MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department of Electronics and Communication Engineering
Question Bank - Academic Year (2021-22)

Course Code & Course Name : 19ECC05 & ELECTROMAGNETIC FIELDS

Name of the Faculty : Dr. J.RANGARAJAN

Year/Sem/Sec : II / III / A

Unit-I: Electrostatics
Part-A (2 Marks)

1. What is a scalar quantity and vector quantity?
2. Find the dot product of the vectors A and B if A =2ax-3ay+4az, B= -ax+2ay+2az
3. Distinguish electric potential and potential difference
4. Recall the conditions of a vector field to be Solenoidal and Irrotational.
5. State stokes theorem.
6. Define coulombs' law.
7. Give the relation between three co ordinate systems.
8. Define electric field and electric intensity
9. State divergence theorem.
10. Define gradient, divergence and curl.
11. Contrast self inductance and mutual inductance.

Part-B (16 Marks)

1. Make use of divergence concept to prove Divergence theorem. (16)
2. Explain in detail about three co-ordinate systems. (16)
3. Explain in detail the boundary conditions of magnetic fields. (16)
4. Explain a) the capacitance of a Parallel plate capacitor b) Electric flux density. (16)
5. Describe the following: a) Electrostatic Energy b) Energy Density. (16)
6. Two parallel plate capacitors of unknown value when connected in series gives 66.67 micro farad. When connected in parallel gives 300 micro farad. Infer the value of unknown capacitors (16)

Unit-II : Magnetostatics
Part-A (2 Marks)

1. State magnetic flux density
2. Identify the relationship between magnetic field strength and density.

3. Recall Biot-Savart law.
4. Define Amperes circuital law.
5. Recall permeability of the medium.
6. Memorize self inductance.
7. Define mutual inductance.
8. Reproduce magnetic potential.
9. Write the Lorentz force equation.
10. State the boundary conditions for magnetic fields.

Part-B (16 Marks)

1.(i).	Explain the behaviour of magnetic materials	(10)
(ii).	Write a brief note on magnetic circuits	(6)
2.	Explain the following: magnetic flux, magnetic field intensity and flux density	(16)
3.	Deduce and explain the Biot-Savart law.	(16)
4.	Explain the boundary conditions for magnetic fields	(16)
5.	Develop an equation for magnetic flux density at any point due to finite length of conductor.	(16)

Unit-III : Time-Varying Fields and Maxwell's Equations

Part-A (2 Marks)

1. State Amperes Circuital law.
2. Define conduction current.
3. Recall displacement current.
4. Write the integral and point form of Maxwell's second equation.
5. Tabulate the entire Maxwell's equations in integral form.
6. State Maxwell's first equation.
7. Recall the boundary conditions for electromagnetic fields.
8. Write the wave equation in electric field.
9. Tabulate the entire Maxwell's equations in differential form.
10. Write the Maxwell's equation from Gauss law both in integral and point form.

Part-B (16 Marks)

1.	Explain the Maxwell's equations in point form and integral form using Ampere's circuital law.	(16)
2.	Summarize Maxwell's equation for time varying fields in integral and differential form.	(16)
3.	Develop Maxwell's Second Equation in integral form from Faraday's Law	(16)
4.	Develop the general wave equation for Electric and Magnetic Field	(16)
5.	Explain the Maxwell's equations in point form and integral form in free space.	(16)

Unit-IV : Transmission Lines at Radio Frequencies

Part-A (2 Marks)

1. Mention the importance of transmission lines.
2. List the types of transmission lines.
3. Mention the usage of balanced line.
4. What are the types of distortion in transmission line?
5. Recall the primary parameters of transmission line.
6. What are called secondary constants of transmission line?
7. Recall the condition for distortion free line.
8. State Smith chart.
9. Define standing wave ratio.
10. Define Reflection coefficient.

Part-B (16 Marks)

1. Develop an equation to find the general equation for voltage and current at any point on the transmission line. (16)
2. Explain the condition for distortion free transmission line with necessary expressions. (16)
3. Explain in detail of input impedance and velocity propagation of transmission line. (16)
4. Explain the smith chart applications in detail. (16)
5. Explain: Reflection coefficient, Reflection factor, Reflection loss, Standing waves (16)
6. A transmission line is having load impedance of 40 + j 50 ohms. Make use of Smith chart find the parameter values (Length and Distance) of a single stub matching, if the characteristic impedance is 50 ohms. (16)

Unit-V : Plane Electromagnetic Waves

Part-A (2 Marks)

1. Label the properties of uniform plane wave
2. What is lossy dielectric medium?
3. Define skin depth.
4. Illustrate the significance of intrinsic impedance of free space. What is its value?
5. Mention the properties of uniform plane wave.
6. What is propagation constant?
7. Write down the wave equation for E and H in a conducting medium.
8. Define group velocity
9. Write the power flow expression in plane wave.
10. State Poynting theorem.

Part-B (16 Marks)

1.(i). Obtain the wave equation for conducting medium. (8)

(ii). Derive wave equations in phasor form. (8)

2.(i). Explain about the propagation of EM waves in good conductor. (8)

(ii). Discuss about the plane waves in lossy dielectrics (8)

3. Explain the nature of a wave which is incident Normally on perfect conductor. (16)

4. Deduce the expression for the Electromagnetic power flow. State the physical significance of that expression. (16)

Course Faculty **HoD**