**Flow up of implementation celli pass play**

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| Course Instructor | Osama. S. Jafar | | | | |
| E-mail | **Osama.sahib@gmail.com** | | | | |
| Title | **Protection** | | | | |
| Course Coordinator | 3 hours per week theory | | | | |
| Course Objective | Introduce students to the basic elements of protection of electrical power system and equipments. | | | | |
| Course Description | **Course Name: protection**  **Credit hours: (2-1-0-2)**  **Pre-requisite: None**  **Course Contents:**  Basic Principles & circuit breaker types, fuses, relays (different type of relays), power system protection (generators, transmission line, bus-bars, transformers, motors), over voltage protection, grounding systems. | | | | |
| Textbook | 1. Power system protection, J. L. Blackburn. 2. Switchgrea and protection, Uday A. Bakshi. 3. Principles of power system V. K. Mehta, 4. Power system analysis and design, D. Glover | | | | |
| Course Assessments | First semester | Second month | Final Exam |  |
| 20% | 20% | 60% |  |
| General Notes |  | | | | |

**Course Weekly Outline**

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| **Week** | **Date** | **Topes Covered** | **Notes** |
| 1 | 7/10/2016 | Definitions and terminology, basic requirements, protection zones |  |
| 2 | 14/10/2016 | Circuit Breakers—Arc Phenomenon—  Principles of arc extinction—Methods of arc extinction, Important Terms Classification of circuit breakers |  |
| 3 | 21/10/2016 | Oil circuit breakers—Types  of oil circuit breakers—Plain break oil circuit breakers—Arc control oil circuit breakers—Low oil circuit breakers—Maintenance of oil circuit breakers |  |
| 4 | 28/10/2016 | Air blast circuit breakers—  Types of air blast circuit breakers—SF  6 Circuit  Breaker—Vacuum circuit breakers—  Switchgear Components |  |
| 5 | 4/11/2016 | Problems of circuit  interruption—Resistance Switching—Circuit Breaker Ratings |  |
| 6 | 11/11/2016 | Examples and problems on circuit breakers. |  |
| 7 | 18/11/2016 | Fuses—Desirable Characteristics of  Fuse Elements—Fuse element materials—Important Terms—Types of  Fuses—Low voltage fuses—High voltage fuses—. | **Monthly Exam.** |
| 8 | 25/11/2016 | Current carrying capacity of fuse element—Difference between a fuse and circuit breaker |  |
| 9 | 2/12/2016 | Examples and problems. |  |
| 10 | 9/12/2016 | Protective Relays—Fundamental  requirements of Protective  Relaying—Basic Relays—Electro  magnetic Attraction Relays |  |
| 11 | 16/12/2016 | Induction Relays—Relay timing—Important terms—Time P.S.M.curve—Calculation of relay operating time | **Monthly Exam** |
| 12 | 23/12/2016 | Functional relay types—Induction type Over-current Relay |  |
| 13 | 30/12/2016 | Induction type directional power Relay—Distance or Impedance relays—Definite distance type impedance. |  |
| 14 | 6/1/2017 | Impedance relays. |  |
| 15 | 13/1/2017 | Differential relays—Current differential relays |  |
| 16 | 20/1/2017 | Voltage balance differential relay—Translay System—Types of Protection. |  |
| 17 | 27/1/2017 | Protection of Alternators—Differential |  |
| 18 | 3/2/2017 | Examples and problems. |  |
| 19 | 10/2/2017 | Protection of Transformer, Protective systems for transformers. |  |
| 20 | 17/2/2017 | Bus-bar Protection—Protection of  Lines |  |
| 21 | 24/2/2017 | Protection—Differential pilot- wire |  |
| 22 | 3/3/2017 | Digital Relaying. |  |
| 23 | 10/3/2017 | Voltage Surge—Causes of Overvoltage’s—Internal causes of overvoltage’s—Lightning |  |
| 24 | 17/3/2017 | Examples and problems |  |
| 25 | 24/3/2017 | Harmful effects of lightning—  Protections against lightnin |  |
| 26 | 31/3/2017 | Overhead Ground  wires—Lightning Arresters |  |
| 27 | 7/4/2017 | Types of lightning arresters—Surge Absorber. |  |
| 28 | 14/4/2017 | Grounding or Earthing—Equipment Grounding. |  |
| 29 | 21/4/2017 | Neutral System—Neutral  Grounding—Advantages of NeutralGrounding—Methods of Neutral Grounding |  |
| 30 | 28/4/2017 | Arc Suppression Coil  Grounding (or Resonant Grounding)—Voltage Transformer Earthing—Grounding Transformer |  |
| 31 | 5/5/2017 | Examples and problems. |  |
| 32 | 12/5/2017 |  |  |
|  | 19/5/2017 |  |  |

**INSTRUCTOR Signature: Dean Signature:**