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Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
OCTOBER 2012**

EE 09 504—POWER ELECTRONICS

(2009 Scheme)

Time : Three Hours

Maximum : 70 Marks

Part A

All questions compulsory.

1. What is the necessity of connecting SCRs in series ?
2. A single phase half wave controlled converter is operated from a 120 V, 50 Hz supply. Load resistance $R = 10 \Omega$. If the average output voltage is 25 % of the maximum possible average output voltage, determine the firing angle.
3. A step up chopper is used to deliver load voltage of 500 V from a 200 V d.c. source. If the blocking period of the thyristor is 80 μ s, compute the required pulse width.
4. What are cycloconverters ?
5. List the demerits of offline UPS.

(5 \times 2 = 10 marks)

Part B

Answer any four questions.

6. Explain, in detail, the turn-off mechanism of an SCR.
7. Explain with a neat circuit diagram, the basic principle of a dual converter.
8. Explain why a PWM technique is becoming increasingly popular and simpler with advances in power semiconductor devices.
9. Explain the basic principle of operation of a cycloconverter with a neat equivalent circuit diagram.
10. Explain the time ratio control and current limit control, and control strategies used for choppers.
11. Compare the linear power supply and SMPS.

(4 \times 5 = 20 marks)

Part C

Answer any one question from each module.

12. What are $\frac{dv}{dt}$ and $\frac{di}{dt}$ ratings of an SCR ? What happens if these ratings are exceeded ? Explain.

Or

13. With a neat structural diagram, explain the operation of IGBT.

Turn over

14. A single-phase half controlled thyristor bridge converter supplies RL load. Assuming that the output is virtually constant at 10 A, determine the following, if the supply voltage is 230 V, 50 Hz and the firing angle is 60° .
- average output voltage of the converter.
 - supply r.m.s. current.
 - supply fundamental r.m.s. current.
 - supply power factor.

Also draw the power circuit arrangement and sketch the waveforms of input voltage and current and output voltage and current.

Or

15. Draw and explain the simple SCR series inverter circuit employing Class A type commutation. Draw and discuss the important waveforms.
16. With relevant diagram, explain the concept of a four quadrant chopper.

Or

17. With a neat circuit diagram, explain the working of a single-phase a.c. voltage regulator with :
- resistive load.
 - inductive load.
18. With the help of a neat circuit diagram and associated waveforms, explain the operation of buck boost regulator.

Or

19. Write short notes on :
- induction cooking.
 - electronic ballast.

(4 × 10 = 40 marks)