PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE, ARASANOOR
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANNA UNIVERSITY – CHENNAI.

REGULATION 2008

B.E. – ECE
(IV Year / VIII SEM)

EC2045 - SATELLITE COMMUNICATION

QUESTION BANK

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AP/ECE

EC2045 - SATELLITE COMMUNICATION

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UNIT I - SATELLITE ORBITS **8**

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits - Look Angle Determination - Limits of visibility - eclipse - Sub satellite point - Sun transit outage - Launching Procedures - launch vehicles and propulsion.

UNIT II - SPACE SEGMENT AND SATELLITE LINK DESIGN **12**

Spacecraft Technology – Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation - performance impairments - system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations - System reliability and design lifetime.

UNIT III - SATELLITE ACCESS **10**

Modulation and Multiplexing: Voice, Data, Video, Analog - digital transmission system, Digital video Broadcast, multiple access: FDMA,TDMA,CDMA, Assignment Methods,Spread Spectrum Communication,compression - encryption.

UNIT IV - EARTH SEGMENT **5**

Earth Station Technology - Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT V - SATELLITE APPLICATIONS **10**

INTELSAT Series,INSAT, VSAT, Mobile satellite services:GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites(DBS) - Direct to home Broadcast (DTH), Digital audio broadcast (DAB) -Worldspace services, Business TV(BTV), GRAMSAT, Specialized services - E-mail, Video conferencing, Internet.

TOTAL:45 PERIODS

TEXT BOOKS:

1. Dennis Roddy,'Satellite Communication',McGraw Hill,4th Edition, 2006.
2. W.L. Pritchard, H.G. Suyderhoud,R.A. Nelson,'Satellite Communication Systems Engineering',Prentice Hall/Pearson,2007.

REFERENCES:

1. N.Agarwal,'Design of Geosynchronous Space Craft',Prentice Hall,1986.
2. B.R.Elbert,'The Satellite Communication Applications', Artech House,1997.
3. Tri T. Ha,'Digital Satellite Communication',II edition,1990.
4. E.Fthenakis,'Manual of Satellite Communications', McGraw Hill,Co.,1984.
5. R.G.Winch,'Telecom Trans Mission Systems', McGraw Hill Co.,1983.
6. B.Ackroyd,'World Satellite Communication and earth station Design',1990.
7. G.B.Bleazard,'Introducing Satellite communications', NCC Publication,1985.
8. M.Richharia,'Satellite Communication Systems-Design Principles',Mac 2003.

UNIT – I SATELLITE ORBITS
2 MARKS

1. What is Satellite?

An artificial body that is projected from earth to orbit either earth (or) another body of solar systems.Types: Information satellites and Communication Satellites

2. Define Satellite Communication.

It is defined as the use of orbiting satellites to receive, amplify and retransmit data to earth stations.

3. State Kepler's first law.

It states that the path followed by the satellite around the primary will be an ellipse.An ellipse has two focal points F1 and F2. The center of mass of the two body system, termed the barycenter is always centered on one of the foci.

e = [square root of (a 2 – b 2)] / a

4. State Kepler's second law.

It states that for equal time intervals, the satellite will sweep out equal areas in its orbital plane, focused at the barycenter.

5. State Kepler's third law.

It states that the square of the periodic time of orbit is perpendicular to the cube of the mean distance between the two bodies.

a 3 = μ / n 2

Where, n = Mean motion of the satellite in rad/sec.

μ = Earth's geocentric gravitational constant.

With the n in radians per sec. the orbital period in second is given by,

P = 2π / n

6. Define apogee.

The point farthest from the earth.

7. Define Perigee.

The point closest from the earth.

8. What is line of apsides?

The line joining the perigee and apogee through the center of the earth.

9. Define ascending node.

The point where the orbit crosses the equatorial plane going from south to north.

10. Define descending node.

The point where the orbit crosses the equatorial plane going from north to south.

11. Define Inclination.

The angle between the orbital plane and the earth's equatorial plane. It is measured at the ascending node from the equator to the orbit going from east to north.

12. Define mean anomaly.

It gives an average bvalue of the angular position of the satellite with reference to the perigee.

13. Define true anomaly.

It is the angle from perigee to the satellite position, measured at the earth's center.

14. Mention the apogee and perigee height.

r a = a(1+e), r p = a(1+e) ,h a = r a – R p, h p = r p – R p

15. What is meant by azimuth angle?

It is defined as the angle produced by intersection of local horizontal plane and the plane passing through the earth station, the satellite and center of earth.

16. Give the 3 different types of applications with respect to satellite systems.

The largest international system (Intelsat)

The domestic satellite system (Dom sat) in U.S.

U.S. National oceanographic and atmospheric administrations(NOAA)

17. Mention the 3 regions to allocate the frequency for satellite services.

Region1: It covers Europe, Africa and Mangolia

Region2: It covers North & South Ameriaca and Greenland.

Region3: It covers Asia, Australia and South West Pacific.

18. Give the types of satellite services.

Fixed satellite service

Broadcasting satellite service

Mobile satellite service

Navigational satellite services

Meteorological satellite services

19. What is mean by Dom sat?

Domestic Satellites. These are used for voice, data and video transmissions within the country.

20. What is mean by INTELSAT?

International Telecommunication Satellite.

21. What is mean by SARSAT?

Search and rescue satellite.

22. Define polar-orbiting satellites.

Polar orbiting satellites orbit the earth in such a way as to cover the north and south polar regions.

23. Give the advantage of geostationary orbit.

There is no necessity for tracking antennas to find the satellite positions.

24. Define look angles.

The azimuth and elevation angles of the ground station antenna are termed as look angles.

25. Write short notes on station keeping.

It is the process of maintenance of satellite's attitude against different factors that can cause drift with time. Satellites need to have their orbits adjusted from time to time, because the satellite is initially placed in the correct orbit,natural forces induce a progressive drift.

26. What are the geostationary satellites?

The satellites present in the geostationary orbit are called geostationary satellite. The geostationary orbit is one in which the satellite appears stationary relative to the earth. It lies in equatorial plane and inclination is '0'. The satellite must orbit the earth in the same direction as the earth spin. The orbit is circular.

27. What is sun transit outage.

The sun transit is nothing but the sun comes within the beam width of the earth station antenna. During this period the sun behaves like an extremely noisy source and it blanks out all the signal from the satellite. This effect is termed as sun transit outage.

16 MARKS

1. (a) Explain about frequency allocations for satellite services. (10)
   (b) Explain about U.S Domsats. (6)
2. Discuss briefly the development of INTELSAT starting from the 1960s through the present. (16)
3. What is meant by polar orbiting? Explain in detail. (16)
4. State Kepler's three laws of planetary motion. Illustrate in each case their relevance to artificial satellites orbiting the earth. (16)
5. Explain in detail the geocentric-equatorial coordinate system which is based on the earth's equatorial plane. (16)
6. Explain in detail about topocentric-horizon coordinate system which is based on observer's horizon plane. (16)
7. Explain in detail about various measure of time. (16)

UNIT – II SPACE SEGMENT AND LINK DESIGN

2 MARKS

1. Give the two segments of basic satellite communication.

a. Earth segment (or) ground segment b. Space segment

2. Write short notes on attitude control system.

It is the system that achieves and maintains the required attitudes. The main functions of attitude control system include maintaining accurate satellite position throughout the life span of the system.

3. What is declination?

The angle of tilt is often referred to as the declination which must not be confused with the magnetic declination used in correcting compass readings.

4. What is meant by payload?

It refers to the equipment used to provide the service for which the satellite has been launched.

5. What is meant by transponder?

In a communication satellite, the equipment which provides the connecting link between the satellite's transmit and receive antennas is referred to as the transponder.

6. Write short notes on station keeping.

It is the process of maintenance of satellite's attitude against different factors that can cause drift with time. Satellites need to have their orbits adjusted from time to time, because the satellite is initially placed in the correct orbit, natural forces induce a progressive drift.

7. What is meant by Pitch angle?

Movement of a spacecraft about an axis which is perpendicular to its longitudinal axis. It is the degree of elevation or depression.

8. What is an propellant?

A solid or liquid substance burnt in a rocket for the purpose of producing thrust.

9. What is an Yaw?

Yaw is the rotation of a vehicle about its vertical axis.

10. What is an zero 'g'?

Zero 'g' is a state when the gravitational attraction is opposed by equal and opposite inertial forces and the body experiences no mechanical stress.

11. Describe the spin stabilized satellites.

In a spin stabilized satellites, the body of the satellite spins at about 30 to 100 rpm about the axis perpendicular to the orbital plane. The satellites are normally dual spin satellites with a spinning section and a despun section on which antennas are mounted. These are kept stationary with respect to earth by counter rotating the despun section.

12. What is meant by frequency reuse?

The carrier with opposite senses of polarization may overlap in frequency. This technique is known as frequency reuse.

13. What is meant by spot beam antenna?

A beam generated by a communication satellite antenna of sufficient size that the angular spread of sufficient size that the angular spread of the energy in the beam is very small with the result that a region that is only a few hundred km in diameter is illuminated on earth.

14. What is meant by momentum wheel stabilization?

During the spin stabilization, flywheels may be used rather than spinning the satellite. These flywheels are termed as momentum wheels.

15. What is polarization interleaving?

Overlap occurs between channels, but these are alternatively polarized left hand circular and right hand circular to reduce interference to acceptable levels. This is referred to as polarization interleaving.

16. Define S/N ratio.

The S/N introduced in the preceding section is used to refer to the ratio of signal power to noise power at the receiver output. This is known as S/N ratio.

17. What is noise weighting?

The method used to improve the post detection signal to noise ratio is referred to as noise weighting.

18. What is noise power spectral density?

Noise power per unit Bandwidth is termed as the noise power spectral density.

19. What is an intermodulation noise?

Intermodulation distortion in high power amplifier can result in signal product which appear as noise.

20. What is an antenna loss?

It is added to noise received as radiation and the total antenna noise temperature is the sum of the equivalent noise temperature of all these sources.

21. Define sky noise.

It is a term used to describe the microwave radiation which is present throughout universe and which appears to originate from matter in any form, at finite temperature.

22. Define noise factor.

An alternative way of representing amplifier noise is by means of its noise factor. In defining the noise factor of an amplifiers, usually taken as 290 k.

23. What is TWTA?

TWTA means Traveling Wave Tube Amplifier. The TWTA is widely used in transponder to provide the final output power required to the transtube and its power supplies.

24. What is an OMT?

The polarization separation takes place in a device known as an orthocoupler or Orthogonal Mode Transducer.

16 MARKS

1. Explain in detail about antenna look angles and the polar mount antenna. (16)
2. Explain about Earth eclipse of satellite and sun transit outage. (16)
3. Explain about launching orbits. (16)
4. Explain what is meant by satellite attitude and briefly describe two forms of attitude Control .(16)
5. Draw the block diagram of TT&C and explain its blocks. (16)
6. Describe briefly the most common type of high-power amplifying device used aboard a communication satellite. (16)
7. Explain about wideband receiver and advanced Tiros-N spacecraft. (16)
8. Describe briefly the antenna subsystem and Anik-E. (16)

9. Explain in detail about thermal control and Morelos. (16)

UNIT – III SATELLITE ACCESS

2 MARKS

1. What is a single mode of operation?

A transponder channel abroad a satellite may be fully loaded by a single transmission from an earth station. This is referred to as a single access mode of operation.

2. What are the methods of multiple access techniques?

FDMA – Frequency Division Multiple Access Techniques

TDMA – Time Division Multiple Access Techniques

3. What is an CDMA?

CDMA – Code Division Multiple Access Techniques

In this method, each signal is associated with a particular code that is used to spread the signal in frequency and time.

4. Give the types of CDMA.

Spread spectrum multiple access

Pulse address multiple access

5. What is SCPC?

SCPC means Single Channel Per Carrier. In a thin route circuit, a transponder channel (36 MHz) may be occupied by a number of single carriers, each associated with its own voice circuit.

6. What is a thin route service?

SCPC systems are widely used on lightly loaded routes, this type of service being referred to as a thin route service.

7. What is an important feature of Intelsat SCPC system?

The system is that each channel is voice activated. This means that on a two way telephone conversation only one carriers is operative at any one time.

8. What is an TDMA? What are the advantages?

TDMA – Time Division Multiple Access Techniques

Only one carrier uses the transponder at any one time, and therefore intermodulation products, which results from the non-linear amplification of multiple carriers are absent.

Advantages : The transponder traveling wave tube can be operated at maximum power output.

9. What is preamble?

Certain time slots at the beginning of each burst are used to carry timing and synchronizing information. These time slots collectively are referred to as preamble.

10. Define guard time.

It is necessary to prevent the bursts from overlapping. The guard time will vary from burst to burst depending on the accuracy with which the various bursts can be positioned within each frame.

11. What is meant by decoding quenching?

In certain phase detection systems, the phase detector must be allowed for some time to recover from one burst before the next burst is received by it.This is known as decoding quenching.

12. What is meant by direct closed loop feedback?

The timing positions are reckoned from the last bit of the unique word in the preamble. The loop method is also known as direct closed loop feedback.

13. What is meant by feedback closed loop control?

The synchronization information is transmitted back to an earth station from a distant, that is termed feedback closed loop control.

14. Define frame efficiency.

It is measure of the fraction of frame time used for the transmission of traffic.

15. What is meant by digital speech interpolation?

The point is that for a significant fraction of the time, the channel is available for other transmission and advantages are taken of this in a form of demand assignment known as digital speech interpolation.

16. What is meant by telephone load activity factor?

The fraction of time a transmission channel is active is known as the telephone load activity factor.

17. What are the types of digital speech interpolation?

Digital time assignment speech interpolation

Speech predictive encoded communications

18. What is meant by freeze out?

It has assumed that a free satellite channel will be found for any incoming speed spurt, but there is a finite probability that all channels will be occupied and the speech spurt lost. Losing a speech spurt in this manner is referred to as freeze out.

19. What is DSI?

The DSI gain is the ratio of the number of terrestrial space channels to number of satellite channels. It depends on the number of satellite channels provided as well as the design objectives.

20. What are the advantages of SPEC method over DSI method?

Freeze out does not occur during overload conditions.

21. Define satellite switched TDMA?

Space Division Multiplexing can be realized by switching the antenna interconnections in synchronism with the TDMA frame rate, this being known as satellite switched TDMA.

22. What is SS / TDMA?

A repetitive sequence of satellite switch modes, also referred to as SS / TDMA.

23. What is processing gain?

The jamming or interference signal energy is reduced by a factor known as the processing gain.

24. What is burst code word?

It is a binary word, a copy of which is stored at each earth station.

25. What is meant by burst position acquisition?

A station just entering, or reentering after a long delay to acquire its correct slot position is known as burst position acquisition.

26. What is an single access?

A transponder channel aboard a satellite may be fully loaded by a single transmission from earth station.

27. What is an multiple access technique?

A transponder to be loaded by a number of carriers. These may originate from a number of earth station may transmit one or more of the carriers. This mode of operation known as multiple access technique.

28. What is meant by frequency reuse?

The satellite as a whole to be accessed by earth stations widely separated geographically but transmitting on the same frequency that is known as frequency reuse.

29. What is meant by space division multiple access?

The satellite as a whole to be accessed by earth stations widely separated geographically but transmitting on the same frequency that is known as frequency reuse. This method of access known as space division multiple access.

30. What is an error detecting code?

A code which allows for the detection of errors is termed as error detecting code.

31. What are the limitations of FDMA-satellite access?

a. If the traffic in the downlink is much heavier than that in the uplink, then FDMA is relatively inefficient.

b. Compared with TDMA, FDMA has less flexibility in reassigning channels.

c. Carrier frequency assignments are hardware controlled.

32. Write about pre-assigned TDMA satellite access.

Example for pre-assigned TDMA is CSC for the SPADE network. CSC can accommodate upto 49 earth stations in the network and 1 reference station. All bursts are of equal length. Each burst contains 128 bits. The bit rate is 128 Kb / s.

33. Write about demand assigned TDMA satellite access.

The burst length may be kept constant and the number of bursts per frame used by the given station is varied when the demand is varied.

16 MARKS

1. Explain with an example the type of traffic route where single access is used. (16)
2. Explain in detail about FDMA and show how this differs from FDM. (16)
3. Explain in detail the operation of a preassigned SCPC network. (16)
4. Explain in detail the operation of the spade system of demand assignment. What is the function of the common signaling channel? (16)
5. Describe the general operating principles of a TDMA network. Show how the transmission bit rate is related to the input bit rate. (16)
6. Explain the need for reference burst and preamble in a TDMA System. (16)
7. Explain in detail about network synchronization with neat sketch. (16)
8. Define and explain the terms carrier recovery, bit-time recovery, traffic data, frame efficiency and channel capacity. (16)
9. Explain in detail about speech interpolation and prediction. (16)
10. Explain in detail about satellite switched TDMA. (16)
11. Describe briefly about on board signal processing for FDMA/TDM operation. (16)
12. Describe in your own words how signal acquisition and tracking are achieved in a DS/SS system . And also derive the expression for maximal sequence. (16)

13. Explain the principle behind spectrum spreading and despreading and how this is used to minimize interference in a CDMA system. Also determine the throughput efficiency of the system. (16)

UNIT – IV EARTH SEGMENT

2 MARKS

1. Define earth segment.

Earth segment of a satellite communication system consists of transmit earth station and receive earth station.

Example : TV Receive Only systems (TVRO systems)

2. Give the difference between KU-band and the C-band receive only systems.

Operating frequency of outdoor unit.

3. What is mean by ODU and IDU.

ODU – The Home Receiver Outdoor Unit

IDU – The Home Receiver Indoor Unit

4. Explain about MATV system.

MATV(Master Antenna TV system) is used to provide reception of DBS TV channels to the user group.It consists of one outdoor unit and various indoor units. Each user can independently access all the channels.

Example : Apartment users

5. Write about CATV system.

CATV(Community Antenna TV system) - As in MATV system, it consists of one outdoor unit and separate feeds for each sense of polarization.

6. Define S/N ratio.

The S/N introduced in the preceding section is used to refer to the ratio of signal power to noise power at the receiver output. This is known as S/N ratio.

7. What is noise weighting?

The method used to improve the post detection signal to noise ratio is referred to as noise weighting.

8. What is an EIRP?

EIRP means Equivalent Isotropic Radiated Power. It is a measure of radiated or transmitted power of an antenna.

9. What is noise power spectral density?

Noise power per unit Bandwidth is termed as the noise power spectral density.

10. What is an intermodulation noise?

Intermodulation distortion in high power amplifier can result in signal product which appear as noise and it is referred to as intermodulation noise.

11. What is an antenna loss?

It is added to noise received as radiation and the total antenna noise temperature is the sum of the equivalent noise temperature of all these sources.

12. Define noise factor.

An alternative way of representing amplifier noise is by means of its noise factor. In defining the noise factor of an amplifiers, usually taken as 290 k.

13. A satellite downlink at 12 GHz operates with a transmit power of 6 W and an antenna gain of 48.2 dB. Calculate the EIRP in dBW.

EIRP = 10 log 6 + 48.2 = 56 dBW

14. The range between a ground station and a satellite is 42000 km. Calculate the free space loss a frequency of 6 GHz.

[Free space loss] = 32.4 + 20 log 42000 + 20 log 6000 = 200.4 dB

15. An antenna has a noise temperature of 35 K and it is matched into a receiver which has a noise temperature of 100 K. Calculate the noise power density and the noise power for a BW of 36 MHz.

N 0 = (35 + 100) * 1.38 * 10 -23 = 1.86 * 10 -21 J

P N = 1.86 * 10 -21 * 36 * 10 6 = 0.067 PW

16. Define Saturation flux density.

The flux density required at the receiving antenna to produce saturation of TWTA is termed the saturation flux density.

16 MARKS

1. With the aid of a block schematic, briefly describe the functioning of the receive only home TV systems. (16)
2. Describe and compare the MATV and CATV systems. (16)
3. With the relevant expression explain in detail about transmission losses. (16)
4. Explain the classifications of system noise temperature. (16)
5. Explain uplink satellite circuit. (16)
6. Explain downlink satellite circuit. (16)
7. Describe briefly about the rains effects. (16)
8. Explain about inter-satellite link. (16)

UNIT – V SATELLITE APPLICATIONS

2 MARKS

1. Give the 3 different types of applications with respect to satellite systems.

The largest international system (Intelsat)

The domestic satellite system (Dom sat) in U.S.

U.S. National oceanographic and atmospheric administrations(NOAA)

2. Mention the 3 regions to allocate the frequency for satellite services.

a. Region1: It covers Europe, Africa and Mangolia

b. Region2: It covers North & South Ameriaca and Greenland.

c. Region3: It covers Asia, Australia and South West Pacific.

3. Give the types of satellite services.

a. Fixed satellite service

b. Broadcasting satellite service

c. Mobile satellite service

d. Navigational satellite services

e. Meteorological satellite services

4. What is mean by Dom sat?

Domestic Satellites. These are used for voice, data and video transmissions within the country.

5. What is mean by INTELSAT?

International Telecommunication Satellite.

6. What is mean by SARSAT?

Search and rescue satellite.

7. What are the applications of Radarsat?

a. Shipping and fisheries.

b. Ocean feature mapping

c. Oil pollution monitoring

d. Iceberg detection

e. Crop monitoring

8. What is ECEF?

The geocentric equatorial coordinate system is used with the GPS system.It is called as earth centered, earth fixed coordinate system.

9. What is dilution of precision?

Position calculations involve range differences and where the ranges are nearly equal, any error is greatly magnified in the difference. This effect, brought a result of the satellite geometry is known as dilution of precision.

10. What is PDOP?

With the GPS system, dilution of position is taken into account through a factor known as the position dilution of precision.

11. What is DBS?

Satellites are used to provide the broadcast transmissions. It is used to provide direct transmissions into the home. The service provided is known as Direct Broadcast Satellite services.Example : Audio, TV and internet services.

12. Give the frequency range of US DBS systems with high power satellites.

a. Uplink frequency range is 17.3 GHz to 17.8 GHz

b. Downlink frequency range is 12.2 GHz to 12.7 GHz

13. Give the frequency range of US DBS systems with medium power satellites.

a. Uplink frequency range is 14 GHz to 14.5 GHz

b. Downlink frequency range is 11.7 GHz to 12.2 GHz

14. What is DTH?

DBS television is also known as Direct To Home (DTH).

15. Write about bit rates for digital television.

It depends format of the picture.

Uncompressed Bit rate = (No. of pixels in a frame)*(No. of pixels per second)* (Number of bits used to encode each pixel)

16. Give the satellite mobile services.

a. DBS – Direct Broadcast satellite

b. VSATS – Very Small Aperture Terminals

c. MSATS – Mobile Satellite Service

d. GPS – Global Positioning Systems

e. Micro Sats

f. Orb Comm – Orbital Communications Corporation

g. Iridium

17. What is GCC and GEC?

GCC - Gateway Control Centers and GEC - Gateway Earth Stations

18. What is INMARSAT?

It is the first global mobile satellite communication system operated at L-band and internationally used by 67 countries for communication between ships and coast so that emergency life saving may be provided. Also it provides modern communication services to maritime, land mobile, aeronautical and other users.

19. List out the regions covered by INMARSAT.

Atlantic ocean region, east (AOR-E)

Atlantic ocean region, west (AOR-W)

Indian ocean region (IOR)\

Pacific ocean region (POR)

20.What is INSAT?

INSAT is a Indian National Satellite System for telecommunications, broadcasting, meteorology and search and rescue services. It was commissioned in 1983. INSAT was the largest domestic communication system in the Asia-Pacific region.

21. List out the INSAT series.

INSAT-1,INSAT-2,INSAT-2A,INSAT-2E and INSAT-3

22.What is GSM?

GSM (Global System for Mobile communications: originally from Groupe Spécial Mobile) is the most popular standard for mobile phones in the world. GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication was easy to build into the system.

23.What is GPRS?

General packet radio service (GPRS) is a packet oriented mobile data service available to users of the 2G cellular communication systems global system for mobile communications (GSM), as well as in the 3G systems. In the 2G systems, GPRS provides data rates of 56-114 kbit/s.

24. Define DAB.

Digital audio broadcasting (DAB), also known as digital radio and high-definition radio, is audio broadcasting in which analog audio is converted into a digital signal and transmitted on an assigned channel in the AM or (more usually) FM frequency range. DAB is said to offer compact disc (CD) - quality audio on the FM (frequency modulation) broadcast band and to offer FM-quality audio on the AM (amplitude modulation) broadcast band.

25. What is DVB?

Digital Video Broadcasting (DVB) is a set of standards that define digital broadcasting using existing satellite, cable, and terrestrial infrastructures.

26. What is GRAMSAT?

The Gramsat Programme (GP) is an initiative to provide communication networks at the state level connecting the state capital to districts and blocks. The networks provide Computer Connectivity, Data Broadcasting and TV Broadcasting facilities having applications like e-Governance, National Resource Information System (NRIS), Development Information, Tele-conferencing, Disaster Management, Tele-medicine and Distance Education.

16 MARKS

1. Describe briefly the video compression process used in MPEG-2. (16)
2. Explain about indoor and outdoor unit of home receiver. (16)
3. Explain about frequencies and polarization, transponder capacity and bit rates for digital television. (16)
4. Explain in detail about satellite mobile services. (16)
5. Describe the operation of typical VSAT system with its applications. (16)
6. Describe the main features of RADARSAT. Explain what is meant by dawn to dusk orbit and why the RADARSAT follows such on orbit. (16)
7. Explain why a minimum of four satellites are visible at an earth utilizing the GPS system for position determination. What does the term dilution of precision refer to? (16)
8. Describe the main features and services offered by the orbcomm satellite system. How do these services offered by geostationary satellites and terrestrial cellular systems. (16)