

B.Tech III Year II Semester (R20) Regular Examinations August 2023

ANTENNAS & MICROWAVE ENGINEERING

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- | | |
|---|----|
| (a) Write the relation between effective aperture and Directivity. | 2M |
| (b) Give an expression of radiation resistance of a small loop. | 2M |
| (c) Write applications of helical antenna. | 2M |
| (d) Discuss the merits and applications of offset feed reflector antenna. | 2M |
| (e) Define pattern multiplication. What is the advantage of pattern multiplication? | 2M |
| (f) Explain the impossibility of TEM wave propagating through the waveguide. | 2M |
| (g) List the basic parameters to measure the performance of a Directional Coupler. | 2M |
| (h) Summarize the applications of reflex klystron. | 2M |
| (i) Explain the main advantage of TRAPATT over IMPATT. | 2M |
| (j) Demonstrate the errors possible in VSWR measurements. | 2M |

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

- 2 (a) Explain the terms: 5M
(i) Radiation resistance. (ii) Effective length. (iii) Radiation intensity. (iv) Beam Area.
(b) Derive the field components and radiation resistance of a quarter wave monopole. 5M
- OR**
- 3 (a) Derive the field components and radiation resistance of a Small Electric Dipole. 5M
(b) Explain the impedance transformation characteristics of a folded dipole. 5M
- 4 (a) Explain the Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes. 5M
(b) Calculate the 3dB beam width and power gain of a parabolic antenna at a frequency of 1.6GHz with 2.4 meter diameter and 48% antenna efficiency. 5M
- OR**
- 5 (a) Demonstrate the constructional features of Cassegrain feed. 5M
(b) Explain the principle of operation of dielectric lens antenna. 5M
- 6 (a) Derive the field strength of a uniform linear array. 5M
(b) Explain the following: (i) Virtual height (ii) Skip distance (iii) Multi-hop propagation. 5M
- OR**
- 7 (a) What are the features of Binomial array? Explain its feeding concepts. 5M
(b) Derive the wave equation for a TE wave and obtain all the field components in a rectangular waveguide. 5M
- 8 (a) With a neat diagram explain in detail about Magic Tee and determine its S-matrix. 5M
(b) Explain the design and working principle of a Isolator. 5M
- OR**
- 9 (a) Explain working of cylindrical travelling wave magnetron and its operation in π mode. 5M
(b) What is the significance of slow wave structure? Explain the amplification process in TWT. 5M
- 10 (a) Explain Two valley theory of Gunn diode. 5M
(b) Discuss the different blocks and their features and precautions of Microwave bench set-up. 5M
- OR**
- 11 (a) How to find Low and high VSWR of a given load at microwave frequencies? Explain. 5M
(b) Draw the block diagram of microwave bench setup and explain the slotted line method of frequency measurement. 5M

B.Tech III Year II Semester (R20) Supplementary Examinations January 2024

ANTENNAS & MICROWAVE ENGINEERING

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- | | |
|---|----|
| (a) Define Directivity. | 2M |
| (b) What are the field zones? | 2M |
| (c) Draw the structure of helical antenna with a coaxial line feed. | 2M |
| (d) Give classification of lens antenna. | 2M |
| (e) Differentiate broad side and End fire array. | 2M |
| (f) Define the following terms with respect to waveguide:
(i) Phase velocity, (ii) Group velocity. | 2M |
| (g) Examine the effect of transit time. | 2M |
| (h) Describe Faraday's rotation. | 2M |
| (i) Illustrate Negative resistance in Gunn diode. | 2M |
| (j) List the main errors in the measurement of attenuation at microwave frequency. | 2M |

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

- 2 (a) Derive the total power radiated by Small Electric Dipole. 5M
(b) Write short notes on Yagi-Uda array Antenna and its applications, advantages and drawbacks. 5M
- OR**
- 3 (a) Derive an expression for the radiation resistance of a Half wave dipole antenna. 5M
(b) Describe the antenna parameters. (i) Gain, (ii) Bandwidth, (iii) Input Impedance, (iv) Effective aperture. 5M
- 4 (a) Describe the construction and working of helical antenna. 5M
(b) Discuss different types of Horn antennas. 5M
- OR**
- 5 (a) With necessary sketches, explain in detail the radiation mechanism of a microstrip patch antenna. 5M
(b) Sketch a neat diagram and explain the principle of parabolic reflector antenna and various types of feed used. 5M
- 6 (a) 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 phase. 5M
(b) Explain the various layers of Ionosphere. 5M
- OR**
- 7 (a) Explain power transmission and attenuation in rectangular wave guide. 5M
(b) Derive the wave equation for a TM wave and obtain all the field components in a Rectangular waveguide. 5M
- 8 (a) Discuss in detail the operation of a 2-hole directional coupler. 5M
(b) Show the operation and properties of E-plane Tee and H-plane Tee. Derive their S parameters. 5M

OR**Contd. in Page 2**

- 9 (a) Explain in detail the operation of Reflex Klystron and derive equation for its efficiency. 5M
(b) Explain the operation of TWT and derive its gain. Give its characteristics and applications. 5M
- 10 (a) Describe the domain formation in Gunn diode with various modes of operations. Also, explain Gunn diode oscillator. 5M
(b) What are avalanche transit time devices? Explain the operation and construction of IMPATT diode. 5M
- OR**
- 11 (a) Explain the impedance, frequency measurement using slotted line method. 5M
(b) Describe the measurement of high VSWR by double minima method with the help of block diagram. 5M
