	DPG Institute of Technology and Management **Sector 34, Gurugram HR 122004**
	Lesson Plan
	Course Name: Antenna and Wave
	Faculty Name: Dr. Sonu Rana

Course Objectives:

Understand the working principles of the Antenna.
Understand the types of Antenna and their propagation.
Understand limitations and application for different networks.

No. of Lectures Hours/Week	**3**	**Exam Hours**	**3**
Total No of lectures	**36**	**Exam Marks**	**75**
Course Code	**PCC-ECE-402G**		

Lecture No.	**Topics to be Covered**	**Teaching Methodology/Pedagogy**	**Class Activity**	**Remarks**
1	Subject Introduction and basic concept of antennas	Simple talk with real-life examples	Group discussion on uses of antennas	
2	Physical concept of radiation and radiation mechanism	Board explanation with diagrams	Q&A session	
3	Radiation pattern, near and far-field regions	Diagram explanation	Students sketch radiation zones	
4	Reciprocity theorem and its applications	Simple derivation with examples	Concept check quiz	

5	Directivity, gain, and effective aperture	**Showing figures on blackboard**	Solve simple numericals	
6	Polarization and its types	Board explanation with examples	Identify polarization type	
7	Input impedance and antenna efficiency	**With Examples**	Short problems practice	
8	Friis transmission equation and link budget	Step-by-step derivation	Numerical exercise	
9	Radiation integrals and auxiliary potential functions	Theoretical explanation	Derivation activity	
10	Radiation from infinitesimal and finite-length dipoles	Diagram and example	Draw current distribution	
11	Linear elements near conductors and image theory	Board explanation	Diagram-based Q&A	
12	Dipoles for mobile communication	Application examples	Case study discussion	
13	Small circular loop antenna	**Black board work**		
14	Introduction to aperture antennas and Huygens' principle	Visual explanation with figures	Concept discussion	
15	Radiation from rectangular and circular apertures	Diagram explanation	Write field expressions	

16	Design considerations for aperture antennas	**Visual Explaination**	Small design exercise	
17	Babinet's principle	Explanation	Q&A session	
18	Complementary antennas	Block Diagram		
19	Sectoral and pyramidal horn antennas	Diagram and derivation	Draw and label horn antenna	
20	Design of horn antennas (gain, directivity)	Board method with examples	Solve small problems	
21	Prime-focus parabolic reflector antenna	Diagram and practical example	Sketch layout	
22	Cassegrain reflector antenna – working and design	Comparative study	Case discussion	
23	Log-periodic	Diagram explanation	Compare their applications	
24	Yagi-Uda antennas	Board work		
25	Frequency-independent antennas and broadcast antennas	Conceptual explanation	Short notes preparation	
26	Introduction to microstrip antennas	Board work	Write key advantages	

27	Characteristics of Microstrip Antenna	Discussion		
28	Feeding methods of microstrip antennas	Diagram and examples	Identify feeding types	
29		**By software**	Solve design problems	
30	Introduction to antenna arrays	**By CST software**	Students solve examples	
31	Array factor	Visual explanation	Simple numerical exercise	
32	Uniformly spaced arrays	Video lecture		
33	Uniform and non-uniform amplitude	Derivation	Solve problems	
34	Planar arrays	Explanation on Board		
35	Array synthesis	Step-by-step derivation	Practice numerical questions	
36	Concept and benefits of smart antennas	Application-oriented explanation	Discussion on 5G and IoT use	

Course Outcomes:

C404.1 Understand the working principles of the Antenna.
C404.2 Analyze the properties of different types of antennas and their design
C404.3 Design and mathematical analysis of various practical antennas and their feeding methods.
C404.4 Analyze performance of various antenna arrays and their comparison.
C404.5 Understand basic Concepts of Smart Antennas.

CO/PO and PSO Mapping:

CO /PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PO O2	PS O3
CO404 .1	3	-	-	-	-	2	2	-	2	3	2	3	2	3	2
CO404 .2	3	3	2	2	2	-	-	-	3	2	-	3	2	3	2
CO404 .3	3	3	2	3	3	-	-	-	-	3	-	3	2	3	2
CO404 .4	3	3	-	-	-	-	-	-	2	3	-	2	2	3	2
CO404 .5	3	-	-	-	-	2	2	-	2	2	2	3	2	3	2

3 = Strong correlation
2 = Moderate correlation
1 = Low correlation
- = No correlation

Signature of Staff In charge Signature of HoD