Reg. No ..... Name **18MP109**

M Phil. DEGREE END SEMESTER EXAMINATION - MARCH 2018

SEMESTER 1 : PHYSICS

COURSE : **16MP1PHYT3 ; OPTOELECTRONIC DEVICE TECHNOLOGY**

(For Regular - 2017 admission)

Time : Three Hours Max. Marks: 75

Section A
Answer any 6 (2 marks each)

1. Why are semiconductors used in optoelectronic applications?
2. Describe superlattices.
3. What are interband transitions.
4. What are the different transparent materials used in infrared optoelectronics?
5. How is labeling done in electron-electron scattering processes? Explain using examples.
6. Explain total overlap factor.
7. Describe escape time in terms of Quantum Cascade laser.
8. What is optical phonon? Explain the condition for optical phonon.
9. What is LED?
10. What is a p-n junction? How does it emit light?

(2 x 6 = 12)

Section B
Answer any 3 (5 marks each)

11. In which type of semiconductor is the absorption the strongest and why?
12. How is the intersubband absorption related to the transition level?
13. How is the thickness of bandgap related to intersubband transition?
14. How is the sum rule of absorption related to effective mass?
15. What are quantum cascade lasers?
16. What are the major drawbacks in using OLED technology?

(5 x 3 = 15)

Section C
Answer any 4 (12 marks each)

17. Explain the difference between direct and indirect band gap semiconductors in terms of absorption coefficients.
18. Explain the origin and effects of confinement in valence band dispersion.
19. How does the absorption in coupled well system differ from the single quantum well?
20. Discuss in detail the different scattering processes and its comparison with experiments.
21. What are intersubband and interband transitions? Compare between them.
22. Explain in detail the main features of a quantum cascade laser? What makes it superior to other lasers?

24. Explain how does a LED panel differ from an OLED panel. Discuss its applications.

(12 x 4 = 48)