Code No: **R164202B** **R16** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022

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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1.	a)	What is the need of FACTS controllers?	[2]
	b)	Mention the importance of self commutating converters?	[3]
	c)	Why shunt compensation is always attempted at midpoint of a transmission line	[2]
	d)	Why static compensator not used as perfect voltage regulator?	[2]
	e)	What are the characteristics differences between TSSC and TCSC?	[3]
	f)	What is the need of UPFC?	[2]

PART–B *(4x14 = 56 Marks)*

2.	a)	Discuss the technical benefits of FACTS technology.	[7]
	b)	Explain the power flow considerations of a transmission interconnected systems.	[7]
3.	a)	What are harmonics? Define total harmonic distortion.	[7]
	b)	Differentiate between voltage sourced and current sourced converters. Also mention the applications of voltage sourced converters.	[7]
4.	a)	Describe the basic thyristor switched capacitor and its operation.	[7]
	b)	Explain the power oscillation damping in shunt compensation	[7]
5.	a)	Discuss the implementation of the VAR reserve control	[7]
	b)	Enumerate the operating features of STATCOM.	[7]
6.	a)	Enumerate the basic operating control schemes of TSSC and TCSC.	[7]
	b)	Discuss the effect of series capacitive compensation in transmission lines.	[7]
7.		Describe the basic operating principles and concepts of UPFC.	[14]

Code No: **R164202B** **R16** **Set No. 2**

IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022

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 FOUR questions from Part-B
*****

PART–A *(14 Marks)*

1.	a)	What are limits the loading capacity of a transmission line?	[2]
	b)	Mention the various types of current source converters	[3]
	c)	What is meant by power oscillations damping?	[2]
	d)	Mention the various control approaches in static VAR generation	[2]
	e)	What are the objectives of series compensation?	[3]
	f)	What are the parameters of the transmission line can be controlled by UPFC?	[2]

PART–B *(4x14 = 56 Marks)*

2.	a)	Discuss the various categories of FACTS controllers in brief.	[7]
	b)	Describe the parameter trade-off of high power devices.	[7]
3.	a)	Enumerate single phase full-wave bridge converter operation.	[7]
	b)	Discuss three-phase current source converter operation in brief	[7]
4.	a)	Explain the concept of end of line voltage support to prevent voltage stability in shunt compensation	[7]
	b)	Describe any of the variable impedance type static VAR generators.	[7]
5.	a)	What is a STATCOM? Discuss its advantages and applications.	[7]
	b)	What is the advantage of regulation slope control? Draw and explain the control scheme for STATCOM with regulation slope control.	[7]
6.	a)	Explain the improvement of transient stability using static series compensation.	[7]
	b)	Describe the Thyristor controlled series capacitor.	[7]
7.	a)	Describe dependence of real and reactive power flow control in UPFC.	[7]
	b)	Illustrate the UPFC application on transmission lines.	[7]

Code No: **R164202B** **R16** **Set No. 3**

IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022

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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) What are the benefits with FACTs controller? [2]
   b) What is the principle of current source converter? [3]
   c) Write the three important objectives of shunt compensation [2]
   d) Compare between SVC and STATCOM. [3]
   e) Write the basic principle difference between series and shunt compensation [2]
   f) What are the applications of UPFC on transmission lines. [2]

PART–B *(4x14 = 56 Marks)*

2. a) List various FACTS controllers with their control attributes. [7]
   b) Explain loss and speed of switching in high power FACTs devices. [7]

3. a) Explain the concept of voltage sourced converters.. [7]
   b) Derive expression for square–wave voltage harmonics for a single–phase bridge converter [7]

4. a) Explain the operation of two-machine Power system with an ideal midpoint reactive compensator with an equivalent circuit and necessary phasor diagram. [7]
   b) Explain in detail about power oscillation damping with shunt compensation and why it is considered as dynamic event [7]

5. a) Discuss the operation of STATCOM with a neat diagram and characteristics. [7]
   b) Describe the transient stability enhancement using STATCOM and SVC [7]

6. a) What is meant by variable impedance type series compensator? Explain the operation of Thyristor Controlled Series Capacitor (GCSC). [7]
   b) Explain the basic control schemes of TCSC and TSSC. [7]

7. Describe the operating principles of unified power flow controller with schematic diagram. [14]

Code No: **R164202B** **R16** **Set No. 4**

IV B.Tech II Semester Regular/ Supplementary Examinations, June - 2022

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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Mention the voltage and current ratings of high power devices. [2]
   b) Why in general voltage sourced converters is preferred over current sourced converters in FACTS controllers [3]
   c) List out the requirements of shunt compensation. [3]
   d) What are the advantages of slope in SVC dynamic characteristics? [2]
   e) What are the important features of GTO thyrister controlled series capacitor? [2]
   f) What is the basic operating principle of an UPFC? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Discuss the benefits of FACTS controllers. [7]
   b) Explain the importance of control parameter of FACTS devices. [7]

3. a) With a neat circuit diagram and necessary waveforms, discuss the working of a single-phase bridge converter. [7]
   b) What are harmonics? What are their sources? How to measure the harmonics? [7]

4. a) Discuss how to prevent voltage instability using shunt compensation connecting at the end of line. [7]
   b) Explain the power oscillation damping with shunt compensation. [7]

5. a) Explain with a neat block diagram, general control scheme of Static VAT Compensator (SVC). [7]
   b) What is transient stability? How attainable enhancement of transient stability can be done by SVC and STATCOM? [7]

6. a) Discuss how series capacitive compensation improves the transient stability of a line. [7]
   b) Discuss the working of a Thyristor controlled Series Capacitor. [7]

7. a) Describe the various transmission control capabilities of UPFC. [7]
   b) Draw and explain the schematic diagram of UPFC. [7]