Reg. No. : | | | | | | | | | | |

Question Paper Code: 45604

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Instrumentation and Control Engineering

14UIC504 - POWER ELECTRONICS AND APPLICATIONS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Among the following power devices, which one is a voltage controlled device and used for high frequency switching.

   (a) BJI (b) IGBT (c) SCR (d) MOSFET

2. _____ is not available in high voltage and high current ratings.

   (a) TRIAC (b) DIAC (c) SCR (d) MOSFET

3. Reactive loading of supply lines by a converter is directly dependent on

   (a) Displacement angle only (b) Displacement angle and distortion factor
   (c) Back emf in the load circuit (d) Circuit configuration

4. The purpose of inductor in a BOOST converter is

   (a) Filtering (b) Charge storing
   (c) Noise reduction (d) Reduction of ripple voltage

5. Average output voltage for step down chopper with input voltage Vs=150V with duty cycle as 60% is Vo=

   (a) 90V (b) 200V (c) 85V (d) 110V

6. _____ type of switching resonant converters is used for high switching frequencies.

   (a) ZCS (b) ZVS (c) Both (d) ZCS or ZVS

7. The load current waveform of single phase inverter feeding pure inductive load is

(a) sinusoidal (b) rectangular (c) trapezoidal (d) triangular

8. _____ number of thyristors conducting simultaneously in 180 degree mode of operation of three phase inverter.

(a) 1 (b) 2 (c) 3 (d) 4

9. _____ is used for speed control of high power ac drives.

(a) Chopper (b) Inverters
(c) Cycloconverters (d) Voltage controllers

10. The inverter of _____ mode would experience a direct short circuit through SCRs.

(a) 120° (b) 240° (c) 180° (d) none of these

PART - B (5 x 2 = 10 Marks)

11. Comment on forced commutation.

12. Define phase angle control.

13. List the control strategies used for the control of chopper.

14. Define total harmonic distortion.

15. List the application of cycloconverters

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Draw and explain the basic structure and equivalent circuit of IGBT. (8)

(ii) Describe the principle of operation of TRIAC. (8)

Or

(b) Describe the working of an IGBT. How does latch – up occur in an IGBT. (16)

17. (a) With neat diagram and waveform, explain the operation of a single-phase full wave rectifier with RL load. (16)

Or

(b) Explain the operation of dual converter with a neat circuit diagram. (16)

18. (a) Explain the current limit control and time ration control as applied to dc chopper. (16)

Or

(b) Describe the working principle of zero controlled switching converters. (16)

19. (a) With neat sketches describe the working of three-phase inverter using 120 degree mode. (16)

Or

(b) Discuss the working principle of current source inverter of single phase capacitor commutated inverter and auto sequential commutated inverter. (16)

20. (a) Explain the operation of three phase AC voltage controller with relevant waveform. (16)

Or

(b) Describe the matrix converter. (16)