

SSP-5328

2009-2010

DEPARTMENT OF PHYSICS  
Curriculum for M.Sc. Space Physics and M.Sc. Physics  
 III Semester (w.e.f 2009-10 batch)  
SP-204 - RADAR SYSTEMS & SATELLITE COMMUNICATION

**UNIT - I**

**Radar Systems:**

Fundamental – A simple RADAR – overview of frequencies – Antenna gain Radar Equation – Accuracy and Resolution – Integration time and the Doppler shift (Ch 1 of Text Book 1)  
 Designing a surveillance radar – Radar and surveillance – Antenna beam – width consideration – pulse repetition frequency – unambiguous range and velocity – pulse length and sampling – radar cross section – clutter noise (Ch 2 of Text Book 1)  
 Tracking Radar – Sequential lobbing – conical scanning – Monopoles Radar – Tracking accuracy and Process – Frequency Agility – Radar guidance (Ch3 of Text Book 1)

**UNIT - II**

Signal and Data Processing – Properties of clutter – Moving Target Indicator Processing Shareholding – Plot extraction – Tract Association, Initiation and Tracking (Ch 5 of Text Book 1)  
 Radar Antenna – Antenna parameters – Antenna Radiation Pattern and aperture distribution – Parabolic reflector – cosecant squared antenna pattern – effect of errors on radiation pattern – Stabilization of antennas (Ch7 of Text Book 2).

**UNIT - III**

**Satellite Communication**

Satellite System – Historical development of satellites – communication satellite systems – communication satellites – orbiting satellites – satellite frequency bands – satellite multiple access formats (Ch1 of Text Book 3).

Satellite orbits and inclination – Look angles, orbital perturbations, space craft and its subsystems – attitude and orbit control system – Telemetry, Tracking and Command – Power system – Transponder – Reliability and space qualification – launch vehicles

(Ch2 & 3 of Text Book 4)

**UNIT - IV**

Multiple Access Techniques – Time division multiple access – Frequency division multiple access – Code division multiple access – Space domain multiple access

(Ch 7 of Text Book 4).

Earth Station technology – Subsystem of an earth station – Transmitter – Receiver Tracking and pointing – Small earth station – different types of earth stations – Frequency coordination – Basic principles of special communication satellites – INMARSAT VSAT, GPS, RADARSAT, INTELST

(Ch 10 & 11 of Text Book 4).

**Text Books:**

1. Understanding Radar Systems – Simon Kingsley and Shaun Quegan.
2. Introduction to Radar Systems – MI Skolnik
3. Satellite Communication – Robert M. Gagliardi
4. Satellite Communication – Manojit Mitra