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**B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019**

Fifth Semester

**EE16503 – POWER ELECTRONICS***(Electrical and Electronics Engineering)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

	<b>CO</b>	<b>RBT</b>
1. Why IGBT is becoming popular in their application to controlled converters?	<b>1</b>	<b>U</b>
2. Differentiate Natural Commutation and Forced Commutation	<b>1</b>	<b>U</b>
3. Define overlap angle.	<b>2</b>	<b>R</b>
4. Justify, how the power factor of semiconverter is better than full converter?	<b>2</b>	<b>U</b>
5. Define current limit control in DC - DC converter.	<b>3</b>	<b>R</b>
6. Give the use of resonant switching.	<b>2</b>	<b>R</b>
7. Compare CSI and VSI.	<b>4</b>	<b>R</b>
8. List out the applications of Multilevel Inverter.	<b>3</b>	<b>U</b>
9. What are the disadvantages of continuous gating signal?	<b>3</b>	<b>R</b>
10. Enumerate some of the industrial applications of a cycloconverter.	<b>4</b>	<b>R</b>

**PART B - (5 X16 = 80 Marks)**

11. (a) Describe about any one driver circuit and snubber circuit for MOSFET. **(16)** **1** **U**
- (OR)**
- (b) (i) Discuss different modes of operation of thyristor with the help of its static V-I characteristics. **(8)** **1** **U**
- (ii) Explain why TRIAC is rarely operated in I quadrant with –ve gate current and in III quadrant with +ve gate current. **(8)** **1** **U**
12. (a) Describe the operation of single phase controlled rectifier which can be operated in Rectification and Inversion Mode. Derive the expressions for average and RMS voltage. **(16)** **2** **AP**

**(OR)**

- (b) Describe the operation of three phase six pulse bridge converter with relevant waveforms for R load ( $\alpha=30^\circ$ ). Derive the expressions for average and RMS voltage. **(16) 2 AP**
13. (a) Draw the power circuit diagram and describe the working of a BUCK converter with relevant waveforms. Also obtain the expressions for critical inductance, critical capacitance, inductor ripple current and capacitor ripple voltage. **(16) 2 AP**
- (OR)**
- (b) A step up chopper has input voltage of 220V and output voltage of 660V. If the non-conducting time of thyristor chopper is 100 microseconds, compute the pulse width of output voltage. In case the pulse width is halved for constant frequency operation. Find the new output voltage. Derive the expressions used in the above problem with necessary waveform. **(16) 2 AP**
14. (a) Discuss the principle of working of a three phase bridge inverter with an appropriate circuit diagram. Draw the output phase and line voltage waveforms on the assumption that each thyristor conducts for  $120^\circ$  and resistive load is star connected. The sequence of firing of various SCR should also be indicated. **(16) 3 AP**
- (OR)**
- (b) (i) List the various types of PWM methods employed in an inverter, briefly discuss about any two types. **(8) 3 U**
- (ii) With a neat circuit diagram and relevant waveforms, discuss the operation of an ideal single phase CSI. **(8) 3 AP**
15. (a) Describe the basic principle of working of single phase to single phase step down cycloconverter for a bridge type converter. Assume both discontinuous and continuous conduction and draw the load current and load voltage waveforms for both the cases. Mark the conduction of various thyristors. **(16) 4 U**
- (OR)**
- (b) With necessary circuit and waveforms, explain the principle of operation of single phase ac voltage controller feeding R load by on-off control and phase control. Derive the expression for rms value of output voltage in both cases. **(16) 4 U**