Introduction: (6 hrs)

History of Satellite; Characteristics of satellite communication systems; Orbital satellites; Geostationary satellite; Orbital patterns; Orbital classification; Spacing and frequency allocations look –angle.

Satellite System Modeling: (4 hrs)

Up – link models; Down – link models; Transponder models; Comparison between transponder types; Frequency bands; characteristics of satellite channel.

Satellite System Link Equation (Power Link Budget): 8 (8 hrs)

Antennas; Receiving &transmitting equipment parameter; Link losses Up-link &Down –link equations; Influence of propagation medium; Atmospheric effect; Ionosphere effect.

Satellite Networks: (18 hrs)

On- way link; Broadcast network; Tow –way link between tow each stations; Multiple Access Techniques; Frequency Division Multiple Access (FDMA); Time Division Multiple ACCESS (TDMA); Multiplexing & Modulation with FDMA& TDMA; Inter – modulation product; Time Random Multiple Access (TRMA); Code Division Multiple Access (CDMA); Hybrid Multiple Access Techniques; Fixed & demand assignment; Multi- beam satellite network; FDMA with multi – beam satellite network; TDMA with multi – beam satellite network (SS/TDM).
**Earth Station Technologies:** (9 hrs)

Organization of an earth station; Earth station design objective; Earth station equipment; Antenna pointing and tracking; Mobile & transponder earth station.

**Introduction of Mobile Communication:** (3 hrs)

Frequencies used for radio communication; Classification of radio frequencies; Atmosphere; Skip distance & Maximum Usable Frequency.

**Cellular Concept- System Design Fundamentals:** (14 hrs)

Fundamentals elements; Frequency reuse; Channel assignment strategies; Handoff; Interference; Capacity; Planning Cellular system; Improve capacity; Tracking grade of service.

**Propagation & Path loss:** (14 hrs)

Large-scale path loss, free-space propagation model, reflection, Diffraction, Scattering, Line budget design, type of fading, mobile multi-path channel.

**Mobile Networks:** (14 hrs)

Introduction, Cellular networks (BT, BTC, MTSO, Registers…), Deference between mobile and fixed telephone network, first gen., second gen.