1) Discuss the following
   a) IGFET has the lowest operating frequency among all semiconductor devices.
   b) Power frequency limitations in microwave BJTs
   c) More than one emitter are used in microwave BJTs
   d) GaAs is preferred over Silicon in fabricating microwave transistors.
   e) Microwave BJTs operate at very high emitter current densities.

2) Define the pinch off voltage in MESFET transistors. A GaAs MESFET has a doping concentration of $8 \times 10^{17}$ cm$^{-3}$, channel height 0.1 micrometer, relative permittivity 13.1. Calculate the pinch off voltage of the device.

3) In a bipolar microwave transistor, the emitter charging time constitutes 40% of the total transit time. Calculate the percentage change in the cut off frequency when the emitter current is increased from 100 mA to 200 mA. All other parameters maybe assumed to remain constant.

4) If the electric field applied to the collector junction of a microwave BJT is $3 \times 10^5$ V/cm and the resulting velocity of carriers is $4 \times 10^7$ cm/s. Find the cut off frequency and the voltage drop giving that the width of the junction is 4 micro meter.