

TM154580C

Reg. No:

Name:

**M. Sc. DEGREE (C.S.S.) EXAMINATION, MARCH 2017
SEMESTER IV – ELECTIVE COURSE (PHYSICS)
PH4OE3TM - NANOPHOTONICS**

Time: Three Hours

Maximum Marks: 75

PART A

I. Answer any five questions. Each question carries 3 marks.

1. Explain the formation of quantum rings.
2. Explain nanobarcodes.
3. Draw the structure of n electronic and photonic crystal, bringing out the comparison in their size scales.
4. Explain defect states.
5. Briefly explain CVD and PLD.
6. What are factors the resolution of pattern depends on? Mention the resolution provided by various lithographic techniques.
7. Differentiate between optical and electron microscope.

(5x3=15)

PART B

II. Answer any six questions. Each question carries 5 marks.

8. Explain the formation of band gap in semiconductors. How do you compare with that of photonic crystals.
9. Outline nanolithography and two photon lithography.
10. Explain the origin of band gap in hollow core fibers.
11. Explain how to construct wave guide splitters and multiplexers using photonic crystals.
12. Write a short note on various pattern replication techniques.
13. Write an account of various probe lithography techniques.
14. Describe how an atomic force microscope works.
15. Describe the instrumentation and principle of FTIR spectroscopy.
16. Explain how an image is formed in a transmission electron microscope.

(6x5=30)

PART C

III. Answer any two questions. Each question carries 15 marks.

17. Outline axial and lateral nanoscopic confinement of light.
18. Write an essay on photonic crystals bringing out the comparison of 1D, 2D and 3D structures, their important features, and formation of band gap.
19. What are photonic crystal fibers? How are they used in nonlinear optical applications?
20. Give an account of various lithographic methods in synthesis of nanomaterials.

(2x15=30)