FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Microwave Electronic Devices

Information :

Course Code :	ELE 514	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electronics & Communication

Instructor Information :

Title	Name	Office hours
Professor	Mahmoud Abdelrahman Abdelfattah Abdallah	7
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Area Of Study :

Develop the students' knowledge about microwave electronic devices.
Prepare students to analyze, design and evaluate the main parameters of the different devices.
Train students to choose the proper and best device suitable for different communication system

Description :

Microwave linear beam tubes (O type), double cavity klystron, multicavity klystron amplifier, travelling wave tube, backward wave oscillator, extended interaction oscillator. Microwave crossed field tubes, (M type) Multicavity magnetron oscillator, backward wave amplifier (Amplitron), backward wave crossed field oscillator (Carcinotron), Gyrotron. Microwave solid state devices: Schottky barrier mixer diodes, tunnel diodes, Gunn diodes, IMPATT diodes, microwave transistor amplifier, and oscillator.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe the objectives and functional parameters of each device
2 -	Explain the operational functions of each device
3 -	Recognize the principles of the vacuum tubes and solid state devices.
4 -	Explain different types of amplifiers and oscillators
5 -	Describe with the help of Smith Chart the operation of transistor amplifier.
b.Intellectual Skills: :	
1 -	Deduce the response of the different vacuum devices to different high voltages and beam currents.
2 -	Evaluate the performance of the different microwave electronic devices.
3 -	Analyze the different criteria of the stability of the transistor amplifiers.
c.Professional and Practical Skills: :	
1 -	Perform practically the analysis of the transistor microwave amplifier using the Smith Chart (the gain, the bandwidth, and the noise level).
d.General and Transferable Skills: :	
1 -	Collaborate effectively within team.

2 -	Work in stressful environment and within constraints.
3 -	Communicate effectively
4 -	Effectively manage tasks, time, and resources.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
S matrix & S parameters of microwave amplifier	5	3	2
Analysis and design of microwave transistor amplifier	5	3	2
Stability condition and calculation of the amplifier gain	5	3	2
Solid state microwave diodes(Gunn ï IMPATT- Tunnel)	10	6	4
Crossed field tubes (linear magnetron)	5	3	2
Multicavity magnetron- frequency- tuning- strapping	10	6	4
Other types of crossed field tubes	5	3	2
Velocity modulated tubes	5	3	2
Double cavity klystron- calculation of gain	5	3	2
Slow wave structures- analysis and types	5	3	2
Travelling wave tube ï structure- analysis	10	6	4
Calculation of the gain and TWT parameters C- N	5	3	2

Teaching And Learning Methodologies :

Lecture
Tutorial
Laboratory

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
In Class Quizzes and Participation	20.00		
Mid-Term Exams	40.00		

Recommended books :

M. Chodrow , C. Susskind, " Fundamentals of Microwave Electronics", Mc Graw hill