BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2023)

CLASS: BTECH **SEMESTER : IV**
BRANCH: ECE **SESSION : SP2023**

SUBJECT: EC257 ELECTROMAGNETIC FIELD AND WAVES

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Derive the differential and integral form of Faraday's Law of Electromagnetic Induction due to time varying flux.	[2]	CO2	3
Q.1(b)	A parallel plate capacitor with plate area of $6cm^2$and plate separation of 4mm has a voltage 60 sin 10^3t V applied to its plates. Calculate the displacement current assuming $\varepsilon=2\varepsilon_0$	[3]	CO2	3
Q.2(a)	Write the differential and integral form of Maxwell' s equation assuming variations of fields Time harmonic assuming time factor $e^{j\omega t}$.	[2]	CO1	2
Q.2(b)	Derive the relation between normal component of electric field intensities on two sides of common boundary between two regions using Maxwell's equation assuming no surface charge densities exists between them.	[3]	CO2	3
Q.3(a)	Write down the expression for attenuation and phase constant of lossy dielectric medium and show that attenuation constant of a plane wave in good conductors approximately equals to phase constant.	[2]	CO3	2
Q.3(b)	A conducting bar slides freely over two conducting rails. Calculate the induced voltage in the bar if i) bar slides at a velocity u = 25 a_y m/s and B = 5 a_z mWb/m^2 ii) If the bar slides at a velocity u= 30a_y m/ s and B= 4cos (10^6t -y)a_z mWb/ m^2 shown in Fig. 1.	[3]	CO4	4
Q.4(a)	Define depth of penetration. Write down Wave equation for potential.	[2]	CO1	1
Q.4(b)	Explain Poynting's theorem and prove it	[3]	CO3	3
Q.5(a)	Describe polarization of wave? When a wave is linearly polarized, circularly polarized?	[2]	CO3	1
Q.5(b)	Derive the expression of reflection co-efficient for plane wave at normal incidence between two different media.	[3]	CO4	4

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