**Dept.of Electrical and Computer Engineering, North South University**

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| **Course Title: Power System Protection Course Code: EEE 462 Credit Hours: 3 credits** | |
| Prerequisite: EEE-362 | Contact hours: 3 hours/week |
| **Course Objective:** Switchgear basic information and different protector details. | |

**Course Contents:**

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| **Midterm (Total Mark: 20)** | | |
| **Segments** | **Course contents** | **Marks** |
| Seg-1 | 1. **INTRODUCTION TO SWITCHGEAR**.    1. **Introduction (V.K Mehta-Pdf-387)**    2. **Definition of Switchgear**    3. **Essentialities of Switchgear protection**   **+ Figure 1.1 (S. Rao)**   * 1. **Essential Features of Switchgear (V.K Mehta-Pdf-388)**   2. **Switchgear Equipment (V.K Mehta-Pdf-388,389,390)**   3. **Short Circuit (V.K Mehta-Pdf-393)**      + 1. **Causes of short-circuit V.K Mehta-Pdf-394)**        2. **Effects of short-circuit V.K Mehta-Pdf-394)**        3. **Importance of short circuit current analysis**      1. **PROTECTIVE RELAYING**    1. **Introduction** **(V.K Mehta-Pdf-497)**    2. **Protective Relays** **(V.K Mehta-Pdf-498)**    3. **Functions of Protective Relaying Fundamental Requirements of Protective Relaying (V.K Mehta-Pdf-498,499,500)**    4. **Types of Protection (V.K Mehta-Pdf-519)**       * 1. **Primary Protection**         2. **Backup Protection**    5. **Types of Basic Relays (V.K Mehta-Pdf-519 + MTA Sheet**   **“Protective Relaying – Art. 1.8.1-1.8.7”/**  **Bakshi-28-30)**   1. **INSTRUMENT TRANSFORMER ( “Protective Relaying – Art. 1.10 – 1.17”/ Bakshi-34-40)** | 10 |
| Seg-2 | 1. **ELECTROMAGNETIC ATTRACTION RELAYS**    1. **Electromagnetic Attraction Relays classification(V.K**   **Mehta-Pdf-500)**   * + - 1. **Attracted Armature Type Relay**   **+ (Fig.2.5 - Bakshi –53)**   * + - 1. **Solenoid Type Relay**   **+ (Fig.2.7 Bakshi –55)**   * + - 1. **Balanced Beam Type Relay**   1. **Advantages of Electromagnetic Attraction Relays**   **(Bakshi –57-Art.2.3.4 )**   * 1. **Disadvantages of Electromagnetic Attraction Relays**   **(Bakshi -57-Art.2.3.5 )**   * 1. **Application of Electromagnetic Attraction Relays**   **(Bakshi –57-Art.2.3.5 )**   1. **INDUCTION RELAYS**    * 1. **Mathematical Derivation of Torque Equation (V.K**   **Mehta-Pdf-501,502)**   * + 1. **Shaded-pole type induction relay(V.K Mehta-Pdf-**   **502)**   * + 1. **Watt-hour-meter** **type induction relay(V.K Mehta-**   **Pdf-503)**   * + 1. **Induction cup type induction relay (V.K Mehta-Pdf-**   **503)** | 10 |
| Seg-3 | 1. **Relay Timing (V.K Mehta-Pdf-504,505)**    1. **Instantaneous relay**    2. **Inverse-time relay**    3. **Definite time lag relay** 2. **Terminologies Used in Protective Relaying[Bakshi-30-Art.1.9 + V.K Mehta-505 + Math-21.1(V.K.Mehta-507) +Math-2.1,2.2(Bakshi-67,68)]** 3. **Functional Relay Types**    1. **Induction Type Overcurrent Relay (non-directional) (V.K.Mehta- 508)**    2. **Induction Type Directional Power Relay(V.K.Mehta- 509)**    3. **Induction Type Directional Overcurrent Relay** **(V.K.Mehta-**   **510)**   * 1. **Thermal relay(Bakshi-75-Art.2.8)** | 10 |