

Bharati Vidyapeeth's College of Engineering for Women, Pune.

Electronics and TeleCommunication Department

Unit Test I T.E. Academic Year: 2008-2009

Subject: Power Electronics

Duration: 1 hour

Marks: 30

- 1) A) Explain two transistor analogy of an SCR and derive an expression for anode current in terms of transistor parameters. (5)
- B) Draw and explain vertical cross section of MOSFET. (5)
- 2 A) Explain 'Latch up' in IGBT and how to avoid it? (5)
- B) Explain in detail current ratings of SCR
- 1) I^2T rating 2) di/dt rating (5)
- 3 A) A 1 phase converter supplies an inductive load, Assuming that the output current is continuous and ripple free equal to 15A. Determine the following if supply voltage is 230V with firing angle is 60°
- 1) Average output voltage 2) Supply RMS current
- 3) Fundamental power factor 4) Distortion factor
- 5) Harmonic factor 6) Active and reactive power (5)
- B) Draw and explain 3 phase full converter with RL load and derive the expressions for E_{dc} , E_{rms} and I_{dc} (5)

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Unit Test II T.E. Academic Year: 2008-2009

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- 1) A) Explain the principle of ICC & phase angle control use in ac voltage controller. (4)
- B) With the help of circuit diagram & with w/f explain the operation of 3 phase full wave ac to dc controller with star balance 60 degree and 120 degree (8)
- C) An ac voltage regulator has a resistive load 10 ohm. $V_{rms}=120V$, 60 Hz. thyristor switch is ON for $n=25$ cycles, $m=75$ cycles determine 1) RMS O/P voltage. 2) I/P power factor. 3) Average & rms current of thyristor (4)

OR

- 1 A) Draw circuit diagram necessary w/f & explain 180 degree conduction modes of operation of 3 phase inverter connected with star load. (6)
- B) Explain following voltage control technique for 1 phase inverter a) SPWM b) MPWM c) sinusoidal pulse width modulation d) modified SPWM (6)
- C) Draw circuit diagram of 1 phase quasi square wave bridge inverter using MOSFET. Sketch following w/f for an inductive load continuous conduction I/P voltage & o/p current (4)
- 2 A) A step up chopper feeds dc motor from 100v dc supply if armature resistance is 1 ohm & motor back emf is 50V calculate the range of duty cycles to obtain no load to full load armature current variation to 2A to 20A assume current to be ripple free (4)
- B) With the help of circuit diagram & w/f explain type C dc chopper with dc motor load (6)
- C) Explain SLR half bridge dc to dc converter (6)

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1) Explain two transistor analogy of SCR and derive an expression for anode current in terms of transistor parameters. (7)

2) Explain vertical cross section & VI characteristics of IGBT & also explain latch up in IGBT & how to avoid it. (8)

OR

2) Explain with neat diagram 3 phase half wave converter/rectifier with RL load. Also draw waveforms of load voltage at angle 135 degree with resp. to phase voltage (8)

3) Explain two quadrant operation of full converter (8)

4) Input voltage $V_s=200V$ with resistive load $R=5\ \text{ohm}$. The load & stray inductance are negligible & T are operated at freq $F_s=2KHz$. If the required dv/dt is $100V/sec$ & discharge current is limited to $100A$. Determine value of R_s & C_s & snubber loss (7)

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Unit Test II T.E. Academic Year: 2009-2010

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- 1) What are various methods of AC voltage regulation? Explain anyone. (7)
- 2) Explain in detail & draw neat waveform of 3 phase DC to AC inverter in 120 degree mode of conduction. Give equation of output voltage (8)
- 3) Give advantages & disadvantages of SMPS over linear power supply (7)
- 4) Explain 4 quadrant chopper with waveform (8)

BHARATI VIDYAPEETH'S COLLEGE OF ENGINEERING FOR WOMEN, PUNE-43

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION

UNIT TEST-1

TIME: 1 HOUR

THIRD YEAR (T.E.)

Marks-30

Power Electronics

- Q.1 a) Explain two transistor analogy of an SCR and derive an expression for anode current in terms of transistor parameters. (5)
- b) Draw and explain vertical cross section of MOSFET. (5)
- Q.2 a) Explain 'Latch up' in IGBT and how to avoid it? (5)
- b) Explain in detail current ratings of SCR
- 1) I^2T rating 2) di/dt rating (5)
- Q.3 a) A 1 phase converter supplies an inductive load, Assuming that the output current is continuous and ripple free equal to 15A. Determine the following if supply voltage is 230V with firing angle is 60°
- 1) Average output voltage 2) Supply RMS current
- 3) Fundamental power factor 4) Distortion factor
- 5) Harmonic factor 6) Active and reactive power (5)
- b) Draw and explain 3 phase full converter with RL load and derive the expressions for E_{dc} , E_{rms} and I_{dc} (5)