**20EE41EA-ELECTRICAL DISTRIBUTION SYSTEMS**

**(EEE)**

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| **Course Category:** | Professional elective | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-practical:** | 3-0-0 |
| **Pre-requisite:** | Fundamentals of power system transmission and distribution, electric power generation and Basic circuit analysis | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn: | |
| 1. The different load characteristics, modeling and analysis of different  factors  2. The types of feeder, feeder voltage levels and its loading.  3. The benefits of optimal location of substations.  4. The power loss, voltage drop, efficiency for transmission lines.  5. The different protective devices operations, applications and co-  ordination procedure.  6. The voltage improvement by using different types of power capacitors  and optimum capacitor location. | |
| **Course Outcomes:** | After completing the course the student will be able to: | |
| **CO1** | Understand different load characteristics, modeling and analysis of different factors. |
| **CO2** | Demonstrate types of feeder, feeder voltage levels and its loading. |
| **CO3** | Analyze benefits of optimal location of substations. |
| **CO4** | Calculate power loss, voltage drop and efficiency of transmission lines. |
| **CO5** | Enumerate different protective devices operations, applications and co-ordination procedure. |
| **CO6** | Design voltage improvement by using different types of power capacitors and optimum capacitor location. |
| **Course Content:** | **UNIT–I**  **Introduction to distributed systems:** Introduction, classification of loads (residential, commercial, and agricultural & industrial) and their characteristics, an overview of rate of computers in distributed system planning, load modeling and characteristics, coincidence factor contribution factor and loss factor.  **UNIT–II**  **Design of distributed networks:** Distribution feedback & substation, design considerations of distribution feeders, radial &loop types of primary feeders, voltage levels, feeder loading.  **UNIT–III**  **Location of substations:** Rating of distribution substations, service area with ‘n’ primary feeders, benefits of optimal location of substations.  **UNIT–IV**  **Distribution system analysis:** Voltage drop & power loss calculations, derivation of voltage drop & power loss in lines, manual methods of solution for radial networks, 3φ balanced primary lines.  **UNIT–V**  **Protective devices & co-ordination:** Objectives of distribution system protection, types of common faults and procedure for fault calculations, protective devices, principles of operation of fuses, circuit breakers, general co-ordination procedure.  **UNIT–VI**  **Power factor & voltage control improvement:** Capacitive compensation for power factor control, different types of power capacitors, shunt & series capacitors, power factor correction, procedure to determine best capacitor location and equipment for voltage control. | |
| **Text books**  **&**  **Reference books:** | **Text books:**  1.“Electrical power distribution system engineering”, by Turan Gonen,  3rd Edition, CRC press, Taylor & Francis group.  2.“Electric power distribution”, by A.S. Pabla, Tata McGraw Hill  Company, 4th Edition.   R**eference books:** 1.“Guide to electrical power distribution systems”, by Anthony J.Pansini, Fairmont Pr; 6th Edition (October 2004) 2.“Electrical power systems quality”, by Dugan Roger C, McGranaghan  M F, Santoso S and Beaty H Wayne, 2nd Edition, McGraw-Hill, 2003. | |
| **e-Resources:** | <http://nptel.ac.in/courses>  http://iete-elan.ac.in  <http://freevideolectures.com/university/iitm> | |