**20EE603**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **July/August,2023** | **Electrical & Electronics Engineering** | | |
| **Sixth Semester** | **HVDC & FACTS** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | List the factors to be considered for planning HVDC transmission systems. | CO1 | L1 | 1M |
|  | b) | Explain in two lines about choice of voltage level in DC transmission. | CO1 | L1 | 1M |
|  | c) | How will overcome the disadvantages in DC transmission? | CO1 | L1 | 1M |
|  | d) | Define harmonic. | CO2 | L1 | 1M |
|  | e) | Define DC filter. | CO2 | L1 | 1M |
|  | f) | Define AC filter. | CO2 | L1 | 1M |
|  | g) | What is the flexibility of electric power transmission? | CO3 | L1 | 1M |
|  | h) | What are the objectives of FACTs controllers? | CO3 | L1 | 1M |
|  | i) | What are the various categories of FACTs controllers? | CO3 | L1 | 1M |
|  | j) | What is IPFC? | CO4 | L1 | 1M |
|  | k) | List the different power electronic devices used in FACTs controllers. | CO4 | L1 | 1M |
|  | l) | What is reactive power compensation in transmission system? | CO4 | L1 | 1M |
|  | m) | What is VSC based HVDC systems? | CO1 | L1 | 1M |
|  | n) | What is ignition angle control in converter operation? | CO2 | L1 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | List and explain the advantages of using DC transmission over AC transmission. | CO1 | L2 | 7M |
|  | b) | Draw the layout of HVDC transmission substation and explain its operation. | CO1 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 3 | a) | Differentiate bipolar and homopolar DC links in transmission system. | CO1 | L2 | 7M |
|  | b) | Explain the operation of voltage source converter-based systems. | CO1 | L2 | 7M |
| **Unit-II** | | | | | |
| 4 | a) | List and explain the features of controlling converter performance. | CO2 | L2 | 7M |
|  | b) | Explain the operation of multi terminal DC systems with their applications. | CO2 | L2 | 7M |
| **(OR)** | | | | | |
| 5 | a) | Explain the operation of current and extinction angle control in converters with necessary illustrations | CO2 | L2 | 7M |
|  | b) | Differentiate series and parallel MTDC systems with necessary diagrams. | CO2 | L2 | 7M |
| **Unit-III** | | | | | |
| 6 | a) | Explain the operation of reactive power compensators in used in FACTs controllers. | CO3 | L2 | 7M |
|  | b) | Explain the necessity of FACTS controllers. | CO3 | L2 | 7M |
| **(OR)** | | | | | |
| 7 | a) | Explain the procedure along with necessary connection diagrams to improve voltage profile using FACTs controllers using mid-point compensation. | CO3 | L2 | 7M |
|  | b) | Explain how the FACTs controllers can control the stability of transmission systems. | CO3 | L2 | 7M |
| **Unit-IV** | | | | | |
| 8 | a) | Explain the objectives and operation of shunt compensation in transmission systems. | CO4 | L2 | 7M |
|  | b) | Explain the operation of UPFC with necessary diagrams and mathematical expressions. | CO4 | L2 | 7M |
| **(OR)** | | | | | |
| 9 | a) | Explain the operation of SVC with necessary diagrams and mathematical expressions. | CO4 | L2 | 7M |
|  | b) | Explain the operating principle to control the active and reactive power flow using controllers. | CO4 | L2 | 7M |