INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA | Affiliated to JNTUH)
Dundigal, Hyderabad - 500 043, Telangana

ELECTRONICS AND COMMUNICATION ENGINEERING

ASSIGNMENT

Course Name	:	**Antennas and Wave Propagation(AWP)**
Course Code	:	**A50418**
Class	:	III - B. Tech I Semester
Branch	:	ECE
Year	:	2017 -2018
Course Coordinator	:	Mrs. A. Usha Rani, Associate Professor
Course Faculty	:	Mrs. A. Usha Rani, Associate Professor Mr.G. Nagendra Prasad Associate Professor, Mr. J. Siva RamaKrishna, Assistant Professor Mr. K. Ravi, Assistant Professor.

OBJECTIVES

This course has the basics of antenna basics and types, concept of wireless communication through the various Medias. The main objectives of antennas and wave propagation are:

i. To understand the basic terminology and concept of antennas.

ii. To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that

iii. To analyze electric and magnetic field emission from various basic antennas mathematical formulation of the analysis

iv. To have knowledge on antenna operation and types as well as their usage in real time field.

v. To aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies though layers in the existing layered free space environment structure.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT-I **ANTENNA BASICS**		
1.	Define following: a) effective aperture b) antenna efficiency	Remember	b,g,h
2	Define following: a) Directivity b) Radiation intensity	Understand	b,f.l
3	An antenna has loss resistance 10Ω, power gain of 20 and Directivity 22 than calculate its radiation resistance (Rr)?	Remember	b,f
4	Define following: a) Resolution b) Beam width	Analyze	g
5	Derive FRIIS transmission formula and explain its significance?	Analyze	g,h
6	Derive the magnetic field components of short dipole?	Remember	i
7	Derive the radiation resistance (Rr) of half wave (λ/2) dipole and quarter wave monopole (λ/4)?	Understand	a
8	Derive the **emf** equation for loop antenna?	Understand	g
9	Derive the power radiated by the short dipole?	Understand	i

10	The radial component of the radiated power density of an infinitesimal linear dipole of length $l<<\lambda$ is given by: $W_{av} = W_r a_r = a_r A_o \sin\theta / r^2$ (W/m^2), then find the maximum directivity of an antenna?	Understand	a
S. No	**Question**	**Blooms Taxonomy Level**	**Course Outcome**
UNIT-II VHF, UHF, AND MICROWAVE ANTENNAS - I			
1	Explain the principle of operation and applications of folded dipoles?	Analyze	f
2	Design 7 elements Yagi – Uda antenna at a frequency of 30MHz?	Understand	d
3	Design 5 elements Yagi – Uda antenna at a frequency of 300MHz?	Apply	e
4	Explain helical antenna? What are the different types of modes of operations of helical antenna?	Understand	f
5	What is a Horn? Explain different types of horns antennas and its applications?	Analyze	j
6	What is folded dipole? Explain characteristics of folded dipole and Yagi – Uda antenna?	Understand Analyze	j,m
7	Design Basic Yagi Uda antenna at a frequency of 30MHz?	Understand	E
8	Calculate in db the directivity of 20 turn helix, having $\alpha = 12^o$, circumference equal to one wave length?	Knowledge & remember	b
9	Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side?	Remember & understand	g,i
10	Design 9 elements Yagi – Uda antenna at a frequency of 300MHz?	Apply & analyze	h,k,m
UNIT-III VHF, UHF, AND MICROWAVE ANTENNAS - II			
1	Explain about characteristics of **Micro strip lines**?	Understand	b,f,i
2	Explain the basic principle of **lens antenna**? What are its **merits and demerits**?	Remember	b,g,h
3	What are the various problems encountered in **parabolic reflector**? Explain?	Understand	g
4	Explain advantages and disadvantages of corner and flat sheet reflectors?	Understand	g,h
5	Explain feed methods of parabolic reflector in detail?	Understand	e
6	Explain the impact of different parameters on characteristics of micro strip antennas?	Remember	j
7	What are the advantages and limitations of strip antennas?	Apply	j,m
8	Compare **Flat and Corner reflector antennas**?	Remember	j
9	Calculate the angular aperture for a parabolic reflector antenna for which aperture number is (i) 0.25 (ii) 0.50 (iii) 0.60. Given the diameter of the reflector mouth is 10m; calculate the position of the focal point with reference the reflector mouth in each case?	Analyze	e,b
10.	Estimate the diameter of a parabolic reflector required to produce a beam of 5^o width at 1.2GHz. How would you make this reflector?	Analyze	e,b
UNIT-IV ANTENNA ARRAYS			
1	Explain the **Gain measurement** with neat block diagram?	Remember	k
2	Explain the **Radiation Pattern measurement** with neat block diagram?	Remember	i
3	What is a uniform linear array? What are the different types of antenna arrays?	Apply	f
4	Draw the radiation field pattern of array of 2- point sources with equal magnitude and phase?	Analyze	e,b
5	Draw the radiation pattern of 4 – element Broad side array with equal magnitude and spacing?	Apply	f
6	Explain necessity for Hansen &wood yard condition? Explain in detail about Hansen &wood yard condition for increased directivity for EFA?	Remember	a
7	Design a 8 element Broadside array of isotropic sources of $\lambda/2$ spacing between elements. The patterns are to be optimum with a side lobe 26db down the main lobe maximum?	Remember	b
8	Calculate the directivity of a broadside array of height 10λ and the length 20λ	Analyze	e,b

S. No	Question	Blooms Taxonomy Level	Course Outcome
	in db?		
9	Two identical point sources separated by a distance d, each source having a field pattern given by $E_o = E_1 \sin\theta$. If $d = \lambda/2$ and phase angle $\alpha = 0$ derive an expression for a total field pattern. Plot the pattern?	Understand	f
10	Design a 4 element broad side array of $\lambda/2$ spacing between elements. The pattern is to be optimum with a side lobe level 19.1db down the main lobe maximum?	Remember	b
	UNIT-V **WAVE PROPAGATION**		
1	Explain in detail bout **Ground wave propagation**? What are the applications of **Ground wave propagation**?	Analyze	f
2	Explain in detail about **Duct propagation**? **M – Curves**?	Understand	f
3	define following: a) MUF b) LUF c) Optimum working frequency	Analyze	j
4	write short notes on : a) Troposphere scattering b) Effect of earth curvature c) LOS and Radio Horizon	Analyze	E
5	Explain in detail about **Line of Sight Propagation**?	Apply	e
6	What is the critical frequency for reflection at vertical incidence if the maximum value of electron density is 1.24×10^6 cm^{-3} ?	Apply	e
7	Calculate the critical frequency for the F1, F2 and E layers for which the maximum ionic densities are 2.3×10^6, 3.5×10^6 and 1.7×10^6 electrons per c.c respectively?	Understand	f
8	Assume that reflection takes place at a height of 400km and that the maximum density in the ionosphere corresponds to 0.9 refractive index at 10MHz. what will be the range (assume flat earth condition) for which the MUF is 10MHz?	Remember	J
9	A transmitter radiates 20W of power at a wavelength of 4 cm. calculate the power received by the antenna at a distance 100km if the gain of the transmitting and receiving antennas are equal and have a value of 30db?	Remember	j
10	Explain the structure of atmosphere?	Analyze	e

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