Code No: **RT42023C** **R13** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) List and explain briefly important controllable parameters that are considered for power flow control. [4]
   b) Explain basic principle of voltage source converter. [4]
   c) Explain necessity of VAR compensation in transmission system. [3]
   d) Explain different losses that are encountered with FC – TCR arrangement. [4]
   e) List merits of Hybrid compensator. [3]
   f) Explain main objectives and usefulness of UPFC in power industry. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Name and explain different types of stability issues that limit transmission capability. [8]
   b) What are FACT controllers and explain different categories of FACT controllers [8]

3. Explain the operation of three phase full wave bridge type voltage source converter with a neat circuit along with the necessary waveforms [16]

4. a) Explain prevention of voltage stability with the help of end of line voltage support. [8]
   b) Explain basic operation of Thyristor Switched Capacitor with necessary waveforms. [8]

5. a) Explain with a neat block diagram general control scheme of Static Var Compensator (SVC). [8]
   b) What is transient stability? How attainable enhancement of transient stability can be done by SVC and STATCOM? [8]

6. a) Explain with a neat functional diagram, implementation of Var Reserve (operating point) control for damping of Power oscillations in the system. [8]
   b) Explain about basic GTO-controlled series capacitor with principle of operation and necessary waveforms. [8]

7. a) Give a comparison between UPFC to IPFC. [8]
   b) Explain principle of operation of IPFC with neat diagram. [8]

Code No: **RT42023C** **R13** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
****

PART–A *(22 Marks)*

1. a) Explain need of transmission interconnection. [3]
   b) Distinguish between current source and voltage source converters. [4]
   c) Explain need of dynamic voltage control in a transmission system. [4]
   d) List different methods of controllable VAR generation [3]
   e) Explain important features of GTO thyrister controlled series capacitor. [4]
   f) Explain the importance of Interline power flow controller(IPFC) [4]

PART–B *(3x16 = 48 Marks)*

2. a) Explain different dynamic stability considerations that were taken for a transmission interconnection. [8]
   b) Explain relative importance of different types of FACTS controllers. [8]

3. a) Explain reasons for possessing harmonics in a single phase bridge circuit and how it can be nullified. [8]
   b) Explain operation of three phase full wave diode converter (neglecting commutation angle) with a neat circuit and necessary waveforms. [8]

4. a) Explain the operation of two-machine Power system with an ideal midpoint reactive compensator with an equivalent circuit and necessary phasor diagram. [8]
   b) Explain in detail about power oscillation damping and why it is considered as dynamic event. [8]

5. a) Explain TSC – TCR type static var generator with a neat functional control Scheme. [8]
   b) Explain with reasons, why static compensator is not used as a perfect terminal voltage regulator but allowed to vary in proportion with compensating current. [8]

6. a) Explain main elements of the overall static compensator control system. [8]
   b) Explain concept of voltage stability and improvement of transient stability. [8]

7. a) Discuss the features of UPFC. [6]
   b) Explain the basic operating principles and characteristics of Interline Power Flow Controller (IPFC). [10]

Code No: **RT42023C** **R13** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Explain concept of power flow in ac system and explain difference when one of the parallel path is replaced with HVDC transmission. [4]
   b) Explain reasons for absence of neutral connection in a full wave circuit. [4]
   c) List functional requirements of reactive shunt compensators. [3]
   d) List major functions pf TSC –TCR type Var generator. [4]
   e) Explain basic idea behind series capacitive compensation. [3]
   f) Explain basic UPFC control scheme. [4]

PART–B *(3x16 = 48 Marks)*

2. a) List various FACTS controllers with their control attributes. [8]
   b) Explain loss and speed of switching in high power FACTs devices. [8]

3. Explain operation of single phase full wave voltage source converter with a neat circuit and necessary waveforms. [16]

4. a) List advantages and disadvantages of current source versus voltage source converters. [8]
   b) Explain how equal area criterion helps to evaluate effectiveness of shunt compensation and other flow control techniques on transient stability improvement. [8]

5. a) Explain implementation of functional control scheme for damping power oscillations in power system. [8]
   b) Explain basic circuit arrangement of Thyristor – Switched Series Capacitor (TSSC) with its principle of operation. [8]

6. a) Explain in detail about basic thyristor – controlled series capacitor scheme. [8]
   b) Illustrate effect of capacitor voltage reversal by TCR. [8]

7. a) Explain capability of UPFC to control real and reactive power flow in transmission line. [8]
   b) Explain functional control of shunt and series converter. [8]

Code No: **RT42023C** **R13** **Set No. 4**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) What are the benefits with FACTs controller? [3]
   b) Distinguish between self-commutating converters with line-commutating converters. [4]
   c) Explain different methods of controllable VAR generation. [4]
   d) Explain basic operating principle of reactive power generation by a rotating synchronous compensator (condenser). [4]
   e) List general objectives of series compensation. [4]
   f) What do you mean by dynamic performance of UPFC? [3]

PART–B *(3x16 = 48 Marks)*

2. a) What do you mean by loading capability and explain different kinds of limitations? [8]
   b) Distinguish between shunt connected controllers with series connected controllers. [8]

3. a) Explain techniques that are realized for harmonic elimination and voltage control. [8]
   b) Explain basic concept of current-source converter. Explain operation of 3-Φ CSC. [8]

4. a) Distinguish in terms of merits and demerits for a two machine transmission power system w.r.t midpoint voltage support and End of line voltage support. [8]
   b) Explain operation of basic thyristor-controlled reactor with waveforms. [8]

5. a) Explain basic Fixed Capacitor–Thyristor-Controlled reactor type Static Var Generator with a neat circuit and its output characteristics. [8]
   b) Explain in detail about steady – state relationship or V-I characteristic of static VAR compensator. [8]

6. a) Compare between STATCOM and SVC in terms of operational and performance characteristics along with application benefits. [8]
   b) With a neat diagram, explain operation of thyrister switched series capacitor. [8]

7. a) Explain the basic operating principles of UPFC with a conceptual representation. [8]
   b) Compare between UPFC with IPFC. [8]