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B.E. / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

Electronics and Communication Engineering Branch

SEVENTH SEMESTER

EC 9047 – POWER ELECTRONICS

(REGULATIONS 2008)

Time: 3 Hours

Max. Marks:100

Answer All Questions

Part-A

(10 x 2 = 20 Marks)

- 1) State the purpose of dv/dt protection.
- 2) Give the symbol and characteristics of N-channel MOSFET.
- 3) Why we need three phase controlled rectifiers?
- 4) What is meant by dual convertors?
- 5) Enumerate the demerits of a linear power supply when compared to SMPS.
- 6) What is a switching mode regulator?
- 7) Write short notes about the half-bridge inverter.
- 8) List the various commonly used techniques in the pulse-width-modulation based inverter.
- 9) What is an electrical time constant of dc motor?
- 10) List the advantages of micro-electronic relays.

Part-B

(5 x 16 = 80 Marks)

11.

(a)

- (i) Draw the circuit diagram of a Power transistor and determine the expressions for α , β and ODF. (8)
- (ii) With neat diagram explain the two transistor analogy of SCR circuit and explain in detail. (8)

12)

- (a) Describe the working of a three phase full converter in the rectifier with RL load and derive the expression for the average output voltage in terms source voltage and firing angle. (16)

(or)

- (b) A single-phase AC voltage controller circuit shown in figure – 1 has a resistive load of $R = 20 \Omega$ and the input voltage is $V_s = 240 \text{ V}$, 120 Hz. The delay angle of thyristor T1 is $\alpha = \pi / 4$. Determine (a) the rms value of output voltage V_o , (b) the input power factor PF, and (c) the average input current. (16)

13.

(a) With the help of circuit diagram and output voltage waveforms, explain the principle of operation of a chopper. (16)

(or)

(b) Describe the principle operation of a Buck-Boost Regulators. Derive an expression for its average dc output voltage. (16)

14.

(a) With the help of neat circuit diagram and associated waveforms, explain the operation of single phase full bridge inverter with resistive load. (16)

(or)

(b) With the necessary explanation and equations, write the notes on following items:-

(i) Voltage source inverters (8)

(ii) Current source inverters (8)

15.

(a) Draw the circuit diagram and explain a speed control scheme for a three phase induction motor and explain its operation. (16)

(or)

(b) Write short notes about the following items:-

(i) Solid state relays (8)

(ii) Micro-electronic relays (8)