Program : **Diploma in Electronics/ Electronics and Communication/ Biomedical Engineering**	
Course Code : **2041**	Course Title: **Basic Electronics**
Semester : **2**	Credits: **3**
Course Category: **Engineering Science**	
Periods per week: **3 (L:3, T:0, P:0)**	Periods per semester: **45**

Course Objectives:

- To introduce various semiconductor diodes and application circuits.
- To illustrate the working of different transistors.
- To introduce various linear and non linear wave shaping circuits.

Course Prerequisites:

Topic	Course code	Course Title	Semester
Basics of electric circuits, and passive components (concurrent with the semester)		Fundamentals of electrical and electronics	2
Basics of Mathematics		Mathematics I & II	1 & 2
Basics of Physics		Applied Physics I& II	1 & 2

Course Outcomes

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Explain Semiconductor theory, and working principle of semiconductor diodes	10	Understanding
CO2	Explain the working principle of Bipolar Junction Transistor and transistor amplifier.	11	Understanding
CO3	Summarize the working principles of JFET, MOSFET and UJT	11	Understanding
CO4	Develop Linear and non linear wave shaping circuits	11	Applying
	Series Test	2	

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2						
CO3	2						
CO4	3		2				

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (hours)	Cognitive Level
CO1	**Explain Semiconductor theory, and working principle of semiconductor diodes.**		
M1.01	Describe Intrinsic and extrinsic semiconductors	3	Understanding
M1.02	Explain formation of PN junction diode, barrier potential	3	Understanding
M1.03	Illustrate biasing of diode, and V-I characteristics	3	Understanding
M1.04	List Specifications of diode	1	Understanding
Contents: Energy band diagrams of conductors, insulators and semiconductors - intrinsic semiconductor - thermal generation- doping- extrinsic semiconductor - N and P type - majority and minority carriers Formation of PN junction diode-depletion region- potential barrier-drift and diffusion currents. Forward and reverse bias - V - I characteristics of a PN junction diode - Interpret knee voltage, reverse breakdown voltage, static & dynamic resistance of PN junction diode from VI characteristics - zener breakdown Forward voltage drop - forward current - power rating - PIV - reverse saturation current			
CO2	**Explain the working principle of Bipolar Junction Transistor and transistor amplifier.**		
M2.01	Describe the physical structure of BJT	2	Understanding
M2.02	Explain the working principle of BJT.	3	Understanding
M2.03	Summarize various transistor configurations and gain relations.	2	Understanding

M2.04	Illustrate the characteristics of BJT	3	Understanding
M2.05	Explain transistor action and amplification	1	Understanding
	Series Test I	1	

Contents:

Bipolar Junction Transistors - Structure - NPN and PNP - symbol - unbiased transistor

Transistor biasing - modes of operation - active, saturation and cut off - operation of NPN transistor - transistor currents

Transistor configurations - current gain α, β and γ - relationship between α and β - effect of temperature in leakage current

Input and output characteristics of common base and common emitter configuration - Cut off, Active and Saturation Regions - comparison of three configurations - importance of CE configuration

Transistor action - Transistor as amplifier.

CO3	**Summarize the working principle of JFET, MOSFET and UJT**		
M3.01	Describe the physical structure of JFET, MOSFET and UJT	3	Understanding
M3.02	Explain the working principle of JFET, MOSFET and UJT	3	Understanding
M3.03	Illustrate the characteristics of JFET, MOSFET and UJT	4	Understanding
M3.04	Compare BJT and FET	1	Remembering

Contents:

Junction Field Effect Transistors: Structure - symbol - operation of N channel JFET - drain characteristics - transfer characteristics - comparison with BJT.

MOSFET: Structure - symbol - principle of operation (N channel depletion type only), drain characteristics - transfer characteristics.

UJT: structure - symbol - equivalent circuit - intrinsic stand off ratio - operation - VI characteristics

CO4	**Develop Linear and non linear wave shaping circuits**		
M4.01	Compare different rectifier circuits	1	Remembering
M4.02	Illustrate passive devices as filters in DC power supply	2	Understanding
M4.03	Develop Linear wave shaping circuits	3	Applying

M4.04	Develop diode nonlinear wave shaping circuits	4	Applying
M4.05	Explain voltage multiplier circuits	1	Understanding
	Series Test II	1	

Contents:

Compare half wave, center tapped and bridge rectifier on the basis of DC output voltage, ripple factor, PIV, and TUV

Need of filters in rectifier - working of capacitor, inductance and □ filer - comparison

Linear wave shaping circuits -RC differentiator - time constant - condition for differentiation - illustrate operation with square wave signal - list applications - RC integrator - condition for integration- illustrate

operation with square wave - list applications

Non linear wave shaping circuits: clipper circuits (shunt type only)- positive, negative, biased , combinational, slicers - circuit diagram - peration - input & output waveforms - diode clamper circuits - positive and negative clampers - biased clampers - working principle - waveforms - transfer characterictics-list applications.

Working of half wave and full wave voltage doublers - voltage Tripler

Text /Reference:

T/R	BookTitle/Author
T1	R S Sedha - A Text Book of Applied Electronics - S Chand
R1	N N Bhargava, Kulshreshtha and S C Gupta - Basic Electronics and Linear Circuits- TMH
R2	Robert Boylestad - Electronic Devices and Circuits - PHI
R3	Anil K Maini and Varsha Agarwal - Electronic Devices and Circuits - Wiley India
R4	David A Bell - Electronic Devices and Circuits - PHI

Online resources:

Sl. No	Website Link
1	https://www.electronics-tutorials.ws
2	https://www.elprocus.com
3	http://www.brainkart.com/menu/electronics-engineering/
4	https://www.electrical4u.com
5	https://www. tutorialspoint.com