

COURSE TITLE : **ELECTRONIC DEVICES AND CIRCUITS**
COURSE CODE : **3053**
COURSE CATEGORY : **B**
PERIODS/WEEK : **4**
PERIODS/SEMESTER : **72**
CREDITS : **4**

TIME SCHEDULE

MODULE	TOPIC	PERIODS
I	Diodes and Transistors	17
	Test I	1
II	Rectifiers, Regulators & wave shaping	17
	Test II	1
III	Amplifiers	17
	Test III	1
IV	Oscillators and Multi vibrators	17
	Test IV	1
	TOTAL	72

Rationale

This subject deals with the basic electronic circuit concepts with diodes, Transistors, rectifiers, Amplifiers, oscillators and multi vibrators. After completing this subject student will be able to familiarize with the working of various electronic elements and the functioning of circuits based on various semi conductor devices.

OBJECTIVES

MODULE I

1.1.0. Understand the construction and working of Diodes and Transistors

- 1.1.1 Explain the formation of PN junctions
- 1.1.2 Study the behavior of PN junction – forward and reverse biasing
- 1.1.3 Explain term – depletion layer, potential barrier, drift current and diffusion current
- 1.1.4 List out applications of diodes -rectifier, wave shaping, freewheeling.
- 1.1.5 Study behavior of Zener diodes – forward and reverse biasing characteristic – difference between ordinary diode and Zener diode – applications-regulation, wave shaping and protection
- 1.1.6 Explain the bipolar transistor as a two junction, three terminal devices – two types of current Carriers- minority &majority
- 1.1.7 Study PNP and NPN transistors: - Current flow-I_b, I_c &I_e and their relationships

- 1.1.8 Study in detail Common Base and Common Emitter configuration – input & output characteristics -DC&AC load line-- concept of Operating point
- 1.1.9 Study amplification factor in all configurations and compare them- α , β & γ and their relationships (Derivation is needed)
- 1.1.10 List out the applications of various configurations-Amplifier, Switching, and Darlington pair

MODULE II

2.1.0. Study Rectifiers, Regulators & wave shaping

- 2.1.1. Explain construction and principles of Half-wave, full wave-(Centre tap and Bridge) rectifying circuits with wave forms.
- 2.1.2. Define Peak inverse Voltage, Ripple factor, regulation and efficiency
- 2.1.3. Compare different types of rectifiers
- 2.1.4. Study different types filter circuits and wave forms of rectifiers using capacitor input filter, Inductor & π Filter
- 2.1.5. Study of Regulators (Series, Shunt)
- 2.1.6. Study Regulator using 7805, 7905 ICs
- 2.1.7. Study clipping circuits– (series, shunt, biased, Double Ended)
- 2.1.8. Study clamping circuits-(positive, negative,)

MODULE III

3.1.0. Amplifiers

- 3.1.1. Study concept of amplification
- 3.1.2. Study transistor as an amplifiers- circuit diagram and working of Common Base amplifier.
- 3.1.3. Study common emitter amplifier.
- 3.1.4. Know different schemes of amplifier coupling- Importance
- 3.1.5. Explain R.C. coupled
- 3.1.6. Explain transformer coupled amplifier.
- 3.1.7. Study frequency response of R.C coupled and transformer coupled Amplifiers
- 3.1.8. Define lower and upper cut off frequencies, band width, and 3dB points

3.2.0. Study voltage and power amplifier

- 3.2.1. Know the importance of impedance matching in power amplifier
- 3.2.2. Explain operation of a single stage power amplifier
- 3.2.3. Explain Class A, Class B and Class C amplifiers
- 3.2.4. Compare the different classes
- 3.2.5. Know about the push pull amplifier and its advantages
- 3.2.6. Explain the working of complimentary symmetry push pull amplifier
- 3.2.7. Know about feed back
- 3.2.8. Study the positive and negative feedback (No Derivation)
- 3.2.9. Study the use of negative feedback amplifier

MODULE IV

4.1.0. Oscillators and Multi vibrators

- 4.1.1. Concept of Barkhausen's criterion
- 4.1.2. Explain principle of oscillators- tank circuit
- 4.1.3. State conditions of sustained oscillation
- 4.1.4. Explain the operation of tuned collector, Hartley, Colpitts, R-C phase shift, & crystal oscillators
- 4.1.5. List out the applications of the above oscillators
- 4.1.6. Different types of multi vibrator circuits- astable, mono stable and Bi stable multi vibrator circuits
- 4.1.7. Explain working of different multi vibrator circuits with wave forms-Applications
- 4.1.8. Explain working of astable & mono stable multi vibrator circuits using IC 555
- 4.1.9. Explain the Schmitt trigger circuit, meaning of UTP and LTP -applications of Schmitt trigger

COURSE CONTENT

MODULE I

Diodes and Transistors

PN junctions – behavior of PN junctions- depletion layer – potential barrier– Drift current, Diffusion current- Characteristics of PN junction Diode -forward bias & Reverse bias, applications(Rectifier, wave shaping, freewheeling), Zener diode – characteristics – forward bias & Reverse bias –applications(Regulation, wave shaping & protection) , Difference between Ordinary diode& Zener Diode ,Bipolar transistor – current carriers – PNP & NPN – current flows(I_b , I_c , & I_e and their relationships), configurations –Common base , common emitter ,common collector - Input and output characteristics of Common Base& Common Emitter(only) - Region of operations - DC&AC load line-Operating point- amplification factors ,concept of α , β & γ and their relationships(Derivation is needed)
Applications of various transistor configurations (Amplifier, switching, Darlington pair)

MODULE II

Rectifiers, Regulators & wave shaping

Half wave - full wave(Centre tap and bridge type) rectifiers using diodes – wave forms – Peak Inverse voltage , ripple factor – regulation& efficiency -comparison of different types of rectifiers , filters – different types-capacitor input, inductor input & π filter, Study of Regulators(Series, Shunt), Regulator using 7805,7905 ICs
Clipping circuits – series – shunt – biased type – double Ended clipper circuits
Clamping circuits – positive -negative clamping circuits

MODULE III

Amplifiers

Principle of amplification , Common Base, Common Emitter Amplifiers using Transistors– Types of Amplifiers – Different scheme of coupling -R.C coupled and transformer coupled - frequency response – dB -upper and lower cut off frequencies – Bandwidth –3dB point, Voltage& Power amplifiers – Impedance matching in power amplifier – Operation of single stage Amplifiers – Class A, B & C types –comparison of push pull amplifiers- working – advantage – complimentary symmetry push pull amplifier- working – feed back in amplifier – types of feedback (positive , Negative)-applications of feed back

MODULE IV

Oscillators and Multi vibrators

Concept of Barkhausen's criterion - condition for oscillations – Classifications of oscillators – tuned collector ,Hartley , Colpitts , RC-Phase shift, crystal oscillators , multi vibrator circuits - astable ,monostable Bistable , multivibrator ,triggering techniques- applications
Astable& Monostable multivibrator using IC 555- Schmitt trigger – UTP and LTP –applications

REFERENCE:

1. Applied Electronics-R.S. Sedha