

**Syllabus of Proposed Open Elective for BE (E & TC)**  
**404190: Advanced Satellite Systems and Applications**

**Teaching Scheme**

**Lectures: 4 Hrs/week**

**Examination Scheme**

**Paper: 100 Marks(3 hrs Duration)**

**Unit I**

**Introduction to Satellite Communication Systems**

Satellite Communication overview, Orbital Mechanics, Look Angles, Attitude and Orbit Control System, Telemetry; Tracking Commands and Monitoring System, Power System, Communication systems, Transponders, Different types of Antennas and relationships, Antennas used in practical systems. (8 hrs)

**Unit II**

**Information Transmission in Satellite Communication Systems**

Analog Transmission using Satellite for Telephony and TV signals, Signal to Noise Ratio, evaluations for telephony and Television systems, Data transmission using Analog FM channels, Digital Transmission on Satellite Channels, Bit and Symbol Error Rates, Raised Cosine signal shaping, Bit Error Rate evaluation using BPSK/QPSK for digital transmission through satellites, SNR for Digital telephony and Television transmission through satellites. (8 hrs)

**Unit III**

**Satellite Communication Systems Design**

Basic Transmission Theory for satellite signal transmission, System Noise Temperature and G/T Ratio, Satellite link Budgets, Satellite System using Small Earth Stations, design for Specified C/N, Link design procedures in C and Ku Band, Rain Attenuation Effects for Telephony, data & TV transmissions, Earth station technology for satellite communications. (8 hrs)

#### **Unit IV**

##### **Satellite Access and Interference considerations**

Satellite Access technologies, FDMA, TDMA, SSMA, CDMA systems, Interference considerations for satellite communications. (8 hrs)

#### **Unit V**

##### **Small Aperture Terminals and TV Program distribution through Satellites**

Network Architectures, VSAT-Earth Stations Engineering, Calculation of Link Margins for Star networks, System Design Procedures, Application for DBS TV and Radio, C / Ku Band satellite TV, Digital DBS, satellite Link Budgets for TV programme distribution. (8 hrs)

#### **Unit VI**

##### **Global Positioning System and other Satellite Applications**

GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, Differential GPS. Other satellite system applications like remote sensing, resources mapping, Data acquisition systems, weather forecasting etc. (8 hrs)

#### **Text Books:**

1. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
2. Satellite Communications - Dennis Roddy, McGraw Hill, 2nd Edition, 1996

#### **Reference Books:**

1. Timothy Pratt, Charles Bostian, Jeremy Allnut "Satellite Communications" Second Edition, John Wiley & Sons.
2. Satellite Communications Engineering - Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.