PVP-19

RF CIRCUIT DESIGN

Course Code	19EC4605D	Year	III	Semester	II
Course Category	Program Elective-III	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Electronic Devices and Amplifier Circuits (19EC3305)
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Interpret the properties of active and passive components at high frequency applications (L2)
CO2	Develop transmission lines used in RF circuit design (L3).
CO3	Build independent and interconnected networks (L3).
CO4	Analyze characteristics of transistor amplifiers for RF applications (L4)

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	1								1	2
CO2	3	2	3	2	2								2	3
CO3	2	3	3	2	3								2	3
CO4	2	3	3	3	2								3	3
Average* (Rounded to nearest integer)	2	3	3	2	2								2	3

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction:** Importance of Radio Frequency Design, Dimensions and Units, frequency Spectrum. RF behavior of Passive Components-Resistors, Capacitors and Inductors at high frequency. Chip Components and Circuit Board Considerations-Chip Resistors, Chip Capacitors, Surface-Mounted inductors. RF circuit Manufacturing Processes	CO1

II	**Active RF Components:** Semiconductor Basics – Physical Properties of Semiconductors, the PN-Junction, Schottky Contact. RF Diodes-Schottky Diode, PIN Diode, Varactor Diode, Tunnel Diode. Bipolar-Junction Transistor - Construction, Functionality and Frequency Response. RF Field Effect Transistors - Construction, Functionality, Frequency Response. Metal Oxide Semiconductor Transistors-Construction, Functionality	CO1
III	**Transmission Line Analysis:** Examples of Transmission Lines – Two-Wire Lines, Coaxial Line, Microstrip Lines. Equivalent Circuit Representation, basic laws, Circuit parameters for a Parallel –Plate Transmission Line. General Transmission line equation, characteristic impedance, lossless transmission line model, Microstrip Transmission lines	CO2
IV	**Single and Multiport Networks:** Basic definitions, interconnecting networks-series and parallel connection of networks, Cascading networks, ABCD network representation. Network properties and applications-inter relations between parameter sets. Scattering Parameters-Definition of S-parameters, chain scattering matrix	CO3
V	**RF Transistor Amplifier Design:** Characteristics of Amplifiers – Amplifier Matching Basics, Power amplifiers, Broadband Amplifiers, High Power Amplifiers, multistage amplifiers.	CO4

Learning Resources
Text Books
1. RF Circuit Design: Theory and applications by Reinhold Ludwing and Gene Bogdnov Pearson Education Asia Publication, New Delhi 2001 2. Secrets of RF Design by Joseph Carr., 3rd Edition, Tata McGraw-Hill Publishing Company Limited.
Reference Books
1. Radio frequency and microwave electronic illustrated Mathew M. Radmanesh, 2001, Pearson Education.
e- Resources & other digital material
1. https://nptel.ac.in/courses/117/102/117102012/#