Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **15EE2023** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SUBSTATION DESIGN** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** |  | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Various factors affect the reliability of an electrical substation or switchyard facility, one of which is the arrangement of switching devices and buses. Classify and discuss the six types of arrangements commonly used in practice. | CO1 | 20 |
| **(OR)** | | | | |
| 2. |  | Draw the one line diagram of a substation having the following equipments:  i) Incoming lines: Two, 220kV  ii) Outgoing Lines: Five, 66kV,One 11kV  iii) Bus-bars: 220 kV-Double bus, 66kV-Double bus, 11kV bus  iv) Transformers: (a) Three winding transformers-Two, 100MVA, 220/66/11kV, 3F (b) Auxiliary transformer-One, 5MVA,11kV/400V, 3F  v) Wave trap, Coupling condenser and Earth switch at incoming lines. Show the positions of CTs, PTs, disconnecting switches, lightning arresters, circuit breakers. | CO1 | 20 |
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| 3. |  | Illustrate the two conditions that a person within or around the substation can experience that can cause them to become part of the ground circuit. | CO1 | 20 |
| **(OR)** | | | | |
| 4. |  | Determine the design criteria for a substation grounding system to limit the actual step and mesh voltages to levels below the tolerable touch and step voltages. | CO2 | 20 |
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| 5. |  | Summarize the Five important Lightning Parameters in detail. | CO1 | 20 |
| **(OR)** | | | | |
| 6. |  | Design and Develop a Combined station auxiliary and system earthing transformer connected directly to 33 kV Substation. | CO2 | 20 |
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| 7. |  | Discuss about Components of a SCADA System based on Traditional SCADA system topology, Networked SCADA communications. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Discuss several data communication systems, which can be used for either relay or SCADA communications. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | With Control Flow Diagram, describe Server-based substation control system architecture, Utility communication and security architecture with smart substation. | CO3 | 20 |