Code: 13A04501 **R13**

B.Tech III Year I Semester (R13) Supplementary Examinations November/December 2017

ANTENNAS & WAVE PROPAGATION

(Electronics and Communication and Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define an isotropic antenna.
(b) What is the relationship between effective aperture and directivity?
(c) What is meant by parasitic elements?
(d) List out the applications of helical antenna.
(e) List out advantages and limitations of Microstrip antennas.
(f) What are the various types of feed system for a parabolic reflector?
(g) Differentiate broadside array and end-fire array.
(h) Define array factor.
(i) What is skip distance?
(j) Define critical frequency of inosphereic layer.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Derive the expression for power radiated and find the radiation resistance of a half wave dipole.
(b) Derive the wave equation in terms of magnetic potential from Maxwell's equations.

OR

3 (a) Discuss in detail about the following antenna parameters:
(i)Polarization. (ii) Beam efficiency. (iii) Radiation Intensity.
(b) Explain about Far-Field Radiation.

UNIT – II

4 (a) Compare the Yagi-Uda array and helical antennas.
(b) With neat sketches, discuss about the folded dipole and its input impendence.

OR

5 (a) What are the design considerations of pyramidal horn antenna?
(b) Give the comparison of far fields of small loop and short dipole.

UNIT – III

6 (a) Explain the different types of lens antenna.
(b) Describe the parabolic reflector used at micro frequencies.

OR

7 (a) Explain in detail about rectangular patch antennas.
(b) Discuss the impact of different parameters on characteristics of micro strip antennas.

UNIT – IV

8 (a) Explain multiplication of radiation pattern.
(b) A uniform linear array is required to produce an end-fire beam when it is operated at a frequency of 10 GHz. It contains 50 radians and are spaced at 0.5λ. Find the progressive phase shift required to produce the end-fire beam. Find the array length.

OR

9 (a) Derive an expression for beam width of broadside array.
(b) Explain the directivity measurement of an antenna.

UNIT – V

10 (a) Write short notes on: (i) Duct propagation. (ii) Space wave propagation.
(b) Derive an expression for effective dielectric constant and critical frequency of an ionospheric layer.

OR

11 (a) Discuss in detail about Ground wave propagation.
(b) Explain how does radio wave propagate through ionosphere and explain its effect on the signal characteristics.

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Code: 13A04603

R13

B.Tech III Year II Semester (R13) Supplementary Examinations May/June 2018

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Compare TE and TM mode.
(b) State the relation between Q factor and coupling coefficients.
(c) What is Tee junction? Give two examples.
(d) State the S-matrix for 4 port circulator.
(e) Outline the advantages of TWT.
(f) Define Applegate diagram.
(g) What is frequency pulling and frequency pushing in magnetrons?
(h) Name some Avalanche transit time devices.
(i) How will you determine the VSWR and return loss in reflectometer method.
(j) List the different types of impedance measurement methods.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Determine the expression for fields in TE and TM mode.

OR

3 With neat sketch, explain the function of rectangular and cylindrical cavities.

UNIT – II

4 Show the operation and properties of E-plane Tee and H-plane Tee. Derive their S parameters.

OR

5 Discuss and explain the operation and characteristics of Gyrator and Isolator.

UNIT – III

6 Summarize the power output mode curve/frequency characteristics of reflex klystron.

OR

7 A helix TWT operates at 4 GHz under a beam voltage 10KV and beam current 500mA. If the helix impedance is 25 Ω and the interaction length of 20 cm, find the output power gain in dB.

UNIT – IV

8 Illustrate with neat sketch, the cross sectional view of magnetron tube and explain how bunching occurs with equations of electron trajectory and derive the expression for Hull cut-off voltage.

OR

9 Discuss the working principle of Gunn diode as a transferred electron device with two valley model, Also draw the structure, equivalent circuit and V-I characteristics of Gunn diode.

UNIT – V

10 Summarize the slotted line method of VSWR measurement and explain how to measure low values of VSWR.

OR

11 With the help of block diagram, explain the steps involved for the insertion loss and power ratio method of attenuation measurement.

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Code: 15A04501 **R15**

B.Tech III Year I Semester (R15) Regular Examinations November/December 2017

ANTENNAS & WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define effective area and effective length of antenna.
(b) Differentiate broadside and end-fire arrays.
(c) State the principle of pattern multiplication.
(d) Draw the radiation patterns of dipole of length $\lambda, 2\lambda$ respectively.
(e) Give the far field expressions for small loop antenna.
(f) What are the advantages of binomial arrays?
(g) Give the advantages of micro strip antennas.
(h) What are the different types of losses in reflector antenna?
(i) Differentiate between radio horizon and optical horizon.
(j) Explain the concept of super refraction.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Obtain the relations between the potentials and their sources.
(b) Derive the expression for the power radiated by an alternating current element and hence its radiation resistance.

OR

3 (a) The radiation intensity of major lobe of many antennas can be adequately represented by:

$$v(\theta,\phi) = B_O \cos\theta \quad for \quad 0 \le \theta \le \Pi/2 \quad \& \quad 0 \le \phi \le 2\Pi$$

Find the directivity.
(b) Define the terms radiation intensity, beam width, bandwidth and beam efficiency.

UNIT – II

4 (a) What is a travelling wave antenna? Explain with sketches the principle and operation of rhombic antenna.
(b) Describe the construction and basic principles of operation of a helical antenna:
(i) Normal mode of operation. (ii) Axial mode of operation.

OR

5 (a) Draw the diagram of pyramidal horn antenna and explain its operation.
(b) The radius of a small loop of constant current is $\lambda/25$. Find the physical area of the loop and compare it with its maximum effective aperture.

UNIT – III

6 (a) With the help of diagrams and equivalent circuits, explain feeding mechanisms of micro strip antenna.
(b) Design a rectangular micro strip antenna using a substrate with dielectric constant of 2.2, h = 0.1588 cm so as to resonate at 10 GHz.

OR

7 (a) Draw the schematic diagram of parabolic reflector with Cassegrain feed and explain different feed patterns.
(b) Explain the working of lens antenna and zoning.

Contd. in page 2

UNIT – IV

8 (a) In a linear array of 4 isotropic elements spaced $\lambda/2$ apart and with equal currents fed in phase, plot the radiation pattern in polar coordinates.

(b) Derive the expressions of null-null beam width of a uniform linear array.

OR

9 (a) What are the precautions to be taken to obtain an accurate pattern measurements.

(b) Explain the method of measurement of antenna directivity with the help of diagram.

UNIT – V

10 (a) Derive expression for the field strength, due to space wave propagation at a point away from the transmitter.

(b) Explain salient features of Sommerfeld's theory.

OR

11 (a) Explain the terms wave tilt, virtual height, MUF, skip distance and critical frequency.

(b) Derive an expression for the refractive index of the ionosphere in terms of 'N' and frequency.

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Code: 15A04501 **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June 2018

ANTENNAS & WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define retarded vector potential.

(b) Calculate the physical height of a half wave dipole (G/2) having antenna Q of 30 and bandwidth of 10 MHz.

(c) Write a note on helical antenna and helical geometry?

(d) Why a short dipole is also called an elemental dipole?

(e) Explain different types of apertures.

(f) Find the directivity of an antenna having radiation resistance of 72 ohms and loss resistance of 12 ohms and a gain of 20.

(g) Differentiate broad side and end fire array.

(h) Explain the principle of pattern multiplication.

(i) Define gyro frequency.

(j) Estimate the surface wave tilt in degrees over an earth of 12 mm conductivity and relative permittivity 20 at a wave length of 300 m.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 A resonant half wave length dipole is made out of copper ($\sigma = 10 \times 10^7$ siemen/m). Calculate the conduction dielectric radiation efficiency of the dipole antenna at $f = 100$ MHz if the radius of the wire is $r_0 = 3 \times 10^{-4}\lambda$ and radiation resistance of the $\lambda/2$ dipole is 73 ohms.

OR

3 Discuss the induction field and radiation field of a small current element and explain at what distance these fields are equal.

UNIT – II

4 With the aid of appropriate sketches, explain fully the operation of Yagi-Uda array. List its applications.

OR

5 Explain the radiation mechanism of microwave Horn antenna with diagram.

UNIT – III

6 With necessary illustrations, explain the radiation characteristics of micro strip antenna and mention its possible applications.

OR

7 Discuss about dielectric and metal lens antennas and their applications.

UNIT – IV

8 Draw the field pattern of array of two point sources with equal amplitude & phase and explain.

OR

9 Explain absolute gain measurement and gain transfer method in detail.

UNIT – V

10 Explain in detail the various regions of ionosphere and discuss the effects of Earth's magnetic field on ionosphere radio wave propagation.

OR

11 Explain the terms: (i) Optimum working frequency. (ii) Duct propagation. (iii) Virtual height. (iv) Skip distance. (v) MUF.

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Code: 13A04501 **R13**

B.Tech III Year I Semester (R13) Supplementary Examinations June/July 2019

ANTENNAS & WAVE PROPAGATION

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Differentiate directivity and power gain.
(b) Define an antenna.
(c) Write the advantages of rhombic antenna.
(d) Name the antennas and which produces circular polarization.
(e) Write the applications of folded dipole antenna.
(f) Mention the advantages of patch antennas.
(g) What is the importance of log periodic dipole array?
(h) List the various types of lens antennas.
(i) What are the layers of ionospheric wave propagation?
(j) Define critical frequency.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) What is aperture area (A_c)? Derive the relation between directivity & aperture area.
(b) Write a brief note on elliptical polarization.

OR

3 (a) Derive an expression for the radiance resistance of alternating current element (heritizian dipole) with neat sketch.
(b) Explain about circular polarization.

UNIT – II

4 Draw the Yagi-Uda antenna and sketch its radiation pattern. Write down the design equations of Yagi-Uda antenna.

OR

5 (a) Find the radiation resistance of a circular loop antenna of radius 0.3183 m operating at 1 MHz. The radius of the wire used is 0.4 mm. Conductivity of the wire is 57 mS/m and μ_r is 1.
(b) Discuss in brief about Horn antennas.

UNIT – III

6 (a) List the different types of reflector antennas.
(b) Write a brief note on Lens antennas.

OR

7 Explain the following:

(a) Microstrip antennas.
(b) Rectangular patch antennas.

Contd. in page 2

UNIT – IV

8 (a) Explain the properties of N element uniform linear end fire array.

(b) Discuss the concept of near and far fields.

OR

9 Explain the following:

(a) Principle of pattern multiplication.

(b) Directivity measurement.

UNIT – V

10 Draw the ionosphere structure and explain about different layers.

OR

11 What are the various modes of wave propagation and explain.

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Code: 15A04501

R15

B.Tech III Year I Semester (R15) Supplementary Examinations October 2020

ANTENNAS & WAVE PROPAGATION

(Electronics & Communication Engineering)

Time: 3 hours | Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define the antenna parameter directivity.
(b) Define polarization.
(c) State Fermat's principle.
(d) Mention the applications of horn antenna.
(e) Mention the advantages of microstrip antenna.
(f) Mention the applications of lens antennas.
(g) State the principle of multiplication of patterns.
(h) What is a uniform linear array?
(i) What is wave tilt?
(j) What is modified refractive index (M)?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Define three network theorems with reference to antenna applications and explain their significance.

OR

3 Derive the field components and rms power radiated from half wave dipole. Calculate the radiation resistance of a half wave dipole.

UNIT – II

4 Draw different types of horn antennas. What are the design considerations of pyramidal horn antenna?

OR

5 (a) Design a Yagi-Uda antenna of six elements to provide a gain of 12dB if the operating frequency is 200 MHz.
(b) Explain the concept of short magnetic dipole.

UNIT – III

6 (a) Explain the characteristics of an active square corner reflector with the help of image principle.
(b) Determine the NNBW and HPBW of 2.5 m paraboloid reflector used at 5 GHz.

OR

7 (a) Explain the construction and working of dielectric lens antenna.
(b) Explain the Cassegrain feed system for parabolic reflectors.

UNIT – IV

8 What is a Broadside array? Derive the properties of broadside array and draw the radiation pattern.

OR

9 (a) Draw the measurement set-up and explain the gain measurement procedure of an antenna.
(b) What are the differences between binomial and linear arrays?

UNIT – V

10 (a) Define diversity and explain different types of diversity techniques.
(b) Define critical frequency and skip distance.

OR

11 (a) Derive the expression for field strength due to space wave.
(b) Mention the factors involved in the propagation of radio waves.

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Code: 15A04501 **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June/July 2019

ANTENNAS & WAVE PROPAGATION

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define radiation resistance.
(b) What is beam efficiency?
(c) State Fermat's principal.
(d) Give an application of loop antenna.
(e) What are the limitations of Lens antenna?
(f) State Huygen's principle.
(g) Define array factor.
(h) What are the conditions to obtain end fire array pattern?
(i) What is meant by skip distance?
(j) What is sporadic E layer in ionosphere?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Solve the wave equation for uniform plane waves in an infinitely extending conducting medium.

OR

3 Derive the field components and rms power radiated from half wave dipole. Calculate the radiation resistance of a half wave dipole. A half wave dipole antenna is driven with a current of 0.5A at the terminals. Calculate E and H strengths, 1 km from the antenna at angles $\theta = 45°, \theta = 90°$.

UNIT – II

4 With a neat sketch, explain the construction and operation of multielement Yagi–Uda antenna. Design a 3 element Yagi-Uda antenna to operate at a frequency of 172 MHz.

OR

5 Explain the radiation mechanism of microwave horn antenna with diagram.

UNIT – III

6 Explain the special features of parabolic reflector antenna and discuss on different types of feed used with neat diagram. Estimate the diameter (effective aperture) of a paraboloidal reflector antenna required to produce a null beam width of 10° at 3 GHz.

OR

7 What are called Lens antennas? With necessary diagram explain its construction and working principle.

UNIT – IV

8 An antenna array consists of two identical isotropic radiators spaced by a distance of $d = \lambda/4$ meters and fed with currents of equal magnitude but with a phase difference $'\beta'$. Evaluate the resultant radiation for $\beta = 0°$ and thereby identify the direction of maximum radiation.

OR

9 Derive the near field and far field electric and magnetic component of a finite length dipole and obtain the radiation pattern for various values of length.

UNIT – V

10 Explain the mechanism of ionospheric propagation with neat diagram.

OR

11 Why do we use high frequency waves in sky wave propagation? Explain in detail.

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