

Program: BE Electrical Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester V

**Course Code: EEC504 and Course Name: POWER ELECTRONICS**

Time: 1 hour

Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

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|-----------|---|
| Q1.       | For a step-up/step-down chopper, if the duty cycle $> 0.5$ then   |
| Option A: | $V_o = V_s$   |
| Option B: | $V_o < V_s$   |
| Option C: | $V_o > V_s$   |
| Option D: | $(V_o + V_s) = D$   |
| Q2.       | Calculate the output voltage of the Boost converter if the supply voltage is 156 V and duty cycle value is 0.4. |
| Option A: | 260 V   |
| Option B: | 264 V   |
| Option C: | 261 V   |
| Option D: | 268 V   |
| Q3.       | What is the formula for output voltage for Buck-Boost converter?  |
| Option A: | $D \times V_{in}$   |
| Option B: | $V_{in} / (1-D)$  |
| Option C: | $(D \times V_{in}) / (1-D)$   |
| Option D: | $(D \times V_{in}) / (1+D)$   |
| Q4.       | The ripple component of the inductor current is _____ than the average component in CCM mode of Chopper.        |
| Option A: | Higher  |
| Option B: | Lower   |
| Option C: | Equal   |
| Option D: | Less than Unity   |
| Q5.       | The voltage in a single phase half wave inverter varies between   |
| Option A: | $V_s$ and 0   |
| Option B: | $V_s/2$ and 0   |
| Option C: | $V_s/2$ and $-V_s/2$  |
| Option D: | $V_s$ and $-V_s$  |
| Q6.       | VSI's using GTOs are turned off by  |
| Option A: | Load commutation  |
| Option B: | Line commutation  |

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| Option C: | Applying a negative gate pulse   |
| Option D: | removing the base signal   |
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| Q7.       | In pulse width modulation  |
| Option A: | The output voltage is modulated  |
| Option B: | The input voltage is modulated   |
| Option C: | The gating pulses are modulated  |
| Option D: | The output voltage is not modulated  |
|           |  |
| Q8.       | In voltage source inverters (VSIs), the output currents _____                        |
| Option A: | Amplitude depends upon the load impedance  |
| Option B: | Waveform depends upon the load impedance   |
| Option C: | Amplitude as well as the nature of the waveform depends on the load                  |
| Option D: | Both amplitude and waveform are independent of the load impedance                    |
|           |  |
| Q9.       | In a 3-phase VSI operating in square-wave mode, the output line voltage is free from |
| Option A: | 3rd harmonic   |
| Option B: | 7th harmonic   |
| Option C: | 11th harmonic  |
| Option D: | 13th harmonic  |
|           |  |
| Q10.      | A three-phase bridge inverter requires minimum of _____ switching devices.           |
| Option A: | 03   |
| Option B: | 04   |
| Option C: | 06   |
| Option D: | 08   |
|           |  |
| Q11.      | Force-commutated CSIs need   |
| Option A: | Capacitors for their commutation   |
| Option B: | Inductors for their commutation  |
| Option C: | Diodes for their commutation   |
| Option D: | Resistors for their commutation  |
|           |  |
| Q12.      | Constant ripple free output current can be achieved in                               |
| Option A: | Converters with R load   |
| Option B: | Converters with RL load  |
| Option C: | Inverters with R load  |
| Option D: | Inverters with RL load   |
|           |  |
| Q13.      | In case of $3\phi$ converters, no thyristor can be fired before                      |
| Option A: | $30^\circ$   |
| Option B: | $60^\circ$   |
| Option C: | $45^\circ$   |
| Option D: | $90^\circ$   |
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| Q14.      | For a single phase half-wave thyristor circuit with R load, the power delivered to   |

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|           | the resistive load is  |
| Option A: | (Average load voltage) x (average load current)  |
| Option B: | (rms supply voltage)*2/R   |
| Option C: | (rms load voltage)*2/R   |
| Option D: | (average load voltage)/R   |
|           |  |
| Q15.      | For a three-phase full controlled converter with R load, the average value of output voltage is zero for |
| Option A: | $\alpha = 0^\circ$   |
| Option B: | $\alpha = 90^\circ$  |
| Option C: | $\alpha = 180^\circ$   |
| Option D: | It can never be zero   |
|           |  |
| Q16.      | If the gate voltage of an SCR is removed, then the   |
| Option A: | Anode current decreases  |
| Option B: | Anode current does not decrease at all   |
| Option C: | Anode current increases  |
| Option D: | Cathode current increases  |
|           |  |
| Q17.      | Which terminal does not belong to the SCR  |
| Option A: | Anode  |
| Option B: | Gate   |
| Option C: | Base   |
| Option D: | Cathode  |
|           |  |
| Q18.      | Among the following, the most suitable method to turn on the SCR device is the                           |
| Option A: | gate triggering method   |
| Option B: | dv/dt triggering method  |
| Option C: | forward voltage triggering method  |
| Option D: | temperature triggering method  |
|           |  |
| Q19.      | The DIAC can be represented by   |
| Option A: | Two SCRs in anti-parallel  |
| Option B: | Two SCRs in parallel   |
| Option C: | Two diodes in anti-parallel  |
| Option D: | Two diodes in parallel   |
|           |  |
| Q20.      | AC voltage controllers convert   |
| Option A: | Fixed ac to fixed dc   |
| Option B: | Variable ac to variable dc   |
| Option C: | Fixed ac to variable ac  |
| Option D: | Fixed ac to variable ac  |
|           |  |
| Q21.      | In case of an ideal power diode, the leakage current flows from  |
| Option A: | Anode to cathode   |
| Option B: | Cathode to anode   |
| Option C: | In both the directions   |
| Option D: | Leakage current does not flow  |

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| Q22.      | A power transistor is a _____ device.   |
| Option A: | Two terminal, bipolar, voltage controlled   |
| Option B: | Two terminal, unipolar, current controlled  |
| Option C: | Three terminal, unipolar, voltage controlled  |
| Option D: | Three terminal, bipolar, current controlled   |
|           |   |
| Q23.      | A latched up IGBT can be turned off by  |
| Option A: | Forced commutation of current   |
| Option B: | Forced commutation of voltage   |
| Option C: | Use of a snubber circuit  |
| Option D: | No external commutation circuit required  |
|           |   |
| Q24.      | Choose the correct statement  |
| Option A: | IGBTs have higher switching losses as compared to BJTs  |
| Option B: | IGBTs have secondary breakdown problems   |
| Option C: | IGBTs have lower gate drive requirements  |
| Option D: | IGBTs are current controlled devices  |
|           |   |
| Q25.      | For a step-down chopper, find the rms value of output voltage. Let $\alpha$ be the duty cycle and $V_s$ be the input voltage. |
| Option A: | $\alpha \times V_s$   |
| Option B: | $V_s/\alpha$  |
| Option C: | $\sqrt{\alpha} \times V_s$  |
| Option D: | $V_s/2$   |

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| <b>Question</b> | <b>Correct Option<br/>(Enter either 'A' or 'B'<br/>or 'C' or 'D')</b> |
|-----------------|---|
| Q1.             | C   |
| Q2.             | A   |
| Q3.             | C   |
| Q4              | B   |
| Q5              | C   |
| Q6              | C   |
| Q7              | C   |
| Q8.             | C   |
| Q9.             | A   |
| Q10.            | C   |
| Q11.            | A   |
| Q12.            | B   |
| Q13.            | A   |
| Q14.            | C   |
| Q15.            | B   |
| Q16.            | B   |

|      |   |
|------|---|
| Q17. | C |
| Q18. | A |
| Q19. | C |
| Q20. | C |
| Q21. | D |
| Q22. | D |
| Q23. | A |
| Q24. | C |
| Q25. | C |