Utkalmani Gopabandhu Institute of Engineering, Rourkela-4

Dept of Electrical Engineering

LESSON PLAN

Course Name: EEM (Th4)

Semester: 3rd

Course Objectives:

1. To clarify the students on insulating, conducting & magnetic materials.
2. To impart knowledge on the Physical, Electrical & Mechanical properties.
3. To impart knowledge on practical uses of various materials in different areas.

Chapter 1

Class 1. Introduction to Electrical Materials.

2. Definition & derivation of Resistivity.
3. Factors affecting resistivity.
4. Classification of conducting materials into low-resistivity and high resistivity.
5. Low Resistivity Materials and their Applications. (Copper, Silver)
6. Continued. (Gold, Aluminum, Steel)
7. Stranded conductors & it's application.
8. Bundled conductors & it's application.
9. Low resistivity copper alloys.
10. High Resistivity Materials and their Applications (Tungsten, Carbon)
11. Continued. (Platinum, Mercury)
12. Superconductivity
13. Superconducting materials.
14. Application of superconductor materials
15. Problems related to resistivity. (Out of syllabus)

Chapter 2

Class 16. Introduction to semiconducting materials.

17. Semiconductors
18. Electron Energy and Energy Band Theory
19. Excitation of Atoms
20. Insulators, Semiconductors and Conductors
21. Covalent Bonds
22. Classification of semiconductors & intrinsic Semiconductors.

23. Extrinsic Semiconductors & Minority and Majority Carriers.
24. N-Type Materials
25. P-Type Materials
26. Applications of Semiconductor materials (Rectifiers)
27. Temperature-sensitive resisters or thermistors.
28. Photoconductive cells & photovoltaic cells.
29. Varisters & Transistors.
30. Hall effect generators & Solar power.

Chapter 3

Class 31. Introduction to Insulators.

32. General properties of Insulating Materials i.e Electrical properties
33. Visual properties & Mechanical properties
34. Thermal properties, Chemical properties & aging
35. Insulating Materials – Classification, properties, applications.
36. Classification of insulating materials on the basis physical and chemical structures. (Rubber, Fabric Insulators)
37. A brief idea on paper, impregnated paper, Porcelain, PVC insulators etc.
38. Insulating gases & it's properties.
39. Insulating liquids & it's properties. (Out of syllabus)

Chapter 4

Class 40. Introductions to dielectric material & Dielectric Constant of Permittivity

41. Polarization (Electrical & Electronic polarization)
42. Solid, Liquid & Gaseous Polarization.
43. Dielectric Loss, dielectric constant & dielectric strength.
44. Electric Conductivity of Dielectrics and their Break Down
45. Properties of Dielectrics.
46. Applications of Dielectrics.

Chapter 5

Class 47. Introduction to Magnetic material.

48. Classification of magnetic materials. Briefing on diamagnetic material.
49. Para magnetism & Ferromagnetism.
50. Magnetization Curve & Hysteresis loop.
51. Eddy Currents & curie Point
52. Magneto-striction & introduction to Soft magnetic materials.

53. Si Steel, CRGO steel & their applications in Electrical Engineering.
54. Introduction to Hard magnetic materials & their applications.

Chapter 6

Class 55. Introduction & Structural Materials.

56. Protective Materials such as Lead
57. Continued. (Steel tapes, wires and strips)
58. Other Materials such as thermocouple, bimetals & soldering materials)
59. Fuse and Fuse materials.
60. Dehydrating material.

Learning Materials:

1. Lecture Notes.
2. Electrical Engineering Material & Electronic components, K.B.Raina, S.K. Bhattacharya, T. Joneja (S. K. Kataria & Sons publication)

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