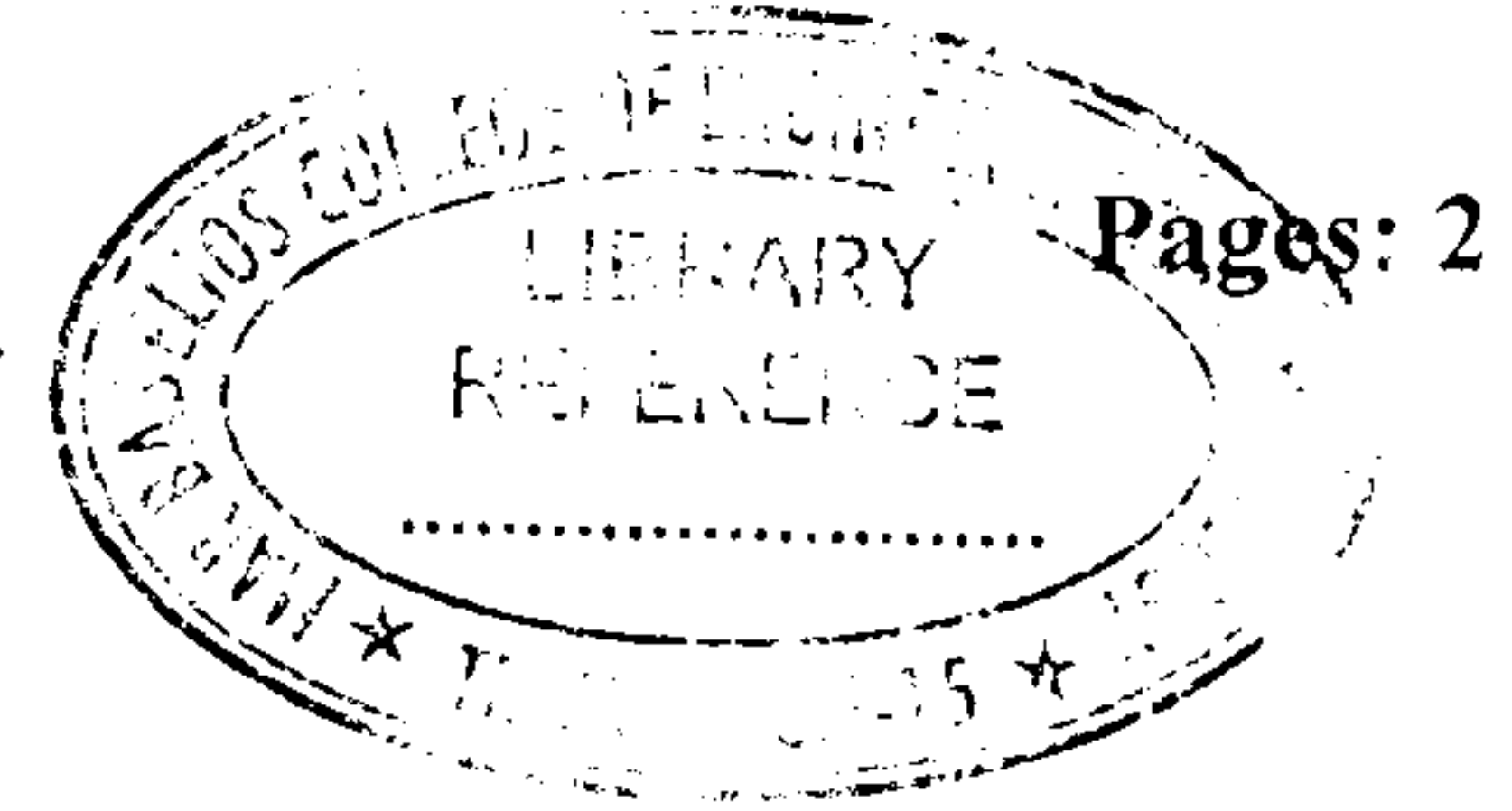


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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE302

Course Name: ELECTROMAGNETICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

Marks

- | | | |
|---|--|-----|
| 1 | Find the divergence of \vec{A} where $\vec{A} = \rho z \sin \phi \vec{a}_\rho + 3 \rho z^2 \cos \phi \vec{a}_\phi$ | (5) |
| 2 | Define equipotential surface? | (5) |
| 3 | Explain Biot-Savart Law. | (5) |
| 4 | Derive Maxwell's equations in differential and integral form from Faraday's Law | (5) |
| 5 | What is displacement current? | (5) |
| 6 | Apply Poynting theorem to derive an expression for power flowing through a co-axial cable | (5) |
| 7 | Compute the phase constant and attenuation constant for a uniform plane wave having frequency 10GHz in a lossy dielectric material for which $\mu = \mu_0$, $\epsilon_r = 2.3$ and $\sigma = 2.56 \times 10^{-4} \text{ S/m}$. | (5) |
| 8 | What is electromagnetic interference? What are its causes? | (5) |

PART B

Answer any two full questions, each carries 10 marks.

- | | | |
|----|--|-----|
| 9 | a) State and Prove Stoke's Theorem | (5) |
| | b) What is Curl of a vector field? Explain its physical significance. | (5) |
| 10 | a) State and Prove Gauss's law. | (5) |
| | b) Apply Gauss's law to find the expression for Electric field Intensity and Electric flux density due an infinite line charge distribution. | (5) |
| 11 | a) Explain the concept of electric potential and potential gradient. | (5) |
| | b) Explain spherical co-ordinate system. | (5) |

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) Apply Biot-Savart law and determine an expression for magnetic field intensity at a point due to an infinitely long straight conductor carrying current I . (7)
- b) Explain continuity equation for current. (3)
- 13 a) State Ampere's circuital law and explain any one application of Ampere's circuital law (5)
- b) Derive the boundary conditions with respect to the electric field at the interface of a dielectric – dielectric boundary (5)
- 14 a) Derive an expression for energy stored in an electrostatic field in terms of electric flux density. (7)
- b) What is electric polarisation? Explain. (3)

PART D

Answer any two full questions, each carries 10 marks.

- 15 State and explain Poynting theorem and Poynting vector. Also derive an expression for average power density. (10)
- 16 a) A uniform plane wave is travelling at a velocity of 2.5×10^5 m/s having wavelength $\lambda = 0.25$ mm in a non magnetic good conductor. Calculate the frequency of wave and the conductivity of a medium. (5)
- b) What are electromagnetic waves? Explain the concept of uniform plane waves. (5)
- 17 Derive the wave equations for a transmission line. (10)
