

Code No: 07A52202

R07**Set No. 2**

III B.Tech I Semester Examinations, May 2011

INDUSTRIAL ELECTRONICS

Instrumentation And Control Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is meant by Load regulation?
(b) Give block schematic of series regulator circuit and explain its working. [8+8]
2. (a) What is complementary impulse commutation?
(b) Describe this type of commutation with a circuit design and appropriate waveforms. [8+8]
3. Explain the theory and principle of dielectric heating taking into consideration the dielectric properties of suitable dielectric materials. [16]
4. (a) Discuss about the operation of emitter coupled differential amplifier.
(b) For differential amplifier two sets of inputs signals are applied as follows:
First set $V_1 = 50 \mu\text{V}$ and $V_2 = -50 \mu\text{V}$
Second set $V_1 = 1050 \mu\text{V}$ and $V_2 = 950 \mu\text{V}$ of CMRR is 100, Calculate the percentage difference of output voltage obtained for these two sets of input voltages. Repeat the same if CMRR is 10,000. [8+8]
5. (a) Explain the SCR sequential flasher used for automobile turn ON/OFF signals.
(b) Draw and explain the operation of a speed control of a dc series motor by a single-phase semiconverter for the continuous motor current. [8+8]
6. (a) Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumptions made.
(b) What is a dc chopper? Explain its operation? [8+8]
7. (a) Draw the phase-shift SCR control circuit using an RC relaxation circuit.
(b) Explain the operation of this circuit using approximate waveforms. [8+8]
8. (a) Determine the component values for a voltage regulator circuit for 12 V at 10 mA. The circuit is to generate from a d.c supply of $20 \pm 5 \text{ V}$.
(b) Explain Full-wave voltage regulator circuit. [8+8]

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R07**Set No. 4**

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1. (a) Explain about various possible Op-Amp configurations of Instrumentation amplifiers.
 (b) List out the advantages and Disadvantages of Instrumentation amplifier. [8+8]
2. (a) Classify electronic timers for sequencing welding process steps.
 (b) Explain the operation of any two electronic timers with suitable schematics. [8+8]
3. (a) Explain application of SCR as a static switch.
 (b) Draw the general SCR phase control circuit and draw its waveforms. [8+8]
4. (a) With examples explain different kinds of protection features provided in voltage regulator.
 (b) Describe the advantages of IC voltage regulators over discrete component version of voltage regulators. [8+8]
5. (a) What is meant by Regulation? Differentiate between load and line regulations.
 (b) Explain the principle of basic shunt regulator circuit. [8+8]
6. Describe the following applications of dielectric heating:
 (a) preheating of plastic preforms
 (b) wood gluing [16]
7. (a) Discuss, about, Class A and Class D types of commutations employed for thyristors with relevant waveforms.
 (b) Explain the methods adopted for the protection of SCRs against over currents. [8+8]
8. For type-A chopper, express the following variables in terms of V_s , R , I_o and duty cycle α in case load inductance causes the load current I_o to remain constant at a value $I_o = V_o/R$. Here V_s is the source voltage.
 (a) Average output voltage and current
 (b) Output current at the instant of commutation.
 (c) Average and rms values of thyristor current.
 (d) Rms value of the output voltage.

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(e) Average and rms values of freewheeling diode current.

[16]

FIRSTRANKER

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1. (a) Explain how SCR can be used in circuit breaker and over voltage protection.
(b) Discuss how SCR can be used in oscillating and chopper circuits. [8+8]
2. (a) Draw a simplified circuit diagram of a regulated power supply.
(b) What type of feedback is employed by this regulator? [8+8]
3. Explain in detail about different Thermal losses in dielectric heating. [16]
4. What is meant by stabilization? Discuss about various stabilization techniques used in DC amplifiers. [16]
5. (a) Explain any two applications of DIAC.
(b) Describe the principle of forced commutation of a thyristor by a capacitor. [8+8]
6. (a) In what respects switched mode power supplies are better than linear regulated powersupplier? Explain?
(b) Draw the circuit of ± 15 V regulated output using a suitable three terminal IC regulator and explain its working. [8+8]
7. Describe the principle of spot welding and butt welding. What are their main applications? Describe the two welding process in brief. [16]
8. (a) The derating of an SCR is more for sine waves than for the square wave (or rectangular waves). Explain.
(b) Explain Reverse Blocking mode, Forward blocking mode and Forward conduction mode of thyristor. [8+8]

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R07**Set No. 3**

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1. Discuss the following in detail:

- (a) Fixed and adjustable IC voltage Regulators.
- (b) Current boosting. [8+8]

- 2. (a) With circuit diagram explain Series Regulator circuit.
- (b) Explain Negative Voltage Regulators. [8+8]

- 3. (a) With circuit diagram explain Transistor Differential amplifier.
- (b) What are the advantages of Differential amplifiers over normal common Emitter amplifier. [8+8]

- 4. Explain direct ultrasonic methods in use for optical image detection visualization. [16]

- 5. (a) Draw the voltage and current waveforms of speed control of a dc series motor by a single-phase semiconverter for the continuous motor current.
- (b) Explain the resistance welding process. [8+8]

- 6. (a) Explain why the inner two layers of an SCR are lightly doped and are wide.
- (b) Explain in detail the turn-off mechanism of an SCR. [8+8]

- 7. (a) An RL load, energized from single-phase, 230 V, 50 Hz source through a single thyristor, has $R = 10 \Omega$ and $L = 0.08 \text{ H}$. If thyristor is triggered in every positive half cycle at $\alpha = 75^\circ$, find current expression as a function of time.
- (b) A battery is charged by a single-phase one-pulse thyristor controlled rectifier. The supply is 30 V, 50 Hz and battery emf is constant at 6V. Find the resistance to be inserted in series with the battery to limit the charging current to 4A on the assumptions that SCR is triggered continuously. Take a voltage drop of 1 V across the SCR. Derive the expression used. [8+8]

- 8. (a) Explain different triggering modes of TRIAC.
- (b) Derive expressions for the DC output voltage in a step down DC chopper with resistive load. Assume lossless switch. [8+8]
