

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

May-June 2026		
(B. Tech.) Program: B.Tech. (Electronics and Telecommunication) Scheme:III		
Regular Examination: TY Semester: VI		
Course Code: EXC602 and Course Name: Electromagnetics and Antenna		
Date of Exam: 22.05.2026	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.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	Calculate E, (i) at origin P(0, 0, 0) (b) Q(15,20,50) in cm, if a charge of $-0.3\mu\text{C}$ charges located at A(25,-30,15) and a second charge of $0.5\mu\text{C}$ charges located at B(-10,8,12) cm.		CO1	Ap
b)	State generalized Maxwell's equations in point and integral form and Explain the significance of it in wireless communication systems.		CO2	U
c)	A transmission line has primary constants $R=0.1\ \Omega/\text{m}$, $G=0.01\ \text{S}/\text{m}$, $L=0.01\ \mu\text{H}/\text{m}$, $C=100\ \text{pF}/\text{m}$. Find the characteristics impedance of line at 2 GHz.		CO3	Ap
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Compare infinitesimal dipole, short dipole, and half-wave dipole antennas based on radiation resistance, current distribution, and field pattern.		CO4	U
b)	Differentiate between small loop and large loop antenna		CO5	U
c)	With neat sketch explain the cassegrain and Gregorian reflector antenna systems.		CO6	U
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	i. Find div D at the origin if $D = e^{-x} \sin y\ ax - e^{-x} \cos y\ ay + 2z\ az$ ii. Discuss divergence theorem and Coulombs Law.		CO1	Ap
b)	The transmission line is connected to transmission line load impedance $25+j50$ at 300 MHz. Find i) The reflection coefficient and return loss at the load end. ii) Impedance and VSWR at a distance of		CO3	Ap

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	50 cm from the load.			
c)	i. Explain near-field and far-field regions of an antenna. Calculate the minimum distance required to measure the field pattern of an antenna of diameter 2m at a frequency of 2.4 GHz. ii. Discuss the effect of parasitic elements on the performance of Yagi-Uda antenna.		CO5	Ap
Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	Derive the Poynting theorem. Explain the meaning of each term. For a uniform plane wave in air, the electric field is $E=20 \cos (\omega t-\beta z) \text{ ax}$. Calculate the corresponding magnetic field and Poynting vector.		CO2	Ap
b)	Evaluate the expression for radio horizon distance and explain line-of-sight propagation.		CO4	Ap
c)	Evaluate the radius and effective radius of circular microstrip antenna (CMSA) for 10 GHz frequency application using a RT duroid substrate having a dielectric constant (ϵ_r) of 2.2 and a substrate thickness of 1.588 mm.		CO6	Ap
