CODE No.: 16BT60401 SVEC-16

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

III B.Tech II Semester (SVEC-16) Regular/Supplementary Examinations August - 2021

ANTENNAS AND WAVEGUIDES
[Electronics and Communication Engineering]

Time: 3 hours **Max. Marks: 70**

Answer One Question from each Unit
All questions carry equal marks

UNIT-I

1.	a)	Derive the wave equation for a TM wave and obtain the expression for the field component in a rectangular wave guide.	CO1	8 Marks
	b)	An air-filled rectangular waveguide of inside dimensions 7 x 3.5cm operates in the dominant TE_{10} mode. i) Find the cutoff frequency. ii) Determine the phase velocity of the wave in the guide at a frequency of 3 .5 GHz. iii) Determine the guided wavelength at the same frequency.	CO1	6 Marks

(OR)

2.		Derive the wave equation for TM wave and TE wave. Obtain the expression for the field component in a rectangular wave guide.	CO1	14 Marks

UNIT-II

3.	a)	Explain the following terms: i) Antenna effective height. ii) Antenna aperture. iii) Current distribution on a thin wire antenna.	CO2	8 Marks
	b)	An antenna has a radiation resistance of 72Ω, a loss resistance of 8Ω and a power gain of 12-dB. Determine the antenna efficiency and its directivity.	CO3	6 Marks

(OR)

4.	a)	Define radiation resistance of an antenna. Calculate the radiation resistance of a λ /10wire dipole in free space.	CO4	7 Marks
	b)	Explain the concept of short magnetic dipole.	CO4	7 Marks

UNIT-III

5.	a)	What is the requirement for tapering of arrays? Describe the applications of arrays.	CO5	8 Marks
	b)	Calculate: i) HPBW. ii) Solid angle, if a linear array having 10 isotropic point source with $\lambda/2$ spacing and phase difference δ=900.	CO2	6 Marks

(OR)

6.	a)	What is a broadside array? Explain in detail the structure, radiation pattern and the principle of operation of such an antenna.	CO5	7 Marks
	b)	Write a brief note on binomial arrays.	CO5	7 Marks

UNIT-IV

7.	a)	With a neat sketch, explain the different types of horn antennas. Mention merits and demerits of each type.	CO4	8 Marks
	b)	A Parabolic dish provides a power gain of 50dB at 10GHz, with 70% efficiency. Find out i) HPBW. ii) BWFN.	CO2	6 Marks

(OR)

8.	a)	What is spillover with reference to parabolic reflectors? Explain the remedial measures to reduce spillover.	CO4	7 Marks
	b)	Explain the principle of parabolic reflector antenna and discuss on different types of feeds.	CO5	7 Marks

UNIT-V

9.	a)	Write short notes on source of errors and radiation pattern lobes.	CO6	7 Marks
	b)	Select a suitable coordinate system for antenna measurements and explain about it.	CO5	7 Marks

(OR)

10.	a)	Evaluate the directivity of: i) An isotropic source. ii) Source with bidirectional cosθ power pattern.	CO5	7 Marks
	b)	Explain in detail the terms beam efficiency and directivity. Use relevant expression a diagram.	CO6	7 Marks