

Third Semester Internal Examination, September 2026

Minor Course in Physics

Solidstate Physics and Spectroscopy

PHY3MN202

Time: 1 Hr

Max Marks: 35

Name:	Marks Scored	Section A		Total Marks
Class:		Section B		
Class No.:		Section C		

Section A

(Each question carries 3 marks, Max marks for section – 7)

1. Distinguish between spontaneous and stimulated emission.
2. What are Einstein's coefficients? Show the relation between them.
3. What are the conditions for a wavefunction to be physically acceptable?

Section B

(Each question carries 6 marks, Max marks for section – 18)

4. Describes the different types of molecular energies and draw the quantised energy levels of each of these types.
5. A molecule makes a transition between the ground state and an excited state having a lifetime of 10^{-3} s. Calculate the uncertainty in the excited state energy level and the width of the associated spectral line.
6. Explain pressure broadening and Doppler broadening of spectral lines.
7. An eigen function of the operator $\frac{d^2}{dx^2}$ is $\sin(3x)$. Find the corresponding eigen value. Test whether $\psi(x) = e^{2x}$ is an eigenfunction of the same operator and if so, find its eigen value.

Section C

(Answer any one question, Each question carries 10 marks)

8. Explain the principle and components of LASER. Describe the characteristics of LASER radiation.
9. Derive the energy eigenvalues and normalised eigenfunctions for a particle confined in a one dimensional box of width L.

Tie this question paper in front of the answer sheet