**CURRICULUM PLAN 2021-22**

Even Semester: II, IV, VI

**Dr. Savita Sharma**

Department of Physics

**B.Sc. (H) Physics – III year, VI Sem**

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| Content | Allocation of Lectures | Month-wise Schedule followed | Tutorial/assignment/  presentation etc |
| **DSE - Nano Materials and Applications** | | |  |
| **SYNTHESIS OF NANOSTRUCTURE MATERIALS (Qualitative):** Top down and Bottom-up approach, Photolithography. Ball milling. Spin coating, Vacuum deposition:  Physical vapor deposition (PVD): Thermal evaporation, Sputtering, Pulsed Laser  Deposition (PLD), electric arc deposition for CNT, C  60, grapheme, Chemical vapor deposition (CVD). Preparation through colloidal methods (Metals, Metal Oxide nanoparticles), Molecular Beam Epitaxy (MBE) growth of quantum dots | 5 | 3-Jan to 13-Jan | Syllabus Overview  Reference books  Problem solving  Theory & Concept Understanding,  ICT Usage – YouTube Videos, Animations etc. |
| **CHARACTERIZATION: Structure and Surface morphology:** X-Ray Diffraction  (XRD). Scanning Electron Microscopy (SEM). Transmission Electron Microscopy  (TEM). Atomic Force Microscopy (AFM).Scanning Tunneling Microscopy (STM).  **Spectroscopy:** Working principle of UV-Vis spectroscopy, IR Spectroscopy, Raman and  Photoluminescence Spectroscopy and study the size dependent properties using these  techniques. | 11 | 17-Jan to 3-Feb | Theory & Concept Understanding,  ICT Usage – YouTube Videos, Animations etc.  Derivations.  Class test in Quiz form on unit end.  Discussion of  Important questions |
| **OPTICAL PROPERTIES:**  Quasi-particles and collective excitations (Qualitative  idea). Quantitative treatment of excitons, Radiative processes: General formalization of absorption, emission and luminescence. Optical properties of nanoparticles as a function of  size, defects and impurities: deep level and surface defects. Numerical problems based on  above topics | 10 | 7-Feb to 21-Feb | Theory & Concept Understanding,  ICT Usage – YouTube Videos, Animations etc.  Discussion of  Important questions  Presentation Assignment Given.  MCQ Quiz test. |
| **APPLICATIONS (Qualitative):** Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). CNT based transistors. Nanomaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots-magnetic data storage. Micro Electromechanical  Systems (MEMS), Nano Electromechanical Systems (NEMS). | 06 | 23-Feb to 10-March | Theory & Concept Understanding,  ICT Usage – YouTube Videos, Animations etc.  Powerpoint presentation  Mock Exam of entire syllabus for IA.  Discussion of previous year papers. |