Code No: 155SE **RA**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, January/February - 2023
ELECTROMAGNETIC FIELDS AND WAVES
(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

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PART – A

(25 Marks)

1.a)	Define Conduction Current.	[2]
b)	What is Electric Flux density and give its units?	[3]
c)	Compare vector and Scalar magnetic potential.	[2]
d)	What is magnetic flux density and give its units?	[3]
e)	Define displacement current density.	[2]
f)	Explain Faraday's Law.	[3]
g)	Define uniform plane wave.	[2]
h)	What is Brewster angle and give its significance.	[3]
i)	Illustrate electromagnetic spectrum.	[2]
j)	Analyze wave equations in rectangular co-ordinates.	[3]

PART – B

(50 Marks)

2.a) State and Explain Coulomb's Law.
b) Three point charges Q_1=1mC, Q_2=2mC, and Q_3= -3mC are respectively located at (0,0,4), (-2,6,1) and (3,-4,-8). Find the the force on Q1. [5+5]

OR

3.a) Derive an expression for Electric Field Intensity due to line charge of distribution.
b) In free space, $V=6xy^2z+8$. At point P(1,2,-5), Find Electric Field Intensity. [6+4]

4.a) Using Biot- Savart's Law, Find $\vec{H}$ on axis of a current loop.
b) State and explain Maxwell's equations for magnetostatic fields. [5+5]

OR

5.a) Show that curl $\vec{H} = \vec{J}$.
b) In a certain conducting region, $\vec{H}$= $yz(x^2+y^2)\overrightarrow{a_x}$-$y^2xz\overrightarrow{a_y}$ +$4x^2y^2\overrightarrow{a_y}$ A/m. Solve for $\vec{J}$. [5+5]

6.a) Obtain the boundary conditions of the tangential and normal components of electric field at the interface of two mediums with different dielectrics.

b) What is transformer e.m.f? Explain in brief. [6+4]

OR

7.a) Tabulate Maxwell's equations for time varying fields in different forms.

b) Demonstrate about inconsistency of Ampere's law. [5+5]

8.a) Derive the expression which describes propagation of uniform plane wave in good conductor.

b) Explain i) Critical angle and ii) total internal reflection. [6+4]

OR

9.a) Prove point form and integral form of Poynting's theorem.

b) What is polarization? Explain in brief. [6+4]

10.a) Discuss about TE/TM mode Analysis.

b) What are microstrip lines? Explain in brief. [6+4]

OR

11.a) Derive Equation for power transmission.

b) Discuss the impossibility of TEM mode. [6+4]

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