

B.Tech I Year (R05) Supplementary Examinations, December 2010
BASIC ELECTRICAL & ELECTRONICS ENGINEERING
 (Biotechnology)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
 All questions carry equal marks

- (a) State and explain Kirchoff's Law.
 (b) Calculate the current through the resistance of $5\ \Omega$ in the specified direction as shown in the figure 1

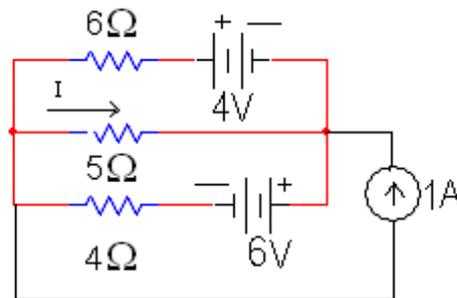


Figure 1:

- (a) Give the constructional features of "CORE" and "Shell" types of transformers, and give the advantages and disadvantages of each type.
 (b) A 5 KVA, 2300 / 230 V, 50 Hz transformer was tested for the iron loss with normal excitation and copper losses at full load, and these were found to be 40 Watts and 112 Watts respectively. Calculate efficiency of the transformer at
 - full load.
 - half full load.
 Assume the power factor of the load as 0.8.
- (a) Explain how a P-type semiconductor is formed. What are the different impurities used for this process.
 (b) Derive the expression for intrinsic conductivity?
 (c) Explain about charge densities in a semiconductor.
- (a) A full wave bridge rectifier is fed with 220 V, 50 Hz, through a step-down transformer of turns ratio 11:1. Assuming ideal diode find the
 - DC output voltage
 - peak inverse voltage
 - Rectifier efficiency. The load resistance is $100\ \Omega$.
 (b) What is ripple factor? Show that the ripple factor for full wave rectifier is 0.482.
- (a) Draw the emitter characteristic of UJT and explain the shape of the curve qualitatively. Mention different regions of operations.
 (b) Draw the circuit of a relaxation oscillator and explain its operations. Mention its applications.
- (a) Classify and define the amplifiers depending on the conduction period and sketch the input and output waveforms.
 (b) Show that the maximum theoretical efficiency of a class A power amplifier is 50%.
- (a) Draw the circuit diagram of Wien bridge oscillator using BJT. Show that the gain of the amplifier must be at least 3 for the oscillations to occur.
 (b) For the fixed-bias Ge transistor, n-p-n type, the junction voltages at saturation and cutoff one in active region, may be assumed to zero. This circuit operate properly over the temperature range $-50\ ^\circ\text{C}$ to $75\ ^\circ\text{C}$ and to just start malfunctioning at these extremes. The various circuit specifications are: $V_{CC} = 4.5\text{V}$, $V_{BB} = 3\text{volts}$, $h_{fe}=40$ at $-50\ ^\circ\text{C}$, and $h_{fe}=60$ at $75\ ^\circ\text{C}$, $I_{CBO} = 4\ \mu\text{A}$ at $25\ ^\circ\text{C}$ and doubles every $10\ ^\circ\text{C}$. Collector current is $10\ \mu\text{A}$. Design the values of R_{c1} , R_1 and R_2 .
- (a) Explain with a block diagram the major blocks of a digital computer.
 (b) Implement the following with either NAND or NOR gates. Use only 4 gates only the normal inputs are available.

$$F = w'xz + w'yz + x'yz' + wxy'z.$$
 (c) With a circuit diagram, explain Counter type A to D converter.
