



APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : PE0821242A-I

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Name:

Reg. No:

SECOND SEMESTER M.TECH. DEGREE EXAMINATION JULY 2021

Branch: Electrical and Electronics Engineering

Specialization: Power Electronics

08EE6242(A) FACTS AND CUSTOM POWER DEVICES

(Common to PE)

Time: 2 hour 15 minutes

Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1.a	How reactive power is controlled in an electrical network?	3
	Answer b or c	
b	Analyse the transmission interconnection power flow in AC system. How power flow is controlled using FACTS controllers?	6
c	A three phase inverter working in sine PWM mode has input voltage of 450V, amplitude modulation index of 0.85 and frequency modulation index of 15. If the carrier frequency of sine PWM is 1.5 kHz, Calculate	6
	(i) RMS value (line-line) of fundamental output voltage	
	(ii) Frequency of fundamental output voltage	
	(iii) Peak value (line-line) of fundamental output voltage if the inverter moves to square wave operation.	
Q. No.	Module 2	Marks
2.a	Compare flying capacitor and cascaded multilevel inverters.	3
	Answer b or c	
b	Analyse the working of three level diode clamped multilevel inverter. Explain the switching pulse generation using sine PWM	6
c	Explain current control techniques used in multilevel inverters.	6

Q. No.	Module 3	Marks
3.a	Explain the internal converter control of STATCOM.	3
Answer b or c		
b	Analyse the potential effectiveness of shunt compensators on transient stability improvement.	6
c	(i) With relevant waveforms, explain the working of thyristor controlled reactor (TCR).	4
	(ii) Compare thyristor controlled reactor (TCR) and thyristor switched reactor (TSR)	2

Q. No.	Module 4	Marks
4.a	How series compensation increases the voltage stability limit effectively?	3
Answer b or c		
b	(i) Analyse the working of static synchronous series compensator (SSSC).	4
	(ii) Compare SSSC and TCSC.	2
c	How power flow control is achieved using phase angle regulators? Explain with power vs. angle characteristics.	6

Q. No.	Module 5	Marks
5.a	Enumerate the features of IPFC.	4
Answer b or c		
b	Illustrate the transmission control capabilities of UPFC. Draw the phasor diagrams for the transmission control capabilities of UPFC.	8
c	Justify the superiority of the UPFC over a phase angle regulator in case of a two machine system.	8

Q. No.	Module 6	Marks
6.a	List out the applications of DVR.	4
Answer b or c		
b	With the help of neat diagram, explain the operation of D-STATCOM	8
c	Explain the operation of UPQC with neat sketches.	8