

The Maharaja Sayajirao University of Baroda Polytechnic Diploma in Electronics & Communication Engg. (HPP)			ACADEMIC YEAR 2021-22	
Year	I	SOLID STATE DEVICES (ELE3223)	Lecture/Lab Hrs per week	4/2
Semester	II		Max marks	100
Pre-Requisite: Basic Mathematics, Basic Electronics				
CO1	Explain semiconductor physics (crystal structure, energy bands).			
CO2	Analyse diode families, characteristics, and applications.			
CO3	Examine BJT configurations, characteristics, biasing, parameters.			
CO4	Evaluate transistor applications (switching, amplifiers).			
CO5	Describe UJT, FET, MOSFET, IGBT, SCR, DIAC, TRIAC.			
BT	1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation			
COURSE CONTENT/SYLLABUS				
Unit	Unit Name	Hrs	Weightage	CO
1	Semiconductor Physics: Crystal structure energy bands, energy band relations.	6	10	CO1
2	P-N junction diode, basic device technology, depletion region and depletion capacitance, current voltage characteristics, junction breakdown, Static (DC) resistance, AC resistance and related numerical, Applications as a switch, clipper, clamper, voltage multiplier, rectifier, Light Emitting diodes: construction, working, characteristics. Applications as seven segment display, indicator. Zener Diode: construction, working, characteristics , Application as a voltage regulator Varactor Diode - Symbol, construction, working, characteristics, Static resistance. Application s Tunnel diode - Symbol, construction, working, characteristics, Static resistance. Applications Gunn Diode - Symbol, construction, working, characteristics, Static resistance. Applications Schottkey Diode- Symbol, construction, working, characteristics, Static resistance. Application Optotransistor: Symbol, construction, working, characteristics, Static resistance. Application.	12	20	CO2
3	BJT- PNP and NPN type transistor - Symbol, construction, CB,CE and CC configuration of transistor, working of a transistor in each configuration, input and output characteristics in each configuration, input and output resistance. Active cut-off and saturation region in the characteristics. Comparison of CB, CE and CC configuration of transistor. Parameters, α , β , Y in CB, CE, and CC conf., Calculation of voltage gain, current gain in CB, CE, and CC configuration. Biasing of transistor, types of biasing. Optotransistor: Symbol, construction, working, characteristics, Static resistance. Application.	10	20	CO1, CO3
4	Application of transistor	12	20	CO4

	i) As a Switch, ii) As a single stage amplifier, h-parameters, AC Equivalent circuit using h-parameters iii) Multistage amplifier – 1. Voltage amplifier- R-C coupled amplifier, Transformer coupled amplifier, direct coupled amplifier, and differential amplifier. 2. Power amplifier –Class A , Class B, Class AB, Comparison between Power amplifier and Voltage amplifier.			
5	Unijunction Transistor- Symbol, construction, working, characteristics, application as a UJT relaxation Oscillator. Field Effect Transistor- -Symbol, construction, working, characteristics, discuss application and comparison with BJT MOSFET: Types , Symbol, construction, working, characteristics, discuss application and comparison with BJT IGBT: Symbol, construction, working, characteristics, discuss application and comparison with BJT, FET, MOSFET	8	14	CO5
6	Thyristors a. SCR : Construction, V-I characteristics symbols and two transistor analogy of transistor b. Diac: Construction, V-I characteristics symbols c. Traic: Construction, V-I characteristics symbols	8	14	CO5
		56	100	

REFERENCE BOOKS:

1.	Physics of semiconductor devices By S.M. Sze John Wiley and Sons, 2001
2.	Electronics devices and circuit theory by Robert Boylested and LouisNashelsky Prentice Hall
3.	Electronics Devices and Circuits by J.B Gupta