**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, C60, 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 OverviewReference booksProblem solvingTheory & 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 ofImportant 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 ofImportant questionsPresentation 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 presentationMock Exam of entire syllabus for IA.Discussion of previous year papers. |