

Reg.No. _____

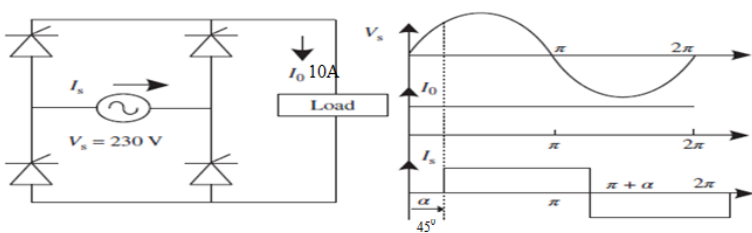
**Karunya UNIVERSITY**(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)**End Semester Examination – Nov/Dec – 2016**

Code : 14EE2033
Sub. Name : Harmonics & Power Quality

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Classify and illustrate the typical power quality phenomena defined in IEEE 1159.	CO2/ CO1	10
	b.	Draw the CBEMA & ITI curve and explain about events described in the curves.	CO2	10
(OR)				
2.	a.	Examine the source and effects of different categories of short duration voltage Variations.	CO2	10
	b.	Give outlines on IEEE and IEC power quality standards.	CO3	10
3.	a.	In a three-phase system, the load voltage consists of $V_a = 0.9 \sin \omega t$, $V_b = 0.8 \sin(\omega t - 120)$, $V_c = 0.7 \sin(\omega t + 120)$. Calculate the following quantity with a sag period of 10ms, 20ms, 30ms with respect to ABC phases. a) Detroit Edison Sag Score (SS) b) Voltage sag Energy c) Voltage sag lost energy index (VSLEI)	CO2/ CO1	08
	b.	Explain the different types of sag with a relevant vector diagram with proper equations.	CO2/CO 3	12
(OR)				
4.	a.	Explain the following causes of sags. a) Voltage sag due to motor sag b) Voltage sag due to single line to ground fault. c) Voltage sag due to transformer energizing.	CO2/CO 3	20
5.	a.	Give outlines on sources of over voltage due to the following phenomenon a) Capacitor switching b) Lightning	CO2/CO 3	20
(OR)				
6.	a.	What is the need for protection against over voltages? What are the basic principles of over voltages protection of load equipments?	CO2/CO 1	20
7.	a.	The converter circuit is shown the below fig. Calculate the following quantities (a) THD of AC mains current (b) DIN (c) TDD of AC mains current (d) DF (e) DPF (f) PF	CO2/ CO3	12

		 <p>Single-phase converter-based current-fed type of a nonlinear load</p>		
	b.	Discriminate between linear and non linear load	CO2	08
(OR)				
8.	a.	Explain in detail about general procedure for harmonic distortion evaluation at the point of coupling, utility systems, customer facility and industrial facility	CO2/ CO3	20
		<u>Compulsory:</u>		
9.	a.	Illustrate the principle of DVR operation used for sag mitigation	CO2/CO 1	10
	b.	Discuss the construction and working principle of active filters for harmonic mitigation.	CO2/CO 1	10

ALL THE BEST