

II B.Tech. I Semester Supplementary Examinations, May -2005
BASIC ELECTRONICS

(Common to Mechanical Engineering and Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw the V- I characteristics of a zener diode. Explain the operation of regulator circuit using zener diode
(b) Explain the operation of full wave rectifier with resistance load and calculate the value of ripple factor of it.
2. (a) Draw the circuit diagram of a transistor in C- E mode and draw and explain its input and output characteristics.
(b) Draw and explain the EBERS -MOLL model for a n-p-n transistor.
3. (a) What are the advantages and disadvantages of negative feed back in amplifiers.
(b) Explain the effects of Negative feedback in an amplifier on,
 - i. Distortion,
 - ii. Stability of transfer function.
4. (a) Draw the circuit and explain the operation of Magnetic energy storage welder
(b) What are the types of resistance welding and explain each of them.
5. (a) Discuss important applications of induction heating.
(b) Briefly explain the principle of dielectric heating? Explain what is loss factor.
6. (a) Explain magnetic deflection system employed for deflecting the beam in C R O. Derive the expression for magnetic deflection sensitivity
(b) Explain the need of coating the screen with fluorescent materials and list different fluorescent materials commonly used.
7. Explain about stack, Input-output and machine control group instructions with examples.
8. (a) List various characteristics of A-to-D converter.
(b) Compare three A-to-D conversion techniques.

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1. (a) Draw the V- I characteristics of a zener diode. Explain the operation of regulator circuit using zener diode
(b) Explain the operation of full wave rectifier with resistance load and calculate the value of ripple factor of it.
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) What are the advantages and disadvantages of negative feed back in amplifiers.
(b) Explain the effects of Negative feedback in an amplifier on,
 - i. Distortion,
 - ii. Stability of transfer function.
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) What are the various general purpose registers? Explain.
(b) What are the functions of the accumulator and program counter?
(c) What are various flags in 8085 microprocessor?
8. (a) Derive an expression for an output voltage of inverted R-2R ladder DAC.
(b) The digital input for a 4-bit DAC is 0110. Calculate its final output voltage.

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1. (a) Draw the atomic structure for P and N type semiconductors. Explain about minority and majority carriers.
(b) Draw Bridge rectifier circuit and explain the working of it. What are the advantages of it over the full wave rectifier with centre tapped transformer?
2. (a) Draw the circuit diagram of a transistor in C- E mode and draw and explain its input and output characteristics.
(b) Draw and explain the EBERS -MOLL model for a n-p-n transistor.
3. (a) Draw the circuit of single stage RC coupled Amplifier and explain its principle of operation.
(b) Derive an expression for sensitivity of feedback Amplifier.
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) 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) 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) What are the functional units of central processing unit. Briefly explain each of them.
(b) What is stack? What are its functions?
8. Explain the dual slope A-to-D converter technique with the help of block diagram.

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1. (a) Draw and explain the graph indicating the variation of minority carrier density with distance in a p-n junction diode under forward biased condition.
(b) Derive the expression for intrinsic conductivity of intrinsic semiconductor. Find the conductivity and resistivity of an intrinsic semiconductor at temperature of 300⁰k. Assume
 $n_i = 2.5 \times 10^{13} / \text{cm}^3$
 $\mu_i = 3800 \text{cm}^2 / \text{sec} - \text{volt}$
 $\mu_p = 1800 \text{cm}^2 / \text{sec} - \text{volt}$
 $q = 1.6 \times 10^{-19} \text{ coulomb.}$
2. (a) Prove that for CE transistor in active region the collector current is given by $I_C = \beta I_B + (1 + \beta) I_{C0}$
(b) Define
 - i. Emitter efficiency
 - ii. Base-transport factor and
 - iii. Dynamic emitter resistance
3. (a) What is meant by feed back? Discuss the general characteristics of negative feedback amplifier.
(b) Draw the circuit diagram of RC oscillator and explain its principle of operation.
4. (a) Explain the operation of I C 555 timer as a mono stable multivibrator and astable multivibrator. Draw necessary circuit diagram and wave forms.
(b) Draw the basic circuit for A.C resistance welding and briefly explain its operation
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) 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 are the functional units of central processing unit. Briefly explain each of them.
(b) What is stack? What are its functions?
8. (a) Explain the principle of operation R -2R type D-to-A converter.
(b) What are its advantages?
