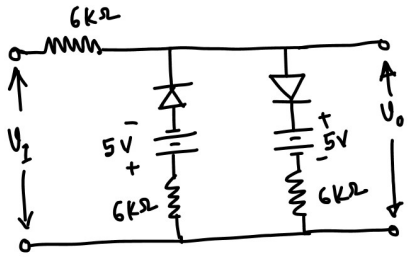
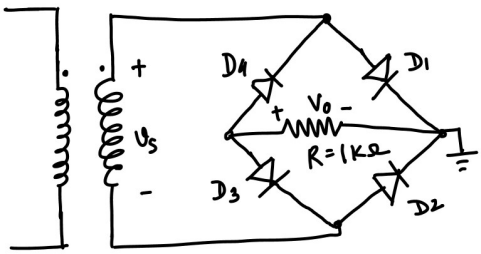
Basic Electronics (Test – 1, Part - A)

- **<u>Instructions:</u> Please mention these on the first page of your answer script (your name, roll no., subject name, your signature and date); Insert page no. in every page; The final answer(s) (numerical values with unit) should be enclosed within a box ; Show the necessary steps in your answers with high clarity and supported explanation; All waveform sketches / diagrams must be neatly drawn and clearly labelled; At the end of this test, you have to upload a single PDF file of your hand-written answer script (Max file size 10 MB); Please note that, this question paper has two parts: <u>Part A</u> and <u>Part B</u>; For any doubt, please feel free to ask the instructor.**

1. For the circuit shown in the following figure, consider the diodes are ideal (V_γ = 0 V). If the input voltage (V_I) is swept from – 8 V to +8 V, find the output voltage (V_o). Neatly plot the variation of V_o with V_I for this range of input. **[3+2]**



2. For the following circuit, the secondary voltage (V_s) is 5 sin (314t) V. For one time-period (T), estimate the time duration during which the diodes are conducting. Neatly draw the waveforms of V_o and V_S on the same X and Y-axis. Calculate the PIV of diode D_3. Given that, V_γ = 0.6 V. **[3+1+1]**



3. An n-type Si material has a resistivity of ρ = 0.65 Ω–cm. **(i)** If the electron mobility is μ_n=1250 cm^2/V–s, what is the concentration of donor atoms? **(ii)** Determine the required electric field to establish a drift current density of J = 160 A/cm^2. **[2+2]**

4. Assuming the diodes are ideal (V_γ = 0), estimate the current I as indicated in the following circuit. **[3]**