

II B.Tech. II Semester Regular Examinations, April/May -2005
BASIC ELECTRONICS
(Metallurgy & Material Technology)

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

Answer any FIVE Questions
All Questions carry equal marks

1. (a) With the help of neat diagrams explain the two biasing techniques of a diode. Draw the V-I characteristics and indicate V_γ .
(b) Obtain the static and dynamic resistances of the p-n junction germanium diode, if the temperature is 27°C and $I_o=1\mu\text{A}$ for an applied forward bias of 0.2 V. Assume $\bar{k} = 1.38 \times 10^{-23} \text{J}/^\circ\text{K}$.
2. (a) What is “Early effect” phenomenon in a transistor and explain its consequences.
(b) Draw and explain the input and output characteristics of n-p-n transistor in C- B configuration.
3. (a) Draw the voltage series, voltage shunt, current series and current shunt feedback amplifiers with discrete components. What is the effect of feedback on input and output impedances on each of the above topologies?
(b) Draw a transistor amplifier using self bias (CE configuration) and explain the operation. What is the type of feedback in the presence of emitter resistance?
4. (a) Classify timers according to the function and briefly explain them.
(b) Draw the circuit for A.C. resistance welding and explain.
5. (a) Explain the principle of dielectric heating.
(b) Explain the application of dielectric heating for
 - i. Pre-heating of plastic preforms and
 - ii. Food processing.
6. (a) What is the necessity of time base in cathode ray oscilloscope? Draw any one type of time base circuits employed in CRO and explain how it produces the saw-tooth wave
(b) List the applications of C R O.
7. (a) What is thermocouple? Draw and explain the construction details of thermocouple.
(b) Explain the different methods to measure the thermocouple output.
8. (a) Explain Piezo-electric effect in crystals.
(b) Explain the method of generating ultra sonic waves using Piezo- electric generator.

- (c) Explain the application of ultrasonic waves in dispersing metals.

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1. (a) Draw and explain the energy band diagrams of conductor, semiconductor and insulator
(b) Draw the V- I characteristics of an ideal diode. Distinguish between avalanche and zener break down
2. (a) Explain the various current components in a p-n-p transistor with forward biased emitter junction and reverse biased collector junction.
(b) Explain the V- I characteristics of SCR
3. (a) CE configuration is supposed to be versatile configuration among the three configurations. Give reasons. What is the special feature of CC configuration?
(b) Define positive feed back. What is the relation between A_f (gain with feed back) and A (gain without feed back).
4. (a) Compare and contrast the following timers
 - i. Thermal Timers
 - ii. Electromechanical Timers
 - iii. Mechanical Timers
 - iv. Electrochemical Timers
(b) Explain
 - i. Bimetal strip timers
 - ii. Thermal expansion timers
5. (a) Explain the theory of induction heating by taking an example of cylindrical metal piece. Draw the Graph showing the variation of eddy current density with distance from the metal surface
(b) Discuss different types of losses observed in dielectric heating.
6. (a) Draw the block diagram of CRO and explain the function of each block.
(b) Derive the expression for the electro-static deflection sensitivity of a cathode ray tube.
7. (a) Explain with necessary sketch how bellows are used to measure the pressure.
(b) List out the advantages and disadvantages of Thermistor and Thermocouple.
8. (a) Draw and explain piezo electric generator circuit using Hartley oscillator for generation of ultrasonic waves.

- (b) Explain the application of ultra sonic waves for the study of non-homogeneities in metals and plastics.

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1. (a) Explain the effect of temperature on V-I characteristics of p-n junction diode.
(b) Derive the expression of ripple factor for full wave rectifier with capacitor filter
2. (a) Explain how the transistor acts as an amplifier.
(b) Define
 - i. Emitter efficiency
 - ii. Transport factor
 - iii. Large signal current gain and
 - iv. Emitter resistance.
3. (a) Draw the voltage series, voltage shunt, current series and current shunt feed back amplifiers with discrete components. What is the effect of feed back on input and output impedances on each of the above topologies?
(b) Draw a transistor amplifier using self bias (CE configuration) and explain the operation. What is the type of feed back in the presence of emitter resistance?
4. (a) Draw the block diagram of timer system. Briefly explain the constituents of industrial timing circuits.
(b) Briefly explain all types of resistance welding.
5. (a) Discuss important applications of induction heating.
(b) Briefly explain the principle of dielectric heating? Explain what is loss factor.
6. (a) Explain the working and construction of a CRT with neat sketch. Give the detailed description of all parts in a CRT.
(b) What is a time base? State the need for time base in CRO.
7. (a) Explain clearly with neat sketch the working principle of potentiometric type accelerometer.
(b) How platinum resistance thermometer can be used to measure the temperature.
8. (a) Classify mechanical generators for generating ultra sonic waves and indicate the frequency of the waves generated by the methods.
(b) Explain

- i. Thermal effects of ultra sonics
- ii. Biological effects of ultra sonics

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1. (a) What is the law of mass action. A p-type germanium at 300⁰k has conductivity of 300 mho/cm. Calculate the concentration of impurity atoms, holes and electrons. Assume that $\mu_p = 1800 \text{ cm}^2/\text{sec volt}$ and $n_i = 2.5 \times 10^{13} \text{ cm}^{-3}$.
(b) Define the following for a rectifier.
 - i. RMS value
 - ii. Ripple factor
 - iii. Regulation
 - iv. PIV
2. (a) Draw the output characteristics of junction transistor in C B configuration and indicate the active, cut off and saturation regions and explain the shape of the these curves.
(b) What are the different methods of triggering SCR. Explain one of these methods.
3. (a) State the merits and demerits of Negative feedback in amplifiers.
(b) What is an oscillator? Explain why positive feedback is necessary to produce oscillations.
4. (a) Classify the timers according to the function and the technique used to achieve the industrial timing.
(b) List the electronic welding controls used in resistance welding.
5. (a) Give the principle of Induction heating. What are the merits of Induction heating.
(b) Explain the application of Induction heating for
 - i. surface hardening of steel.
 - ii. Annealing of brass and iron.
6. (a) Explain the working and construction of a CRT with neat sketch. Give the detailed description of all parts in a CRT.
(b) What is a time base? State the need for time base in CRO.
7. (a) Explain the working principle of capacitive transducer to measure the pressure with bridge circuit.

- (b) Describe the construction and working principle of photoelectric transducer to measure the pressure.
- 8. (a) Classify mechanical generators for generating ultra sonic waves and indicate the frequency of the waves generated by the methods.
- (b) Explain
 - i. Thermal effects of ultra sonics
 - ii. Biological effects of ultra sonics

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