LED Design

Due 11.21.02

Design a light emitting diode operating at 1.3 µm (λ ≤ 1.3 µm)

(a) Outline steps you would take to design an efficient LED.

(b) Follow your design methodology by appropriately selecting:

(i) Semiconductor material,
(ii) Device parameters (doping levels, etc.) , device geometry and device
dimensions (e.g. dimensions of various regions, thickness of AR coating),
(iii) Packaging scheme.

(c) Provide analytical backup for your choices in part (b). In particular, evaluate (if
possible) the following parameters,
η\text{int} , η\text{ext} , and the output light power.
State assumptions made and/or parameter values taken.

(d) Suggest structural changes and/or other methods, that would result in higher LED
outputs (for a given dc input). This part should be attempted after completing the
first three parts.

Hint: Use supplementary notes for bandgap, lattice parameters, and other information. If the
electrical and optical parameters of the material you select are not in literature, assume some
realistic values based on GaAs or GaP parameters.