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



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

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| **Code :** | **14EE2027** | **Duration :** | **3hrs** |
| **Sub. Name :** | **HVDC AND FACTS** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Discuss in detail about the modern trends in HVDC technology. | CO1 | 15 |
| b. | Sketch the hierarchical control structure for a HVDC link. | CO1 | 05 |
| **(OR)** | | | | |
| 2. | a. | Give a neat sketch of different HVDC Links. Why the bipolar line is more commonly used? | CO1 | 08 |
| b. | Explain with a single line diagram of a VSC based HVDC Converter station. | CO2 | 12 |
|  |  |  |  |  |
| 3. | a. | Draw the converter characteristics of a HVDC link and explain the different modes of operation. | CO2 | 15 |
| b. | List out the problems of AC interconnection. | CO1 | 05 |
| **(OR)** | | | | |
| 4. | a. | Discuss in detail the HVDC converter control characteristics, negative current margin and modified characteristics including VDCOL. | CO 2 | 10 |
| b. | Explain in detail the starting and stopping of a HVDC Link in terms of  [i] Energisation and De-energisation of a bridge.  [ii] Start-up of DC Link. | CO 2 | 10 |
|  |  |  |  |  |
| 5. | a. | Explain in detail about the role of SVC in enhancing the steady state power limit and power system damping. | CO3 | 14 |
| b. | Explain in detail about the classification of different FACTS controllers. | CO3 | 06 |
| **(OR)** | | | | |
| 6. | a. | Explain the shunt compensation connected at the midpoint of the line. | CO3 | 10 |
| b. | Describe the compensation by a series capacitor connected at the midpoint of the line. | CO3 | 10 |
|  |  |  |  |  |
| 7. |  | Explain the basic principle and different modes of operation in TCSC. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Explain the working of STATCOM. Compare its performance with SVC. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Draw the configuration of UPFC implementation using two ‘back-to-back’ connected voltage sourced converters with a common DC Link. | CO3 | 05 |
| b. | With phasor diagram, explain the different modes of operation of UPFC. | CO3 | 15 |