



SWARNANDHRA

COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharamapuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20EC6T 03	MICROWAVE AND OPTICAL COMMUNICATIONS	VI	ECE	5	2024-25	18.11.2024

COURSE OUTCOMES

After completion of the course students are able to

CO1	Discriminate different types of wave guide modes and characteristics in wave guides. (K4)
CO2	Interpret different types of components which are using in microwave communication. (K3)
CO3	Evaluate the operation of different Optical Fiber components.(K4)
CO4	Demonstrate the various losses in Optical Fibers.(K3)

UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method	
I	CO: 1 Discriminate different type of wave guide modes and characteristics in wave guides. (K4)	UNIT-1: WAVEGUIDES					V-Lab Simulation Chalk & Talk, Smart Class, PPT Tutorial
		1.1	Microwave Spectrum, Bands	T1, T2	2		
		1.2	Applications and advantages of Microwaves	T1, T2	2		
		1.3	Rectangular Waveguides – TE/TM mode analysis	T1, T2	2		
		1.4	Expressions for Fields	T1, T2	1		
		1.5	Characteristic Equation and Cut-off Frequencies	T1, T2	1		
		1.6	Dominant ,Degenerate Modes, Phase velocity and Group velocity	T1, T2	2		
		1.7	Wavelengths and Impedance Relations	T1, T2	1		
		1.8	Power Transmission and Power Losses in Rectangular wave guide	T1,T2, R1,	2		
		1.9	Impossibility of TEM mode.	T1,T2, R1	1		
		Class Test			1		
Total					15		



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		UNIT-2: MICROWAVE ACTIVE AND PASSIVE DEVICES				
II	CO: 2 Interpret different types of components which are using in microwave communication. (K3)	2.1	Gunn Diode-Principle, Two Valley Model Theory/RWH Theory, and Characteristics and Modes of operation.	T1, T2	2	Chalk & Talk, Smart Class, PPT Tutorial, & Case Study
		2.2	Principle of Operation of IMPATT, TRAPATT, BARITT and PIN Diodes	T1, T2	2	
		2.3	Two Cavity Klystron Amplifier Power and Efficiency considerations	T1, T2	2	
		2.4	Reflex Klystron Oscillators Modes and Efficiency considerations	T1, T2, R1	2	
		2.5	Magnetrons	T1, T2, R1	1	
		2.6	TWT and Slow Wave Structures.	T1, T2, R1	2	
		2.7	Scattering Parameters E & H Plane Tees and Hybrid ring(Rate Race)	T1, T2, R1,	2	
		2.8	Magic Tee ,Directional Coupler and Power divider	T1, T2, R1	1	
		2.9	Fixed and Variable Attenuators	T1,T2	1	
		3.0	Ferrite Devices	T1,T2	1	
			Class Test		1	
Total				17		
		UNIT – 3: MICROWAVE MEASUREMENTS				
III	CO: 2 Interpret different types of components which are using in microwave communication. (K3)	3.1	Description Microwave Bench, Different Blocks , their Features, and Precautions	T1, T2,	2	Chalk & Talk, PPT Tutorial, Smart Class
		3.2	VSWR and Frequency Meter	T1, T2	1	
		3.3	Power meter and Slotted line section	T1,T2, R1	2	
		3.4	Measurement of Attenuation and Frequency	T1,T2, R1	2	
		3.5	Measurement of Impedance and Power	T1,T2, R1	1	
		3.6	Measurement of VSWR and Cavity Q	T1, T2, R1	2	
			Class Test		1	V-Lab Simulation



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				Total	11		
IV	CO: 3 Evaluate the operation of different Optical Fiber components.(K4)	UNIT - 4 OPTICAL FIBERS AND DEVICES					Chalk & Talk, PPT, Smart Class Tutorial, Active Learning & Case Study
		4.1	Historical development, The general system advantages and applications of OFC	T3.R2	2		
		4.2	Propagation of light through optical fiber structures	T3.R2	1		
		4.3	Acceptance angle, Numerical aperture and Attenuation	T3.R2	2		
		4.4	Absorption and scattering losses	T3.R2	1		
		4.5	Single mode fiber connector	T3.R2	1		
		4.6	Dispersion – Radiation losses	T3.R2	1		
		4.7	Splicing Technique	T3.R2	1		
		4.8	Optical Fiber connector and their types	T3.R2	1		
						Total	
V	CO:4 Demonstrate the various losses in Optical Fibers.(K3)	UNIT – 5 : OPTICAL NETWORKS					Chalk & Talk, PPT Tutorial, Smart Class, Active Learning & Case Study
		5.1	Optical Source – LED's Structure material, Quantum efficiency, Power, Modulation and Power band width product	T3.R2	2		
		5.2	ILD characteristics.	T3.R2	1		
		5.3	Optical detectors – PIN and APD characteristics.	T3.R2	1		
		5.4	Optical transmitters and receivers,	T3.R2	1		
		5.5	System block diagram	T3.R2	1		
		5.6	point to point link design	T3.R2	1		
		5.7	power budget analysis	T3.R2	1		
		5.8	Line Coding in Optical Links	T3.R2	1		
		5.9	WDM- DWDM	T2	1		
				Total	11		
Content beyond Syllabus (if needed)	Applications of Microwave - Microwave Oven and Fundamentals of RF Engineering						
				Total	11		
				CUMULATIVE PROPOSED PERIODS	65		



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Text Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1.	Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3 rd Edition, 1994.(UNITS-I&II).
2.	Microwave and Radar Engineering- M.Kulkarni, Umesh Publications 4 th Edition, 2010. (UNITS-I,II&III)
3.	Gerd Keiser, "Optical Fiber Communications", the McGraw Hill Companies, 4 th Edition, 2008. (UNITS-IV&V)
Reference Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1.	Annapurna Das, Sisir K Das, "Microwave Engineering", 2nd edition, 2006, Tata McGraw Hill.
2.	John. M. Senior, "Optical Fiber Communications Principles and Practice", Second Edition, PHI, 1992.
Web Details	
1.	https://www.microwaves101.com/encyclopedias/waveguide-primer
2.	http://www.tallguide.com/Waveguidelinearity.html
3.	https://www.tutorialspoint.com/microwave_engineering

	Name	Signature with Date
i.	Faculty - I	Mr.V.Srinivas V.Son
ii.	Faculty - II	Mr.Ch.K.L Rao Chaleas
iii.	Course Coordinator	Mr.V.Srinivas V.Son
iv.	Module Coordinator	Dr.Y.S.V.Raman Y.S.V.Raman
v.	Programme Coordinator	Dr.B.Subrahmanyeswara Rao B.Subrahmanyeswara Rao


Principal
(Dr.A.Gopi Chand)