K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

August 2023

(B. Tech) Program: B. Tech. (Electronics and Telecommunication) Scheme: II
Examination: TY Semester: VI
Course Code: **EXC601** and Course Name: **Electromagnetic and Antenna**

Date of Exam: 07.08.2023 Duration: 2.5 Hours Max. Marks: 60

Instructions:
(1). All questions are compulsory.
(2). Draw neat diagrams wherever applicable.
(3). Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Enlist the antenna parameters and define any two.	2	5	U
ii)	Draw the labelled diagram of the ionosphere.	2	4	U
iii)	Explain the Microstrip antenna. Explain why it is popular in recent times.	2	6	U
iv)	Differentiate the end fire array and broadside array.	2	6	U
v)	Explain isotropic antenna, Omni-directional antenna and directional antenna.	2	5	U
vi)	Draw the following points on the smith chart. The normalizing impedance is 50 Ω. (a). 50+j50 Ω, (b). 10+j0 Ω	2	3	Ap
vii)	Explain boundary conditions of E and H fields for two media.	2	2	U
viii)	Define: Coulombs Law and Gauss law.	2	1	U
Q.2	Solve any four questions out of six.	16		
i)	Derive Maxwell's equation in terms of displacement current density.	4	2	U
ii)	Compare Log Periodic Antenna and Yagi-Uda Antenna.	4	4	U
iii)	Define the depth of penetration (skin depth). Determine it for Gold at 1 MHz (Assume μ_r=1 and conductivity for Gold = σ= 4.11x 10^7 ℧/m)	4	1	Ap
iv)	A 50 Ω loss less transmission line is terminated by a load impedance Z_L= 50-j75 Ω. If the incidence power is 100 mW, find the power dissipated by the load.	4	3	Ap
v)	What is reactive near field. Explain its importance in communication and its applications.	4	5	U

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vi)	List different feeding method of parabolic reflector antenna and explain any one.	4	6	U
Q.3	Solve any two questions out of three.	16		
i)	The two charges 6 μC and 8 μC are separated by 10 cm. Find the force between them. If two charges are brought in contact and and then separated by 5 cm. Find the force in this case.	8	1	Ap
ii)	Derive the relation for maximum distance between transmitting and receiving antenna (Earth is assumed to be flat) for space wave propagation.	8	4	Ap
iii)	Derive radiation resistance of small dipole. Explain its significance.	8	5	Ap
Q.4	Solve any two questions out of three.	16		
i)	State Poynting theorem. Derive mathematical expression for Poynting theorem and explain the meaning of each term.	8	1	Ap
ii)	Draw the following on the smith chart. The normalizing impedance is 50 Ω. (a). 75+j75 Ω, (b). 10+j60 Ω (c). 0-j50 Ω (d). reflection coefficient = Γ= $0.4\angle 50°$. (e). constant VSWR circle for $\rho = 2.5$ (f). minimum resistance point on the constant VSWR circle for $\rho = 1.5$	8	3	Ap
iii)	Design a circular microstrip antenna using a FR4 with a dielectric constant of 4.4, h = 0.1588 cm (0.0625 in.) so as to resonate at 2.45 GHz.	8	6	Ap

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