

M.Sc. 3rd Semester Examination, 2018**PHYSICS****Course Title: Advanced Optics****Paper : PHY 302C****Course ID : 32452****Time: 2 Hours****Full Marks: 40***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any five* questions: 2×5=10
 - (a) What is the life time of a particle in a energy level? Write the relation of it with B coefficient. 2
 - (b) Write down the properties of a Gaussian beam. 2
 - (c) Define population inversion. How does it achieved in lasers? 2
 - (d) What are the advantages of semiconductor lasers over other conventional lasers? 2
 - (e) What is TEM₀₀ mode? 2
 - (f) What is nonlinear susceptibility tensor? 2
 - (g) Define signal to noise ratio? 2

2. Answer *any four* questions: 5×4=20
 - (a) Why do we not have 2-level laser? 5
 - (b) Establish the relation between Einstein's A and B Coefficient. 5
 - (c) Explain the role of He and N₂ in CO₂ laser. 5
 - (d) Explain various types of resonators. 5
 - (e) Derive the expression of intensity dependent refractive index. 5

3. Answer *any one* question: 10×1=10
 - (a) Describe Q Switching. What are the different types of Q Switching? What is a Photodiode? Explain the working principle of a Photodiode. 2+4+1+3=10
 - (b) Derive expression for intensity of light obtained in second harmonic generation and from this show that second harmonic generation production efficiency depends on the magnitude of the phase-matching. 10