1. Draw the small-signal equivalent circuits for the following three BJT circuits:

(A) \[ i_C \rightarrow V_{CC} \]

(B) \[ V_{CC} \]

(C) \[ V_{CC} \]

2. Design a common emitter amplifier with \( V_{CC} = 1.8 \) V and a power budget \( P = 1 \) mW while achieving maximum voltage gain for the following BJT operating conditions:
   a. edge of saturation (\( V_{BC} = 0 \) V)
   b. soft saturation (\( V_{CE} = 0.4 \) V)
   c. strong saturation (\( V_{CE} = 0.2 \) V)
(Hint: determine \( RC \) and voltage gain in each case)

3. Assuming the following circuit is biased with \( I_C = 1 \) mA and \( RC = 1 \) k\( \Omega \). Given \( \beta = 100 \) and \( VCC = 10 \) V, determine the small signal voltage gain and the input and output impedances.