

AMCT23 ELECTRONIC CERAMICS

UNIT-1 CERAMIC INSULATORS

- 1.1 Porcelain insulators- triaxle, steatite,
- 1.2 Non feldspathic types- composition, properties and uses
- 1.3 Dielectric strength- dielectric breakdown mechanisms
- 1.4 Factors affecting dielectric strength
- 1.5 Dielectric constant and loss-polarization- different types of polarization-
- 1.6 Effect of frequency and temperature.

UNIT-2 CERAMIC CAPACITORS

- 2.1 Capacitance-ferroelectric behavior
- 2.2 Barium titanate- effect of solid solutions
- 2.3 Additives- film capacitors, single layer discrete capacitors
- 2.4 Multilayer capacitors- basic principles and fabrication processes.

UNIT-3 FERROELECTRIC CERAMICS

- 3.1 Piezo-electricity- barium titanate, relaxor ferroelectrics,
- 3.2 Multiferroics, ferroelectricity, manufacture of barium titanate based ceramics
- 3.3 Properties of ferroelectric ceramics- hysteresis loop
- 3.4 PZT- PLZT materials, compositional systems, processing and fabrication
- 3.5 Mixed oxide and chemical precipitation processes.

UNIT-4 MAGNETIC CERAMICS

- 4.1 Classification of magnetic materials
- 4.2 Domain theory- Ferromagnetism
- 4.3 Spinel ferrites- structure, types of ferrites- manganese, zinc ferrites
- 4.4 Hexagonal ferrites- garnets
- 4.5 Standard ceramic processing and fabrication techniques-GMR.

UNIT-5 VARISTORS AND FUEL CELLS

- 5.1 Introduction- ZnO varistors- PN junction diode
- 5.2 Electrical characteristics, fabrication of ZnO varistor behavior-
- 5.3 Microstructure- gas sensors fuel cells-
- 5.4 Types, principle, working, solid oxide fuel cells
- 5.5 Applications- structure and operation principle of oxygen sensors, NO_x sensors.

References Books:

1. Setter N and Colla SL, Ferroelectric Ceramics, Birkhauser Ver Lag, 1993.
2. S.Somiya, F.Aldinger, N.Clausen, RM Sprigs, K.Uchino, K.Koumoto, M.Kaneno, Handbook of Advanced Ceramics : Vol.II, Processing and their applications, Academic Press, 2003.
3. Buchanan RC, Ceramic Materials for Electronics, Marcel Dekker Inc., NY, 1991.