This exam involves determining the frequency response of the common-emitter amplifier circuit shown below.

re = 65 ohms
Transistor AC beta = 186.
Midband voltage gain from base-to-collector = -150.
Parasitic transistor capacitance values are Cbe = 22pF and Cbc = 7.3pF.

Calculate the following,

a) Critical frequency associated with C1.
\[ F_1 = \frac{1}{2\pi} (R_s + \frac{R_1}{R_2} + R_{in}) \] where \( R_{in} = (1+\beta)re \)

\[ R_t = \frac{5000 + \frac{1}{((1/120000) + (1/57200) + (1/187*65)))}}{1/6.28*0.000001*14252} = 11.17 \]
b) Critical frequency associated with C2.

\[
F_2 = \frac{1}{2\pi (R_c + R_3)C_2} = \frac{1}{6.28 \times 40k \times 1\mu F} = 4\text{Hz}
\]

c) The critical frequency associated with transistor parasitic capacitances, Cbe and Cbc.

\[
C_t = C_{be} + (1 - A_{vb})C_{bc}
\]

\[
= 22\text{pF} + (1 + 150)7.3\text{pF}
\]

\[
= (22^{-12}) + ((1+150) \times 7.3 \times 10^{-12})
\]

\[
= 1.1\text{nF}
\]
\[ Rt = \left( \frac{R_s}{R_1//R_2/(1+\beta)re} \right) = 1/(1/5000 + (1/120000) + (1/57200) + (1/(1+186)*65)) \]

\[ = 3245.8 \]

\[ F_h = \frac{1}{2\pi R_tC_t} \]

\[ = 1/(6.28*3245.8*1.1*10^{-9}) \]

\[ = 44.6 \text{ kHz} \]

Amplifier Frequency Response