Code No: RT31045 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Draw and represent each part of a Radiation pattern in linear and polar Plot?	[3M]
	b)	Calculate the height of driven element in yagi - uda antenna working at 100MHZ?	[4M]
	c)	Define first side lobe ratio(SLR)? What is the SLR for Uniform array?	[4M]
	d)	If a helical antenna has a spacing between turns 0.05m ,diameter 0.1m , Number of turns equal to 20 and operates at 1GHz , find the Null-to-Null beamwidth .	[4M]
	e)	Define corner reflector (cr)? Find the number of images in 60^0 CR and their sign?	[3M]
	f)	Define Roughness of Earth? Write the condition of earth electrically Smooth or rough?	[4M]

PART –B

2	a)	Explain the radiation mechanism from dipoles.	[8M]
	b)	Calculate the effective heights of Hertzian dipole, linear dipole,λ/4 dipole and λ/2 dipoles.	[8M]
3	a)	Derive the field equations (E&M fields) of a λ/4 Mono pole antenna.	[8M]
	b)	Find the radiation resistance of a Hertzian dipole of length λ/15, λ/30.	[8M]
4	a)	Prove that the array factor is same for 2-element linear uniform array Placed on azimuthal or elevation planes.	[8M]
	b)	What are scanning arrays? Explain? Derive the Phase values at different conditions.	[8M]
5		Write a short notes on i)Non resonant radiators ii)Helical antenna	[16M]
6	a)	Derive the field gain of a 90^0 corner reflector.	[8M]
	b)	Explain the working principle of lens antenna.	[8M]
7	a)	Classify the fading and discuss the features of fading in skywave propagation.	[8M]
	b)	Write a notes on i) Ionospheric Abnormalities ii) Virtual height	[8M]

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Code No: RT31045 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Define i) Solid angle ii) steradian	[4M]
	b)	A circular loop antenna has a diameter of 1.5 λ. Find its radiation resistance.	[4M]
	c)	Define uniform and Non uniform linear array?	[3M]
	d)	Define Pitch angle ? Write the significance of pitch angle in helical Antenna?	[4M]
	e)	Why lens antennas are restricted to microwave frequency? Explain?	[3M]
	f)	Discuss the variation of magnitude and phase of reflection coefficient in ground wave propagation?	[4M]

PART –B

2	a)	Calculate the exact directivity of the following bidirectional power Pattern $p(\theta,\Phi)=P_m \sin^2\theta \sin^2\Phi$	[8M]
	b)	Estimate the power gain of an antenna for given data .The HPBW radiation one plane is 60^0 and on orthogonal plane is 30^0. Antenna efficiency is 85%.	[8M]
3	a)	Starting from basic equations of EM field, derive the radiated power and radiation resistance of a current element?	[8M]
	b)	What is the effective area of a half-wave dipole operating at 500MHZ?	[8M]
4	a)	Obtain the resultant pattern of an array of two directional (but point Source) short collinear dipoles. $\alpha_e=0$, $d=\lambda/2$.	[8M]
	b)	Explain the designing of 5-element yagi-uda antenna?	[8M]
5	a)	Discuss the designing and other parameters of a microstrip antenna.	[8M]
	b)	Calculate Rrad , θmax and directivity of a non-resonant radiators of Length 3λ.	[8M]
6	a)	Derive the field gain of a flat sheet corner reflector.	[8M]
	b)	Write short notes on Horn antennas.	[8M]
7	a)	A transmitter operating at a frequency of 1.7 MHz is required to provide a ground wave field strength of 0.5mV/m at a distance of 10km. A short Vertical transmitting antenna has an efficiency of 50%.The conductivity of the ground is $5x10^{-5}$(mho)/cm and its relative permittivity is 10. Find the transmitter power required.	[8M]
	b)	Write short notes on i) duct propagation ii) Tropospheric scattering	[8M]

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Code No: RT31045 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Calculate the directivity of an antenna, if it radiates on one plane is 30^0 and an orthogonal plane is 45^0.	[3M]
	b)	Find the radiation efficiency of a Hertzian dipole of length 0.03λ at a Frequency of 100 MHz if the loss resistance is 0.01Ω.	[4M]
	c)	Find the Null-to-Null beam width of end-fire array length (L)= 10λ, N=50.	[3M]
	d)	If a helical antenna has a spacing between turns 0.05m ,diameter 0.1m , Number of turns equal to 20 and operates at 1.5GHZ , find Directivity.	[4M]
	e)	What is the role of distance criterion in antenna measurements? Explain?	[3M]
	f)	Discuss the effect of the curvature of the earth in space wave propagation?	[3M]

PART –B

2	a)	Estimate an approximate directivity of the following unidirectional power Pattern $p(\theta,\Phi) = 5\sin\theta$. Also compare with exact value of directivity?	[8M]
	b)	Define field regions? Estimate all field regions of a given antenna of Diameter 1λ.	[8M]
3	a)	Derive the field equations from a small loop antenna?	[8M]
	b)	What is the effective area of a half-wave dipole operating at 500MHZ?	[8M]
4	a)	Obtain the resultant pattern of two short vertical dipoles with $\alpha_e=0$, $d=\lambda/2$.	[8M]
	b)	Estimate the Zin of 3-fold folded dipole antenna ?	[8M]
5	a)	Explain the working principle of rectangular patch antenna?	[8M]
	b)	If a helical antenna has a spacing turns 0.05 m, diameter 0.1m , number of turns equal to 20 and operates at 200MHZ. Find the null-to-null Beam width of the main beam, half -power beam width and directivity.	[8M]
6		Write short notes on i) Parabolic reflector antennas ii) 2-antenna gain measurement. iii) Cassegrain feeds iv) Aperture blocking	[16M]
7	a)	Draw the atmospheric layers and discuss about each layer in ionospheric Region.	[8M]
	b)	A broadcast transmitter supplies 100kW to an antenna that radiates 50% of this power. The antenna has directional characteristics such that the Field strength without ground losses is given by E_0=300X1.28(sqrt P_{kw}) mV/m at 1Km. Find the field strength of the Ground wave at 100km for the following types of earth conditions for f=500KHz, Rockey soil flat sandy :ε_r=10, σ=2x10 $^{-5}$ (mho)/cm.	[8M]

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Code No: RT31045 **R13** SET - 4

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ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	If an antenna diameter is 2λ and working at 100kHz.Calculate the condition of farfield distance?	[3M]
	b)	How the retarded potentials are helped to estimate radiated fields at far field? Justify?	[4M]
	c)	Calculate the height of a reflector element in yagi-uda antenna working at 50 KHz.	[3M]
	d)	List out the advantages and limitations of a microstrip antenna.	[3M]
	e)	Find the power gain of a square horn antennas whose aperture size is 8λ.	[4M]
	f)	Explain the term "virtual height" in skywave propagation.	[4M]

PART -B

2	a)	Draw the equivalent circuit of an antenna? Explain the theorems which are used in antennas?	[8M]
	b)	Find the directivity, efficiency and effective area of an antenna if its R_r=80Ω, R_l=10Ω.The power gain is 10 dB and antenna operates at a frequency 100MHz.	[8M]
3	a)	Prove that the R_{rad} of a λ/2 dipole is 73Ω.	[8M]
	b)	What are the differences between antenna equivalent circuit and RLC circuit? Explain.	[8M]
4	a)	Obtain the pattern of a two-element array fed 180^0 out of phase (end-fire) and 0^0 (BSA) phase and spaced at d=λ/2.	[8M]
	b)	An array contains 100 isotropic radiators with an inter element spacing of 0.5λ. It is required to produce broadside and end-fire beams. a)Find Null-to-Null beam width and half-power beam width in degrees.	[8M]
5	a)	Design a rectangular microstrip antenna at fr=3GHZ, ε_r=2.2, h=1.56mm. Assume required data.	[8M]
	b)	Explain the working principle of Helical antenna in normal mode. Define axial ratio.	[8M]
6	a)	Derive the design equations of a horn antenna.	[8M]
	b)	Write short notes on antenna test sites.	[8M]
7	a)	Discuss MUF and skip distance.	[8M]
	b)	Derive the field strength equation at a distance in space wave propagation.	[8M]

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