Government Polytechnic, Chhapar (Charkhi Dadri)

Electrical Engineering Department

Lesson Plan

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| **Name of Faculty** | | | Sh. Pardeep Kumar |
| **Discipline** | | | Electrical Engineering |
| **Semester** | | | 3rd |
| **Subject** | | | Electrical and Electronics Engineering Materials |
| **Lesson Plan Duration** | | | From September 2022 to January 2023 |
| **Work load (Theory + Practical) Per Week** | | | (04+00) |
| **Week** | **Theory** | | |
|  | **Lecture Day** | **Topics** | |
| 1st | Day1 | **1.Classification of materials** | |
| Day2 | Classification of Conducting ,semi conducting and insulating materials based on  atomic structure | |
| Day3 | Classification based on energy bands | |
| Day4 | Revision and Class test of 1st unit | |
| 2nd | Day1 | **2. Conducting Materials** , Resistance and factors affecting it  Such as alloying and temperature | |
| Day2 | Classification of conducting material as low resistivity and high resistivity  materials | |
| Day3 | low resistance materials Copper: General properties as conductor resistivity,  temperature coefficient and density | |
| Day4 | Mechanical properties of hard-drawn and annealed copper corrosion, contact  resistance | |
| 3rd | Day1 | Application of copper in the field of electrical engineering. | |
| Day2 | Aluminium: General properties as resistivity, temperature coefficient, density | |
| Day3 | Mechanical properties of hard and annealed aluminium, solder ability, contact  resistance | |
| Day4 | Applications in the field of electrical engineering. | |
| 4th | Day1 | Steel: Mechanical properties of steel | |
| Day2 | Applications in the field of electrical engineering. | |
| Day3 | Introduction to bundle conductors and its applications | |
| Day4 | Low resistivity copper alloys Brass, Bronze and their applications | |
| 5th | Day1 | Applications of special metals e.g. Silver, Gold, Platinum etc | |
| Day2 | High resistivity materials and their applications manganin, constantan, | |
| Day3 | Nichrome, mercury, platinum, carbon and tungsten | |
| Day4 | Superconductors and their applications | |
| 6th | Day1 | Revision and problem related to 2nd unit | |
| Day2 | Class Test of 2nd unit | |
| Day3 | **3. Review of Semi-conducting Materials**, Semi-conductors and their properties | |
| Day4 | Materials used for electronic components like resistors, capacitors, diodes,  transistors and inductors etc. | |
| 7th | Day1 | Class Test of 3rd unit | |
| Day2 | **4. Insulating materials; General Properties** | |
| Day3 | Electrical Properties :Resistivity, surface resistance, dielectric loss,  dielectric strength | |
| Day4 | Physical Properties Hygroscopicity, tensile and compressive strength, abrasive  resistance, brittleness | |
| 8th | Day1 | Thermal Properties: Heat resistance, classification according to  Permissible temperature rise | |
| Day2 | Chemical Properties: Solubility, chemical resistance, weather ability | |
| Day3 | Mechanical properties, mechanical structure, tensile structure | |
| Day4 | Revision and problem related to 4thunit | |

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| 9th | Day1 | Class Test of 4th unit |
| Day2 | **5. Introduction to Insulating Materials and their applications** |
| Day3 | Plastics Definition and classification |
| Day4 | Thermosetting materials: Bakelite, amino resins, epoxy resins their important  properties and applications |
| 10th | Day1 | Thermo-plastic materials: PVC, Polyethelene, silicones, their important  properties and applications |
| Day2 | Natural insulating materials, properties and their applications |
| Day3 | Mica and Mica products, Asbestos and asbestos products, Ceramic materials |
| Day4 | Glass and glass products Cotton, silk, jute, paper, Rubber, Bitumen |
| 11th | Day1 | Mineral and insulating oil for transformer, insulating varnish for coating and  impregnation |
| Day2 | Gaseous materials; Air, Hydrogen, Nitrogen, SFtheir properties and applications |
| Day3 | Revision and problem related to 5thunit |
| Day4 | Class Test of 5th unit |
| 12th | Day1 | **6. Magnetic Materials:** Introduction, Ferromagnetic materials, permeability |
| Day2 | B-H curve, magnetic saturation, hysteresis loop including coercive force and  residual magnetism |
| Day3 | Concept of eddy current and hysteresis loss, |
| Day4 | Curie temperature, magnetostriction effect. |
| 13th | Day1 | Soft Magnetic Materials: Alloyed steels with silicon: |
| Day2 | High silicon alloy steel for transformers |
| Day3 | low silicon alloy steel for electric rotating machines |
| Day4 | Cold rolled grain oriented steels for transformer, |
| 14th | Day1 | Non-oriented steels for rotating machine, Nickel-iron alloys, Soft Ferrites |
| Day2 | Hard magnetic materials Tungsten steel, |
| Day3 | chrome steel , hard ferrites cobalt and Steel applications. |
| Day4 | Revision and problem related to 6thunit |
| 15th | Day1 | Class Test of 6th unit |
| Day2 | **7. Special Materials** Thermocouple, bimetals |
| Day3 | leads soldering and fuses material and their applications |
| Day4 | Revision and problem related to 7thunit |
| 16th | Day1 | **8. Introduction of various engineering materials** necessary for fabrication of  electrical machines such as motors, |
| Day2 | generators, transformers etc. |
| Day3 | Revision/Review/Test of old HSBTE Papers |
| Day4 | Revision/Review/Test of old HSBTE Papers |