Code No: NR420403 **Set No.1**

IV B.Tech. II Semester Supplementary Examinations, July -2005
INDUSTRIAL ELECTRONICS
(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering and Mechatronics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the operation of a two stage D.C amplifier using Miller compensation technique.
   (b) List out the specifications of a D.C amplifier.
2. (a) Explain in detail the principle of obtaining a regulated power supply.
   (b) What is a controlled series voltage regulator? Give its block diagram.
   (c) Tabulate the differences between
      i. Shunt and series regulators.
      ii. Zener shunt regulator and transistorized shunt regulator.
3. (a) What are the different protection techniques used in regulated power supplies.
   (b) Describe the 3 advantages of IC voltage regulators.
4. (a) Define the gate power dissipation and explain its importance in SCR
   (b) If the V_g I_g characteristic of an SCR is assumed to be a straight line passing through the origin with a gradient of 3 x 10^3, calculate the required gate source resistance. Given E_gs =10V and allowable P_g =0.012 ohms.
5. Describe the operation of a single phase, two-pulse, mid-point converter with relevant voltage and current waveforms. Discuss how each SCR is subjected to a reverse voltage equal to double the supply voltage in case turns ratio from primary to each secondary is unity.
6. Draw and explain the operation of the time-sharing inverter circuit and give its related current and voltage waveforms.
7. (a) Explain the poly-phase resistance welding circuit.
   (b) Explain a single phase resistance welding circuit.
8. (a) Explain the coagulating action of Ultrasonics.
   (b) Explain the chemical ,thermal and biological effects of Ultrasonics.

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Why drift compensation is needed in the amplifier circuit ? What are different techniques?
   (b) Explain any one compensation technique with neat ckt. diagram and relevant calculations.
2. (a) Explain in detail the principle of obtaining a regulated power supply.
   (b) What is a controlled series voltage regulator? Give its block diagram.
   (c) Tabulate the differences between
      i. Shunt and series regulators.
      ii. Zener shunt regulator and transistorized shunt regulator.
3. Explain the principle of operation of shunt voltage regulator using integrated circuit.
4. (a) Explain the various types of triggering methods of an SCR briefly. Which is the universal method and why?
   (b) List any four Triac applications.
5. (a) Derive the expressions for the following performance factors of a single-phase fully controlled bridge converter
      i. Input harmonic factor
      ii. Voltage ripple factor
      iii. Active power input
      iv. Reactive power input.
   (b) A voltage source e = 100 sin 377 t supplies a resistive load of 100μ through a thyristor, which performs half-wave controlled rectification. Calculate the average power in the load, if the firing angle is fired at 45^0 with respect to the supply voltage waveform.
6. (a) Explain the design aspects of series inverter.
   (b) Explain how the output frequency is higher than the resonant frequency in the above circuit.
7. Explain the SCR sequential flasher used for automobile turn signals.
8. (a) Explain different coupling methods of electrodes to the RF generators.

(b) List and explain different thermal losses in dielectric heating.

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Code No: NR420403 **Set No.3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the operation of a two stage D.C amplifier using Miller compensation technique.
   (b) List out the specifications of a D.C amplifier.
2. (a) What is the disadvantage of single transistor SMPS and how it can be eliminated using bridge type of configuration?
   (b) A single transistor, fly back SMPS operating at 16 kHz is supplying a mean load power of 120W at a mean voltage of 80 V from a dc source of 110 V. Estimate the mark/ space ratio of the output voltage and the value of inductance required in the circuit.
3. (a) How is short-circuit current protection provided for an IC regulator? Draw and explain the circuit diagram.
   (b) Explain voltage regulator system using LM 105 IC and with an external pass transistor.
4. (a) The equivalent capacitance of the depletion layer of reverse biased junction of an SCR is 30PF, fired with a dV/dt of 150V/microsec. Calculate the capacitive current flowing through the junction.
   (b) Explain different commutation methods of Triacs.
5. Explain the operation of three-phase , half-wave controlled converter with inductive load. Sketch the associated waveforms and derive expressions for the average voltage output.
6. (a) With the circuit diagram and output voltage waveform, explain the principle of operation of chopper.
   (b) Explain the time ratio control and current limit control, and control strategies used for chopper.
7. (a) Explain the resistance welding process.
   (b) Draw the basic circuit of ac resistance welding and explain it.
8. (a) Explain the theory behind the induction heating.
   (b) List and explain the applications of induction heating.

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Code No: NR420403 **Set No.4**

IV B.Tech. II Semester Supplementary Examinations, July -2005
INDUSTRIAL ELECTRONICS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is a Differential amplifier? How can it be used to compensate the drift in the amplifier?
   (b) Explain about the 'Single stage Emitter coupled differential amplifier.
2. Draw the circuit and explain the working of switching mode voltage regulator. What are the salient features of thus circuit?
3. (a) Sketch a regulator circuit that uses an LM217 IC positive voltage regulator and explain it.
   (b) Explain the concept of short circuit protection in IC Regulators.
4. (a) List the advantages of thyristor as compared to BJT for switching applications.
   (b) An SCR has a V_g -I_g characteristics given as $V_g = 1.5 + 8\ I_g$. In a certain application, the gate voltage consists of rectangular pulses of 12 V and of duration 50microsec with the duty cycle 0.2. Find the value of R_g series resistor in gate circuit to limit the peak power dissipation in the gate to 5 watts. And also calculate average power dissipation in the gate.
   (c) Define the Nonrepetitive and Repetitive peak reverse and forward voltage ratings of SCR.
5. Explain the operation of three-phase , half-wave controlled converter with inductive load. Sketch the associated waveforms and derive expressions for the average voltage output.
6. Design a snubber circuit and explain its operation and give its applications.
7. Explain the triac motor starting switch for $\frac{1}{2}$ hp, 230V AC single phase induction motor.
8. (a) Explain the theory and principle of dielectric heating.
   (b) List various Industrial applications of dielectric heating.

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