PVP 20

Code: 20BS1402

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2023

ELECTROMAGNETIC FIELDS & WAVES
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Develop the relation between the electrostatic potential and electric field intensity.	L3	CO2	7 M
	b)	Develop the expression for electric field intensity at a point 'P' due to an infinite line charge of density 'ρ_L' C / m.	L3	CO2	7 M
OR					
2	a)	State and explain Gauss's law and write limitations of Gauss's law.	L2	CO1	7 M
	b)	Four point charges each of 10μC are placed in free space at the points (1, 0, 0), (-1, 0, 0), (0,1,0) and (0,-1,0) m respectively. Calculate the force on a point charge of 30μC located at a point (0, 0, 1) m.	L3	CO2	7 M

UNIT-II					
3	a)	Develop the expressions for magnetic field intensity due to finite and infinite line current element.	L3	CO2	7 M
	b)	Given magnetic flux density $\vec{B} = \rho Sin\emptyset \, \overrightarrow{a_\emptyset}$. Find the total flux crossing through the surface defined by $\emptyset = \frac{\pi}{4}$, $1 \leq \rho \leq 2 \; and \; 0 \leq z \leq 5$.	L3	CO2	7 M
OR					
4	a)	Define and explain biot –savarts law.	L2	CO1	7 M
	b)	Develop an expression for energy stored and energy density in the magnetic field.	L3	CO2	7 M
UNIT-III					
5	a)	With necessary explanation, solve Maxwell's equations for time varying fields in differential and integral forms.	L3	CO1, CO3	7 M
	b)	In a material for which σ=5 S/m and ε_r = 1, the electric field intensity is $E=250 \; sin10^{10}t$ V/m. Calculate the conduction and displacement current densities and the frequency at which both have equal magnitudes.	L3	CO3	7 M
OR					
6	a)	Develop an expression for the displacement current density.	L3	CO3	7 M
	b)	Explain Farday's Law of Electromagnetic induction.	L2	CO1	7 M

UNIT-IV					
7	a)	Solve the expression for the attenuation constant, phase constant, and intrinsic impedance for a uniform plane wave in a good conductor.	L3	CO3	7 M
	b)	Discuss about the plane waves in lossy dielectrics.	L2	CO3	7 M
OR					
8	a)	State and Prove Poynting Theorem. Write its applications.	L3	CO3	7 M
	b)	Find the skin depth at a frequency of 1.6 MHz in aluminium σ= 38.2 ms/m and $\mu_r = 1$.	L3	CO3	7 M
UNIT-V					
9	a)	Examine the expressions for the transmission and reflection coefficients at the interface of two media for normal incidence on dielectric.	L4	CO4	10 M
	b)	A parallel polarized wave propagates from air into a dielectric at a Brewster angle of 75^0. Find ε_r.	L3	CO4	4 M
OR					
10	a)	Define Brewster angle and Analyze that $\tan\theta_B = \sqrt{\frac{\varepsilon_2}{\varepsilon_1}}$.	L4	CO4	7 M
	b)	Explain Reflection by a perfect conductor for oblique incidence.	L4	CO4	7 M