

## S.E. (ELECTRONICS) SEMESTER III

### BASIC OF ELECTRONIC CIRCUITS

Period per week	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	3	50
	Oral Examination	---	25
	Term Work	---	25
	TOTAL	---	200

Detailed Syllabus		Lectures/Week
1.	<p><b>Semiconductor Materials and Diodes</b>                      Review of Semiconductor Materials and Properties, The PN Junction, Introduction to Semiconductor Diode Theory. Diode Circuits: DC Analysis and Models, AC Equivalent Circuits, Other Diode Types – Solar Cell, Photodiode, Light-Emitting Diode, Schottky Barrier Diode, Pin Diode, Zener Diode, Zener as voltage Regulator, Temperature Effects, Understanding Manufacturer's Specifications.</p>	06
2.	<p><b>Diode Circuits</b>                      Design of Rectifier Circuits:- Full Wave Rectification with 'C', 'L-C' &amp; 'pi' Filter, Ripple-Voltage and Diode Current, Voltage Doubler &amp; Multiplier Circuit, Zener Diode Circuits, Clipper and Clamper Circuits, Multiple-Diode Circuits. Photodiode and LED Circuits.</p>	08
3.	<p><b>The Bipolar Junction Transistor</b>                      Basic Bipolar Junction Transistor, PNP &amp; NPN Transistor Structures Device Symbols:, Current-Voltage Characteristics, Transistor Biasing – Single Base Resistor Biasing, Voltage Divider Biasing and Bias Stability, DC Analysis of Transistor Circuits in Common Emitter Common Base and Common Collector configurations, Forward-active Mode Operation Load Line considerations, Non ideal Transistor Leakage Currents and Breakdown, Integrated Circuit Biasing, Multistage Circuits. Transistor Applications – As a Switch,</p>	08
4.	<p><b>Basic BJT Amplifiers</b></p>	12

	<p>The BJT Linear Amplifier, Graphical Analysis and AC Equivalent Circuit, Small Signal Hybrid – <math>\pi</math>, (<math>g_m r_{\pi}</math>) Equivalent Circuit of the Bipolar Transistor, Hybrid – <math>\pi</math> (<math>g_m r_{\pi}</math>) Equivalent Circuit Including the Early Effect, Expanded Hybrid – <math>\pi</math> Equivalent Circuit, Other Small – Signal Parameters And Equivalent Circuits, Basic Transistor Amplifier Configurations i.e. Common Emitter Common Base and Common Collector (Emitter Follower. AC Load Line Analysis, The Three Basic Amplifier configurations: Summary and Comparison, Design of Single Stage BJT Amplifier.</p> <p>Multistage Amplifiers, Band-Width and Power Considerations, Thermal Considerations in Transistor Amplifiers, Manufacturers’ Specifications.</p>	
5.	<p><b>The Field Effect Transistor</b></p> <p>Junction Field–Effect Transistor, MOS Field–Effect Transistor, MOSFET, Self Biasing Mid-Point Biasing, Biasing for Zero Drain Current-Drift Potential Divider Biasing and DC Circuit Analysis, Basic MOSFET Applications: Switch, Digital Logic Gate and Amplifier. Temperature effects in MOSFETs, Input Protection in MOSFET. The Power FET (VMOS).</p>	12
6.	<p><b>Basic FET Amplifiers</b></p> <p>Basic JFET Amplifier Configurations :- Common Source Amplifier, The Source Follower(Common Drain) Amplifier, The Common Gate Configurations. Summary of the Three Basic Amplifier Configurations.AC Circuit analyses of Common Source Amplifier, The Source Follower(Common Drain) Amplifier, The Common Gate Amplifier Configurations. Design of Single Stage JFET Amplifier. MOSFET amplifier Biasing and DC Circuit Analysis.Ac analysis of Single Stage MOSFET amplifier. Single – Stage Integrated Circuit MOSFET Amplifiers, Multistage Amplifiers.</p>	10

**Text Books:**

1. Donald A. Neamen, Electronic Circuit Analysis and Design, Second edition, McGraw Hill International
2. Robert L Boylestad Louis Nashelsky, Electronic Devices and Circuit theory, sixth edition, Pentice Lay India.
3. Martin Roden , Gordon Carpenter, William Wieserman, Electronic Design, Fourth edition, Shroff Publishers,
4. Microelectronics Circuits (Analysis and Design),By Mohammad Rashid, Cengage Learning

**Reference Books:**

1. Electronics Devices and circuits Theodore F. Bogart, Jr. Jeffrey S. Beasley, Guillermo Rico.
2. Donald Schilling & Charles Belove, Electronic Circuits Discrete and Integrated, Third edition, McGraw Hill

**Termwork:**

The termwork shall consist of atleast six laboratory experiments covering the whole of syllabus, duly recorded and graded as well as atleast four computer simulations using EDA tools like PSPICE duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

**SUGGESTED LIST OF EXPERIMENTS****Laboratory / Simulation**

1. Application of diodes as a (positive / negative and both), a clamper (positive /negative)
2. FWR with different types of Filters and finding its ripple factor.
3. Voltage Regulation using Zener diode.
4. Design and Analysis of BJT Amplifier with fixed bias, Collector bias, Potential divider bias. Determinations of its DC operating point
5. input and output characteristic of BJT in CB,CC,CE configuration and its parameters.
6. BJT as a Voltage Amplifier. Determination of its performance parameters ( $A_V, A_i, R_i, R_o$ )
7. FET as a Voltage Amplifier and determination of its performance parameters.
8. Output characteristics and Transfer Characteristics of JFET, Finding its Parameters, mutual conductance and amplification factor.

