**20EE504**

**Hall Ticket Number:**

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| **III/IV B.Tech (Supplementary) DEGREE EXAMINATION** | | | |
| **July/August,2023** | **Electrical & Electronics Engineering** | | |
| **Fifth Semester** | **Power Electronics** | | |
| **Time:** Three Hours | | **Maximum: 7**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X14=56 Marks) |

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| 1. | a) | Draw the turn – ON characteristics of SCR | CO1 | L1 | 1M |
|  | b) | |  | | --- | | Define Latching current in SCR | | CO1 | L1 | 1M |
|  | c) | Explain the effect of source inductance in fully controlled bridge rectifier with  continuous conduction. | CO1 | L1 | 1M |
|  | d) | Draw the circuit diagram of a 1-phase full wave controlled rectifier. | CO2 | L1 | 1M |
|  | e) | Define commutation Process in SCR. | CO2 | L1 | 1M |
|  | f) | * What are the different turn on methods of SCR? | CO2 | L1 | 1M |
|  | g) | * What is snubber circuit? | CO3 | L1 | 1M |
|  | h) | * Define is firing angle? | CO3 | L1 | 1M |
|  | i) | **What are the applications of SCR?** | CO3 | L1 | 1M |
|  | j) | Define Modulation index | CO3 | L1 | 1M |
|  | k) | What is the function of Buck converter? | CO4 | L1 | 1M |
|  | l) | Define duty cycle. | CO4 | L1 | 1M |
|  | m) | What is inverter and its types? | CO4 | L1 | 1M |
|  | n) | What is the principle of operation of Inverter? | CO4 | L1 | 1M |
| **Unit -I** | | | | | |
| 2. | a) | Explain briefly about the working principle of SCR with the help of its V-I Characteristics. | CO1 | L2 | 7M |
|  | b) | Explain in details about the SCR commutation Process. | CO1 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 3. | a) | Describe the switching characteristics of power MOSFET and IGBT and compare them? | CO1 | L2 | 7M |
|  | b) | What is snubber circuit and explain about the designing of snubber circuit ? | CO1 | L1 | 7M |
|  |  | **Unit -II** |  |  |  |
| 4. | a) | Explain the operation of single phase full-wave controlled rectifier with R load. Draw the waveforms of output voltage, voltage across SCR and derive average load current. | CO2 | L3 | 7M |
|  | b) | A single phase half controlled bridge converter is connected to R load with R = 30 Ω. The converter is supplied from 230 V, 50 Hz ac supply. (i) Determine average voltage and average load current; (ii) Determine RMS voltage. | CO2 | L3 | 7M |
|  |  | **(OR)** |  |  |  |
| 5. |  | Explain the effect of source inductance in single-phase full wave controlled bridge rectifier for RL- load with neat waveforms and also deduce the expression | CO2 | L3 | 14M |
|  |  | **Unit -III** | |  |  |
| 6. | a) | Explain the working of a 1-phase full bridge Inverter with RL load. Draw the relevant output waveforms | CO3 | L2 | 7M |
|  | b) | Explain in detail about the operation of 3-phase full bridge Inverter with RL load. Draw the relevant output waveforms. | CO3 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 7. | a) | Explain in detail about the operation of single phase multiple pulse width modulation technique with a neat sketch. | CO3 | L2 | 7M |
|  | b) | Explain in detail about the operation of single phase sinusoidal pulse width modulation technique with a neat sketch. | CO3 | L2 | 7M |
|  |  | **Unit -IV** |  |  |  |
| 8. | a) | Explain the principle of operation of Buck-Boost converter with a neat sketch and Deduce an expression for load voltage and current. | CO4 | L2 | 7M |
|  | b) | If a chopper circuit is operating at a frequency of 4 kHz on a 440 V, DC Supply system. If the load voltage is 260 V, then compute **(i)** conduction period **(ii)** Blocking period **(iii)** Duty cycle | CO4 | L3 | 7M |
|  |  | **(OR)** |  |  |  |
| 9. | a) | Describe working of 3-Phase AC-AC regulators with R load only and draw the  relevant waveforms. | CO4 | L2 | 7M |
|  | b) | A single phase full –wave ac voltage controller is connected with a load of *R* = 10 Ω with an input voltage of 230 V, 50 Hz. When the firing angle of Thyristoris 45o,determine i) power output at load, ii) average value of Thyristor current and iii) RMS value of Thyristor current. | CO4 | L3 | 7M |

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