SATELLITE COMMUNICATION EC 601 ECC
E.C-IIIrd YEAR (VIth SEMESTER)

	Lecture	Tutorial	Practical
Teaching Hours	3	0	0
Examination Scheme Marks	100	00	Cont. Evaluation: 00 Examination: 00

Faculty: Ms. Vandana J.Shah. & Mr.Dhiren Bhagat

Sr. No.	Contents	Text Book	Ref. Book
1.	**Overview of Satellite Systems:** Frequency Allocations for Satellite Services.	**[1]** Pg No-2	
2,3,4	**Orbit & Launching Methods:** Introduction, Kepler's first Law, Kepler's second Law, Kepler's Third Law, Definition of terms for earth orbiting satellites, Orbital elements, Apogee and Perigee Heights, Orbital Perturbations-effects of Nonspherical Earth, Atmospheric Drag, Inclined Orbits-Calendars, Universal Time, Julian Dates, Sidereal Time, The orbital Plane, Sun-Synchrnous orbit, The Geostationary orbit- Antenna Look Angles, The Polar Mount Antenna, Limits of Visibility, Earth Eclipsed of Satellite, Sun Transit Outage.	**[1]** Pg.No-21-78	
5,6	**The Space Segment:** Introduction, The power supply, Attitude Control- Spin Stabilization, Three-Axis Stabilization, Station Keeping, Thermal Control, TT&C Subsystem, Transponders- The wideband receiver, The input demultiplexer, The Power Amplifier.	**[1]** Pg. No-159-178	
7,8	**The Space Link:** Introduction, Equivalent Isotropic Radiated Power, Transmission Losses- Free-space transmission, feeder losses, Antenna misalignment losses, fixed atmospheric and ionospheric losses, effects of rain.	**[1]** Pg. No-279-284	
9,10,11	**The link power budget equation & System Noise- Antenna Noise,** Amplifier Noise Temperature, Amplifier in cascade, Noise factor, Noise temperature of Absorption Networks, Overall system Noise Temperature	**[1]** Pg. No-286-294	
12,13	**Career to Noise Ratio, The Uplink-** Saturation Flux Density, Input Back-off, The Earth Station HPA, Uplink Rain-Fade Margin. **Downlink:** Output Back-off, Satellite TWTA output, Downlink Rain-Fade Margin. **Combine uplink and downlink C/N Ratio.**	**[1]** Pg. No-296-309	
14,15,16	**Power-efficient modulation techniques:** Baseband transmission system concept, Introduction to power efficient techniques, Equivalence of low-pass and bandpass channel models, Coherent and differentially coherent BPSK and QPSK system.	**[3]** Pg. No-267-269, 272, 277	**[2]** PgNo-128-192
17, 18,19	**Spectral-efficient modulation techniques:** Introduction linearly and nonlinearly amplified M-ary PSK and QAM Earth Station and satellite Modems, Minimum Shift Keying.	**[3]** 277-280, 298	**[2]** Pg No-240-249
20,21	**Information Theory:** Introduction, Measure of information, Engineering measure of information, Average Information per message-Entropy of a Source, Source Encoding(Huffman coding) Entropy, Channel Capacity of a discrete memoriless channel, Mutual Information	**[4]**Pg No-679-690; 693-698,706-709	**[3]** Pg. No-349-368, sums from chapter 9.
22,23,24	**Coding for error detection and correction:**	**[3]**	**[4]**

	Source coding/decoding, Huffman Coding, Channel coding, Algebraic Codes(Linear Block Codes), Hamming Distance, Cyclic Codes, Cyclic Encoder, Decoding of Cyclic Codes, Convolution Codes-Convolutional encoder, encoder(rate 1/2), Block Codes Vs. Convolutional Codes, Trelli's code diagram, code tree for encoder.	PgNo-391-408, 415-419, 421-434, 439-444, 446-448, 453-456,457, 459,460,	Pg. No-728-745, 747-755
25,26,27	**The Earth Segment:** Introduction, Receiver-only home TV systems- the outdoor unit, the indoor unit, Master Antenna TV system, Community Antenna TV system, Transit- Receiver Earth Stations.	**[1]** Pg. No-201-211	
28	**Satellite services:** Introduction,direct broacat astellite (DBS) services	**[1]** Pg No-399-403	
29	MSAT, VSATs	**[1]** Pg No-404-407	
30	Globle positiong satellite systems	**[1]** Pg No-411	
31	**Earth Segment:** Introuction	**[1]** Pg No-201-204	
32	receive only home TV systems	**[1]** Pg No-201-204	
33	Master antenna TV systems, community antenna TV systems	**[1]** Pg No-204-205	
34	Transmit-receive earth stations	**[1]** Pg No-206-211	
35	**Time Division Multiple Access systems(TDMA):** Introduction, Basic TDMA architecture.	**[1]** Pg No 356	**[3] Ch:8**
36	Reference burst, preamble and post amble	**[1]** Pg No 361-363	
37	Carrier recovery, network synchronization	**[1]** Pg No 363-367	
38	Unique word detection, traffic data	**[1]** Pg No 367-371	
39	Frame efficiency and channel capacity	**[1]** Pg No 372	
40	Pre assigned TDMA, demand assigned TDMA	**[1]** Pg No 373-375	

41	On-board signal processing for FDMA/TDM operation	**[1]** Pg No 384-386	
42	Coed division multiple access	**[1]** Pg No 390-393	**[3] Ch:8,11**

References:

[1]. Satellite Communication by Dennis Roddy, 2/e, McGraw-HILL International edition.
[2]. Digital communications-Satellite/earth station engineering by Kamilo Feher, Prentice-Hall Inc., USA.
[3]. Digital Communications (including Labwork), 2/e by M. Kulkarni, Umesh Publication.
[4]. B.P.Lathi, "Modern digital and analog communication systems", 3/e, Oxford University press, reprinted 2002.
[5]. R. P. Singh. "Communication systems- Analog and Digital", Tata McGraw Hill.