INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

1. **Name of the Academic Unit: Materials Science Centre**

2. **Subject Name: Fundamentals of Electronic Materials and Devices**
   L-T-P: 3-1-0 Credits:4

3. **Pre-requisites: None**

4. **Syllabus and reference books:**

Syllabus:

Part I Foundation of Electronic Materials (8h)

1. Introduction
2. Bonding in Materials
3. Crystal Structure
4. Defects in Crystals

Part II Semiconducting materials and devices (12h)

6. Intrinsic and Extrinsic Semiconductors
7. Doping: Majority / Minority Carriers
8. Diffussion and Conduction
9. Schottky & Ohmic Contacts
10. Devices – I (p – n junction)
11. Devices – II (light emitting devices)
12. Devices – III (photo – voltaic and photo – detecting devices)

Part III Semiconductor processing techniques (10h)

13. Introduction to crystal growth (bulk and epitaxy)
14. Semiconductor processing technology (oxidation, diffusion, ion implantation, metallization)
15. Lithography
16. Junction fabrication
17. Semiconductor device packaging

Part IV Functional electronic materials (6h)

18. Dielectric Materials
19. Energy Harvesting Materials
20. Materials for Organic Electronic Devices

Reference Books:

1. Principles of Electronic Materials and Devices, S. O. Kasap
2. Electronic Properties of Materials, Rolf E. Hummel
3. Solid State Electronic Devices, Ben G. Streetman and Sanjay K. Banerjee
4. VLSI Technology, S. M. Sze
5. Electroceramics: Materials, Properties Applications, A.J. Moulson and J.M. Herbert

5. Lecture-wise break-up:

Sl. No.	Topic	No. of lectures
1.	**Foundation of Electronic Materials**	8
2.	**Semiconducting materials and devices**	12
3.	**Semiconductor processing techniques**	10
4.	**Functional electronic materials**	6
5	**Tutorials**	12
	Total number of hours	42