Lesson Plan

(LASER SYSTEM AND APPLICATIONS) (ROE-043)

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| L. No. | Content | Remark |
| 1 | **Unit – I Basic Principle of Modern Physics:** |  |
| 2 | Black body radiation |  |
| 3 | Atomic structure |  |
| 4 | Spectral series of hydrogen atom |  |
| 5 | Polarization |  |
| 6 | Absorption and florescence of X-ray, |  |
| 7 | Energy distribution in electrons |  |
| 8 | Probability of distribution of free electrons |  |
| 9 | Free electron in metals |  |
| 10 | Energy level in free electrons |  |
| 11 | Application of Schrodinger equation in potential well, |  |
| 12 | Potential step, tunneling effect. |  |
| 13 | **Unit – II: Elements and Techniques of Laser** |  |
| 14 | Concept of coherence |  |
| 15 | Temporal and Spatial coherence, |  |
| 16 | Coherence length and time |  |
| 17 | Brightness and Intensity |  |
| 18 | Directionality and Monochromacity |  |
| 19 | Absorption, Spontaneous and Stimulated Emission process |  |
| 20 | Einstein’s coefficients |  |
| 21 | Population inversion, |  |
| 22 | Pumping and pumping schemes, |  |
| 23 | laser gain |  |
| 24 | Optical cavities |  |
| 25 | Optical cavities and its types |  |
| 26 | **Unit – III:Principle of Laser & General Lasers:** |  |
| 27 | Main components of Laser |  |
| 28 | Principle of Laser action, |  |
| 29 | Introduction to general lasers and their types |  |
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| 31 | Three & four level Lasers, |  |
| 32 | Three & four level Lasers, |  |
| 33 | Continuous Wave Lasers |  |
| 34 | Pulsed Lasers |  |
| 35 | Q-switch lasers |  |
| 36 | **Unit – IV: Systems Types of Laser** |  |
| 37 | Solid state Lasers: Neodymium laser |  |
| 38 | Nd-Yag laser, |  |
| 39 | Nd-Glass laser and Alexandrite laser |  |
| 40 | Liquid Lasers: Dye laser |  |
| 41 | Tuning in Dye laser, |  |
| 42 | Model-Locked Ring Dye laser. |  |
| 43 | Gas Laser: Ionic lasers,. |  |
| 44 | Argon ion laser, Krypton ion laser |  |
| 45 | He-Cadmium laser |  |
| 46 | Copper vapour laser, Carbon dioxide laser. |  |
| 47 | Excimers laser. Semiconductor Laser. |  |
| 48 | Characteristics of semiconductor lasers, Semiconductor diode lasers, |  |
| 49 | Hetrojunction lasers, Homojunction lasers, |  |
| 50 | Quantum well lasers. |  |
| 51 | **Unit – V Material Processing: Material processing with lasers,** |  |
| 52 | Interaction mechanism, Material processing mechanism |  |
| 53 | Drilling, Cutting and Welding process with laser. |  |
| 54 | Laser hardening. Medical Science: Medical lasers |  |
| 55 | Laser diagnostic, Laser in ophthalmology, laser in glaucoma |  |
| 56 | Laser for general surgery, Laser in dermatology, laser in dentistry, Laser in medicine. |  |
| 57 | Optical Communication: Optical source for fiber optical communication |  |
| 58 | Powering and coupling, Transmission, Hologram their characteristics. LIDAR. |  |

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