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

Question Paper Code: 45604

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. _____diodes have relatively large reverse recovery times of the about 25μs.

   (a) General purpose (b) Fast recovery
   (c) Schottky (d) None of the above

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. A Converter which can operate in both 3-pulse and 6-pulse modes is a

   (a) 1-phase full converter (b) 3-phase half-wave converter
   (c) 3-phase semi converter (d) 3-phase full converter

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. A step – up chopper has V_s as the source voltage and α as the duty cycle. The output voltage for this chopper is given by

(a) Vs (1 + α) (b) Vs / (1 - α)
(c) Vs (1 - α) (d) Vs / (1 + α)

7. In Single-Pulse modulation of PWM inverters, third harmonic can be eliminated if pulse width is equal to

(a) 30^0 (b) 60^0 (c) 120^0 (d) 150^0

8. A Single phase CSI has capacitor C as the load. For a constant source current, the voltage across the capacitor is

(a) Square Wave (b) Triangular Wave
(c) Step Function (d) Pulsed Wave

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. What is meant by step-up and step-down chopper?

14. Define total harmonic distortion.

15. List the application of cycloconverters

PART - C (5 x 16 = 80 Marks)

16. (a) Explain the constructions and switches characteristics of power MOSFET. (16)

Or

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

17. (a) (i) List the classification of converters with circuit symbol. (8)

(ii) Elaborate the working principle of half wave rectifier with RL load. (8)

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) Discuss the principle of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for 180^0 and the resistive load is star connected. The sequence of firing of various SCRs should also be indicated in the diagram. (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) Describe the working of a multistage sequence control of voltage controllers. (16)

Or

(b) Describe the matrix converter. (16)

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