R20 Regulation *Subject code:3E7BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B. Tech VII Semester Regular/Supplementary Examinations, December 2024

FLEXIBLE AC TRANSMISSION SYSTEMS
(EEE)

Maximum Marks: 70 Date:30.12.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

	All the following questions carry equal marks (10X2M=20 Marks)	**CO**	**Bloom Tx**
1	State Two economic benefits of using FACTS controllers.	1	BL-1
2	How do FACTS devices contribute to renewable energy integration?	1	BL-1
3	What is power oscillation damping, and why is it needed?	2	BL-1
4	How do hybrid VAR generators combine the benefits of variable impedance and switching converters?	2	BL-2
5	Which device, SVC or STATCOM, offers faster response time, and why?	3	BL-1
6	How does SVC improve voltage stability in a power system?	3	BL-1
7	What is the function of GTO thyristor in a GSC?	4	BL-1BL-1
8	Define the term series voltage injection as applied to SSSC.	4	BL-2
9	List the components of a UPFC.	5	BL-1
10	How is the voltage stability index affected by IPFC?	5	BL-2

Part-B

	Answer All the following questions. **(5X10M=50Marks)**	**CO**	**Bloom Tx**
11	A. Explain the dynamic stability considerations of an interconnected transmission system. [5M] B. List and discuss different types of FACTS controllers. Give examples for each type and mention their applications. [5M]	1	BL-3
	OR		
12	A. Explain the Single phase full-wave bridge converter with necessary waveforms. [6M] B. Enumerate the relative merits and demerits of current source converters over voltage source converters. [4M]	1	BL-3
13	A. Explain midpoint voltage regulation for line segmentation using shunt compensation. [5M] B. Discuss the improvement of voltage stability using shunt compensation. [5M]	2	BL-3

	OR		
14	Explain how equal area criterion helps to evaluate effectiveness of shunt compensation and other flow control techniques on transient stability improvement [10M]	2	BL-3
15	A. Explain the STATCOM with smart grids. [5M] B. Explain with a neat block diagram general control scheme of Static Var Compensator (SVC TSC-TCR). [5M]	3	BL-3 BL-3
	OR		
16	Write a comparison between STATCOM and SVC in the following [10M] (i) V-I characteristics (ii) transient stability.	3	BL-3
17	A. Enumerate the basic operating control schemes of TSSC and TCSC. [5M] B. Discuss the effect of series capacitive compensation on transmission lines. [5M]	4	BL-4
	OR		
18	Explain the basic circuit arrangement and working of Static Synchronous series compensator (SSSC). [10M]	4	BL-3
19	A. Discuss the features of UPFC. [5M] B. Describe the mathematical representation of IPFC and how it manages reactive power flow across multiple transmission lines. [5M]	5	BL-3
	OR		
20	Explain the modeling of UPFC, focusing on its series and shunt components. [10M]	5	BL-3