CBCS SCHEME - Make-Up Exam
Sri Sairam College of Engineering,Anekal

USN | | | | | | | | | | |

BEE613C

# Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
## FACTS and HVDC Transmission

Time: 3 hrs. Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
*2. M : Marks , L: Bloom's level , C: Course outcomes.*

| | | Module – 1 | M | L | C |
|---|---|---|---|---|---|
| Q.1 | a. | Explain the basic types of FACTS controllers, with neat sketch. | 10 | L1 | CO1 |
| | b. | Discuss the power flow and dynamic stability considerations of a transmission interconnection. | 10 | L1 | CO1 |
| | | **OR** | | | |
| Q.2 | a. | Enumerate the relative importance of controllable parameters. | 10 | L1 | CO1 |
| | b. | Discuss in detail possible benefits of FACTS technology also justify in perspective HVDC or FACTS. | 10 | L1 | CO1 |
| | | **Module – 2** | | | |
| Q.3 | a. | With the help of a two machine system, explain how shunt compensation can help in improving transient stability. | 10 | L2 | CO2 |
| | b. | Describe the operation of TCR along with circuit and V – I characteristics. | 10 | L2 | CO2 |
| | | **OR** | | | |
| Q.4 | a. | Explain with suitable diagram the switching converter type VAR generator. | 10 | L2 | CO2 |
| | b. | Explain with suitable sketch, the single phase operation of Thyristor Switched Reactor (TSR). | 10 | L2 | CO2 |
| | | **Module – 3** | | | |
| Q.5 | a. | Describe important objectives of series compensation, also explain the concept of series capacitive compensation with neat sketch. | 10 | L2 | CO3 |
| | b. | Explain the operation of Static Synchronous Series Compensation (SSSC) with the help of suitable sketch. | 10 | L2 | CO3 |
| | | **OR** | | | |
| Q.6 | a. | Discuss the improvement of transient stability in series compensate line with the help of equal area criterion. | 10 | L2 | CO3 |
| | b. | With a neat sketch explain the working of [TSSC] Thyorstor Switched Series Capacitor. | 10 | L2 | CO3 |
| | | **Module – 4** | | | |
| Q.7 | a. | Describe overview and organization of HVDC systems. | 10 | L3 | CO4 |
| | b. | State the advantages and application of HVDC systems. | 10 | L3 | CO4 |
| | | **OR** | | | |
| Q.8 | a. | Draw the schematic diagram and explain the operation of 12-pulse converter. | 10 | L3 | CO4 |
| | b. | Explain the operation of 3-phase bridge converter with the help of circuit and waveforms. | 10 | L3 | CO4 |
| | | **Module – 5** | | | |
| Q.9 | a. | Explain briefly desired features of HVDC control and also explain commutation failure. | 10 | L2 | CO5 |
| | b. | Describe the design of HVDC control. | 10 | L2 | CO5 |
| | | **OR** | | | |
| Q.10 | a. | Enumerate five important control functions of a HVDC system and also explain voltage stability and reactive power. | 10 | L2 | CO5 |
| | b. | Explain : i) Individual Phase Control [IPC]<br>ii) Equidistant Pulse Control [EPC]. | 10 | L2 | CO5 |

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## Facts and HVDC Transmission

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***2. M : Marks , L: Bloom's level , C: Course outcomes.***

| | | Module – 1 | M | L | C |
|---|---|---|---|---|---|
| Q.1 | a. | Define "Facts Controller", list the opportunities for 'Facts' in detail. | 06 | L2 | CO1 |
| | b. | Explain the importance and read of transmission interconnections. | 08 | L2 | CO1 |
| | c. | Discuss the limitations on transmission line loading capability. | 06 | L2 | CO2 |
| | | **OR** | | | |
| Q.2 | a. | Discuss the power flow and dynamic stability considerations of a transmission interconnection. | 06 | L3 | CO2 |
| | b. | Describe the power flow in an AC system with a suitable diagram. | 08 | L4 | CO2 |
| | c. | Explain about the basic types of Facts controlling in detail. | 06 | L2 | CO1 |
| | | **Module – 2** | | | |
| Q.3 | a. | Illustrate how shunt compensation can help in improving transient stability with the help of two machine system ? | 10 | L4 | CO2 |
| | b. | Explain the operation of Fixed Capacitor thyristor controlled Reactor type static VAR Generator with a suitable diagram and plot its Demand versus output characteristics. | 10 | L2 | CO2 |
| | | **OR** | | | |
| Q.4 | a. | Compare the V – I and V – Q characteristics of STATCOM and SVC, | 06 | L2 | CO2 |
| | b. | Discuss in detail about the basic control approaches for VAR Generator. | 08 | L2 | CO2 |
| | c. | State the importance of voltage slope provided in V – I characteristics of SVC and STATcom. | 06 | L2 | CO2 |
| | | **Module – 3** | | | |
| Q.5 | a. | Explain the concept of series capacitive compensation with a neat sketch and list the objectives of series compensation. | 10 | L2 | CO3 |
| | b. | Illustrate how voltage stability of a rodial system can be improved using static series compensation with a neat diagram. | 10 | L3 | CO3 |
| | | **OR** | | | |
| Q.6 | a. | Explain the operation of Thyristor –switched series capacitor (T S S C) with a neat sketch also describe its V – I characteristics. | 10 | L2 | CO3 |
| | b. | Discuss in detail about Transmitted power versus Transmission angle characteristics of a static series synchronous compensator (S S S C)with a relevant graph. | 10 | L2 | CO3 |
| | | **Module – 4** | | | |
| Q.7 | a. | Explain the operation of three phase full bridge converter with a neat circuit diagram and waveform, also derive the expression for the average output and direct voltage 'Vd'. | 10 | L4 | CO4 |
| | b. | Describe the organization of HVDC systems in detail. | 10 | L2 | CO4 |

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| | | **OR** | | | |
| **Q.8** | **a.** | State the advantages and applications of HVDC transmission system. | **06** | **L1** | **CO4** |
| | **b.** | Define multi-terminal HVDC, also list the types of multi-terminal HVDC. | **06** | **L2** | **CO4** |
| | **c.** | Explain the operation of 12 pulse convector with a neat Circuit diagram and Waveform. | **08** | **L2** | **CO4** |
| | | **Module – 5** | | | |
| **Q.9** | **a.** | Describe the important control functions of a HVDC system. | **06** | **L3** | **CO5** |
| | **b.** | Discuss in detail about " commutation failure" in HVDC converter system. | **06** | **L2** | **CO5** |
| | **c.** | Write a short note on :<br>i) Reactive power<br>ii) Voltage stability | **08** | **L1** | **CO5** |
| | | **OR** | | | |
| **Q.10** | **a.** | Discuss in detail how reversal of power flow is achieved in a Line Commutated Thyristor convector with a help of control characteristics. | **10** | **L3** | **CO5** |
| | **b.** | Describe the design of HVDC control and also explain the convector control for a HVDC system. | **10** | **L4** | **CO5** |

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