Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EE3EP01 / EX3EP01 Advanced Power Electronics

Programme: B.Tech. Branch/Specialisation: EE/EX

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Q.1 i. In a flyback converter, the inductor of the buck-boost converter has been replaced by a **1**

(a) Flyback capacitor (b) Flyback resistor

(c) Flyback transformer (d) Flyback transistor

ii. The average value of the output voltage in a step - down dc chopper is given by. **1**

(a) $V_0 = V_s$ (b) $V_0 = D V_s$

(c) $V_0 = V_s / D$ (d) $V_0 = V_s / (1 - D)$

iii. In a series resonant inverter **1**

(a) The load current has square waveform

(b) Trigger frequency is higher than damped resonant frequency

(c) Change of frequency does not alter transferred power

(d) Output voltage depends upon damping factor of the load

iv. In resonant pulse inverters **1**

(a) DC output voltage veriation is wide

(b) Frequency is low

(c) Output voltage is never sinusoidal

(d) DC saturation of transformer core is minimised

v. Increasing the number of pulses (N), _____ **1**

(a) Reduces the output voltage amplitude

(b) Reduces the inverter efficiency

(c) Improves the inverter efficiency

(d) None of these

P.T.O.

vi. Single phase VSI are mainly used in **1**
(a) Power supplies (b) Ups
(c) Multilevel configuration (d) All of these

vii. If an ac chopper is feeding an inductive load, the firing pulse to the SCR **1**
(a) May have a width equal to turn ON time of the SCR
(b) Should be a series of pulses of short duration
(c) Should be a single pulse of long duration
(d) Should be train of pulses of duration equal to the conduction period of the SCR.

viii. The AC voltage controllers are used in _____ applications. **1**
(a) Power generation (b) Electric heating
(c) Conveyor belt motion (d) Power transmission

ix. FACT devices generally used to for compensate of transmission line **1**
(a) Reactance (b) Conductance
(c) Resistance (d) Admittance

x. Combination of STATCOM and SSSC will make. **1**
(a) UPQC (b) TCSC (c) UPFC (d) SVR

Q.2 i. Describe the different scheme of switching regulator and their advantage. **4**

ii. Explain the operation of full bridge configurations of flyback converter with circuit diagram & waveform. **6**

OR iii. Explain the operation of push-pull converter with circuit diagram & waveform. **6**

Q.3 i. Explain the need of resonant converters. **4**

ii. Describe the ZVS resonant converter with relevent circuit and waveform. **6**

OR iii. Describe the Zero Current Switching (ZCS) Resonant Converters with relevent circuit and waveform. **6**

Q.4 i. What is multi-level inverters. what is its application. **3**

ii. Explain principle of the diode clamped multilevel inverter with circuit diagram. Also give advantage and disadvantage. **7**

OR iii. Explain principle of the flying capacitors multilevel inverter. Also give advantage and disadvantage. **7**

Q.5 i. Give the advantages of ac chopper over ac voltage controller. **4**

ii. Explain full wave ac phase controller for R-L load with relevent circuit and waveform. **6**

OR iii. Describe the harmonic elimination in PWM ac chopper. **6**

Q.6 Attempt any two:

i. What is the FACT controllers. How the reactive power controlled using it. List the generation of facts controllers with their application. **5**

ii. Describe the STATCOM configuration, operating principle and application. **5**

iii. Describe the SSSC configuration, operating principle and application. **5**

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Marking Scheme

EE3EP01 / EX3EP01 Advanced Power Electronics

Q.1	i.	In a flyback converter, the inductor of the buck-boost converter has been replaced by a (c) Flyback transformer		**1**
	ii.	The average value of the output voltage in a step - down dc chopper is given by. (b) $V_0 = D V s$		**1**
	iii.	In a series resonant inverter (d) Output voltage depends upon damping factor of the load		**1**
	iv.	In resonant pulse inverters (d) DC saturation of transformer core is minimised		**1**
	v.	Increasing the number of pulses (N), _____ (b) Reduces the inverter efficiency		**1**
	vi.	Single phase VSI are mainly used in (d) All of these		**1**
	vii.	If an ac chopper is feeding an inductive load, the firing pulse to the SCR (d) Should be train of pulses of duration equal to the conduction period of the SCR.		**1**
	viii.	The AC voltage controllers are used in _____ applications. (b) Electric heating		**1**
	ix.	FACT devices generally used to for compensate of transmission line (a) Reactance		**1**
	x.	Combination of STATCOM and SSSC will make. (c) UPFC		**1**
Q.2	i.	Advantage switching regulator 1 mark for each	(1 mark *4)	**4**
	ii.	Operation of full bridge configurations of flyback converter		**6**
		Explanation	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks	
OR	iii.	Operation of push-pull converter.		**6**
		Explanation	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks	
Q.3	i.	Need of resonant converters.		**4**
		Description	2 marks	
		Advantages	2 marks	
	ii.	ZVS resonant converter		**6**
		Description	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks.	
OR	iii.	Zero Current Switching (ZCS) Resonant Converters		**6**
		Description	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks	
Q.4	i.	Multi-level inverters	2 marks	**3**
		Its application	1 mark	
	ii.	Principle of the diode clamped multilevel inverter	2.5 marks	**7**
		Circuit diagram	2.5 marks	
		Advantage and disadvantage	2 marks	
OR	iii.	Principle of the flying capacitors multilevel inverter	2.5 marks	**7**
		Circuit diagram	2.5 marks	
		Advantage and disadvantage	2 marks	
Q.5	i.	Advantages of ac chopper over ac voltage controller. 1 mark for each point	(1 mark *4)	**4**
	ii.	Full wave ac phase controller for R-L load		**6**
		Explanation	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks	
OR	iii.	Harmonic elimination in PWM ac chopper.		**6**
		Explanation	2 marks	
		Waveform	2 marks	
		Circuit diagram	2 marks	
Q.6		Attempt any two:		
	i.	Definition of FACT controllers	1 mark	**5**
		Power controlling	2 marks	
		Generation of facts controllers with their application	2 marks	
	ii.	STATCOM configuration	2 marks	**5**
		Operating principle	2 marks	
		Application	1 mark	
	iii.	SSSC configuration	2 marks	**5**
		Operating principle	2 marks	
		Application	1 mark	

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