



Facilitated by AICTE, NQM, APSCHE,  
IITM, IBM, TCS & Others

# Online Faculty Programme on QT-10 Solid State Physics for Quantum Technologies

May 08 – 30, 2026  
Twenty Days (Mon to Sat)  
Time: 3– 5 PM (Daily 2 Hours)



Jointly Organized by Meity, MNITJ, IITG, IITK,  
NITP, IIITDM & Others

**Chairman, EICT Academy &  
Director MNIT Jaipur**

Prof. Narayana Prasad Padhy

**Chief Investigator, EICT Academy**

Prof. Vineet Sahula, ECE

**Coordinator, EICT Academy**

Dr. Satyasai Jagannath Nanda, ECE

**Co- Chief Investigators, EICT Academy**

Prof. Lava Bhargava, ECE

Prof. Pilli Emmanuel Shubhakar, CSE

Dr. Ravi Kumar Maddila, ECE

**Objective (Electronics & ICT Academy-Phase II)**

- 1) To conduct specialized FDPs for faculty/mentor training in line with the vision of MeitY by promoting emerging areas of technology and other high-priority areas that are pillars of both the "Make in India" and the "Digital India" programs.
- 2) To promote synergy and collaboration with industry, academia, universities and other institutions of learning, especially in emerging technology areas.
- 3) To support the National Policy on Electronics 2019 (NPE 2019) which envisions positioning India as a global hub for ESDM sector, including MeitY Schemes/policies such as Programme for Semiconductors and Display Fab Ecosystem; India AI; National Programme on AI, Production Linked Incentive Scheme for IT Hardware & Large-Scale Electronics Manufacturing; EMC; SPECS; Chips to System (C2S); etc.
- 4) To promote standardization of FDPs through Joint Faculty Development Programmes.
- 5) To support the vision of the National Education Policy (NEP 2020), which mandates that Indian educators go through at least 50 hours in professional development programmes per year.
- 6) To design, develop & deliver specialised FDPs on emerging technologies/ niche areas/ specialised modules for specific research areas for Faculty in Higher Education Institutions (HEI), besides FDPs on multi-disciplinary areas connected with ICT tools and technologies and other digital hybrid domains, covering a wide spectrum of engineering and non-engineering colleges, polytechnics, ITIs, and PGT educators.

An intensive **20 Day - 40 Hours** Training Programme in Online Mode is being organized for faculty and doctoral students of engineering, science, and technological institutions. It is also open to working professionals from the industry/organizations. The programme will be run for **only two hours** in the afternoon from **15:00 to 17:00 hours Daily (Mon to Sat)**.

**QT-10: Solid State Physics for Quantum Technologies** is the **Ninth** in a series of Faculty Development programmes aligning to the courses in the recently approved **Minor Course Curriculum on Quantum Materials** by AICTE, DST and IBM.

<https://facilities.aicte-india.org/Minor Quantum Technologies.pdf>

**Experts/Speakers-**

- 1) Prof. Sanjeev Srivastava, IIT Kharagpur
- 2) Prof. J P Singh, IIT Delhi
- 3) Prof. Aravinda S, IIT Tirupati
- 4) Dr. Mostafizur Rahaman, Quantum Research Scientist, IBM
- 5) Prof. Aditi Sen De, QIC group, HRI Allahabad
- 6) Dr. Rahul Singhal, MNIT Jaipur
- 7) Dr. K Venkataratnam Kamma, MNIT Jaipur
- 8) Dr. Aswath Babu H, IIIT Dharwad

**Programme Modules:**

**Structure and bonding in solids, properties, characterization:** Unit cells, crystal lattices and structures, Bravais lattices, miller indices and d-spacing, Laue equations and Bragg's law, atomic scattering factor, bonds, Drude theory of metals, electrical conductivity, Hall effect, density of energy states, MB, BE and FD statistics, characterization tools-XRD, FTIR, Raman, XPS.

**Lattice vibrations, free electron theory, formation of energy bands:** Lattice vibrations, 1D mono-atomic and di-atomic chains, normal modes, concept of phonons, classical theory of solids, free electron theory, electron in periodic potential, Bloch theorem, K-P Model, formation of energy bands, band gap, effective mass, concept of negative mass.

**Magnetism and Superconductivity:** Origin of magnetism, diamagnetism, quantum theory of diamagnetism, paramagnetism, ferromagnetism, mean field theory, Curie Weiss law, domain theory of ferromagnetism, superconductivity, BCS theory, Type-I and II superconductors, high TC superconductors, Josephson's effect and SQUID.

**Basics of Quantum Technologies:** Review of Quantum Mechanics, Qbit, matrix and Bloch sphere representation, computational basis, unitary evolution, multi qubit states, multiqubit devices, qubit-qubit interaction and entangling gates, spin qubits, electron spin manipulation, two spin qubit gates, scaling up spin qubits, quantum error correction, no-cloning theorem, superdense coding, pure states to bell states, bell inequalities, density operator, pure and mixed ensemble, interfacing qubit and photons, circuit quantum electrodynamics.

**Principal Coordinator**

**Dr. Rahul Singhal**  
9549654378(M)

**Joint-Principal Coordinator**

**Dr. K. Venkataratnam Kamma**  
9549654377 (M)

**Registration:**

Registration is open to faculty, working professionals, industry persons, doctoral, postgraduate and graduate students. Participants will be admitted on first-come first-served basis.

Register online at-(<http://online.mnit.ac.in/eict/>)

**Certification Fee:**

- Academic (Faculty/PhD Scholars) [(India/SAARC/African countries)]: **₹500/-**
- Professionals / Industry / Others [India / SAARC / African countries]: **₹1000/-**
- Participants from the **Rest of the World USD: US\$ 60**

(A) The fee covers online participation, material and certification charges.

(B) Webinar Classes will be on Cisco **WebEx**, Notes / Slides will be shared and Quizzes / Assignments will be conducted on **Canvas** e - Learning Platform,  
→ For any other query, email us at [fdp.eict@mnit.ac.in](mailto:fdp.eict@mnit.ac.in)



**Malaviya National Institute of Technology (MNIT) Jaipur** one of the oldest NITs, the institute has a rich heritage of sixty years producing world class engineers, managers, architects and scientists. Ranked 43rd nationally in the NIRF ranking-2024 (Engineering), the institute offers learning opportunities for undergraduate, postgraduate students, and researchers in various domains.

**Andhra Pradesh State Council of Higher Education (APSCHE)**, the first of its kind in the country, set up as per the recommendations of the NEP, is primarily a coordinating body between the **University Grants Commission (UGC)** and the **State Government Universities**