# 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 COMMUNIACTION ENGINEERING

### **QUESTION BANK**

Course Name	:	Antennas and Wave Propagation (AWP)
Course Code	:	A50418
Class	:	III - B. Tech
Branch	:	ECE
Year	:	2017 – 18
<b>Course Coordinator</b>	:	Mrs. A. Usha Rani, Associate Professor
<b>Course Faculty</b>	:	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	Course Outcom			
		level	e			
	UNIT-I					
	ANTENNA FUNDAMENTALS					
	SHORT ANSWER QUESTIONS					
1	Define an antenna?	Remember	1			
2	Describe the meant by radiation pattern?	Remember	1			
3	Define Radiation intensity?	Analyze	1			
4	Define Beam efficiency?	Remember	1			
5	Define Directivity?	Analyze	1			
6	Describe the different types of aperture?	Remember	1			
9	Define different types of aperture?	Understand	1,2			
10	Define Aperture efficiency?	Remember	1			
11	Describe the meant by effective height?	Analyze	1,2			
12	Describe the field zones?	Understand	1			
13	Define antenna efficiency?	Understand	1			

14	Describe the radiation resistance?	Analyze	1,2
15	Describe the meant by antenna beam width?	Analyze	2
	-	•	
16 17	Describe the meant by reciprocity Theorem?  Describe the meant by isotropic radiator?	Analyze Understand	2 2
18	Define gain?	Understand	2
19	Define self impedance?	Understand	1
20	Define mutual impedance?	Understand	1
21	Describe the FRIIS transmission formula and explain its significance?	Analyze	2
22	Explain effective aperture area with its types in detail?	Understand	2
23	Define axial ratio?	Understand	2
24	Define radian and ste radian?	Understand	1
25	Describe the meant by Beam Area?	Understand	1
	LONG ANSWER QUESTIONS		
1	Explain the retarded vector potential in detail?	Understand	1
2	Derive an expression for the power radiated by the current element and calculate the radiation resistance?	Analyze	1
3	Derive an expression for the far field component of a half wave dipole of an antenna?	Analyze	2
4	Derive the total power radiated by half wave dipole?	Remember	2
5	Show that the radiation resistance of a half wave dipole is 730hms?	Understand	3
6	Derive an expression for the electric field and magnetic field due to a current element at a distance point in free space?	Remember	2
7	Derive an expression for the gain of half wave dipole?	Understand	2
8	Derive FRIIS transmission formula and explain its significance?	Understand	1
9	Derive an expression for power radiated by an isotropic antenna?	Understand	1
	· · · · · · · · · · · · · · · · · · ·		
10	Derive the relation between directivity and beam solid angle?	Remember	1
11	Derive the relationship between radiation resistance and efficiency?	Remember	2
12	Derive an expression for field intensity at a distant point?	Understand	2
13	Derive the field components of loop antenna?	Understand	1
14	Write short notes on: (a) Fields of an oscillating dipole?	Understand	1
15	Derive the expression of distance where Near and Far fields are separated?	Remember	1
16	Explain the Principle of Operation of loop antenna?	Remember	1
	ANALYTICAL QUESTIONS	110	
1	The radial component of the radiated power density of an antenna is		2
	given by Wrad = Wrar = $\frac{2}{\text{arAosin}\theta/r}$ (W/m), then determine the	A a 1 a	2
	total radiated power?	Analyze	
2	The radial component of the radiated power density of an infinitesimal linear		3
	dipole of length $1 << \lambda$ is given by: Wav = Wrar = arAosin $\theta$ /r (W/m), then	Evaluate	
	find the maximum directivity of an antenna?	Evaluate	
3	Show That the Directivity of An Small Current Element is 1.5.	Evaluate	2
4	A Transmitting Antenna Having An Effective Height of 61.4 meters, takes a		2
	current of 5Amp (rms) at a Wavelength of 625meters. Find Rr, Pr, Antenna Efficiency for Total Antenna Resistance of 50ohms.	Remember	
5	A Thin Dipole Antenna is $\frac{\pi}{15}$ long. If its loss Resistance is 1.5 $\Omega$ . Find Rr and the Efficiency.	Evaluate	2
6	A Transmitting Antenna Having An Effective Height of 100 meters has a current at the base 100A at the Frequency of 300KHz, Calculate the Field Strength at a distance of 100km,Rr,Pr.	Remember	2
7	An Antenna having a Gain of 6db over a Reference Antenna, is Radiating 700Watts. Calculate the Power that Reference Antenna must Radiate in Order to be Equally Effective in the most Preferred Direction.	Evaluate	2
8	An Antenna has a Radiation Resistance of $72\Omega$ , a loss Resistance of $8\Omega$ and a Power Gain of 12db, Determine the Antenna Efficiency and Directivity.	Evaluate	3

SHORT ANSWER QUESTIONS  1 Describe the the Special feature of folded dipole antennas? Remember   2 Describe the Advantages of folded dipole? Understand   4 Compare half wave dipole & folded dipole? Remember   5 Describe the Application of folded dipole? Remember   5 Describe the a promation mode of helix antenna   6 Describe the a normal mode of helix antenna   7 Discriminate the axial mode of helix antenna   8 Remember   6 Describe the a normal mode of helix antenna   8 Remember   6 Describe the parameters to be considered for the design of a helical   8 Describe the parameters to be considered for the design of a helical   8 Describe the mean by basic yagi antenna?   9 List the applications of helical antenna?   9 List the applications of helical antenna?   10 Describe the mean by basic yagi antenna?   11 Describe the characteristics of Yagi uda antenna?   12 Describe the characteristics of Yagi uda antenna?   13 Describe the different types of horn antennas used in practical   14 Describe the different types of horn antennas used in practical   15 Describe the mean by fermat's principle   16 Describe the mean by fermat's principle   17 Describe the mean by fermat's principle   18 Remember   19 Describe the mean by fermat's principle   19 Describe the advantages horn antennas   10 Describe the mean by fermat's principle   20 Remember   21 Suplain the special features of various types of Horn antennas   22 With a suitable diagram, discuss the construction and operation of a   23 Yagi-Uda antenna?   24 Suplain the principle of peration and applications of folded dipoles?   25 Draw The Helical Antenna With Neat Geometry.   26 Explain in detail the working principle of Helical antenna in Normal mode   27 Explain habout the Design Considerations Of Pyramidal Horn Antenna.   28 Explain the Working Principle of Horn Antenna.   29 Derive the Voltage and Current Relations in Parasitic Elements.   20 Design Basic Yagi Uda antenna at a frequency of 300MHz   21 Design Selement Yagi - Uda antenna at a frequency of 300MHz		UNIT -2 VHF, UHF AND MICROWAVE ANTENNAS - I		
Describe the the Special feature of folded dipole antennas?  Describe the Advantages of folded dipole?  Describe the Application of folded dipole?  Compare half wave dipole & folded dipole?  Describe the Application of folded dipole?  Describe the a normal mode of helix antenna  Remember  Describe the a axial mode with Normal Mode  Describe the a axial mode with Normal Mode  Discriminate the axial mode with Normal Mode  Discriminate the axial mode with Normal Mode  Describe the parameters to be considered for the design of a helical antenna  Apply  List the applications of helical antenna?  List the applications of helical antenna?  Describe the mean by basic yagi antenna?  Describe the mean by basic yagi antenna?  Describe the mean by bosic yagi antenna?  Describe the mean by hom  Understand  Describe the mean by termat's principle  Remember  LONG ANSWER QUESTIONS  Explain the special features of various types of Horn antennas  Explain in desail the working principle of Helical antenna in Normal mode  Explain in detail the working principle of Helical antenna in Normal mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna.  Analyze  Explain be Working Principle of Helical antenna in Axial mode  Evaluate  Explain the Working Principle		,		
2 Describe the Advantages of folded dipole? Remember 5 3 Describe the Application of folded dipole? Remember 5 4 Compare half wave dipole & folded dipole? Remember 5 5 Describe the a normal mode of helix antenna Remember 6 6 Describe the a axial mode of helix antenna Remember 7 6 Describe the a axial mode of helix antenna Remember 6 7 Discriminate the axial mode with Normal Mode 1 Understand 6 8 Describe the parameters to be considered for the design of a helical antenna 1 Apply 6 8 Describe the parameters to be considered for the design of a helical antenna 1 Apply 6 9 List the applications of helical antenna? Understand 6 10 Describe the mean by basic yagi antenna? Understand 6 11 Describe the characteristics of Yagi uda antenna? Understand 5 12 Describe the deriversitics of Yagi uda antenna? Understand 5 13 Describe the different types of horn antennas used in practical applications 1 Understand 5 14 Describe the advantages horn antennas used in practical applications 1 Understand 5 15 Describe the advantages horn antennas 1 Remember 1 Remember 1 Remember 1 Remember 1 Remember 1 Remember 2 Remember 4 Remember 5 Remember 4 Remember 5 Remember 4 Remember 5 Remember 6 Remember 6 Remember 6 Remember 7 Remember 8 Remember 9	1		Remember	4
Describe the Application of folded dipole?   Remember   5	2	-		4
4 Compare half wave dipole & folded dipole? 5 Describe the an anomal mode of helix antenna 6 Describe the a axial mode of helix antenna 7 Discriminate the axial mode with Normal Mode 8 Describe the parameters to be considered for the design of a helical antenna 9 List the applications of helical antenna? 10 Describe the parameters to be considered for the design of a helical antenna 9 List the applications of helical antenna? 11 Describe the mean by basic yagi antenna? 12 Describe the characteristics of Yagi uda antenna? 13 Describe the mean by horn 14 Describe the different types of horn antennas used in practical applications 14 Describe the different types of horn antennas used in practical applications 14 Describe the mean by fermat's principle 15 Describe the advantages horn antennas 16 Remember 17 Describe the advantages horn antennas 18 Remember 19 Describe the advantages horn antennas 19 Describe the mean by fermat's principle 10 Describe the mean by fermat's principle 11 Describe the mean by fermat's principle 12 Describe the mean by fermat's principle 13 Describe the mean by fermat's principle 14 Describe the mean by fermat's principle 15 Describe the mean by fermat's principle 16 Remember 17 Explain the special features of various types of Horn antennas 18 Evaluate 19 Explain in detail the working principle of Helical antenna in Normal mode 20 With a suitable diagram, discuss the construction and operation of a Analyze 30 Explain in detail the working principle of Helical antenna in Normal mode 41 Explain the principle of operation and applications of folded dipoles? 42 Explain in detail the working principle of Helical antenna in Axial mode 43 Explain in detail the working principle of Helical antenna in Axial mode 44 Explain in detail the working principle of Helical antenna in Axial mode 45 Explain in detail the working principle of Helical antenna in Axial mode 46 Explain the Operation and applications of folded dipoles? 40 Explain the Working Principle of Helical antenna in Axial mode 41 Explai				
5 Describe the a normal mode of helix antenna Remember 6 Describe the a axial mode of helix antenna Remember 6 Describe the a axial mode of helix antenna Remember 6 Describe the paximeters to be considered for the design of a helical antenna Apply 6 antenna 4 Describe the parameters to be considered for the design of a helical antenna 4 Apply 6 Describe the parameters to be considered for the design of a helical 4 Apply 6 Describe the parameters to be considered for the design of a helical 4 Apply 6 Describe the mean by basic yagi antenna? Understand 6 Describe the characteristics of Yagi uda antenna? Understand 6 Describe the defired types of horn antennas used in practical 4 popilications 1 Describe the different types of horn antennas used in practical 4 popilications 1 Describe the advantages horn antennas 1 Remember 1 Describe the advantages horn antennas 2 Vigil Uda antenna (discriber the describer				
Describe the a axial mode of helix antenna   Remember   Discriminate the axial mode with Normal Mode   Understand   Apply   Go				
Discriminate the axial mode with Normal Mode   Describe the parameters to be considered for the design of a helical antenna   Apply   6				
8 Describe the parameters to be considered for the design of a helical antenna antenna 9  List the applications of helical antenna? Understand 6  10 Describe the mean by basic yagi antenna? Apply 6  11 Describe the characteristics of Yagi uda antenna? Understand 5  12 Describe the mean by horn Understand 5  Describe the mean by horn Understand 5  Describe the mean by horn Understand 5  Describe the mean by form antennas used in practical applications Understand 3  Describe the mean by fermat's principle Remember 4  Describe the mean by fermat's principle Remember 4  Describe the mean by fermat's principle Remember 4  Describe the advantages hor antennas Remember 4  LONG ANSWER QUESTIONS  1 Explain the special features of various types of Horn antennas Evaluate 4  With a suitable diagram, discuss the construction and operation of a Yagi-Uda antenna? Analyze 4  2 With a suitable diagram, discuss the construction and operation of a Yagi-Uda antenna? Evaluate 5  Explain the principle of operation and applications of folded dipoles? Evaluate 5  Draw The Helical Antenna With Neat Geometry. Evaluate 5  Draw The Helical Antenna With Neat Geometry. Evaluate 5  Explain in detail the working principle of Helical antenna in Axial mode Evaluate 5  Explain the Working Principle of Horn Antenna. Analyze 4  Explain the Working Principle of Horn Antenna. Analyze 4  Derive the Voltage and Current Relations in Parasitic Elements. Analyze 6  Classify the Types of Horn Antennas with neat Geometry Analyze 6  1 Design Basic Yagi Uda antenna at a frequency of 30MHz Evaluate 5  Calculate in db the directivity of 20 turn helix, having α = 12 0  Calculate in db the directivity of 20 turn helix, having α = 12 0  Calculate in db the directivity of 20 turn helix, having α = 12 0  Calculate in db the directivity of 20 turn helix, having α = 12 0  Calculate in db the directivity of 20 turn helix, having α = 12 0  Calculate in db the directivity of 20 turn helix, having α = 12 0  Analyze 1  Analyze 1  Analyze 2  Analyze 3  Calculate in db the				6
1		Describe the parameters to be considered for the design of a helical		6
Describe the mean by basic yagi antenna?   Apply   6	9		Understand	6
11 Describe the characteristics of Yagi uda antenna? 12 Describe the mean by horn 13 Describe the themean by horn 14 Describe the different types of horn antennas used in practical applications 15 Describe the mean by fermat's principle 16 Describe the mean by fermat's principle 17 Describe the advantages horn antennas 18 Remember 19 Remember 20 Remember 21 Describe the advantages horn antennas 22 Remember 23 Remember 24 Remember 25 Remember 26 Remember 27 Remember 28 Remember 29 With a suitable diagram, discuss the construction and operation of a Analyze Yagi-Uda antenna? 20 Analyze Paplian in detail the working principle of Helical antenna in Normal mode Evaluate 29 Explain in detail the working principle of Helical antenna in Normal mode Evaluate 20 Explain the principle of operation and applications of folded dipoles? 21 Explain the Helical Antenna With Neat Geometry. Evaluate 22 Explain about the Design Considerations Of Pyramidal Horn Antenna. Analyze 23 Analyze 24 Explain the Working Principle of Helical antenna in Axial mode Evaluate 25 Explain About the Design Considerations of Pyramidal Horn Antenna. Analyze 38 Explain the Working Principle of Horn Antenna. Analyze 40 Derive the Voltage and Current Relations in Parasitic Elements. Analyze 41 Classify the Types of Horn Antennas with neat Geometry 42 Design Basic Yagi Uda antenna at a frequency of 30MHz 43 Design Basic Yagi Uda antenna at a frequency of 30MHz 44 Design S element Yagi – Uda antenna at a frequency of 30MHz 45 Design S element Yagi – Uda antenna at a frequency of 30MHz 46 Calculate in do the directivity of 20 turn helix, having α = 12 0 Analyze 47 Calculate in the power gain of optimum horn antenna approximately with a square aperture of 10 Ω on one side 48 Find out the Length L, Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10X. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode. 49 Principle of Nord Remember Pattern. 40 Analyze 41 Analyze 42 Pattern Pattern Pattern Pattern P				6
Describe the mean by horn   Describe the different types of horn antennas used in practical applications   Understand   Some properties   Describe the different types of horn antennas used in practical applications   Understand   Some properties   Describe the mean by fermat's principle   Remember   4				6
Describe the different types of horn antennas used in practical applications  14 Describe the mean by fermat's principle 15 Describe the advantages horn antennas  16 Describe the advantages horn antennas  17 Describe the advantages horn antennas  18 Describe the advantages horn antennas  19 Describe the advantages horn antennas  10 Describe the advantages horn antennas  10 Describe the advantages horn antennas  11 Describe the special features of various types of Horn antennas  12 Describe the special features of various types of Horn antennas  19 Describe the different types of Horn antennas  10 Describe the different types of Horn antenna in Normal mode  10 Describe the different types of Horn antenna in Normal mode  11 Design Basic Yagi Uda antenna With Neat Geometry.  12 Design Basic Yagi Uda antenna with neat Geometry  13 Design Basic Yagi Uda antenna at a frequency of 300MHz  14 Design Basic Yagi Uda antenna at a frequency of 300MHz  15 Design 5 element Yagi – Uda antenna at a frequency of 300MHz  16 Design Calculate in db the directivity of 20 turn helix, having α = 12 Orious the Down and turn square aperture of 10λ on one side  17 Design Basic Yagi Uda antenna at a frequency of 300MHz  18 Design 5 element Yagi – Uda antenna at a frequency of 300MHz  19 Design 6 element Yagi – Uda antenna at a frequency of 300MHz  20 Design 7 element Yagi – Uda antenna at a frequency of 300MHz  21 Design 7 element Yagi – Uda antenna at a frequency of 300MHz  22 Design 8 element Yagi – Uda antenna at a frequency of 300MHz  23 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  24 Saluate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  25 Find out then Length L, Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for hor				5
13   applications   Cinterstant   3   3   Describe the mean by fermat's principle   Remember   4			i i	
Describe the mean by fermat's principle   Remember   A	13		Understand	5
LONG ANSWER QUESTIONS   Explain the special features of various types of Horn antennas   Evaluate   4	14		Remember	4
Explain the special features of various types of Horn antennas   Evaluate   4	15		Remember	4
With a suitable diagram, discuss the construction and operation of a Yagi-Uda antenna?   4		LONG ANSWER QUESTIONS		
2       Yagi-Uda antenna?         3       Explain in detail the working principle of Helical antenna in Normal mode       Evaluate       5         4       Explain the principle of operation and applications of folded dipoles?       Evaluate       5         5       Draw The Helical Antenna With Neat Geometry.       Evaluate       5         6       Explain in detail the working principle of Helical antenna in Axial mode       Evaluate       5         7       Explain About the Design Considerations Of Pyramidal Horn Antenna.       Analyze       6         8       Explain the Working Principle of Horn Antenna.       Analyze       4         9       Derive the Voltage and Current Relations in Parasitic Elements.       Analyze       4         10       Classify the Types of Horn Antennas with neat Geometry       Analyze       6         ANALYTICAL QUESTIONS       Versuate       5         1       Design Basic Yagi Uda antenna at a frequency of 30MHz       Evaluate       5         2       Design 5 element Yagi – Uda antenna at a frequency of 300MHz       Evaluate       5         3       Calculate in db the directivity of 20 turn helix, having α = 12 °, circumference       Analyze       5         4       Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ. on one side       Analyze <td>1</td> <td></td> <td>Evaluate</td> <td>4</td>	1		Evaluate	4
Explain the principle of operation and applications of folded dipoles?  Draw The Helical Antenna With Neat Geometry.  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain in detail the working principle of Helical antenna in Axial mode  Explain About the Design Considerations Of Pyramidal Horn Antenna.  Analyze  Explain the Working Principle of Horn Antenna.  Analyze  Derive the Voltage and Current Relations in Parasitic Elements.  Analyze  ANALYTICAL QUESTIONS  Design Basic Yagi Uda antenna at a frequency of 30MHz  Design Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Calculate in db the directivity of 20 turn helix, having α = 12 0, circumference equal to one wave length  Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  Find out the Length L,Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  Analyze  Tunit-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  Remember  8 Remember	2		Analyze	4
5 Draw The Helical Antenna With Neat Geometry.  Evaluate  Explain in detail the working principle of Helical antenna in Axial mode  Evaluate  5 Explain About the Design Considerations Of Pyramidal Horn Antenna.  Analyze  Explain the Working Principle of Horn Antenna.  Analyze  Explain the Working Principle of Horn Antenna.  Analyze  Derive the Voltage and Current Relations in Parasitic Elements.  Analyze  Analyze  Analyze  Analyze  Analyze  Classify the Types of Horn Antennas with neat Geometry  ANALYTICAL QUESTIONS  Design Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi — Uda antenna at a frequency of 300MHz  Calculate in db the directivity of 20 turn helix, having α = 12	3	Explain in detail the working principle of Helical antenna in Normal mode	Evaluate	5
Explain in detail the working principle of Helical antenna in Axial mode  Explain About the Design Considerations Of Pyramidal Horn Antenna.  Explain the Working Principle of Horn Antenna.  Analyze  Explain the Working Principle of Horn Antenna.  Analyze  Derive the Voltage and Current Relations in Parasitic Elements.  Classify the Types of Horn Antennas with neat Geometry  ANALYTICAL QUESTIONS  Design Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Calculate in db the directivity of 20 turn helix, having α = 12 0, circumference equal to one wave length  Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  Find out the Length L,Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  Analyze  Terctangular wave guide with TE <sub>10</sub> mode.  Analyze  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  Remember  8	4	Explain the principle of operation and applications of folded dipoles?	Evaluate	6
Explain About the Design Considerations Of Pyramidal Horn Antenna.   Analyze   4	5	Draw The Helical Antenna With Neat Geometry.	Evaluate	5
8 Explain the Working Principle of Horn Antenna.  Analyze 4 9 Derive the Voltage and Current Relations in Parasitic Elements. Analyze 6 10 Classify the Types of Horn Antennas with neat Geometry  ANALYTICAL QUESTIONS  1 Design Basic Yagi Uda antenna at a frequency of 30MHz Evaluate 5 2 Design 5 element Yagi – Uda antenna at a frequency of 300MHz Evaluate 5 3 Calculate in db the directivity of 20 turn helix, having α = 12        Calculate in db the directivity of 20 turn helix, having α = 12        Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  5 Find out the Length L, Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  Analyze 4  SHORT ANSWER QUESTIONS 1 Describe the features of Patch antennas Remember 8	6	Explain in detail the working principle of Helical antenna in Axial mode	Evaluate	5
9 Derive the Voltage and Current Relations in Parasitic Elements.  Analyze 4 10 Classify the Types of Horn Antennas with neat Geometry Analyze 6  ANALYTICAL QUESTIONS  1 Design Basic Yagi Uda antenna at a frequency of 30MHz Evaluate 5 2 Design 5 element Yagi – Uda antenna at a frequency of 300MHz Evaluate 5 3 Calculate in db the directivity of 20 turn helix, having α = 12 °, circumference equal to one wave length 4 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side 5 5 Find out the Length L, Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode. 6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS 1 Describe the features of Patch antennas Remember 8	7	Explain About the Design Considerations Of Pyramidal Horn Antenna.	Analyze	6
Analyze  Besign Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Calculate in db the directivity of 20 turn helix, having α = 12 0, circumference equal to one wave length  Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  Analyze  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  Remember  8	8	Explain the Working Principle of Horn Antenna.	Analyze	4
ANALYTICAL QUESTIONS  1 Design Basic Yagi Uda antenna at a frequency of 30MHz Evaluate 5  2 Design 5 element Yagi – Uda antenna at a frequency of 300MHz Evaluate 5  3 Calculate in db the directivity of 20 turn helix, having α = 12 , circumference equal to one wave length 4 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side 5  5 Find out the Length L, Width W, and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode. 4  6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern. 4  CUNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas Remember 8			Analyze	4
Design Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Evaluate  Calculate in db the directivity of 20 turn helix, having α = 12    Analyze  circumference equal to one wave length  Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  Analyze  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  Remember  8	10	Classify the Types of Horn Antennas with neat Geometry	Analyze	6
Design Basic Yagi Uda antenna at a frequency of 30MHz  Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Evaluate  Calculate in db the directivity of 20 turn helix, having α = 12    Analyze  circumference equal to one wave length  Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  Analyze  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  Remember  8		ANALYTICAL QUESTIONS		
Design 5 element Yagi – Uda antenna at a frequency of 300MHz  Calculate in db the directivity of 20 turn helix, having α = 12	1		Evaluate	5
Calculate in db the directivity of 20 turn helix, having α = 12 °, circumference equal to one wave length  4 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  5 Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  4 UNIT-3 VHF, UHF AND MICROWAVE ANTENNAS - II SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas  Remember	2	1 7		
circumference equal to one wave length  4 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  5 Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  4 Analyze  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas  Remember			Evaluate	3
4 Calculate the power gain of optimum horn antenna approximately with a square aperture of 10λ on one side  5 Find out the Length L,Width W,and half flare anglesθ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  6 A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas Remember 8	3	circumference	Analyze	5
Find out the Length L, Width W, and half flare angles θ <sub>E</sub> & θ <sub>H</sub> of a Pyramidal horn antenna for Which the Mouth Height h=10λ. The Horn is fed by a rectangular wave guide with TE <sub>10</sub> mode.  A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  Analyze  UNIT-3  VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas  Remember	4	Calculate the power gain of optimum horn antenna approximately with a	Analyze	4
A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn spacing of λ/4. Find HPBW, Axial Ratio, Gain, Power Pattern.  UNIT-3 VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas Remember 8	5	Find out the Length L, Width W, and half flare angles $\theta_E$ & $\theta_H$ of a Pyramidal horn antenna for Which the Mouth Height h=10 $\lambda$ . The Horn is fed by a	Analyze	4
VHF, UHF AND MICROWAVE ANTENNAS - II  SHORT ANSWER QUESTIONS  1 Describe the features of Patch antennas Remember 8	6	A 16 Turn Helical Beam Antenna has a Circumference of λ, and turn	Analyze	4
1 Describe the features of Patch antennas Remember 8		VHF, UHF AND MICROWAVE ANTENNAS - II		
	1		D 1	
				8

		1	
3	Describe the mean by spill over?	Remember	8
4	Define F/D ratio?	Understand	8
5	List Out the advantages of strip antennas	Understand	8
6	Describe the characteristic of micro strip antennas	Understand	8
7	Describe the limitations of strip antennas	Understand	8
8	Describe the features of micro strip antennas	Understand	8
9	Describe the advantages of parabolic reflector antenna	Understand	8
10	Describe the use of stocked MSA	Understand	8
11	Describe the drawbacks of parabolic reflector antenna	Remember	8
12	Describe the mean by tuning in MSA	Understand	8
13 14	Describe the drawbacks of corner and flat sheet antennas	Understand	8
15	Write the formula for centre frequency of patch antenna Listout the Feed Methods of Patch Antenna	Understand Understand	8
16	Write the Performance Parameters of Micro Strip antennas?	Understand	8
17	Discuss the effect of Substrate on the radiation of Patch antenna	Understand	8
18	List out all the Microwave Antennas	Understand	8
19	Write Design Considerations of Low profile Antennas	Understand	8
20	List the Applications of reflector antennas		8
20	List the Applications of Terrector antennas  MID-II	Apply	U
1	List the types of Horn antennas?	Remember	8
2	Compare the reflector and lens antennas?	Understand	8
3	Describe the drawbacks of lens antenna?	Understand	0
4		Analyza	8
	Mention different types of Lens antennas	Analyze	
5	Sketch the Paraboloidal Reflector antenna along with its radiation pattern.	Understand	8
6	What is the principle of Horn antenna.	Understand	8
- 7 - 8	Reproduce the expression for flare angle of Horn antenna.	Remember Remember	8
	List the applications of Horn antenna.		
9	Recall the expression for Axial length of Horn antenna.	Remember	8
10	Define capture area ?	Remember	8
11	Discriminate Delay lens with Metal plate lens.	Understand	8
12	Explain Fermat's principle.	Understand	8
13	State the drawbacks of lens antenna?	Remember	8
14	List the various types of feed system for a parabolic reflector	Remember	8
15	Recall the applications of Parabolic dish antenna	Remember	8
16	Give examples of secondary antennas.	Remember	8
17	State the advantages of Zoning?	Understand	8
18	Relate thickness and frequency of Lens antenna.	Understand	8
-	- *		
19	For a DTH antenna, the diameter is D <sub>a</sub> . Relate the directivity with diameter.	Remember	8
20	Reproduce the figure of Cassegrain feed.	Remember	8
	LONG ANSWER QUESTIONS		
1	Describe the features of micro strip antennas?	Evaluate	8
2	Describe the advantages and limitations of strip antennas?	Understand	8
3	Describe the feed methods of rectangular strip antennas?	Remember	8
4	Explain the characteristics of micro strip antennas?	Understand	8
5	Explain the impact of different parameters on characteristics of micro strip antennas?	Understand	8
6	Explain advantages and disadvantages of corner and flat sheet reflectors?	Understand	8
7	Explain feed methods of parabolic reflector in detail?	Analyze	8
8	Explain the principle of operation of basic lens antenna?	Analyze	8
9	Describe types lens antennas? Explain?	Analyze	8
10	Describe the advantage, disadvantages and applications of lens antenna?	Analyze	8

1	ANALYTICAL QUESTIONS  A parabolic reflector antenna with diameter 20 m, is designed to operate at	Apply	7,8
1	frequency of 6GHz and illumination efficiency of 0.54. Calculate antenna gain?	Арріу	7,0
2	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?	Remember	7,8
3	Estimate the diameter of a parabolic reflector required to produce a beam of 5 width at 1.2GHz. How would you make this reflector?	Understand	7,8
4	Design an optimum horn antenna with mouth height h=20 $\lambda$ and path difference $\delta = 0.20 \lambda$ . Find L and $\theta$ .	Apply	7,8
5	Calculate the directivity and power gain of an optimum horn antenna with a square of $10 \lambda$ on a side.	Apply	7,8
6	Find out the length , width & flare angles of $\theta_E$ & $\theta_H$ of pyramidal horn antenna for which the mouth height is $10~\lambda$ .	Apply	7,8
7	A parabolic dish antenna provides a gain of 75dB at a frequency of 15GHz. Calculate the capture area, HPBW and FNBW.	Apply	7
8	Find beam width between first nulls and half power beam width for 2m diameter paraboloid reflector which is operating at 5 GHz.	Remember	7
	UNIT-IV		
	ANTENNA ARRAYS& MEASUREMENTS SHORT ANSWER QUESTIONS		
1	Describe the point source.	Remember	9
2	Describe the meant by array.	Understand	9
3	Describe the meant by uniform linear array.	Remember	9
4	List out the types of array	Understand	9
5	Describe the Broad side array	Understand	10
6	Describe the End fire array	Understand	10
7	Describe the collinear array	Understand	10
8	Describe the parasitic array	Remember	10
9	Describe the Sources of Error in brief	Remember	10
10	Draw the IEEE Standard Co-Ordinate Systems.	Remember	10
11	Differentiate broad side and End fire array	Understand	11
12	Describe the need for the Binomial array	Remember	11
13	Define power pattern?	Remember	11
14	Describe the need for Antenna Measurement	Remember	11
15	LONG ANGWED OVERTIONS	Understand	11
	LONG ANSWER QUESTIONS		
1	Write short notes on various forms of arrays i. Broad side array ii. End fire array ii. Collinear array iv. Parasitic array?	Apply	10
2	Explain the Radiation Pattern Measurement with Neat Sketch.	Analyze	11
	Explain the Gain Measurement by 3-Antenna Method with Neat Sketch.	Remember	11
3	Explain the Sources of Error while doing the Measurement.	Remember	11
3	Explain the Sources of Error while doing the Measurement.		
	Explain the Directivity Measurement with Neat Sketch.	Evaluate	11
4		Evaluate Evaluate	11
4 5	Explain the Directivity Measurement with Neat Sketch.		11
4 5 6	Explain the Directivity Measurement with Neat Sketch.  Write detail notes on Binomial arrays  Explain the principle of Pattern multiplication?  Derive the expression for the far field pattern of an array of 2 – isotropic point sources i) Equal amplitude and phase ii) Equal amplitude and opposite	Evaluate	11
4 5 6 7	Explain the Directivity Measurement with Neat Sketch.  Write detail notes on Binomial arrays  Explain the principle of Pattern multiplication?  Derive the expression for the far field pattern of an array of 2 – isotropic	Evaluate Apply	11

	ANALYTICAL QUESTIONS		
1	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?	Analyze	11
2	Calculate the directivity of a broadside array of height $10\lambda$ and the length $20\lambda$ in db?	Analyze	11
3	Two identical point sources separated by a distance d, each source having a field pattern given by Eo = E1sin $\theta$ . If d = $\lambda/2$ and phase angle $\alpha$ = 0 derive an expression for a total field pattern. Plot the pattern?	Understand	11
4	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?	Analyze	11
5	While Measuring the Gain Of Horn Antenna, the gain oscillator was set for 9GHz Frequency and the Attenuation inserted was found to be 908db.Calculate the gain of the horn. The distance between the two horn was 35cm.  UNIT-V	Analyze	11
	Wave propagation		
	SHORT ANSWER QUESTIONS		
1	Define Ground wave?	Understand	13
2	Describe the types of Ground waves	Understand	13
3	Describe the Space Wave in detail	Understand	13
4	Describe Surface Wave in detail	Remember	12
5	Describe the Ray Path.	Understand	12
6	Explain Skip Distance?	Remember	12
7	Describe the Scattering Phenomena.	Understand	12
8	Define LUF?	Understand	12
9	Describe maximum Usable Frequency?	Remember	12
10	Describe The concept of Virtual Height.	Understand	12
11	Define Optimum frequency?	Understand	12
12	Explain the Structure of Atmosphere?	Remember	12
13	Explain the various layers of Ionosphere?	Understand	12
14	Explain Absorption	Understand	12
15	Draw the Structure of Ionosphere	Remember	12
	LONG ANSWER QUESTIONS		
1	Describe and Distinguish between the terms – (i) Critical Frequency &MUF (ii) Virtual Height and Skip Distance.	Understand	13
2	Derive the Relation Between Skip Distance and MUF	Analyze	13
3	Explain the Effect of Earth's Curvature and Absorption	Analyze	13
4	Explain the Concept of Refraction and Reflection of Sky Waves by Ionosphere	Understand	13
5	Sketch and Explain the Field Strength Variation of Space wave with Distance and Antenna Height	Apply	13
6	Explain the duct propagation and M-Curves in detail?	Apply	13
7	Explain the Gave propagation and IV Cut ves in detair.  Explain the Significance of E And F Layers of Ionosphere, And Account for the Multi Hop Propagation	Analyze	13
8	Derive the Curved Earth Reflections in Ground Wave Propagation	Remember	13
9	Derive the Plane Earth Reflections in Ground Wave Propagation	Understand	13
10	Describe the Following Terms in Detail (i)Critical Frequency(ii)Super Refraction	Remember	11
	ANALYTICAL QUESTIONS		
	· · · · · · · · · · · · · · · · · · ·		

	maximum value of electron density is 1.24x10 cm ?		
2	Calculate the critical frequency for the F1, F2 and E layers for which the maximum ionic densities are 2.3x10 , 3.5x10 and 1.7x10 electrons per c.c respectively?	Evaluate	13
3	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?	Apply	13
4	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?	Apply	13
5	Find the MUF and refractive index for a sky wave signal reflected by a layer at a height of 200 km, and having an electron density of 2.0 X 10^11 per cubic meter, for a skip distance of 2500 km. Also calculate the corresponding angle of incidence	Apply	12

Prepared By: Ms. A.Usharani, Associate Professor

Mr. G.Nagendra Prasad, Associate Professor Mr. J. Siva Rama Krishna, Assistant Professor.

Mr. K.Ravi, Assistant Professor.

Date: July 18, 2017.

HOD, ECE