2015

M.Sc.

4th Semester Examination

ELECTRONICS

PAPER—ELC-403

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Quantum Electronics)

Answer Q. No. 1 and any three from the rest.

1. (a) Mention the steps for producing MASER.

(b) Explain the term “carrier confinement” in a double heterojunction laser.

(Turn Over)
(c) Discuss the physical significance of Fermi's Golden Rule.

(d) What is GRIN-SCH? Mention its advantages.

(e) What are the advantages of SAM-APD over an ordinary APD?  

2. (a) Using time independent perturbation theory, derive an expression for second order perturbation in energy.

(b) The number of QWs in MQW could be increased infinitely for better performance – Explain.

(c) State the advantages of NH₃ MASER.  

3. (a) Using time dependent perturbation theory explain the phenomena of absorption and emission.

(b) Distinguish between graded gap and staircase APDs.

(c) Discuss the noises present in APDs.  

C/15/M.Sc./4th Seme./ELC-403 (Continued)
4. (a) Write briefly on:
   (i) Quantum dot laser;
   (ii) Quantum wire laser.

(b) Prove that the density of state in two dimensions is independent of energy. (3+3)+4

5. (a) Explain the working principle of a solid state photomultiplier tube.

(b) Define radiant sensitivity and quantum efficiency of photomultiplier tube. Why Boro-silicate glass is used most as its window material? 5+(3+2)

6. (a) Give an estimate of the thickness of the active region of a quantum well.

(b) Explain Photoconductive gain in case of a quantum well infra-red photodetector.

(c) Compare p-n photodiode and p-i-n photodiode with regards to their performance. 4+3+3

Internal Assessment — 10