M.Sc. Physics IV-Semester Theory

4.4B: Electronics (Special – IV): Satellite and Mobile Communication

Unit - I: **12Hrs**

Satellite Communication - I: History of Satellites, Kepler's laws, Principles of Satellite orbits and positioning, Satellite Height, Speed, Angle of inclination, Geo synchronous orbits, Position coordinates in latitude and longitude, Azimuth and elevation, Repeaters and Satellite Transponders, Frequency allocations for Transponder channels, Spectrum usage, Frequency Reuse, Satellite Subsystems – Attitude and Orbit Control Systems, Communication Subsystems, Channelization process - Multi channel Architecture, Power Subsystems; Telemetry, Command and Control Sub-systems.

Unit-II: **12Hrs**

Satellite Communication - II: Ground station, Antenna Subsystems, Receive Subsystems - Receive ground control equipment, Transmitter Subsystems – Transmit ground control equipment, Power Subsystems, Telemetry and Control Subsystems, Satellite Applications - Communication satellites, Digital Satellite Radio, Surveillance satellites, Global Navigation Satellite Systems - Space segment, Control segment, GPS receivers - GPS Triangulation, GPS Applications.

Unit-III: **12Hrs**

Introduction to Cellular Mobile Systems: Limitations of conventional mobile telephone system - Spectrum efficiency considerations, Technology feasibility and affordability; Trunking efficiency, Basic Cellular System, Performance criteria – Voice quality, Service quality, Special features, Operation of Cellular Systems, Planning a Cellular System – Regulations, Engineer's role and Finding solutions:

Unit-IV: **12Hrs**

Elements of Cellular Mobile Radio System: General Description – Maximum number of Calls per Hour, Maximum number of frequency channels per cell, Frequency Reuse Channels – Frequency reuse schemes, Frequency reuse distance, Number of customers in the system, Co-channel interference reduction factor, Handoff Mechanism, Cell Splitting, Personal Communication System (PCS) – Standards, 1G, 2G, 3G and 4G.

Recommended Books:

1. Electronic Communication Systems - ***Wayne Tomasi,*** 5th edition, Pearson Education.
2. Principles of Electronic Communication Systems – ***Louis E. Frenzel*** (3rd Ed.) MGH

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3. Principles of Communication Systems – ***H. Taub, D. L. Schilling, Goutam Saha*** (3rd edition), TMH
4. Satellite Communications - ***Timothy Pratt, Charless Bostian, Jeremy Allnutt,*** 2nd edition, Wiley.
5. Electronic Communications – ***Dennis Roddy and John Coolen***, Pearson Education.
6. Mobile Cellular Communications – ***William C. Y. Lee,*** 2nd edition, MGH.
7. Mobile Communications – ***Jochen H. Schille***

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