$$\boxed{\textbf{Set No. 1}}$$

II B.Tech I Semester Supplementary Examinations, March 2006
BASIC ELECTRONICS
(Common to Mechanical Engineering, Production Engineering and Automobile Engineering)

Time: 3 hours
Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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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. [8+8]

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. [8+8]

3. (a) Draw the block diagram of a general purpose feedback system and prove that, $A_f = \frac{A}{1+A\beta}$
   (b) Draw the schematic block diagram of Oscillator and explain its operation.

   [8+8]

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. [8+8]

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. [10+6]

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. [8+8]

7. (a) What are the functions performed during fetch and execution cycles of an instruction? Explain with suitable examples if required.
   (b) If the memory clip size is 1024 x 4 bits, how many clips are required to make up 2K (2048) bytes of memory? How many address lines are necessary to address 2048K (2 Mega bytes) of memory? [8+8]

8. (a) Which is the fastest ADC and why?
   (b) What do you mean by quantization error in A-to-D converters?

(c) Define the terms

    i. Stability

    ii. Accuracy

    iii. Conversion time

    iv. Settling time. [5+5+6]

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Set No. 2

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Time: 3 hours
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Answer any FIVE Questions
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1. (a) What is meant by Fermi-level in semiconductor? Where does the Fermi level lie in an intrinsic semi-conductor? Explain with neat energy band diagrams.

   (b) Explain V- I Characteristics of a junction diode with the help of the diode equation. [8+8]

2. (a) Prove that for CE transistor in active region the collector current is given by
   $I_C = \beta\,I_B + (1 + \beta)\,I_{C_O}$

   (b) Define
      i. Emitter efficiency
      ii. Base-transport factor and
      iii. Dynamic emitter resistance [8+8]

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). [10+6]

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. [8+8]

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. [10+6]

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. [8+8]

7. What are the various types of data formats for microprocessor instructions? Give examples for each type of data format. [16]

8. (a) Define the terms:
      i. Accuracy
      ii. Resolution

    iii. Settling time

    iv. Conversion time. for D/A converters.

(b) What is the difference between A/D and D/A converter? Give applications of each. [8+8]

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1. (a) From the V-I characteristics of a diode, explain the terms dynamic resistance and static resistance

   (b) Draw Half - wave rectifier with capacitor filter and explain its operation. [8+8]

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. [8+8]

3. (a) Write short notes on "Frequency stability in Oscillator".

   (b) Draw the circuit of RC phase shift Oscillator using transistor. Derive an expression for frequency of Oscillation. [6+10]

4. (a) Compare transistor timer with relay load control and SCR delay timer.

   (b) Draw the circuit diagram of asynchronous welding control system and explain.

   [8+8]

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. [8+8]

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. [8+8]

7. Explain with a block diagram, the architecture of micro processor. [16]

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.

   [8+8]

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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?

   [8+8]

2. (a) Explain about the construction of a transistor using Epitaxial Planar type.

   (b) Explain why the output characteristics of a transistor in CE configuration have more slope than in CB configuration. [8+8]

3. (a) Distinguish between class A, class B, Class C operations of an amplifier.

   (b) Compare the various types of feedback amplifiers in respect of input and output impedances. [8+8]

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. [8+8]

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. [8+8]

6. (a) Explain magnetic deflection system employed for deflecting the beam in CRO. 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. [8+8]

7. What are the various types of data formats for microprocessor instructions? Give examples for each type of data format. [16]

8. Explain the operation of counter type A-to-D converter using D-to-A converter. [16]

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