ADD-ON COURSE OF
DEPT. OF PHYSICS

Smart Materials and Structures: (10 L + 1 Visit)

❖ ***Introduction to smart materials***:

- Intelligent materials: Embedded vs artificial; Definition; classification; Need of smart materials in modern era; role of smart materials in intelligent system. (1L)

❖ ***Electrically Active Materials:***

- *Piezo and Ferro Electric materials:* coupling coefficient; piezoelectric constant; piezo ceramics; piezo composites; polycrystalline and single crystal piezo materials; polymer based piezo materials; Ferroelectric loop and materials: applications.
- *Dielectric materials:* Definition; Dielectric constant; Electrostrictive materials; Electrochemical fluids; applications.
- *Ionic Materials:* conductive polymers; CNT; Smart 2-D materials; Polymer-metal composites. (4L)

❖ ***Thermally Active Materials:***

- Shape metal alloy; classification; transformation; Applications. (1L)

❖ ***Magnetically Active Materials:***

- Magneto-mechanical coupling coefficient; Joules effect; Villari Effect; Matteucci Effect; Widemann Effect; Magnetostriction; Superconductors, Magneto-rheological fluid; Applications. (2L)

❖ ***Chemically Active Material:***

- Redox Materials: Electrochemical Effect; Chemical Gels, Self-healing materials, Applications. (1L)

❖ ***Optically Active Materials:***

- Basics of Non-linear optical Materials; Polymers, liquid crystals; Single crystals; Applications. (1L)