Q. Code: 530922

Reg. No. | | | | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATION, MAY 2023

Sixth Semester

EC18602– ANTENNA THEORY AND DESIGN

(Electronics and Communication Engineering)

(Regulation 2018 / Regulation 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Illustrate the insights of antennas and arrays	**3**
CO 2	Determine the radiation characteristics of different types of aperture and slot antenna.	**3**
CO 3	Design microstrip antennas and its analysis.	**3**
CO 4	Show the recent special antennas and its analysis.	**2**
CO5	Identify the different types of propagation mechanisms at different frequencies.	**2**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Compare radian and Steradian.	**1**	**2**
2.	Define pattern multiplication theorem.	**1**	**1**
3.	State field equivalence principle.	**2**	**1**
4.	List out the different types of paraboloid reflectors.	**2**	**2**
5.	Classify the types of feeding structures used for Microstrip patch antennas.	**3**	**2**
6.	How do we design the rectangular microstrip patch antenna for practical applications.	**3**	**2**
7.	Illustrate the three regions of log periodic antenna.	**4**	**2**
8.	Point out the benefits of reconfigurable antenna.	**4**	**2**
9.	Why space wave propagation is called as line of sight propagation?	**5**	**2**
10.	Calculate the critical frequency for reflection at vertical incidence if the maximum value of electron density is 1.24×10^6 cm^{-3}.	**5**	**3**

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Derive the field components and radiation resistance of half wave dipole antenna.	**(14)**	**1**	**3**
	(OR)			
(b)	The uniform linear array consists of 16 isotropic point sources with a spacing of $\lambda/4$. If the phase difference between each successive elements is -90 degree, calculate the directivity, HPBW, Beam solid angle.	**(14)**	**1**	**3**

12. (a)	**(i)**	Derive the radiated field components of field from a rectangular aperture with an illustration of Field Equivalence Principle.	**(7)**	**2**	**3**
	(ii)	Justify how a parabolic reflector is able to achieve high directivity.	**(7)**	**2**	**3**
		(OR)			
	(b)	Derive the impedance of slot antenna and prove that it is directly proportional to the intrinsic impedance of the medium. And also discuss the significant features of slot antenna.	**(14)**	**2**	**3**
13. (a)		Design a rectangular microstrip antenna using a substrate (RT/duroid 5880) with dielectric constant of 2.2, h = 3.2mm so as to resonate at 5 GHz.	**(14)**	**3**	**3**
		(OR)			
	(b)	Explain the rectangular patch antenna in cavity model with necessary equations.	**(14)**	**3**	**3**
14. (a)		Design a log periodic dipole array with 8.5 dB gain over a frequency of 10 MHz to 30 MHZ, from the carrel curve 8.5 dB gain corresponds to τ=0.895, σ =0.166**.**	**(14)**	**4**	**4**
		(OR)			
	(b)	Elucidate in detail about the special antenna that combines the features of parabolic reflector and microstrip array.	**(14)**	**4**	**4**
15. (a)		With necessary diagram explain in detail about antenna impedance and radiation measurements.	**(14)**	**5**	**3**
		(OR)			
	(b)	Describe the Ionosphere layers and investigate how ducts can be used for microwave propagation.	**(14)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A pyramidal horn antenna having aperture dimensions of a = 5.2 cm and b = 3.8 cm is used at a frequency of 10GHz.Find its gain, directivity and HPBW.	**(10)**	**2**	**5**

****