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 trem "carrier confinement" in a double heterojunction laser.

(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 ? 2×5

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 – Exaplin.

(c) State the advantages of NH_3 MASER. 5+3+2

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. 5+3+2

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
