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

Question Paper Code : 51506

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electrical and Electronics Engineering

EE 2301/EE 51/10133 EE504/10144 EE 504 – POWER ELECTRONICS

(Common to Instrumentation and Control Engineering)

(Regulations 2008/2010)

(Common to PTEE 2301/10144 EE 504 – Power Electronics for B.E. (Part-Time) Fourth Semester – Electrical and Electronics Engineering – Regulations 2009/2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. How Triac differs from SCR ?

2. What are the factors associated with switching loss ?

3. Define Harmonic factor.

4. How controlled rectifiers are used in battery charger application ?

5. What is the function of step-up chopper ?

6. What is meant by SMPS ? Mention its applications.

7. What are the advantages of space vector modulation over sinusoidal PWM ?

8. State the need for reduction of harmonics in inventers.

9. Draw the power circuit for single phase AC voltage controller using Triac.

10. What is matrix converter ?

PART – B (5 × 16 = 80 Marks)

11. (a) Explain the switching characteristics of IGBT. How it differs from MOSFET ? Also state the relation with switching loss and switching frequency. **(16)**

OR

(b) Explain the basic structure, V-I characteristics and applications of any two power semiconductor devices in thyristor family. **(16)**

12. (a) Derive the expressions for performance parameters associated with input current of single phase fully controlled converter. **(16)**

OR

(b) Draw the basic block diagram of a dual converter operating in circulating current mode and describe the operation with relevant waveforms. **(16)**

13. (a) Explain the different control strategies used for chopper. Compare its advantages and disadvantages. **(16)**

OR

(b) Explain the operation of Boost converter with appropriate power circuit and waveforms. Derive the expression for voltage gain, L_{min} for continuous conduction and the value of capacitance. **(16)**

14. (a) With appropriate power circuit, discuss the principle of operation of three phase inverter with 180° thyristor conduction mode. Also, prepare a table which shows the sequence of firing of various SCRs. **(12 + 4)**

OR

(b) Compare the performances of voltage source inverters, PWM inverters and current source inverters. **(16)**

15. (a) Explain the different configurations of single phase AC voltage controller with its power circuit and derive the expression for output voltage. **(16)**

OR

(b) Describe the principle of working of single phase to single phase cycloconverter for both continuous and discontinuous conductions. **(16)**
