**Government College for Women, Bawani Khera (Bhiwani)**

**Department of Physics**

**Academic Year: 2023-24**

Paper Title: **Quantum Mechanics (20UPHY 402)**

**Marks Allotted: 50**

**External Examination: 40**

**Internal Assessment: 10**

**Objective of Teaching the Paper:** Upon successful completion of the course, the student:

* Will be able to understand the basic concepts and principles of quantum mechanics and its

applications to simple systems like simple harmonic oscillator.

* Will be able to understand angular momentum and spin dynamics of quantum systems. Will

be able to solve angular momentum using CG coefficients.

* Will be able to distinguish odd half and integral spin particles. Can understand the symmetric

and antisymmetric particles.

* Will be able to find the energy and wave functions of quantum conservative systems.
* Will understand various approximation techniques and solve simple systems.

Mode of Transaction for the Paper:

* Lectures
* Discussion
* Assignments

**Readings:**

Essential Readings:

1. Quantum mechanics, D.J. Griffiths, Pearson Ltd.
2. Quantum mechanics V. K. Jain.
3. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill.

**Teaching Plan for the Academic ession 2023-24**

**B.Sc. 2nd Year, Semester 4th**

**Teacher:**

**Dr. Pawan Kumar Assistant Professor, Physics,** [**pawansaroha500@gmail.com**](mailto:pawansaroha500@gmail.com)

**Contact: +91-9466580255**

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| **Lesson Plan for The Month Feb 2024 to May 2024** | **Subject: Quantum Mechanics** |
| **Name Of the Teacher: Dr. Pawan Kumar** | **Class: BSc 4th Sem** |
| 01-02-2024 To 03-02-  2024 | Black body radiation, Quantum theory of radiation, Photon |
| 05-02-2024 To 10-02-  2024 | Photoelectric effect and Einstein’s photoelectric equation, Compton effect. |
| 12-02-2024 To 17-02-  2024 | In-adequacy of old-quantum theory, De Broglie hypothesis, Davisson and Germer experiment, Phase velocity and Group velocity |
| 19-02-2024 To 23-02-  2024 | Heisenberg’s uncertainty principal, Time-energy and angular momentum, position momentum uncertainty |
| 26-02-2024 To 02-03-  2024 | Uncertainty principle from de-Broglie wave, |
| 04-03-2024 To 09-03-  2024 | Wave function and its significance, properties of Wave function, |
| 11-03-2024 To 16-03-  2024 | Orthogonality and normalization of Wave function, Assignment 1 and Unit Test |
| 18-03-2024 To 22-03-  2024 | Time dependent Schrodinger Wave equation, Time independent Schrodinger equation, |
| 23-03-2024 To 31-03-  2024 | **Break (Holi)** |
| 01-04-2024 To 06-04-  2024 | Momentum and energy operator, Hermitian operators |
| 08-04-2024 To 12-04-  2024 | Commutators relation of various operators, eigen values and eigen function |
| 15-04-2024 To 20-04-  2024 | Probabilities and normalization, probability current densities and relation to wave function, |
| 22-04-2024 To 27-04-  2024 | Expectation values of dynamical quantities, particle in 1-dimension infinite square well. |
| 29-04-2024 To 04-05-  2024 | Application of Schrodinger wave equation in the solution of one-dimensional problem, one dimensional potential barrier, |
| 06-05-2024 To 11-05-  2024 | Solution of Schrodinger equation for harmonic oscillator ground state and excited state, Schrodinger equation in spherical coordinates, separation of variable r, θ, ϕ coordinates. |
| 06-05-2024 To 11-05-  2024 | Solution of θ and ϕ equations, spherical harmonics, Assignment 2 and Unit Test |

Dr. Pawan Kumar

Assistant Professor in Physics

GCW Bawani Khera