Code No. D-2071/AICTE

FACULTY OF ENGINEERING

B.E. (ECE) IV - Semester (AICTE) (Backlog) Examination, March/April 2022

Subject: Electromagnetic Theory and Transmission Lines

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1. Describe the three orthogonal surfaces that define cylindrical coordinates of a point.
2. Derive the relation between E and V.
3. State Biot-Savart's law.
4. In cylindrical co-ordinates, B= (2.0│r)aϕ Tesla. Determine the magnetic flux ϕ crossing the plane surface defined by 0.5 < r < 2.5m and 0 < Z < 20m.
5. List out the Maxwell's equations in sinusoidal form.
6. Define critical angle & Brewster angle.
7. What is the condition of distortionless transmission line
8. What is loading of coil? What is the purpose of loading?
9. Define VSWR and reflection Coefficient of a transmission lines.
10. List out the applications of Smith Chart.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) State and prove Divergence Theorem?

(b) A line charge ρL = 400PC/m lies along the x-axis. The surface of zero potential passes through the point (0, 5, 12). Find the potential at point (2, 3, -4) m.

12 (a) State and Prove Stoke's theorem.

(b) Discuss Magnetic Scalar and Vector potential

13 (a) State and prove Poynting Theorem.

(b) Discuss reflection and transmission coefficient of an electric field wave travelling in incident normally at the surface of perfect dielectric.

14 (a) Find the characteristic impedance of open circuit and short circuit transmission lines and also find relation between them.

(b) Derive an expression for Campbell's formula.

15 A transmission line of characteristic impedance of 100Ω is terminated in a load of (200 + j300) Ω. Design a single stub to sketch the line to the load using smith chart at the frequency 10MHz.

16 (a) Show that intrinsic impedance for free space is 120π or 377ohms.

(b) A distortionless line has Z_0 = 60Ω, α = 20mN/pm, μ = 0.6C, where C is velocity of light in a vacuum. Find R, L, C and G at 100MHz.

17 (a) Compare the characteristic impedance λ/2, λ/4 and λ/8.

(b) Describe in detail Maxwell's equations in point form and integral form.

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