EE/SG/10042019/T3

Name:.....
Roll No:.....

DEPARTMENT OF ELECTRCAL ENGINEERING
National Institute of Technology Calicut

TEST 3 **WINTER SEMESTER APRIL 2019**

EE6302D ADVANCED POWER ELECTRONIC CIRCUITS

Time: Three Hours Total Marks: 50

Answer all questions

I. A 3 phase motor load requires input currents of i_a=10 sin (100πt), i_b=10 sin (100πt-2π/3) and i_c=10 sin (100πt-4π/3) from a 20A current source. Draw the circuit diagram and indicate all possible states of the inverter. Draw the vector diagram and show the reference phasor at 2ms. Calculate the dwell times. Derive the expressions used. What are the conditions to be satisfied for the PWM control of current source inverters? (8marks)

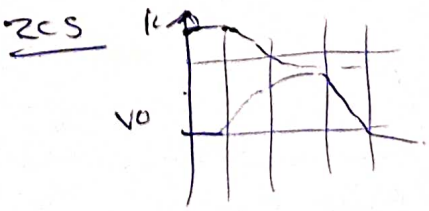
II. A seven level CHBMLI topology is obtained from two voltage sources/phase. Find the ratio of the voltages of the two sources. Draw the circuit diagram, output voltage waveform and the switching table. (5marks)

III. Draw the schematic diagram of a single phase 3 level capacitor clamped MLI feeding an R-L load. Draw the output voltage and current waveforms. Indicate the devices conducting in a cycle. (5marks)

IV. For an ideal Type A chopper, input voltage is 220V, chopping frequency is 500Hz, duty cycle is 0.3, R=1Ω, L= 3mH and E_b =23V. Check whether the load current is continuous or not. Find average output current, maximum and minimum values of steady state output current, average value of source current, input power and power lost in the resistor. Derive the expressions used. (8marks)

V. A single phase induction motor is fed through a SPWM controlled full bridge converter. Explain, how power flow can be controlled during regenerative mode of the system. (7marks)

VI. In a ZCS resonant-switch buck converter, the output filter inductor is quite large and all components are ideal. Calculate i_{Lr} and V_{cr} waveforms as a function of time. Sketch the



waveforms for V_{cr}, i_{Lr}, i_L V_D, V_L and explain the important transition periods. Obtain the peak current rating of each device. (10 marks)

VII. What is the reason for low power quality in utility systems?. Explain the basic scheme of a single phase power factor correction scheme. (7marks)

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