# INSTITUTE OF ENGINEERING AND MANAGEMENT <u>GOURAHARI VIHAR, PO: RANIPUT, JEYPORE – 764 005</u>

## **LESSON PLAN**

# Name of the Subject: WAVE PROPAGATION & BROADBAND COMMUNICATION ENGINEERING

#### Name of the Faculty: JAGANNATH DAS

Semester: 5<sup>TH</sup> Semester

### Semester From: July to December

#### Branch: ETC

No. of Weeks: 15 Weeks

Wee k	Day	<b>Theory/ Practical Topics</b>	Classes
		${f Unit}\;1$ - wave propagation & antenna	12
1	1	Effects of environments such as reflection, refraction, interference, diffraction, absorption and attenuation (Definition only)	1
	2	Classification based on Modes of Propagation-Ground wave, Ionosphere ,Sky wave propagation, Space wave propagation	1
	3	Definition – critical frequency, max. useable frequency, skip distance, fading, Duct propagation & Troposphere scatter propagation actual height and virtual height	1
	4	Definition - Antenna gains, Directive gain, Directivity, effective aperture,	1
2	5	polarization, input impedance, efficiency, Radiator resistance, Bandwidth, Beam width, Radiation pattern	1
	6	Antenna -types of antenna: Mono pole and dipole antenna	1
2	7	Omni directional antenna	1
	8	Operation of following antenna with advantage & applications	1
3	9	Directional high frequency antenna : , Yagi & Rohmbus only	1
	10	UHF & Microwave antenna .: Dish antenna (with parabolic reflector) & Horn antenna	1
	11	Basic Concepts of Smart Antennas	1
	12	Concept and benefits of smart antennas	1
		Unit 2- TRANSMISSION LINES.	10
	13	Fundamentals of transmission line	1
4	14	Equivalent circuit of transmission line	1
	15	Equivalent circuit of transmission line & RF equivalent circuit	1
	16	Characteristics impedance, methods of calculations	1
5	17	Characteristics impedance, methods of simple numerical.	1
	18	Losses in transmission line.	1
	19	Standing wave – SWR, VSWR, Reflection coefficient, simple numerical.	1
	20	Quarter wave & half wavelength line	1

6	21	Impedance matching & Stubs – single & double	1
		Primary & secondary constant of X-mission line.	
	22		1
		. Unit-3 TELEVISION ENGINEERING	13
	23		1
	24	Define-Aspect ratio, Rectangular Switching Flicker, Horizontal Resolution, Video bandwidth	- 1
	24	Interlaced scanning, Composite video signal	1
	25	Synchronization pulses	1
7	26	TV Transmitter – Block diagram & function of each block	1
	27		1
	28	Monochrome TV Receiver -Block diagram & function of each block.	1
	29	Colour TV signals (Luminance Signal & Chrominance Signal,( I & Q,U & V Signals).	1
0	30	Types of Televisions by Technology- cathode-ray tube TVs	1
8	31	Plasma Display Panels, Digital Light Processing (DLP),Liquid Crystal Display (LCD)	1
	32	LCD),Organic Light-Emitting Diode (OLED) Display, Quantum Light-Emitting Diode (QLED) – only Comparison based on application	1
	33	Discuss the principle of operation - LCD display, Large Screen Display.	1
	34	CATV systems & Types & networks	1
9	35	Digital TV Technology-Digital TV Signals, Transmission of digital TV signals & Digital TV receiver Video programme processor unit.	1
		Unit 4 - MICROWAVE ENGINEERING.	15
	36	Define MICROWAVE ENGINEERING	1
	36 37	Define MICROWAVE ENGINEERING Define Microwave Wave Guides	1
10	36 37 38	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives	1 1 1
10	36 37 38 39	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage	1 1 1 1
10	36 37 38 39 <b>40</b>	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.	1 1 1 1 1
10	36 37 38 39 <b>40</b> 41	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.	1 1 1 1 1 1
10	36 37 38 39 <b>40</b> 41 42	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.	1 1 1 1 1 1 1 1
10	36 37 38 39 <b>40</b> 41 42 43	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .	1 1 1 1 1 1 1 1 1
10	36 37 38 39 <b>40</b> 41 42 43 44	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .   Microwave tubes-Principle of operational of two Cavity Klystron	1 1 1 1 1 1 1 1 1 1
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10	36 37 38 39 <b>40</b> 41 42 43 44 45 46 47 48	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .   Microwave tubes-Principle of operational of two Cavity Klystron   Propagation of EM wave through wave guide with TM modes.   Working of Circulator   Principle of Operations of Travelling Wave Tubes   Principle of Operations of Cyclotron	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
10 11 12	36     37     38     39     40     41     42     43     44     45     46     47     48     49	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .   Microwave tubes-Principle of operational of two Cavity Klystron   Propagation of EM wave through wave guide with TM modes.   Working of Circulator   Principle of Operations of Travelling Wave Tubes   Principle of Operations of Cyclotron   Principle of Operations of Tunnel Diode	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
10	36     37     38     39     40     41     42     43     44     45     46     47     48     49	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .   Microwave tubes-Principle of operational of two Cavity Klystron   Propagation of EM wave through wave guide with TM modes.   Working of Circulator   Principle of Operations of Travelling Wave Tubes   Principle of Operations of Tunnel Diode   Principle of Operations of Gunn diode	1 1 1 1 1 1 1 1 1 1 1 1 1 1
10 11 12 13	36     37     38     39     40     41     42     43     44     45     46     47     48     49	Define MICROWAVE ENGINEERING   Define Microwave Wave Guides   Operation of rectangular wave gives   Operation of rectangular wave gives and its advantage   Propagation of EM wave through wave guide with TE modes.   Circular wave guide.   Operational Cavity resonator.   Working of Directional coupler, Isolators .   Microwave tubes-Principle of operational of two Cavity Klystron   Propagation of EM wave through wave guide with TM modes.   Working of Circulator   Principle of Operations of Travelling Wave Tubes   Principle of Operations of Tunnel Diode   Principle of Operations of Gunn diode	1 1 1 1 1 1 1 1 1 1 1 1 1 1
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		Unit 5- Broadband communication	10
14	51	Broadband communication system	1
	52	Broadband communication system-Fundamental of Components and Network architecture	1
	53	Cable broadband data network- architecture	1
	54	importance & future of broadband telecommunication internet based network.	1
15	55	SONET(Synchronous Optical Network)-Signal frame components topologies advantages applications & and disadvantages	1
	56	ISDN - ISDN Devices interfaces	1
	57	Services, Architecture of ISDN	1
	58	Applications of ISDN.	1
16	59	BISDN -interfaces & Terminals	1
	60	Protocol architecture applications of BISDN & Internet based network.	1
	61	Revision	1

#### **RECOMMENDED BOOKS**

- 1. Electronics Communication by G. Kennedy- MGH
- 2. Television & Video Engineering by A.M.Dhake, Tata McGraw Hill.
- 3. Broadband Communication System by AKUJUOBI & SADIKU (PHI)
- 4. Antennas and wave Propogation by John D Kraus, Ronald J Marhefka, Ahmad S Khan, TMG
- 5. Microwave & Radio Engg. By M.Kulkani-Ummesh Publication.
- 6. Microwave Engineering by Monojil Mitra Dhanpat Rai& Co
- 7. Broadband Communication by Balaji Kumar (Reference)
- 8. Introduction to Broadband Communication Sysyem by Chapman & Hall (Reference)
- 9. Microwave Engineering by G.S.N. Raju, IKI (Reference)