SCHEME OF COURSE WORK

Course Title	: **Antennas and Wave Propagation**		
Course Code	: 13EC1116	L T P C	4 0 0 3
Program:	:B.Tech		
Specialization:	: Electronics and Communication Engineering		
Semester	:V		
Prerequisites	: EM Waves and Transmission Lines		
Courses to which it is a prerequisite	: Radar Engg.		

Course Outcomes (COs):

1	Identify the importance of various antenna parameters.
2	Use Maxwell's equations to calculate fields from dynamic charge and current distributions.
3	Design and analysis of high frequency and Microwave antennas.
4	Design array antenna from specifications.
5	Comprehend various modes of radio wave propagation.

Course Outcomes versus Program Outcomes:

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**S**	**S**	**M**									**S**
CO2	**S**	**S**	**S**	**S**	**M**							**M**
CO3			**M**	**M**								**M**
CO4	**S**	**S**	**S**	**S**	**M**							**S**
CO5			**M**			**M**	**M**					

S - Strongly correlated, M - Moderately correlated, Blank - No correlation

Assessment Methods:	Assignment/ Quiz/Mid Exam/Surprise test/Open book test

Week	Topic /Contents	Course Outcomes	Sample questions	Teaching-Learning Strategy	Assessment Method & Schedule
1	Radiation Mechanism	CO-1	The field pattern of an antenna is given by En=(Sin θ/θ) (Sin φ/φ) i. Plot the Normalized power pattern. ii. Estimate the main beam efficiency of the antenna.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
2	Antenna Parameters	CO-1	Explain the following: i. Normalized Field Pattern ii. Beam Solid Angle iii. Beam Efficiency iv. Directivity.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
3	Antenna Theorems, Radiation characteristics of Electric Dipole	CO-1	Prove that the directivity of a λ/2 aerial is 0.39 db more than that of short dipole.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
4	Quarter wave Monopole and Half wave Dipole Radiation characteristics	CO-1	Calculate the power gain of a half wave Dipole whose ohmic losses and Direc- tive gain are 7.0 Ohms and 1.64 respectively.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
5	Principle of Pattern Multiplication, N element Uniform Linear Arrays	CO-2	Find the radiation Pattern of 4 isotropic elements fed in phase, spaced λ/2 apart by using pattern multiplication.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
6	Broadside, End fire Arrays, Binomial Arrays	CO-2	Show the directivity of End fire Array (with increased directivity) is given by 1.789[4(L/λ)].	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
7	Methods of Array synthesis	CO-2	Show that Dolph-Tchebyshelf distributions gives optimum distribution and minimum side lobe level for a given beam width of major lobe.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
8	Traveling wave radiators, Long wire and Rhombic Antenna	CO-3	1.What is Travelling Wave Antenna and write its Applications 2.Describe the Design Aspects of Rhombic Antenna	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I
9	Mid Test-1				
10	Small loop antenna, Helical Antenna	CO-3	Sketch and explain the constructional features of a helical antenna. Distinguish between axial and normal modes of helix radiations and list out their requirements.	Lecture/ Problem solving	Assignment I/Quiz-I/Mid-I/ Open book test
11	Yagi-Uda Arrays, Log periodic antenna, Reflector antenna	CO-4	With reference to aperture blocking, describe the performance of paraboloids	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II

12	Parabolic Reflectors, Feeds, Slot antenna	CO-4	Show that for a slot in a conducting plane, the impedance Zslot is given by Zdipole Zslot=$Z0^2$/4 where Z0 is the impedance of free space.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II
13	Antenna Measurement Theory	CO-4	1.Explain the necessity for uniform phase requirements in antenna measurements. How is it achieved in practice? 2.With neat set up, explain the absolute method of measuring the gain of an antenna.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II
14	Ground Wave Propagation	CO-5	1.Mention the salient features of Ground wave propagation. 2.Explain the phenomena of wave tilt and its effects.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II/ Open book test
15	Sky Wave Propagation	CO-5	1.Describe the structure of the ionosphere and the part played by each layer in it in the long distance transmission of radio signals in the HF band.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II
16	Sky Wave Propagation , Space wave Propagation,	CO-5	1. What is signal fading? List the various types of fading and explain. 2. Determine the change in the electron density of E layer when the critical frequency changes from 4 MHz to 1 MHz between mid day and sunset.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II
17	Space wave Propagation	CO-5	1.Write explanatory notes on the following. (a) Tropospheric scattering (b) Radio horizon and optical horizon (c) Elevated duct, and surface duct.	Lecture/ Problem solving	Assignment II/Quiz-II/Mid-II
18	Mid-Test 2				
19/20	END EXAM				