Basic Electronics (Test – 2, 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 and with 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 during the test.**

Consider the following whenever required,
For BJT, $|V_{BE\_ON}| = 0.7$ V; V_A is very high if not stated explicitly
For diode, $V_y = 0.7$ V and forward resistance is negligible
Symbols have their usual meaning

Q1. Find the Q-point (V_{CEQ} and I_{CQ}) for the following circuit (Fig. 1). Given that CE current gain of the BJT is 200. **[4]**

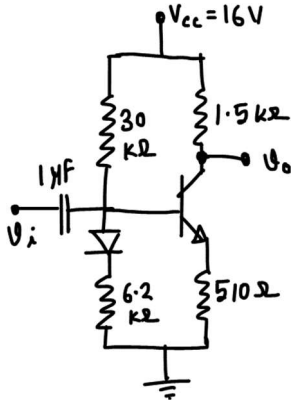


Figure 1

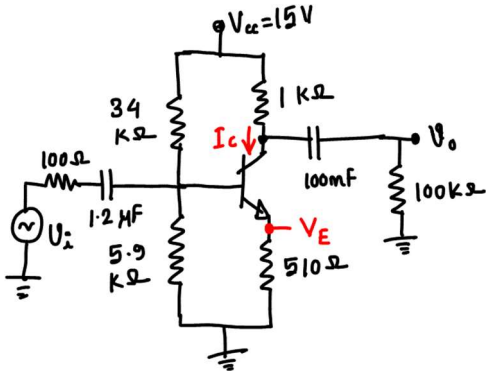
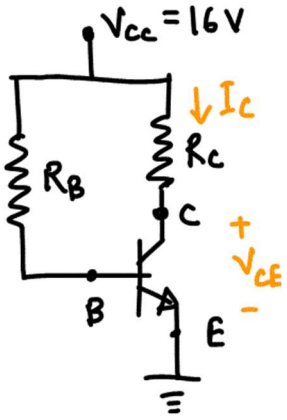
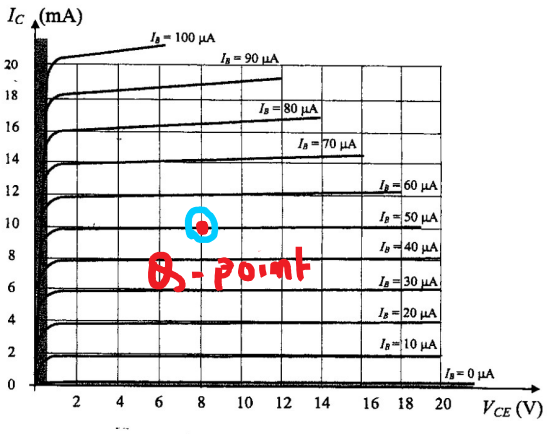


Figure 2

Q2. For the amplifier circuit shown in Fig. 2, β = 200 and V_A = 150 V. Find I_C and V_E as indicated in the figure. Estimate the small signal parameters (g_m, r_π, r_o) and evaluate the small-signal gain of the amplifier. Ignore the Early effect during DC calculations. **[2+3+3]**

Q3. Find the value of R_B and R_C to establish the Q-point as indicated in the transistor characteristics. **[4]**





Transistor collector characteristic curves