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| **Lesson Plan** |
| **Faculty** | **Mr. Jaideep Panjeta** |
| **Discipline** | **Electrical Engineering** |
| **Semester** | **6th** |
| **Subject** | **Power System Protection** |
| **Duration** | **15 Weeks (from 20 January 2025 to 2nd May 2025)** |
| **Work Load per Week** | **Lecture – 03 ; Practical - 02** |
|  |  | **Theory** | **PRACTICALS** |
| **Week** | **Lecture Day** | **Topic** | **Name of Practical** |
| **I** | **1** | **Introduction of the Subject:** Power System Protection  | **Introduction of the power System Lab** |
| **2** | **Introduction of Faults**  |
| **3** | 1.1 Common type of faults in both overhead and underground systems.  |
| **II** | **1** | 1.2 Types of Symmetrical faults: Three phases to ground and Three Phase fault.  | 1. Identify various switchgears installed in the laboratory and write their specifications. |
| **2** | 1.3 Types of Unsymmetrical faults: Line to line fault, Single line to ground fault,  |
| **3** | double line to ground fault, Line to line and third line to ground fault. |
| **III** | **1** | **Assignment No 01** | 2. Test HRC fuse by performing the load test.  |
| **2** | **UNIT II** **Introduction of Switchgears**  |
| **3** | 2.1 Definition of switchgear, Purpose of switchgear.  |
| **IV** | **1** | Function of, switch, fuse, isolator and circuit breaker.  | 3. Perform the overload and short circuit test of MCB as per IS specifications. |
| **2** | Difference between fuse and circuit breaker.  |
| **3** | 2.2 Circuit Breaker: Operating principle of circuit breaker. Arc phenomenon. Methods of Arc extinction. |
| **V** | **1** | Definition of Arc voltage, Restriking and Recovery voltage, | 4. Plot the time-current characteristics of Kit-Kat fuse wire. |
| **2** | Rate of rise of restriking voltage (RRRV). Rating of Circuit breakers: making capacity, breaking capacity, short time capacity. |
| **3** | 2.3 Types of Circuit Breakers: Constructional and working of Oil circuit breakers, Air Blast Circuit Breaker, |
| **VI** | **1** | SF6 circuit breakers, VCB.  | 5. Perform Earthing of different equipment installed in the institute viz Motors, Generators, Energy Meter, Main Distribution Board and Energy Meter Box. |
| **2** | Test No 01 |
| **3** | **Introduction of Protection Devices** |
| **VII** | **1** | 3.1 Fuses: Properties and Characteristics of fuse,  | 6. Plot the time current characteristics of over current relay.  |
| **2** | Types of Fuse: HV and LV fuses, rewire-able, cartridge, HRC.  |
| **3** | 3.2 Earthing: Purpose of earthing, method of earthing, |
| **VIII** | **1** | Equipment earthing, Substation earthing, Methods of reducing earth resistance. | 7. To write down specifications of Lightning arrestors installed in a substation. |
| **2** | 3.3 Basic relay terminology- Protective relay, Relay time, Pick up, Reset current, current setting, Plug setting multiplier, Time setting multiplier.  |
| **3** | 3.4 Protective relays: Classification, principle of working, construction and operation of – Electromagnetic (Attracted armature type, Induction) relay, |
| **IX** | **1** | Thermal relay. Block diagram and working of Static relay.  | 8. Power measurement by using CTs and PTs.  |
| **2** | i. Over-current relay: Principle, operation of instantaneous over current relay, Inverse definite minimum time (IDMT) over current relay.  |
| **3** | ii. Directional over-current: operation of Directional over-current. |
| **X** | **1** | iii. Differential relay: operation of Differential relay. | 9. Measurement of current on any LT line with clip meter.  |
| **2** | iv. Distance relays: Impedance relay, mho relay.  |
| **3** | **Assignment No 02** |
| **XI** | **1** | **UNIT IV** **Protection scheme** 4.1 Protection for Alternator: Differential protection over current,  | 10. Study of different types of circuit breakers and isolators by visiting power station and to prepare detailed report. |
| **2** | Earth fault protection scheme. |
| **3** | 4.2 Protection for transformer: Buchholz protection scheme,  |
| **XII** | **1** | differential protection scheme.  | 11. Prepare charts on different Generating stations in our state mentioning their locations.  |
| **2** | 4.3 Protection for Feeder and transmission line - time graded and over current protection,  |
| **3** | current graded system, differential protection |
| **XIII** | **1** | **UNIT V** **Over-Voltage Protection** 5.1 Causes of over voltages: Internal and external causes,  | 12. Students may be taken to various Sub-stations/Grid Stations for study the differential protection of transformer. |
| **2** | types of lighting strokes.  |
| **3** | 5.2 Protection against Overvoltage and Lightning: ground wire,  |
| **XIV** | **1** | earthing screen, surge diverters or lightning arresters.  | **File checking and Viva voce** |
| **2** | 5.3 Types of Lightning arresters: rod gap, horn gap,  |
| **3** | metal oxide type. |
| **XV** | **1** | Test No 03 | **File checking and Viva voce** |
| **2** | **Assignments No 03** |
| **3** | **Revison** |