Lesson Plan

Name of faculty : Dr. Shyam Sunder

Discipline : Physics

Semester : 5th

Subject : **Fields & Waves (EE-301-L**

Lesson plan duration : 15 weeks

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| **Week** | **Theory** | | **Actual Lesson Plans Covered** | | |
| **Lecture**  **Day** | **Topic (Including assignment / Test)** | **Dates** | **HOD Sign.** | **Director-Principal** |
| **Unit-I** | | | | | |
| 1st | 1. | Review of vector analysis |  |  |  |
| 2. | Review of vector analysis |  |  |  |
| 3. | Review of vector analysis |  |  |  |
| 4. | Orthogonal co-ordinate systems |  |  |  |
| 2nd | 5. | Review of vector calculus in all the three coordinate systems |  |  |  |
| 6. | Review of vector calculus in all the three coordinate systems |  |  |  |
| 7. | Review of vector calculus in all the three coordinate systems |  |  |  |
| 8. | Line, surface and volume integrals |  |  |  |
| 3rd | 9. | Gradient, divergence and curl of a vector and their physical significance |  |  |  |
| 10. | Gradient, divergence and curl of a vector and their physical significance |  |  |  |
| 11. | Divergence theorem, Stokes theorem |  |  |  |
| 12. | Solenoidal and irrotational fields, Coulomb’s law and its discussions, electric field, electric flux, electric flux density, Numerical problems |  |  |  |
| 4th | 13. | Gauss’s law of electrostatics and its applications |  |  |  |
| 14. | Uniform line charge and its distribution |  |  |  |
| 15. | Surface charge and its distribution |  |  |  |
| 16. | Volume charge and its distribution |  |  |  |
| 5th | 17. | Concepts of electric field and electric potentials |  |  |  |
| 18. | Electric field and potential at a point due to electric dipole |  |  |  |
| 19. | Methods of Images |  |  |  |
| 20. | Methods of images and its applications |  |  |  |
| 6th | 21. | Capacitor and its various concepts |  |  |  |
| 22. | Cylindrical and spherical capacitors and other capacitor types (parallel plate, parallel plate with multiple dielectrics, Coaxial cable etc.) |  |  |  |
| 23. | Energy density in electric field, Numerical problems |  |  |  |
| **Unit-II** | | | | |
| 24. | Magnetostatics, magnetic flux and magnetic flux density |  |  |  |
| 7th | **Minor Test-I** | | | | |
| 8th | 25. | Magnetic field intensity, Biot Savart’s Law |  |  |  |
| 26. | Amperes circuital law and its applications |  |  |  |
| 27. | Amperes circuital law and its applications |  |  |  |
| 28. | Magnetic vector potentials, |  |  |  |
| 9th | 29. | Magnetic field energy and energy density in magnetic field, Numerical |  |  |  |
|  |  |  |
| 30. | Boundary conditions for electric and magnetic fields at the interface of various types of media |  |  |  |
| 31. | Boundary conditions for electric and magnetic fields at the interface of various types of media |  |  |  |
| 32. | Laplace and Poisson’s equations. |  |  |  |
| 9th | 33. | Continuity equation, displacement current and displacement current density |  |  |  |
| 34. | Conduction current and conduction current density |  |  |  |
| 35. | Maxwell’s equations in differential and integral forms |  |  |  |
| 36. | Maxwell’s equations in differential and integral forms |  |  |  |
| 10th | 37. | Maxwell’s equations in time varying forms and its physical significance, numerical problems. |  |  |  |
| 38. | Retarded potentials |  |  |  |
| **Unit-III** | | | | |
| 39. | Plane waves and uniform plane waves and their properties, |  |  |  |
| 40. | Wave equations in various media |  |  |  |
| 11th | 41. | Wave equations in various media |  |  |  |
| 42. | Polarization and its types |  |  |  |
| 43. | Polarization and its types, Intrinsic impedance, propagation constant |  |  |  |
| 44. | Reflection and refraction of uniform plane wave at the interface of conductor-dielectric and dielectric- dielectric (both normal and oblique incidence) |  |  |  |
| 12th | 45. | Reflection and refraction of uniform plane wave at the interface of conductor-dielectric and dielectric- dielectric (both normal and oblique incidence) |  |  |  |
| 46. | Relaxation time, skin effect, skin depth and surface impedance |  |  |  |
| 47. | Poynting theorem and poynting vector theorem. Its physical significance, Numerical problems |  |  |  |
| **Unit-IV** | | | | |
| 48. | Distributed parameters, circuit parameters, concepts of voltage and current flow in a transmission line |  |  |  |
| 13th | 49. | Line equations, characteristics impedance, reflection of transmission line, |  |  |  |
| 50. | Maxima and minima, standing wave ratio, impedance matching, Smith’s Chart |  |  |  |
| 51. | Smith’s chart and its applications, co-axial transmission line. |  |  |  |
| 52. | Concept of wave guides, TE, TM and TEM modes in rectangular and circular wave guides, |  |  |  |
| 14th | **Minor Test-II** | | | | |
| 15th | 53 | Cut off and guide wave length, characteristics impedance, |  |  |  |
|  | 54. | Dielectric waveguides. |  |  |  |
|  | 55. | Numerical problems and Old question paper-Discussions |  |  |  |
|  | 56. | Numerical problems and Old question paper-Discussions |  |  |  |