

# COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electronics and Communications Engineering

Instructor: Dr. Amr Bayoumi

Course Title: Solid State Electronics

Course No.: EC210

Fall 2016

Sheet 10



---

I

## Question 1:

Derive the expression for the effective density of states for electrons.

Hint:

- The solution of  $\int_0^{\infty} x^{\frac{1}{2}} e^{-x} dx = \frac{\sqrt{\pi}}{2}$
- Use the transformation  $x = (E - E_c)/K_B T$

## Question 2:

Calculate, using the results of Q1, the effective conduction band density of states,  $N_c$  for electrons and  $N_v$  for holes for Si, assuming  $m_n^* = 1.182m_0$ ,  $m_p^* = 0.81m_0$  at  $T=300K$

## Question 3:

Example 5.5 p.394.