corresponds to Unit No. 3 (Objective Nos.: 3, Outcome Nos.: 3)

Q1. Which part of a transistor is heavily doped and emits majority carriers, either electrons or holes?

- A) Collector B) Emitter C) Base and Emitter D) Base

Q2. The number of depletion layers in a transistor is?

- A) 2 B) 3 C) 4 D) 5

Q3. Which among the following configuration has High current and Low voltage gain?

- A) CB B) CC C) CE D) None of these

Q4. BJT transistor consists of how many terminals?

- A) 3 B) 2 C) 1 D) 4

Q5. BJT stands for.....

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 4

This tutorial corresponds to Unit No. 4 (Objective Nos.: 4, Outcome Nos.: 4)

Q1. What are the terminals of FET

- A) Gate Drain Source C) Base Emitter Collector
B) Anode Cathode Gate D) Darian Base Source

Q2. FET Stands for-----

Q3. MOSFET STANDS FOR-----

Q4. _____ is a current control device

- A) BJT B) FET C) MOSFET D) VDR

Q5. _____ is a voltage control device

- A) BJT C) FET B) UJT D) PN

Signature of HOD

Date:

Signature of faculty

Date:

TUTORIAL SHEET – 5

This tutorial corresponds to Unit No. 5 (Objective Nos.: 5, Outcome Nos.: 5)

Q1. SCR stands for.....

Q2. Solar cell can also be called as.....

Q3. Light Emitting Diode converts

A) Electrical to Light energy B) Light to Electrical energy

C) Electrical to mechanical energy D) None of these

Q4. Photo diode operates in

A) forward bias B) reverse bias

C) both forward and reverse D) none

Q5. What is the range of intrinsic standoff ratio in UJT

A) 0.5 to 0.75 B) 1 to 1.5 C) 2 to 5 D) above 5

Signature of HOD

Signature of faculty

Date:

Date:

EVALUATION STRATEGY

Target (s)

- a. Percentage of Pass : 85%

Assessment Method (s) (Maximum Marks for evaluation are defined in the Academic Regulations)

- a. Daily Attendance
- b. Assignments
- c. Online Quiz
- d. Continuous Internal Assessment
- e. Semester / End Examination

List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this semester

Case Study of any one existing application

Signature of HOD

Signature of faculty

Date:

Date:

COURSE COMPLETION STATUS

Actual Date of Completion & Remarks if any

Units	Remarks	Objective No. Achieved	Outcome No. Achieved
Unit 1	completed on 28.02.2024	1	1
Unit 2	completed on 23.03.2024	2	2
Unit 3	completed on 22.04.2024	3	3
Unit 4	completed on 06.05.2024	4	4
Unit 5	completed on 12.06.2024	5	5

Signature of HOD

Signature of faculty

Date:

Date:

Mappings

1. Course Objectives-Course Outcomes Relationship Matrix

(Indicate the relationships by mark “X”)

Course-Objectives \ Course-Outcomes	1	2	3	4	5
1	H				
2		H			
3			H		
4				H	
5					H

2. Course Outcomes-Program Outcomes (POs) & PSOs Relationship Matrix

(Indicate the relationships by mark “X”)

P-Outcomes \ C-Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO 1	PSO 2
1	H			M										
2	M	H	M											
3	H													
4	M	L	M	L										
5	H	L		M	M									

H-HIGH M-MODERATE L-LOW

Rubric for Evaluation

Performance Criteria	Unsatisfactory	Developing	Satisfactory	Exemplary
	1	2	3	4
<i>Research & Gather Information</i>	Does not collect any information that relates to the topic	Collects very little information some relates to the topic	Collects some basic Information most relates to the topic	Collects a great deal of Information all relates to the topic
<i>Fulfill team role's duty</i>	Does not perform any duties of assigned team role.	Performs very little duties.	Performs nearly all duties.	Performs all duties of assigned team role.
<i>Share Equally</i>	Always relies on others to do the work.	Rarely does the assigned work - often needs reminding.	Usually does the assigned work - rarely needs reminding.	Always does the assigned work without having to be reminded
<i>Listen to other team mates</i>	Is always talking— never allows anyone else to speak.	Usually doing most of the talking-- rarely allows others to speak	Listens, but sometimes talks too much.	Listens and speaks a fair amount.

EDC MID I & II PAPERS



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I B.TECH II SEMESTER I MID EXAMINATIONS - APRIL 2024

Branch : B.Tech. (Common to All)

Max. Marks: 30

Date : 02 - Apr - 2024 AN

Time: 120 Minutes

Subject : Electronic Devices and Circuits, EC205ES

PART - A

ANSWER ALL QUESTIONS

10 X 1 M = 10 M

Q.No	Question		CO	BTL
1.	Write diode current equation	()	CO1	L2
2.	An ideal diode in forward-bias acts as (A). Buffer (B). Multiplier (C). Closed switch (D). Open switch	()	CO1	L1
3.	VI characteristics of pn junction diode is (A). Linear (B). non linear (C). decreasing (D). none of the above	()	CO1	L2
4.	Define reverse saturation current of PN junction diode	()	CO1	L2
5.	Define efficiency and what is the efficiency of halfwave and fullwave rectifier	()	CO2	L1
6.	Define clipper	()	CO2	L1
7.	Define Rectifier	()	CO2	L1
8.	what do you meant by clamper	()	CO2	L1
9.	What is the increasing order for size of BJT terminals (A). base<emitter<collector (B). collector<emitter<base (C). base<collector<emitter (D). none of the above	()	CO3	L2
10.	What is the order of doping concentration for regions of BJT (A). base>emitter>collector (B). emitter>base>collector (C). base<collector<emitter (D). none of the above	()	CO3	L2

PART - B

ANSWER ANY FOUR

4 X 5 M = 20 M

Q.No	Question		CO	BTL
11.	With neat diagram explain the working of pn junction diode in forward bias and reverse bias with volt-ampere characteristics		CO1	L2
12.	Explain volt-ampere characteristics of pn junction diode and show the effect of temperature on it		CO1	L2
13.	Explain the working of bridge rectifier with the help of waveforms and also derive its efficiency		CO2	L2
14.	Explain the working of halfwave rectifier with the help of waveforms and also derive its ripple factor		CO2	L2
15.	Explain the operation of PNP Transistor		CO3	L2
16.	With neat diagram explain the input-output characteristics of BJT for CB configuration		CO3	L3



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I B.TECH II SEMESTER II MID EXAMINATIONS - JUNE 2024

Branch : B.Tech. COMMON TO ALL

Max. Marks : 30M

Date : 19-Jun-2024 Session : Afternoon

Time : 120 Min

Subject : Electronic Devices and Circuits,EC205ES

PART - A

ANSWER ALL THE QUESTIONS

10 X 1M = 10M

Q.No	Question	CO	BTL
1.	What are the application of transistors.	CO3	L1
2.	What is saturaion and cut off region.	CO3	L1
3.	MOSFET stands for _____	CO4	L1
4.	Write relation between FET parameters.	CO4	L1
5.	FET is _____ Variable resistor (A). Current (B). Voltage (C). Power (D). Channel	CO4	L1
6.	Draw Symbol of N-channel JFET	CO4	L1
7.	Draw symbol of UJT.	CO5	L1
8.	Draw Characteristics of Solar Cell	CO5	L1
9.	Draw symbol of LED.	CO5	L1
10.	What are the applications of Photo Diode.	CO5	L1

PART - B

ANSWER ANY FOUR

4 X 5M = 20M

Q.No	Question	CO	BTL
11.	Draw and explain input and output characteristics of of BJT CE configuration.	CO3	L3
12.	Explain Transistor switching characteristics in detail.	CO3	L4
13.	Explain construction , working and V-I Characteristics of N-channel Depletion MOSFET.	CO4	L3
14.	Compare BJT and FET.	CO4	L3
15.	Explain operation, V-I Characteristics of UJT.	CO5	L3
16.	Explain operation, V-I Characteristics of Varactor Diode.	CO5	L3

Internal Marks (IT)**Continuous Internal Assessment (R-22)**Programme: **B.Tech. (IT)**Year: **I**Course: **Theory**A.Y: **2023-24**Course: **EDC**Faculty Name: **Mr. K. RAMA KRISHNA**

S. No	Roll No	MID-I (30M)	MID-II (30M)	Avg. of MID I & II(30M)	Avg. of assignment I & II(5M)	Viva- Voce/Poster Presentation (5M)	Total Marks (40)
1	23C11A1201	2	8	5	4	5	14
2	23C11A1202	4	AB	2	0	3	5
3	23C11A1203	29	29	29	5	5	39
4	23C11A1204	2	6	4	5	5	14
5	23C11A1205	8	17	13	4	5	22
6	23C11A1206	18	23	21	5	5	31
7	23C11A1207	24	11	18	5	5	28
8	23C11A1208	3	AB	2	2	5	9
9	23C11A1209	20	22	21	5	5	31
10	23C11A1210	22	26	24	5	5	34
11	23C11A1211	12	0	6	5	5	16
12	23C11A1212	20	11	16	5	5	26
13	23C11A1213	30	29	30	5	5	40
14	23C11A1214	5	3	4	5	5	14
15	23C11A1215	15	16	16	5	5	26
16	23C11A1216	11	8	10	5	5	20
17	23C11A1217	5	AB	3	2	5	10

18	23C11A1218	3	1	2	3	5	10
19	23C11A1219	4	0	2	5	5	12
20	23C11A1220	4	4	4	5	5	14
21	23C11A1221	18	17	18	5	5	28
22	23C11A1222	13	13	13	5	5	23
23	23C11A1223	12	15	14	5	5	24
24	23C11A1224	4	AB	2	3	5	10
25	23C11A1225	16	20	18	5	5	28
26	23C11A1226	4	8	6	4	5	15
27	23C11A1227	21	25	23	5	5	33
28	23C11A1228	11	15	13	5	5	23
29	23C11A1229	2	10	6	3	5	14
30	23C11A1230	8	16	12	5	5	22
31	23C11A1231	9	5	7	5	5	17
32	23C11A1232	13	18	16	5	5	26
33	23C11A1233	5	8	7	5	5	17
34	23C11A1234	5	12	9	5	5	19
35	23C11A1235	2	AB	1	2	5	8
36	23C11A1236	3	7	5	5	5	15
37	23C11A1237	16	23	20	5	5	30
38	23C11A1239	21	17	19	5	5	29
39	23C11A1242	13	21	17	5	5	27
40	23C11A1243	2	5	4	5	5	14
41	23C11A1244	2	5	4	5	5	14
42	23C11A1245	13	10	12	3	5	20

43	23C11A1246	16	17	17	5	5	27
44	23C11A1247	11	23	17	5	5	27
45	23C11A1248	4	6	5	5	5	15
46	23C11A1249	2	3	3	2	5	10
47	23C11A1250	8	9	9	5	5	19
48	23C11A1251	13	25	19	5	5	29
49	23C11A1252	4	8	6	5	5	16
50	23C11A1253	25	28	27	5	5	37
51	23C11A1254	9	17	13	5	5	23
52	23C11A1255	20	28	24	5	5	34
53	23C11A1256	2	5	4	5	5	14
54	23C11A1257	2	9	6	3	5	14
55	23C11A1259	8	14	11	5	5	21

Signature of Faculty

Signature of HoD

:

Sample Answer scripts and Assignments Link

<https://drive.google.com/drive/folders/1oHzsoJv4Ix7Zv6HkaA4z50iM2fa9vuGE>

Course materials like Notes, PPT's, etc.

Will be attached.

EDC Material Link

<https://drive.google.com/drive/u/0/folders/1LiIjgWmjwxDQeYBBf7SzyjBjyGcONhgk>