**Lesson Plan**

**(2018-19)**

Name of the Teacher: Dr. Neetu

Class and Section: B.Sc III year, Semester IV

Subject: Quantum, Laser

|  |  |  |
| --- | --- | --- |
| **Week** | **Date** | **Topics** |
| 1 | 16 |  |
| 17 |  |
| 18 |  |
| 19 | Overview, scale of quantum physics, boundary between classical and quantum phenomena, Photon |
| 20 | Photoelectric effect, Compton effect (theory and result), Frank- Hertz experiment, de-Broglie hypothesis. |
| 21 | Davisson and Germer experiment, G.P. Thomson experiment |
| 22 | **Sunday** |
| 2 | 23 |  |
| 24 |  |
| 25 |  |
| 26 | Phase velocity, group velocity and their relation, Heisenberg's uncertainty principle |
| 27 | Time energy and angular momentum, position uncertainty, Uncertainty principle from de Broglie wave. (Wave-particle duality) |
| 28 | Gamma Ray Microscope, Electron diffraction from a slit, |
| 29 | **Sunday** |
| 3 | 30 |  |
| 31 | **Shaheed Udham Singh’s Matyrdom Day** |
| 1- August-18 |  |
| 2 | Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle) |
| 3 | Time-independent Schrodinger wave equation |
| 4 | eigen values, eigen functions, wave functions and its significance |
| 5 | **Sunday** |
| 4 | 6 |  |
| 7 |  |
| 8 |  |
| 9 | Orthogonality and Normalization of function, concept of observer and operator |
| 10 | Expectation values of dynamical quantities, probability current density |
| 11 | Free particle in one-dimensional box, Free particle in one-dimensional box (solution of Schrodinger wave equation) |
| 12 | **Sunday** |
| 5 | 13 |  |
| 14 |  |
| 15 | **Independence Day** |
| 16 | eigen functions, eigen values, quantization of energy and momentum, nodes and anti nodes, zero point energy). |
| 17 | One dimensional step potential E > Vo (Reflection and Transmission coefficient) |
| 18 | One dimensional step potential E > Vo (Reflection and Transmission coefficient) |
| 19 | **Sunday** |
| 6 | 20- August-18 |  |
| 21 |  |
| 22 |  |
| 23 | Assignment I |
| 24 | One dimensional step potential E < Vo (penetration depth calculation). |
| 25 | One dimensional step potential E < Vo (penetration depth calculation) |

**-----1-----**

|  |  |  |
| --- | --- | --- |
|  | 26 | **SundayRakshaBandhan** |
| 7 | 27 |  |
| 28 |  |
| 29 |  |
| 30 | One dimensional potential barrier, E > Vo (Reflection and Transmission coefficient) |
| 31 | One-dimensional potential barrier, E < Vo (penetration or tunneling coefficient). |
| 1-Sept-18 | One-dimensional potential barrier, E < Vo (penetration or tunneling coefficient). |
| 2 | **Sunday** |
| 8 | 3 | **Janamshatmi** |
| 4 |  |
| 5 |  |
| 6 | Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states). |
| 7 | Continue (06-09-2018) |
| 8 | Revision of Unit-2 |
| 9 | **Sunday** |
| 9 | 10 |  |
| 11 |  |
| 12 |  |
| 13 | Unit III: Laser Physics –I Absorption and emission of radiation, Main features of a laser: Directionality, high intensity |
| 14 | **Samvatsari** |
| 15 | high degree of coherence, spatial and temporal coherence |
| 16 | **Sunday** |
| 10 | 17 |  |
| 18 |  |
| 19 |  |
| 20 | Einstein's coefficients and possibility of amplification |
| 21 | momentum transfer, life time of a level, kinetics of optical absorption ((two and three level rate equation, Fuchbauerlanderburg formula) |
| 22 | momentum transfer, life time of a level, kinetics of optical absorption ((two and three level rate equation, Fuchbauerlanderburg formula) |
| 23 | **Sunday** |
| 11 | 24 |  |
| 25 |  |
| 26 |  |
| 27 | population inversion: A necessary condition for light amplification, resonance cavity, |
| 28 | laser pumping, Threshold condition for laser emission |
| 29 | line broadening mechanism |
| 30 | **Sunday** |
| 12 | 1-Oct-18 |  |
| 2 | **Mahatma Gandhi Jayanti** |
| 3 |  |
| 4 | homogeneous and inhomogeneous line broadening (natural, collision and Doppler broadening). |
| 5 | Test of Unit-2 |
| 6 | Assignment II |
| 7 | **Sunday** |
| 13 | 8 |  |
| 9 |  |
| 10 | **Maharaja Agrasen Jayanti** |
| 11 | Unit IV: Laser Physics – II He-Ne laser and RUBY laser (Principle, Construction and working) |
| 12 | Continue 11-10-2018 |
| 13 | Optical properties of semiconductor |
| 14 | **Sunday** |
| 14 | 15 |  |
| 16 |  |
| 17 |  |
| 18 | **Dussehra** |

**-----2-----**

|  |  |  |
| --- | --- | --- |
|  | 19 | Semiconductor laser (Principle, Construction and working) |
| 20 | Semiconductor laser (Principle, Construction and working) |
| 21 | **Sunday** |
| 15 | 22 |  |
| 23 |  |
| 24 | **Maharishi Valmiki Jayanti** |
| 25 | Applications of lasers in the field of medicine and industry. |
| 26 | Revision Unit-IV |
| 27 | **KarvaChauth** |
| 28 | **Sunday** |
| 16 | 29 |  |
| 30 |  |
| 31 |  |
| 1-Nov-18 | **Haryana Day** |
| 2 | Numerical Solving Class |
| 3 | Doubt Session |
| 4 | **Sunday** |
| 17 | 5 |  |
| 6 to 13 | **Vacation – I (Diwali)** |
| 14 | **Examinations** |