

Lecture Plan -1

Semester:-VIII Class:-ECS
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Course Code:-ECE-812-F

Section: A

S. No.	Topic :-Evolution and growth of communication satellite	Time Allotted:-
1.	Introduction – Satellite is used in many ways in our daily life . e.g. T.V. Broadcasting, mobile comm., ATM,weather forecasting etc.The first ever launched satellite was SPUTNIK-1 by USSR followed by SCORE of USA.Various organizations worldwide related to satellite comm.. are IFRB,CCIR,CCITT,WARC.	10 Min
2	Division of the Topic- -Evolution of satellite - Synchronous satellite -International Regulation and frequency co-ordination - Frequency band for satellite communication. -Frequency allocation for fixed satellite service and broadcasting satellites.	30 Min
3.	Conclusion Satellite in geostationary orbit remain permanently at the same place in sky at an altitude of about 35870 Km.	5 Min
4	Question / Answer X-Band is used for which purpose? -Military band Give the full form of ITU? -International telecommunication union.	5 Min

Assignment to be given:- To be given after completion of unit No. 1, 2

Reference Readings:-

- (1) Satellite communication by D.C.Aggarwal
- (2)
Satellite communication by Pratt & Bostian

Lecture Plan -2

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: A

S. No.	Topic :-Advantages of satellite communication, Active satellite,Passive satellite	Time Allotted:-
1.	Introduction- Application of digital satellite communication. in our daily life like STAR T.V.,difference between active and passive satellite,modem and codec.	10 Min
2	Division of the Topic- -advantages of satellite communication. -disadvantages of satellite communication. -Various types of satellite like Active satellite, Passive satellite - Modem & Codec	30 Min
3.	Conclusion- Modem is used for modulation & demodulation.Codec is used for coding & decoding.	5 Min
4	Question / Answer What is difference between active and passive satellite? -In active satellite amplification take place,in passive satellite it acts as reflector. What is the difference between modem and codec? - Modem is used for modulation & demodulation.Codec is used for coding & decoding	5 Min

Assignment to be given:- To be given after completion of unit No. 1, 2

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan-3

Semester:-VIII Class:-ECS Course Code:-ECE-812-F

Faculty Name: Akanksha Kulshreshtha

Subject:SATELLITE COMMUNICATION ENGINEERING

Section: A

S. No.	Topic :-General link design equations	Time Allotted:-
1.	Introduction- Discussion about the factors responsible for design of satellite like Weight of satellite, Cost of launching per Kg., Frequency allocation, Atmospheric Effect.	<u>10 min</u>
2	Division of the Topic- -Geometry of simple radio link - EIRP -Directivity of antenna -Various losses in system -Derivation of radiated power	<u>30 min</u>
3.	Conclusion- Path loss between a satellite and earth station is 195.6 dB and 199.1 dB at 4 GHz & 6 GHz respectively.	<u>5 min</u>
4	Question / Answer What is EIRP? -Effective isotropic radiated power What are various path losses? -atmospheric and ionospheric losses	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 1, 2

Reference Readings:-

- 1) Satellite communication by D.C. Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -4

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: A

S. No.	Topic :-System noise temperature	Time Allotted:-
1.	Introduction-Various source of noise in satellite are atmospheric noise and ionospheric losses.Carrier to noise ratio,Gain of antenna to the system noise temperature ratio are important aspects in link design.	<u>10 min</u>
2	Division of the Topic- -System noise temperature -Noise power at demod. Input -Noise power at output of IF amplifier - C/N ratio -C/N ratio in decibel -G/T ratio.	<u>30 min</u>
3.	Conclusion-G/T ratio is used to specify quality of E.S. figure of merit.To reduce noise temperature parametric amplifiers are used.	<u>5min</u>
4	Question / Answer Why G/T ratio is called figure of merit? -G/T ratio is used to specify quality of earth station. Factors on which G/T ratio depend? -G/T ratio depend on C/N.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:-

- 1)Satellite communication by D.C.Agarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -5

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: A

S. No.	Topic :-Atmospheric and ionospheric effect on link design	Time Allotted:-
1.	Introduction- Elevation angle,freespace losses,atmospheric losses,ionospheric losses effect the link design in different ways.	<u>10 min</u>
2	Division of the Topic- -Effect of rain attenuation at higher & lower frequency - Effect of lower layer e.g.absorption,diffusion -Effect of rain on 6/4 GHz & above 10 GHz - Effective path length	<u>30 min</u>
3.	Conclusion- Atmosphere have less effect on link quality at frequencies between 2 GHz & 10 GHz and for high elevation angle at 6/4 GHz rain attenuation is negligible	<u>5 min</u>
4	Question / Answer Which layer cause refraction & depolarization? - Upper layer of atmosphere Factors on which rain attenuation depend ? -Frequency,Rainfall rate,diameter and distribution of rainrate.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings: -

- (1) Satellite communication by D.C.Aggarwal
- (2) Satellite communication by Pratt & Bostian

LECTURE PLAN-6

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: A

S. No.	Topic :-Complete link design,Earth station parameter	Time Allotted:-
1.	Introduction- A single complete link consists of two earth stations and a satellite.radio relay is done by satellite.Thus the complete link is made up of uplink & downlink.	<u>10 min</u>
2	Division of the Topic-- (C/N) _u --(C/N) _d - (C/NO) _T - (S/N) _{out} -Earth station parameter	<u>30 min</u>
3.	Conclusion- -(S/N) _{out} =C*FM improvement/N _I N	<u>5 min</u>
4	Question / Answer What is condition for noise dominant? -C/I >C/N What is condition for interference dominant? - C/I <C/N	<u>5 min</u>

Assignment to be given:-

- 1.derive the general link design equation.
- 2.how the system become complete downlink limited?
- 3.draw the block diagram of earth station.
- 4.what is diff. between active and passive satellite

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan-8

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-S/N ratio with multiplexed telephone signal,SCPC system	Time Allotted:-
1.	Introduction- S/N ratio & C/N ratio in frequency modulation in satellite link,threshold value in FM detector,noise performance in telephone channel.	<u>10 min</u>
2	Division of the Topic- -Derivation of equation of FM modulated signal - Bessel function representation of FM -Improvement in S/N with BW compression - Threshold value of $[C/N]_i$ -psophometric weighting factor -loading factor -SCPC system	<u>30 min</u>
3.	Conclusion- SCPC link is active for only half the time under fully loaded condition.	<u>5 min</u>
4	Question / Answer What is threshold in full improvement? - 12.5dB Explain SCPC? -Single channel per carrier	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -9

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
 Faculty Name: Akanksha Kulshreshtha
 Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-CSSB system,analog FM/FDM techniques,TV satellite link	Time Allotted:-
1.	Introduction-Advantages of companding in FM/FDM is to increase the average power & S/N ratio is improved by 17dB.	<u>10 min</u>
2	Division of the Topic-- CSSB system -Individual voice channels stacked in frequency -Peak to peak luminance S/N ratio for a FM/FDM TV signal	<u>30 min</u>
3.	Conclusion-[S/N] _{pp} reduces to $[S/N]_{pp} = 40.24 + [C/N]_i(\text{Db})$ -----FSS $[S/N]_{pp} = 33.53 + [C/N]_i(\text{Db})$ -----DBS	<u>5 min</u>
4	Question / Answer What is companding ? Compression at transmit site followed by expansion in received site What are advantages of companding? It improves 16-17 dB overall S/N ratio	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -10

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-Intermodulation products,Energy Dispersal	Time Allotted:-
1.	Introduction- TWTA operating at saturation point give amplitude as well as amplitude as well as phase nonlinearities in FM/FDM signal.This generate intermodulation products.	<u>10 min</u>
2	Division of the Topic- -Operation characteristics of TWTA - intermodulation ratio -power loss due to intermodulation products -backoff power -energy dispersal	<u>30 min</u>
3.	Conclusion- intermodulation products fall with in the transponder bandwidth and interfere with each other. Energy dispersal signal is triangular waveform.	<u>5 min</u>
4	Question / Answer What is energy dispersal? -Controlling of radiated spectral density is known as energy dispersal. What is full loading? -Minimum power spectral density with maximum modulation amplitude.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -11

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-Advantages of digital comm.,elements of digital comm..	Time Allotted:-
1.	Introduction:-Advantages of digital comm. Are compatibility,flexibility,high degree of reliability,operating speed,miniaturization,precision in data handling.	<u>10 min</u>
2	Division of the Topic -Advantages of digital comm.. -Byte -Baud -Source encoder & decoder -digital baseband signal	<u>30 min</u>
3.	Conclusion- Digital comm.. is better than analog comm.in error handling.maintainence and operation of digital system is simpler.	<u>5 min</u>
4	Question / Answer What is byte? -One byte represents 8 bits. Explain baud. -A baud is the unit of signalling speed.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -12

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-Techniques used for digital modulation, satellite link design	Time Allotted:-
1.	Introduction- Discussion about the digital modulation techniques, Bit error, symbol error, channel capacity.	<u>10 min</u>
2	Division of the Topic - ASK -QASK -PSK -QPSK -BFSK -Satellite Digital Link Design	<u>30 min</u>
3.	Conclusion- Variation of rate R as a function of C/No has been studied for the digital satellite link- $C/N=(E_b/N_0)(R_b/B)$.	<u>5 min</u>
4	Question / Answer What is bandwidth of BPSK. - 2fp. What are the two components of QASK? -inphase component, quadrature component.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1) Satellite communication by D.C. Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -13

Semester:-VIII Class:-ECS Course Code:-ECE-812-F

Faculty Name: Akanksha Kulshreshtha

Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-Time division multiplexing	Time Allotted:-
1.	Introduction- In TDM, different channels are assigned different time slots in a specified time interval for transmission.	<u>10 min</u>
2	Division of the Topic - Principle of TDM -Information sources -Channel -Commutation	<u>30 min</u>
3.	Conclusion- Intermodulation effects are not present in TDM.it requires perfect synchronism between the multiplexing and demultiplexing commutators.	<u>5 min</u>
4	Question / Answer What is commutation? -process in which M information channels to be interleaved on to a single transmission channel. What is full form of BER? - bit error rate	<u>5 min</u>

Assignment to be given:-

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Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -14

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-Multiple access techniques	Time Allotted:-
1.	Introduction-This chapter introduces the concept of multiple access techniques TDMA Frame structure &burst structure,frame efficiency	<u>10 min</u>
2	Division of the Topic - FDMA -TDMA -TDMA Frame structure -Reference BURST STRUCTURE - traffic burst -TDMA Frame efficiency	<u>30 min</u>
3.	Conclusion TDMA Burst structure consists of a reference burst & traffic bursts.reference burst is composed of preamble[header]	<u>5 min</u>
4	Question / Answer What is multiple access? -It allows interconnection among large no. of earth station terminals simultaneously via satellite. What is role of reference burst? -It is used to synchronize & identify the frame	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -15

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-TDMA Superframe	Time Allotted:-
1.	Introduction- Discussion about TDMA superframe,frame acquisition & synchronization,the various timing involved at the transmitting & received sides in TDMA	<u>10 min</u>
2	Division of the Topic - TDMA Superframe -TDMA Frame acquisition -TDMA Frame synchronization - RFA -TFA	<u>30 min</u>
3.	Conclusion- Superframe combination reduces overheads considerably,increasing the TDMA Frame efficiency.the acquisition process is required when traffic station enters or reenters operation.	<u>5 min</u>
4	Question / Answer What is TDMA Superframe ? -To increase TDMA frame efficiency frames are combined in sequential manner called superframe. What is equation of delay? - $D_n(l+1) = D_n(i) - E_n(i)$	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -16

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :-TDMA compared to FDMA	Time Allotted:-
1.	Introduction- Discussion about TDMA & FDMA transponder capacity vs no. of accesses,transmission as well as reception of burst according to time plan	<u>10 min</u>
2	Division of the Topic -Intermodulation product in FDMA -Traffic capacities for FDMA & TDMA - Transmit burst time plan -received burst time plan	<u>30 min</u>
3.	Conclusion- FDMA is not suitable for increased system traffic due to intermodulation products. TDMA burst time plan is simply the traffic assignment with in a product.	<u>5 min</u>
4	Question / Answer What is burst time plan? -Burst time plan avoid overlapping of bursts at the satellite transponder. What is traffic planning process? Adjustment of burst time plan according to traffic change.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -17

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :- Satellite switched TDMA	Time Allotted:-
1.	Introduction- Multiple beam TDMA satellite switched TDMA is used in INTELSAT 6. It provides interconnection of UBS and DBS in the satellite comm. system and their interconnectivity.	<u>10 min</u>
2	Division of the Topic -Frame slots of earth station -SS-TDMA -SSTDMSA -Zone beam antenna -spot beam antenna	<u>30 min</u>
3.	Conclusion- Efficiency of SSTDMA is defined as ratio of actually used capacity to the total capacity from transponder.	<u>5 min</u>
4	Question / Answer What is zone beam antenna? -it can receive from transmitter anywhere within the coverage zone. What is number of UBS and DBS in INTELSAT 6.0? Six upbeams & six downbeams.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 3,4,5

Reference Readings:-

- 1) Satellite communication by D.C. Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -18

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: B

S. No.	Topic :- Beam hopping TDMA,CDMA & hybrid access technique	Time Allotted:-
1.	Introduction- IN Beam hopping TDMA switching is achieved by each station hopping from one frequency to another according to destination of transmitted burst.	<u>10 min</u>
2	Division of the Topic - Fixed assignment -Demand assignment -SPDA system -DASS network	<u>30 min</u>
3.	Conclusion- Beam hopping TDMA helps in avoiding the interburst interference associated with conventional TDMA.	<u>5 min</u>
4	Question / Answer Mention full form of CDMA. - code division multiple access What is SPADE system? -single channel per carrier access on demand equipment	<u>5 min</u>

Assignment to be given:-

- 1.what is difference between multiplexing and multiple access techniques.
- 2.what are advantages of digital comm..
- 3.Explain SCPC.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -19

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :-INTRODUCTION ,SYNCHRONOUS ORBIT	Time Allotted:-
1.	Introduction- satellite orbit has special significance and it has to be maintained geostationary at all cost. There are two problems- Launching and putting satellite in geostationary orbit Maintaining it.	<u>10 min</u>
2	Division of the Topic-- Kepler's Law -Newton's gravitational law -Derivation of equation putting satellite in geostationary orbit	<u>30 min</u>
3.	Conclusion-Centripetal force should be equal to the gravitational force to keep satellite in geostationary orbit	<u>5 min</u>
4	Question / Answer What are main problems in satellite comm..? - Launching and putting satellite in geostationary orbit - Station keeping. What is Kepler's first law? -the orbit of a satellite is an ellipse with the center of the earth at one focus.	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1) Satellite communication by D.C. Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan-20

Semester:-VIII Class:-ECS Course Code:-ECE-812-F

Faculty Name: Akanksha Kulshreshtha

Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :- ORBITAL PARAMETERS,LOOK ANGLE	Time Allotted:-
1.	Introduction- The look angles are the angles to which an earth station antenna must be pointed to communicate with the geostationary satellite.	<u>10 min</u>
2	Division of the Topic-- Eccentricity -Apogee distance -Perigee distance -Locus parameters -eccentric anomaly -azimuth angle,elevation angle	<u>30 min</u>
3.	Conclusion -Angles M,E are related by the equation $M=E-e \sin E$	<u>5 min</u>
4	Question / Answer Mention six orbital quantities. - eccentricity -semi major axis -time of perigee -right ascension of ascending node -inclination -argument of perigee	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

1)Satellite communication by D.C.Aggarwal

2) Satellite communication by Pratt & Bostian

Lecture Plan -21

Semester:-VIII Class:-ECS Course Code:-ECE-812-F

Faculty Name: Akanksha Kulshreshtha

Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :- Earth Coverage,slant range	Time Allotted:-
1.	Introduction- Coverage of earth by satellite over the country should be maximum.Slant range is calculated in terms of elevation angle.	<u>10 min</u>
2	Division of the Topic- -Co-ordinate of earth station -Slant range -Apex angle -maximum slant range	<u>30 min</u>
3.	Conclusion -Maximum coverage is given by portion of earth with in a cone with the satellite at its apex and tangent to the earth's surface.	<u>5 min</u>
4	Question / Answer What is value of maximum apex angle? -17.4 What is value of central angle for maximum apex angle? -81.3	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

1)Satellite communication by D.C.Aggarwal

2) Satellite communication by Pratt & Bostian

Lecture Plan -22

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :- Ecilpse effects, satellite placement	Time Allotted:-
1.	Introduction- Solar eclipses caused by the earth and moon affect the working of satellite and in particularly energy generated by solar cells	<u>10 min</u>
2	Division of the Topic- -Inclination angle of earth's equatorial plane -Movement of sun relative to earth -Eclipse due to earth when sun is at equinox -Satellite placement	<u>30 min</u>
3.	Conclusion Velocity increment changes the satellite's lower circular orbit into elliptical orbit with the perigee at initial altitude and with apogee at the altitude of final circular orbit.	<u>5 min</u>
4	Question / Answer What is the maximum shadow angle at equinoxes? 17.4 deg What is angle of inclination for maximum shadow angle? 8.7 deg	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1) Satellite communication by D.C. Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -23

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :- Station keeping	Time Allotted:-
1.	Introduction- Station keeping is required to keep the satellite in geostationary orbit.	<u>10 min</u>
2	Division of the Topic-- N-S station keeping -E-W station keeping -velocity increment and correction	<u>30 min</u>
3.	Conclusion A typical value for long lived satellite is $\lambda_{av}=0.86$ deg which corresponds to velocity increment correction for $v=460$ m/s.	<u>5 min</u>
4	Question / Answer What is north south station keeping? -It requires a thrust impulse perpendicular to orbital plane. What is accuracy for station keeping? -0.1 deg	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -24

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: C

S. No.	Topic :- Satellite stabilization	Time Allotted:-
1.	Introduction- Disbalancing of satellite is due to gravitational force,sun,moon,and planets solar pressure acting on antennas,earth's magnetic field.the control of these activities is done by satellite stabilization.	<u>10 min</u>
2	Division of the Topic-- Attitude control -three axis body stabilization. -spin stabilization.	<u>30 min</u>
3.	Conclusion Spin stabilzation is achieved by rotation of satellite body between 30 and 120 rpmcreating an initial stiffness which maintains the satellite spin axisprependicular to equatorial plane.	<u>5 min</u>
4	Question / Answer What do you mean by three axis? -yaw -roll -pitch axes What is disadvantage of spin stabilization? Use of de spun antenna	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -25

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
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Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-BDS,INMARSAT,INTELSAT	Time Allotted:-
1.	Introduction-Discussion about the special purpose communication satellite used at international level like INMARSAT,INTELSAT.Reconnaissance satellite used for military purpose.	<u>10 MIN</u>
2	Division of the Topic -Direct broadcast satellite -link component of DBS system -INMARSAT -Areas of working of INMARSAT - INTELSAT -Configuration of various intelsat system	<u>30 MIN</u>
3.	Conclusion- DBS also called as broadcast sat. system is meant for individual reception & community reception.in this reception of TV signal is direct.INMARSAT is used to indicate no. of ships & lives lost.	<u>5 MIN</u>
4	Question / Answer What is DBS? -Direct broadcast satellite e.g. TV What is INMARSAT? -INTERNATIONAL MARITIME SATELLITE ORGANISATION	<u>5 MIN</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

1)Satellite communication by D.C.Aggarwal

2) Satellite communication by Pratt & Bostian

Lecture Plan-26

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-VSAT,MSAT ,LEO s	Time Allotted:-
1.	Introduction-satellite are also used in ATM centers,mobile communication.MSAT is the marriage between satellite & mobile phones.	<u>10 MIN</u>
2	Division of the Topic -Very small aperture terminals -value added network -mobile satellite communication system -lower earth orbit satellite	<u>30 MIN</u>
3.	Conclusion- For MSAT satellite must provide sufficient power in the direction of coverage area.SARSAT is used for receiving passangers & crew members of sinking ships or crash airplanes.	<u>5 MIN</u>
4	Question / Answer What is VSATVAN? -it is for providing network management services that are expensive or diffcult to obtain from conventional data network what is use of LEO? -store and forward satellite communication	<u>5 MIN</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -27

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-SATELLITE Vs FIBRE OPTICS,LADSAT,DEFENSE SATELLITE	Time Allotted:-
1.	Introduction-satellite is for point to multipoint & for very long distance.optical fibre is for point to point & transmission needed high security.	<u>10 min</u>
2	Division of the Topic Satellite comm.. w.r.t. optical fibre - LANDSAT -defense satellites	<u>30 min</u>
3.	Conclusion- It is concluded that neither the technologies can replace each other.Both have its own application.LANDSAT provides worldwide high resolution multispectral data of earth surface.	<u>5 min</u>
4	Question / Answer What is LANDSAT? -It is one of the earth exploration satellite services (EESSS) What is use of reconnaissance satellite ? -These are used to monitor objects& their movements on ground	<u>5 min</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -28

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-LINK ANALYSIS,OPTICAL SATELLITE LINK TRANSMISSION	Time Allotted:-
1.	Introduction-laser satellite comm. at optical range provides three main advantages like greater BW,small beam divergence angle and smaller antennas.	<u>10 MIN</u>
2	Division of the Topic - link analysis -atmospheric effect -complete link analysis -C/N for transponder	<u>30 MIN</u>
3.	Conclusion- Optical computer solves the problem of slowness & heat build up associated with electronics computer.	<u>5 MIN</u>
4	Question / Answer Why laser can not be used for communication between earth station & satellite/ -Because it is atmospheric dependent. What is C/N for transponder? -C/N ratio refers to the uplink satellite carrier bandwidth	<u>5 MIN</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -29

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-optical link receiver, beam acquisition	Time Allotted:-
1.	Introduction-receiver consist of antannas,filter,photodetectors & conventional received electronics system.	<u>10 MIN</u>
2	Division of the Topic -Principle of direct detection system - Principle of heterodyne detection system - Photodetector noise model - Beam acquisition -	<u>30 MIN</u>
3.	Conclusion- Polarization,amplitude distrtribution & phase of local oscillator are matched to signal beam	<u>5 MIN</u>
4	Question / Answer What is photodetector? -device in which conductivity is due to photon of light. What is optical BW? Range of wavelength around the laser wavelength allowed by optical filter.	<u>5 MIN</u>

Assignment to be given:-

To be given after completion of unit No. 6,7,8.

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian

Lecture Plan -30

Semester:-VIII Class:-ECS Course Code:-ECE-812-F
Faculty Name: Akanksha Kulshreshtha
Subject:SATELLITE COMMUNICATION ENGINEERING

Section: D

S. No.	Topic :-tracking & pointing, deep space optical comm.. link	Time Allotted:-
1.	Introduction-The angle of drifting of receiving satellite is point ahead angle.Main spacecraft comm.. instrument is the optical Tran receiver package called optranspac.	<u>10 MIN</u>
2	Division of the Topic - point ahead angle -pointing error -block diagram of optical satellite crosslink - deep space optical comm.. link -	<u>30 MIN</u>
3.	Conclusion- Before optical data transmission transmitting antennas must acquire beacon from the receiver .in case point ahead is needed the transmitter must point ahead by proper angle & direction.	<u>5 MIN</u>
4	Question / Answer What is optical beacon? -unmodulated light source transmitted by receiving satellite back to the transmitting satellite what is optranspac? -optical transmitter & receiver package.	<u>5 MIN</u>

Assignment to be given:-

- 1.What do you understand by optical beacon?
- 2.Explain LEO,SARSAT,MSAT,VSAT. 3.What do you mean by satellite stabilization.?

Reference Readings:-

- 1)Satellite communication by D.C.Aggarwal
- 2) Satellite communication by Pratt & Bostian