Code No: 09A51801 | R09 | SET-1

B. Tech III Year I Semester Examinations, December-2011
BASIC ELECTRONICS
(METALLURGY AND MATERIAL TECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Describe the phenomenon of diffusion of charge carriers in the semiconductor.
b) Draw the energy band diagram of P-N junction and explain the working of a diode. [7+8]

2.a) The resistivities of the P-region and N-region of a silicon diode are 6ohms-cm and 4ohms-cm respectively. Calculate the contact potential V_o and potential energy barrier E_o .if the doping densities of both P and N regions are tripled. Determine V_o and E_o . Given data q =1.6×10^{-19} C n_i = 1.5×10^{10} /cm^3 , μ_p =500cm^2 /v-s μ_n =1300cm^2 /v-s and v_T = 0,026v at 300^0 K.
b) Derive an expression for ripple factor for full wave rectifier with C-filter. [7+8]

3.a) Explain the principle of NPN and PNP transistor. How are its terminals named?
b) Define pinch-off voltage V_p ?.Sketch the depletion region before and after pinch- off. [7+8]

4.a) With the V-I characteristics describe the working principle of an SCR.
b) Explain the terms.
i) Firing angle
ii) Conduction angle of an SCR. [7+8]

5.a) Draw a Darlington emitter follower. Explain why the input impedance is higher than that of a single stage emitter follower.
b) Draw the small signal model of common source amplifier and derive an expression for voltage gain and output impedance. [7+8]

6.a) Describe the construction of phase shift oscillator and explain its working.
b) Drive the expression for the frequency of oscillation and the minimum gain required for sustained oscillations of the RC phase shift oscillator. [7+8]

7.a) Explain the following type of Timers.
i) Electro-mechanical Timers.
ii) Electronic Timers.
b) List different welding circuits
c) Explain Projection welding process. [15]

8.a) Giving basic set up, explain the principle of Induction heating.
b) Draw and explain the heat control circuit for resistance welding. [15]

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Code No: 09A51801 | R09 | SET-2

B. Tech III Year I Semester Examinations, December-2011
BASIC ELECTRONICS
(METALLURGY AND MATERIAL TECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Describe the action of P-N junction diode under forward bias and reverse bias.
b) Explain the Hall Effect. How can Hall Effect be used to determine some of the properties of a semiconductor? [7+8]

2.a) Find the concentration of holes and electrons in a P-type silicon at 300^0K. assuming resistivity as 0.02Ω-cm assume
μ_p =500cm^2 /v-s, $n_i = 1.5 \times 10^{10}$ /cm^3
b). Explain the action of bridge rectifier and give waveforms of input and output voltages. [7+8]

3.a) What is the relation between I_B, I_E and I_C in Common base configurations?
b) Explain the early effect and sequences.
c) What are the different configurations of BJT? [15]

4.a) What is TRAIC? Sketch its characteristics and describe its operation.
b) Explain why an SCR is operated only in the forward biased condition. [7+8]

5.a) Draw the frequency response of an amplifier and the reason for different slopes in the response.
b) Explain how does negative feedback reduce distortion in an amplifier. [7+8]

6.a) What are the different types of negative feedback? Explain how the inputs and output impedances of an amplifier are affected by the different types of negative feedback.
b) The distortion in an amplifier is found to be 3% when the feedback ratio of a negative feedback amplifier is 0.04. When the feedback is removed, the distortion becomes 15% . Find the open loop gain and closed loop gain. [7+8]

7.a) Name principal types of resistance welding processes and briefly explain them.
b) List different applications of Ultrasonic Waves and explain the principle and working of Pulsed-echo Ultrasonic Flow Detector. [7+8]

8. Write a short note on:
a) Resistance wielding.
b) Timer circuits
c) Dielectric heating. [15]

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Code No: 09A51801 | R09 | SET-3

B. Tech III Year I Semester Examinations, December-2011
BASIC ELECTRONICS
(METALLURGY AND MATERIAL TECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Derive an expression for a ripple factor in a full wave rectifier with resistive load.
b). A half wave rectifier has a load at $3.5k\Omega$. if the diode resistance and secondary coil resistance together have a resistance of 800Ω and input voltage has a signal voltage of peak value 240v calculate
i) Peak, average and RMS value of current following
ii) DC power output
iii) Efficiency of the rectifier. [7+8]

2.a) Sketch the conduction and valence bands before and after diffusion of carriers in a P-N junction.
b) Explain the majority and minority carriers in the semiconductor. [7+8]

3.a) Explain the input and output characteristics of a transistor in CE configuration.
b) Determine the h-parameters from the characteristics of CB configurations. [7+8]

4.a) Explain how triggering of an SCR can be controlled by the gate signal supplied.
b) What is the advantage of TRAIC over the SCR? [7+8]

5.a) Enumerate the effects of negative feedback on the various characteristics of the amplifier.
b) Describe with necessary derivation, the effect of negative feedback on the bandwidth and distortion in an amplifier. [7+8]

6.a) State and briefly explain Barkhausen criterion for oscillation.
b) Draw the circuit diagram of a general oscillator and obtain the maintenance condition and the frequency of oscillations. [7+8]

7.a) Draw and explain the heat control circuit for resistance welding.
b) Compare and contrast the following timers:
i) Thermal Timers
ii) Electro-mechanical Timers
iii) Electronic Timers. [7+8]

8.a) Giving basic set up, explain the principle of Induction heating.
b) Explain the principle of Dielectric heating. [7+8]

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Code No: 09A51801 | R09 | SET-4

B. Tech III Year I Semester Examinations, December-2011
BASIC ELECTRONICS
(METALLURGY AND MATERIAL TECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Explain the diffusion process that takes place at the junctions of a semiconductor diode and explain the presence of a depletion region.
b) Derive an expression for Fermi level in the P-type and N-type semiconductors. [7+8]

2.a) Sketch the circuit for the full wave rectifier. Derive an expression for DC current, DC load diode voltages and the RMS current.
b) A 230V, 60Hz voltage is applied to the primary of a 5:1 step down , center –taped transformer used in a full wave rectifier having a load of 900Ω.if the diode resistance and secondary coil resistance together has a resistance of 100Ω determine the
i) Dc voltage across the load,
ii) DC current flowing through the load. [7+8]

3.a) Determine the h-parameters from the characteristics of Common emitter configurations.
b) Derive the relationship between h_{FE} and h_{fe}. [7+8]

4.a) Draw the V-I characteristics of a DIAC and explain its working principle .
b) Why phase shift through the R-C feed back network of R-C phase shift oscillator is to be 180^0? Explain. [7+8]

5.a) Explain with circuit diagram a negative feedback amplifier and obtain expression for its closed loop gain.
b) An amplifier with stage gain 200 is provided with negative feedback of feedback ratio 0.05. Find the new gain. [7+8]

6.a) Draw the circuit of Hartley oscillator and explain its working. Drive the expressions for frequency of oscillation and condition for starting of oscillation.
b) Discuss the frequency range of RC and LC oscillator. [10+5]

7.a) Explain the application of Induction Heating for
i. Brazing and
ii. Annealing of Brass and Bronze items.
b) Briefly explain “Thermal Expansion timers”. [7+8]

8.a) Explain the principle of Dielectric heating and List the applications of Dielectric heating.
b) Explain the use of Ultrasonic waves in Degassing of liquids. [7+8]

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