



School of Electronics Engineering
CAT- II, Fall Semester 2022-23

Course Name : Engineering Electromagnetics
Course Code : BECE205L
Mode : Open Book

Duration : 90 min.
Max. Marks : 50
Slot : D1+TD1

Answer all the following Questions

S. No.	Question	Marks
1	Plane $x = 10$ carries current 130 mA/m along $\mathbf{a}_z$, while line $x = 2, y = -6$ carries filamentary current $20\pi \text{ mA}$ along $\mathbf{a}_z$. Determine $\mathbf{H}$ at $(5, 6, 3)$.	10
2a	A current distribution gives rise to the vector magnetic potential $\mathbf{A} = x^2y \mathbf{a}_x + y^2x \mathbf{a}_y - 4xyz \mathbf{a}_z \text{ Wb/m}$. Calculate the flux through the surface defined by $z = 1, 0 \leq x \leq 1, -1 \leq y \leq 4$.	5+5
2b	In a medium with $\mu_r = 1$ has $\vec{E} = \cos(10^8t - z) \mathbf{a}_x \text{ V/m}$ propagating in $+z$ direction. Determine (i) intrinsic/wave impedance (ii) magnetic field equation (iii) Poynting vector.	
3	A medium is characterised by $(\mu = \mu_0, \epsilon = \epsilon_0, \sigma = 0)$. If $\mathbf{H} = 2\sin(10^6t - \beta z) \mathbf{a}_y \text{ A/m}$, find phase constant β and $\mathbf{E}$ using Maxwell's equation.	10
4	A transmission line operating at a frequency of 5 KHz has the following line parameters: $L = 1.5 \mu\text{H/m}$, $C = 1.4 \text{ nF/m}$, $R = 12 \Omega/\text{m}$ and $G = 1.4 \mu\text{S/m}$. Calculate (i) characteristics impedance (ii) propagation constant (iii) attenuation constant (iv) phase constant (v) wavelength and (vi) the velocity of propagation.	10
5	For the transmission shown below,  Calculate the following using analytical expression or Smith Chart. (i) Reflection co-efficient at the load (ii) Voltage standing wave ratio (iii) Input impedance (iv) Load admittance.	10