Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17EE2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **POWER ELECTRONICS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Elucidate the reverse recovery characteristics of a power diode with neat diagram. | CO1 | 10 |
| b. | With neat diagrams describe the switching characteristics of IGBT. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Explain the static and switching characteristics of thyristor in detail with neat diagrams. | CO1 | 15 |
| b. | Indicate the uses of snupper circuit in the thyristor circuit. | CO1 | 5 |
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| 3. | a. | Explain the operation of a single phase fully controlled full bridge converter with RL load in rectification mode with neat diagram and waveforms. | CO2 | 10 |
| b. | A single phase fully controlled full bridge converter is supplied by 230V, 50Hz. It is connected with RL Load.  i) Determine the average and rms output voltage if the firing angle  is 60°.  ii) Calculate the firing angle for which the average output voltage  of the converter is 100V. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Draw the circuit diagram and waveforms of three phase half wave controlled rectifier with R load. | CO2 | 6 |
| b. | With a neat circuit diagram, explain any one type of firing circuit used for fully controlled rectifier. | CO2 | 10 |
|  | c. | Compare single phase semi converter and full converter. | CO2 | 4 |
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| 5. | a. | Discuss the working of the single phase ac to ac full wave voltage controller with R Load, with necessary circuit, equations and waveforms. | CO3 | 15 |
| b. | A single phase full wave ac voltage controller has a resistive load of R=10 Ω and the input voltage is Vs=120V (rms), 60Hz. The delay angles of thyristors T1 and T2 are equal. α1=α2= α=900. Determine the rms output voltage and the input power factor. | CO3 | 5 |
| **(OR)** | | | | |
| 6. | a. | With relevant circuit diagram and waveforms, explain the operation of the step down chopper with R load and derive the expression for the average value of the load voltage, load currents. | CO3 | 12 |
| b. | A step down chopper has Vdc = 100 V, R = 10Ω. If the duty cycle is 0.4, calculate the average voltage Vavg, rms voltage Vrms, average current Iavg and output power Po | CO3 | 8 |
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| 7. |  | With relevant circuit diagram and waveforms, explain the operation of three phase bridge inverter in 180° mode conduction. Derive the expression for the RMS value of phase voltage and line voltage. | CO6 | 20 |
| **(OR)** | | | | |
| 8. | a. | With relevant circuit diagram and waveforms, explain the operation of single phase full bridge inverter. Derive the expression for the RMS value of phase voltage. | CO4 | 10 |
| b. | Compare voltage source inverter with current source inverter. |  | 4 |
| c. | The single phase full bridge inverter has a resistive load R=2.4Ω. The dc input voltage is Vs=48V. Determine the rms output voltage at fundamental frequency and the output power. | CO4 | 6 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss the working of HVDC systems with relevant circuit diagram. | CO6 | 10 |
| b. | With relevant circuit diagram and waveforms, explain the operation of multilevel inverter. | CO6 | 10 |