

Enrollment No.....



Faculty of Engineering  
End Sem (Even) Examination May-2022  
EE5CP06 Reactive Power & Voltage Control

Programme: M.Tech.

Branch/Specialisation: EE

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. The voltage of a particular bus can be controlled by controlling the: **1**  
 (a) Phase Angle (b) Reactive power of the bus  
 (c) Both (a) and (b) (d) Active power of the bus
- ii. With the help of a reactive power compensator, it is possible to have **1**  
 (a) Constant voltage operation only  
 (b) Unity pf operation only  
 (c) Both (a) and (b)  
 (d) None of these
- iii. FACTS devices are generally used for to compensate ..... of **1**  
 the transmission lines.  
 (a) Reactance (b) Resistance  
 (c) Conductance (d) Admittance
- iv. FACTS devices generally deal with: **1**  
 (a) Apparent power (b) Active power  
 (c) Reactive power (d) Load angle
- v. Harmonics cause which of the following: **1**  
 (a) Capacitor Failure (b) Nuisance Tripping  
 (c) Heating in Windings (d) All of these
- vi. Filters are used to reduce which of the following: **1**  
 (a) Voltage Sag (b) Voltage Distortion  
 (c) Harmonics (d) All of these
- vii. The application of UPFC is: **1**  
 (a) Power flow control (b) Power swing damping  
 (c) Both (a) and (b) (d) None of these

P.T.O.

[2]

- viii. Disadvantage with series compensation: **1**  
 (a) Reduce the stability (b) Increase the power drop  
 (c) Reduce the power factor (d) Increase in fault current
- ix. The condition for variable capacitive mode in TCSC is: **1**  
 (a) Firing angle ( $\alpha$ ) closer to  $180^\circ$   
 (b) Firing angle ( $\alpha$ ) closer to  $90^\circ$   
 (c) Firing angle ( $\alpha$ ) greater than  $180^\circ$   
 (d) None of these
- x. SSSC is a: **1**  
 (a) Series compensation device (b) Shunt compensation device  
 (c) Combined compensator (d) Loss reduction device
- Q.2 i. What is load compensation? **2**  
 ii. Explain the reactive power compensation. **3**  
 iii. Explain reasons for variation of voltage in a power system and suggest methods to improve voltage profile. **5**
- OR iv. Explain the behaviour of uncompensated transmission line for different power factor under load conditions. **5**
- Q.3 i. Discuss the working of SSC. **2**  
 ii. Explain the necessity of FACTS controllers and type of FACTS devices. **8**
- OR iii. Explain the working and advantage of STATCOM devices. **8**
- Q.4 i. Explain the harmonic filters. **3**  
 ii. Explain the factors to be considered for designing passive filters. Also explain their limitations. **7**
- OR iii. What do you understand by harmonics? Explain the different types of harmonics. **7**
- Q.5 i. How the unified power flow controller (UPFC) is different from a simple VSC? **4**  
 ii. Explain the unified power flow controller (UPFC) with block diagram. **6**
- OR iii. Explain the working principle of interline power flow controller (IPFC). **6**

[3]

- Q.6 Attempt any two:
- i. Explain the working of Thyristor controlled series capacitor (TCSC). **5**
- ii. Explain the principle of operation of switching type series compensators (SSSC). **5**
- iii. Explain the Thyristor controlled phase angle regulator. **5**

\*\*\*\*\*

# Scheme of Marking



Faculty of Engineering	
End Sem (Even) Examination May-2022	
Reactive Power & Voltage Control EE5CP06	
Programme: M.Tech.	Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	Reactive power of the bus	1
	ii)	Either constant voltage or unity pf	1
	iii)	Reactance	1
	iv)	Reactive power	1
	v)	All of the above	1
	vi)	All the options are correct	1
	vii)	Both	1
	viii)	Reduce the power factor	1
	ix)	Firing angle ( $\alpha$ ) closer to $180^\circ$	1
	x)	Series compensation device	1
Q.2	i.	Load compensation method 4 explanation	2
	ii.	reactive power definition (1) compensation (2)	3
	iii.	reasons (2) methods (3)	5
OR	iv.	unity P.f (1) lag P.f (1) lead P.f (1) explanation (3)	5
Q.3	i.	working principle of SSC (2)	2
	ii.	necessity (5) types and explanation (3)	8
OR	iii.	working (4) advantages (4)	8
Q.4	i.	definition (1) explanation (2)	3
	ii.	factors (4) limitations (3)	7
OR	iii.	harmonics explanation (4) different types (3)	7
Q.5	i.	UPFC explanation (2) differences (2)	4

	ii.	Block diagram (2) explanation (4)	6
OR	iii.	block diagram (2) working principle (4)	6
Q.6			
	i.	circuit diagram (2) explanation (3)	5
	ii.	circuit diagram (2) explanation (3)	5
	iii.	circuit diagram (2) explanation (3)	5