12th Science Lesson 10 Questions in English

10] Electronics and Communication

1. Which of the following statement is correct?

1) The communication industry is one of the largest in size and is the oldest
2) Right from the developments made in communication by great scientists like J.C. Bose, G. Marconi, and Alexander Graham Bell, communication has witnessed leaps and bounds
    a) 1 alone
    b) 2 alone
    c) 1, 2
    d) None

Explanation

Communication exists since the dawn of life in this world. Growth in science and technology removed the locational disadvantage effectively. Information can be exchanged from one person to another anywhere on this Earth. Right from the developments made in communication by great scientists like J.C. Bose, G. Marconi, and Alexander Graham Bell, communication has witnessed leaps and bounds. The communication industry is one of the largest in size and is the oldest since communication through telegraph (1844), telephone (1876), and Radio (1887) started centuries back.

2. Which century witnessed a leap over the development of communication?

a) 18^{th}
b) 19^{th}
c) 20^{th}
d) 21^{st}

Explanation

The intensive research in the mid- and late nineteenth century leads to the development of long-distance transmission in the shortest possible time. However, the **20th century witnessed a leap over the development of communication**, meeting the demands of speed and secured transfer of data.

3. Which of the following is audio frequency?

a) 20 to 20000 Hz
b) 20 to 20000 MHz
c) 10 to 10000 Hz
d) 10 to 10000 MHz

Explanation

The transmission of information through short distances does not require complicated techniques. The energy of the information signal is sufficient enough to be sent directly. However, if the information, for example, **audio frequency (20 to 20,000 Hz)** needs to be transmitted to long

distances across the world, certain techniques are required to transmit the information without any loss.

4. Carrier signal is a_____

a) Low frequency signal
b) High frequency signal
c) Very High frequency signal
d) Medium frequency signal

Explanation

For long distance transmission, the low frequency baseband signal (input signal) is superimposed onto a high frequency radio signal by a process called modulation. **In the modulation process, a very high frequency signal called carrier signal (radio signal) is used to carry the baseband signal**.

5. The carrier signal is usually a_____ wave

a) Sine
b) Cosine
c) Tan
d) Cot

Explanation

The carrier signal is usually a **sine wave signal**. In the modulation process, a very high frequency signal called carrier signal (radio signal) is used to carry the baseband signal.

6. Which of the following statement is correct?

1) As the frequency of the carrier signal is very high, it can be transmitted to long distances with less attenuation.
2) Carrier signal does not have information.
3) The carrier signal will be more compatible with the communication medium like free space and can propagate with greater efficiency.
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

As the frequency of the carrier signal is very high, it can be transmitted to long distances with less attenuation. The carrier signal is usually a sine wave signal. Also, the carrier signal will be more compatible with the communication medium like free space and can propagate with greater efficiency. **Carrier signal does not have information.**

7. $e_c = E_c \sin(2\pi v_c t + \phi)$, What does E_c mean?

a) Frequency
b) Amplitude
c) Initial energy

d) Frequency modulated

Explanation

A sinusoidal carrier wave can be represented as $e_c = E_c \sin(2\pi v_c t + \phi)$, where **Ec is the amplitude**, vc is the frequency and ϕ is the initial phase of the carrier wave at any instant of time t.

8. Which of the following parameters of carrier signal can be modified?

1) Amplitude
2) Phase
3) Frequency
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

Three characteristics in the carrier signal can be modified by the baseband signal during the process of modulation: **amplitude, frequency and phase of the carrier signal**.

9. How many types of many types of modulation are there based on modification parameters?

a) 3
b) 5
c) 4
d) 5

Explanation

There are 3 types of modulation based on which parameter is modified. They are (i) amplitude modulation, (ii) frequency modulation and (iii) phase modulation.

10. Which of the following statement is correct?

1) If the amplitude of the carrier signal is modified in proportion to the instantaneous amplitude of the baseband signal, then it is called amplitude modulation
2) Here the frequency and the phase of the carrier signal remain constant
3) Amplitude modulation is used in radio, mobile and TV broadcasting
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

If the amplitude of the carrier signal is modified in proportion to the instantaneous amplitude of the baseband signal, then it is called amplitude modulation. Here the frequency and the phase of the carrier signal remain constant. **Amplitude modulation is used in radio and TV broadcasting**.

11. Which of the following are advantage of AM?

a) Low cost
b) Low noise
c) High operating range
d) High efficiency

Explanation

Advantages of AM

i) Easy transmission and reception

ii) Lesser bandwidth requirements

iii) **Low cost**

Limitations of AM

i) Noise level is high

ii) Low efficiency

iii) Small operating range

12. Which of the following statement is correct about Frequency modulation?

1) The frequency of the baseband signal is modified in proportion to the instantaneous amplitude of the carrier signal
2) Increase in the amplitude of the baseband signal increases the frequency of the carrier signal and vice versa
3) The amplitude and the phase of the carrier signal remain constant.
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

The frequency of the carrier signal is modified in proportion to the instantaneous amplitude of the baseband signal in frequency modulation. Here the amplitude and the phase of the carrier signal remain constant. Increase in the amplitude of the baseband signal increases the frequency of the carrier signal and vice versa.

13. Louder signal leads to_____ and relatively weaker signals to____

a) Rarefactions, Compression
b) Compression, Rarefaction
c) Compression, Compression
d) Rarefaction, compression

Explanation

Increase in the amplitude of the baseband signal increases the frequency of the carrier signal and vice versa. This leads to compressions and rarefactions in the frequency spectrum of the modulated wave. **Louder signal leads to compressions and relatively weaker signals to rarefactions.**

14. Which of the following statement is correct?

1) When the frequency of the baseband signal is zero (no input signal), there is no change in the frequency of the carrier wave
2) It is at its normal frequency and is called as centre frequency or resting frequency
3) Practically this is the allotted frequency of the FM transmitter
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

When the frequency of the baseband signal is zero (no input signal), there is no change in the frequency of the carrier wave. It is at its normal frequency and is called as centre frequency or resting frequency. Practically this is the allotted frequency of the FM transmitter.

15. Which of the following are advantages of FM?

1) Decreased signal to noise ratio
2) FM bandwidth covers the entire frequency range which humans can hear
3) The operating range is quite large
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

Advantages of FM

i) **Large decrease in noise. This leads to an increase in signal-noise ratio.**

ii) The operating range is quite large.

iii) The transmission efficiency is very high as all the transmitted power is useful.

iv) FM bandwidth covers the entire frequency range which humans can hear. Due to this, FM radio has better quality compared to AM radio.

16. Which of the following statement is correct?

1) In phase modulation, the instantaneous amplitude of the baseband signal modifies the phase of the carrier signal keeping the amplitude and frequency constant
2) This modulation is used to generate frequency modulated signals
3) It is similar to frequency modulation except that the phase of the carrier is varied instead of varying frequency
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

In phase modulation, the instantaneous amplitude of the baseband signal modifies the phase of the carrier signal keeping the amplitude and frequency constant. This modulation is used to generate frequency modulated signals. It is similar to frequency modulation except that the phase of the carrier is varied instead of varying frequency.

17. Which of the following statement is correct?

1) If a square wave is used as the baseband signal, then phase reversal takes place in the modulated signal
2) FM and PM waves are same as square wave modulating signal

a) 1 alone
b) 2 alone
c) 1, 2
d) None

Explanation

If a square wave is used as the baseband signal, then phase reversal takes place in the modulated signal. **FM and PM waves are completely different for square wave modulating signal**.

18. The frequency shift in phase modulation depends on____

1) Amplitude of the carrier signal
2) Amplitude of the modulating signal
3) The frequency of the signal

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

The frequency shift in carrier wave frequency exists in phase modulation as well. The frequency shift depends on (i) **amplitude of the modulating signal and (ii) the frequency of the signal.**

19. Which of the following statement is correct?

1) PM wave is similar to FM wave
2) PM generally uses a larger bandwidth than FM
3) Phase modulation provides high transmission speed on a given bandwidth

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

PM wave is similar to FM wave. **PM generally uses a smaller bandwidth than FM**. In other words, in PM, more information can be sent in a given bandwidth. Hence, phase modulation provides high transmission speed on a given bandwidth.

20. Which of the following statement is correct?

1) Electronics plays a major role in communication
2) Electronic communication is nothing but the transmission of sound, text, pictures, or data through a medium
3) Long distance transmission uses free space as a medium
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

Electronics plays a major role in communication. Electronic communication is nothing but the transmission of sound, text, pictures, or data through a medium. Long distance transmission uses free space as a medium. This section provides sufficient information on how voice signal is transmitted by a transmitter through space and received by the receiver at the receiving end.

21. Which of the following could be input to the input transducer?

1) Image
2) Music
3) Speech
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

Information can be in the form of speech, music, pictures, or computer data. This information is given as input to the input transducer.

22. ____ is a device that converts variations in a physical quantity into an equivalent electrical signal or vice versa

a) Transmitter
b) Receiver
c) Transducer
d) Oscillator

Explanation

A transducer is a device that converts variations in a physical quantity (pressure, temperature, sound) into an equivalent electrical signal or vice versa.

23. The electrical equivalent of the original information is called_____

a) Broadband signal
b) Baseband signal
c) Carrier signal
d) All the above

Explanation

The **electrical equivalent of the original information is called the baseband signal**. The best example for the transducer is the microphone that converts sound energy into electrical energy

24. Which of the following circuits are included in transmitter?

1) Amplifier
2) Modulator
3) Power amplifier
    a) 1, 2
    b) 1, 3
    c) 2, 3
    d) All the above

Explanation

Transmitter feeds the electrical signal from the transducer to the communication channel. It consists of circuits such as **amplifier, oscillator, modulator and power amplifier**. The transmitter is located at the broadcasting station.

25. Which of the following statement is correct?

1) The transducer output is very weak and is amplified by the amplifier.
2) Oscillator generates high-frequency carrier wave (a sinusoidal wave) for long distance transmission into space.
    a) 1 alone
    b) 2 alone
    c) 1, 2
    d) None

Explanation

Amplifier: The transducer output is very weak and is amplified by the amplifier.

Oscillator: It generates high-frequency carrier wave (a sinusoidal wave) for long distance transmission into space. As the energy of a wave is proportional to its frequency, the carrier wave has very high energy.

26. _____ superimposes the baseband signal onto the carrier signal

a) Oscillator
b) Amplifier
c) Modulator
d) Power amplifier

Explanation

Modulator superimposes the baseband signal onto the carrier signal and generates the modulated signal.

27. What is the velocity of Electromagnetic waves?

a) 3×10^8 m s^{-1}
b) 3×10^8 m s
c) 3×10^9 m s^{-1}
d) 3×10^8 m s^{-2}

Explanation

Transmitting antenna radiates the radio signal into space in all directions. **It travels in the form of electromagnetic waves with the velocity of light (3×10^8 m s^{-1})**

28. Which of the following statement is correct?

1) Communication channel is used to carry the electrical signal from transmitter to receiver with less noise or distortion
2) The communication medium is basically of two types: wireline communication and wireless communication
    a) 1 alone
    b) 2 alone
    c) 1, 2
    d) None

Explanation

Communication channel is used to carry the electrical signal from transmitter to receiver with less noise or distortion. The communication medium is basically of two types: wireline communication and wireless communication.

29. Which of the following are used in wireline connection?

a) Cable
b) Wires
c) Optic fibers
d) All the above

Explanation

Wireline communication (point to point communication) uses mediums like **wires, cables and optical fibres**. These systems cannot be used for long distance transmission as they are connected physically. Examples are telephone, intercom and cable TV.

30. Which of the following statement is correct?

1) Wireless communication uses free space as a communication medium
2) The signals are transmitted in the form of electromagnetic waves with the help of a transmitting antenna
3) Mobile, radio or TV broadcasting and satellite communication are examples of wireless communication

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

Wireless communication uses free space as a communication medium. The signals are transmitted in the form of electromagnetic waves with the help of a transmitting antenna. Hence wireless communication is used for long distance transmission. Examples are mobile, radio or TV broadcasting and satellite communication.

31. Which of the following statement about noise is correct?

1) It is the undesirable electrical signal that interferes with the transmitted signal.
2) Noise can be completely eliminated
3) Noise attenuates or reduces the quality of the transmitted signal.

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

Noise is the undesirable electrical signal that interferes with the transmitted signal. Noise attenuates or reduces the quality of the transmitted signal. **Noise cannot be completely eliminated**. However, it can be reduced using various techniques.

32. Which of the following are man-made noise disturbance?

1) Radiation from Sun
2) Automobiles
3) Electric motor

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

Noise may be **man-made (automobiles, welding machines, electric motors etc.**) or natural (lightning, radiation from sun and stars and environmental effects).

33. Which of the following statement is correct?

1) The signals that are transmitted through the communication medium are received by a receiving antenna which converts EM waves into RF signals and are fed into the receiver.
2) The receiver consists of electronic circuits like demodulator, amplifier, detector etc.

a) 1 alone
b) 2 alone

c) 1, 2
d) None

Explanation

The signals that are transmitted through the communication medium are received by a receiving antenna which converts EM waves into RF signals and are fed into the receiver. The receiver consists of electronic circuits like demodulator, amplifier, detector etc. The demodulator extracts the baseband signal from the modulated signal. Then the baseband signal is detected and amplified using amplifiers. Finally, it is fed to the output transducer.

34. Which of the following statement is incorrect?

1) Repeaters are used to increase the range or distance through which the signals are sent
2) The signals are received, amplified and retransmitted with a carrier signal of different frequency to the destination
    a) 1 alone
    b) 2 alone
    c) 1, 2
    d) None

Explanation

Repeaters are used to increase the range or distance through which the signals are sent. It is a combination of transmitter and receiver. The signals are received, amplified and retransmitted with a carrier signal of different frequency to the destination. The best example is the communication satellite in space

35. Which of the following are output transducer?

1) Speakers
2) Picture tubes
3) Microphone
4) Computer monitor
    a) 1, 2, 4
    b) 1, 2, 3
    c) 2, 3, 4
    d) All the above

Explanation

Output transducer converts the electrical signal back to its original form such as sound, music, pictures or data. Examples of **output transducers are loudspeakers, picture tubes, computer monitor, etc.**

36. The loss of strength of a signal while propagating through a medium is known as_____

a) Reduction
b) Attenuation
c) Distraction

d) All the above

Explanation

The **loss of strength of a signal while propagating through a medium is known as attenuation**. Range is the maximum distance between the source and the destination up to which the signal is received with sufficient strength.

37. Which of the following can be transmitted through bandwidth of signal?

1) Voice
2) Music
3) Picture

a) 1, 2
b) 1, 3
c) 2, 3
d) All the above

Explanation

The frequency range over which the baseband signals or the **information signals such as voice, music, picture etc is transmitted is known as bandwidth**. Each of these signals has different frequencies.

38. Bandwidth gives the difference between the____ and____ frequency limits of the signal

a) Upper, middle
b) Middle, lower
c) Upper, lower
d) Upper, upper

Explanation

The type of communication system depends on the nature of the frequency band for a given signal. **Bandwidth gives the difference between the upper and lower frequency limits of the signal**.

39. The height of the antenna must be a multiple of_____

a) λ/ 4
b) λ/ 2
c) λ/ 3
d) λ/ 5

Explanation

Antenna is used at both transmitter and receiver end. Antenna height is an important parameter to be discussed. The height of the antenna must be a multiple of **h = λ/ 4**

40. The frequencies from___ kHz to____ GHz are transmitted through wireless communication

a) 1, 100
b) 2, 200
c) 3, 300

d) 2, 400

Explanation

The information signal modulated with the carrier wave (radio wave) is transmitted by an antenna. This travels through space and is received by the receiving antenna at the other end. **The frequencies from 2 kHz to 400 GHz are transmitted through wireless communication**.

41. Match the following

I.	Ground wave propagation	1. 30 MHz to 400 GHz
II.	Sky wave propagation	2. 2 kHz to 2 MHz
III.	Space wave propagation	3. 3 MHz to 30 MHz

a) 3, 1, 2
b) 2, 1, 3
c) 2, 3, 1
d) 1, 2, 3

Explanation

• **Ground wave propagation** (or) surface wave propagation **(nearly 2 kHz to 2 MHz)**

• **Sky wave propagation** (or) ionospheric propagation **(nearly 3 MHz to 30 MHz)**

• **Space wave propagation (nearly 30 MHz to 400 GHz)**

42. Which of the following statement is correct?

1) If the electromagnetic waves transmitted by the transmitter glide over the surface of the earth to reach the receiver, then the propagation is called ground wave propagation
2) Both transmitting and receiving antennas must be close to the earth

a) 1 alone
b) 2 alone
c) 1, 2
d) None

Explanation

If the electromagnetic waves transmitted by the transmitter glide over the surface of the earth to reach the receiver, then the propagation is called ground wave propagation. The corresponding waves are called ground waves or surface waves. Both transmitting and receiving antennas must be close to the earth. The size of the antenna plays a major role in deciding the efficiency of the radiation of signals.

43. The attenuation of the signal with distance depends on_____

1) Frequency of the transmitter
2) Power of the transmitter
3) Condition of the earth surface

a) 1, 2
b) 1, 3
c) 2, 3

d) All the above

Explanation

The attenuation of the signal with distance depends on (i) power of the transmitter (ii) frequency of the transmitter and (iii) condition of the Earth surface.

44. The earth behaves like a leaky_____

a) Insulator
b) Resistor
c) Capacitor
d) Inductor

Explanation

When the transmitted signal in the form of EM wave is in contact with the Earth, it induces charges in the Earth and constitutes a current. Due to this, the **Earth behaves like a leaky capacitor which leads to the attenuation of the wave**.

45. The frequency of the ground waves is mostly less than____ MHz

a) 10
b) 20
c) 2
d) 34

Explanation

The **frequency of the ground waves is mostly less than 2 MHz as high frequency** waves undergo more absorption of energy at the earth's atmosphere.

46. Surface wave propagation is used in____

a) Ship to ship
b) Ship to shore
c) Mobile communication
d) All the above

Explanation

The medium wave signals received during the day time use surface wave propagation. It is mainly used in **local broadcasting, radio navigation, for ship-to-ship, ship to-shore communication and mobile communication.**

47. Which of the following statement is incorrect?

1) The mode of propagation in which the electromagnetic waves radiated from an antenna, directed upwards at large angles, gets reflected by the troposphere back to earth is called ionospheric propagation
2) The corresponding waves are called sky waves
   a) 1 alone
   b) 2 alone

c) 1, 2
d) None

Explanation

The mode of propagation in which the electromagnetic waves radiated from an antenna, directed upwards at large angles, gets **reflected by the ionosphere** back to earth is called sky wave propagation or ionospheric propagation. The corresponding waves are called sky waves.

48. A single reflection helps the radio waves to travel a distance of approximately_____ Km

a) 2000
b) 4000
c) 3000
d) 1000

Explanation

Extremely long-distance communication is also possible as the radio waves can undergo multiple reflections between the earth and the ionosphere. A **single reflection helps the radio waves to travel a distance of approximately 4000 km**.

49. Ionosphere distance of approximately____ km and spreads up to____ km above the Earth surface

a) 40, 400
b) 50, 100
c) 50, 400
d) 80, 300

Explanation

Ionosphere acts as a reflecting surface. It is at a distance of approximately 50 km and spreads up to 400 km above the Earth surface. Due to the absorption of ultraviolet rays, cosmic ray, and other high energy radiations like α, β rays from sun, the air molecules in the ionosphere get ionized

50. The phenomenon of bending the radio waves back to earth is_____

a) Refraction
b) Reflection
c) Total internal reflection
d) Total internal refraction

Explanation

Due to the absorption of ultraviolet rays, cosmic ray, and other high energy radiations like α, β rays from sun, the air molecules in the ionosphere get ionized. This produces charged ions and these ions provide a reflecting medium for the reflection of radio waves or communication waves back to Earth within the permitted frequency range. The **phenomenon of bending the radio waves back to earth is nothing but the total internal reflection.**

51. The shortest distance between the transmitter and the point of reception of the sky wave along the surface is called____

a) Skid distance
b) Skip distance
c) Skin distance
d) None

Explanation

The shortest distance between the transmitter and the point of reception of the sky wave along the surface is called as the skip distance.

52. Lesser the frequency, skip distance is_____

a) Higher
b) Lesser
c) Zero
d) None

Explanation

The higher the frequency, higher is the skip distance and for a frequency less than the critical frequency, skip distance is zero.

53. The electromagnetic waves of very high frequencies above___ MHz are called as space waves.

a) 20
b) 30
c) 3
d) 120

Explanation

The process of sending and receiving information signal through space is called space wave communication. The **electromagnetic waves of very high frequencies above 30 MHz are called as space waves**.

54. Which of the following are the advantages of microwaves over radio waves?

1) High data rate
2) Larger bandwidth
3) Better directivity
4) Large antenna size

a) 1, 2, 4
b) 2, 3, 4
c) 1, 2, 3
d) All the above

Explanation

Microwaves having high frequencies (super high frequency band) are used against radio waves due to certain advantages: **larger bandwidth, high data rates, better directivity, small antenna size, low power consumption**, etc.

55. What is the radius of earth?

a) 5400 Km
b) 6400 Km
c) 4500 Km
d) 3300 km

Explanation

The range or distance (d) of coverage of the propagation depends on the height (h) of the antenna given by the equation, where R is the radius of the Earth and it is 6400 km.

56. A transmitting antenna has a height of 40 m and the height of the receiving antenna is 30 m. What is the maximum distance between them for line-of-sight communication? The radius of the earth is 6.4×10^6 m.

a) 54.54 Km
b) 42. 21 Km
c) 37.71 Km
d) 23.37 Km

Explanation

Solution:

The total distance d between the transmitting and receiving antennas will be the sum of the individual distances of coverage.

$$d = d_1 + d_2$$
$$= \sqrt{2Rh_1} + \sqrt{2Rh_2}$$
$$= \sqrt{2R}\left(\sqrt{h_1} + \sqrt{h_2}\right)$$
$$= \sqrt{2\times6.4\times10^6}\times\left(\sqrt{40} + \sqrt{30}\right)$$
$$= 16\times10^2\sqrt{5}\times(6.32 + 5.48)$$
$$= 42217\,m = 42.217\,km$$

57. Which of the following are advantages of fibre cables?

1) Fiber cables are very thin and weigh lesser than copper cable
2) Fiber optic system is immune to electrical interferences
3) Fiber optic cables are cheaper than copper cables.

a) 1, 2
b) 1, 3
c) 2, 3

d) All the above

Explanation

Merits

i) Fiber cables are very thin and weigh lesser than copper cables. ii) This system has much larger band width. This means that its information carrying capacity is larger. iii) Fiber optic system is immune to electrical interferences. iv) Fiber optic cables are cheaper than copper cables.

58. Recent developments in optical communication provide the data speed at the rate of __ Gbps

a) 10
b) 5
c) 15
d) 25

Explanation

Fiber optic cables provide the fastest transmission rate compared to any other form of transmission. It can provide data speed of 1 Gbps for homes and business. Multimode fibers operate at the speed of 10 Mbps. **Recent developments in optical communication provide the data speed at the rate of 25 Gbps**

59. Which of the following statement is correct?

1) The satellite communication is a mode of communication of signal between transmitter and receiver via satellite
2) The message signal from the Earth station is transmitted to the satellite on board via an uplink
    a) 1 alone
    b) 2 alone
    c) 1, 2
    d) None

Explanation

The satellite communication is a mode of communication of signal between transmitter and receiver via satellite. The message signal from the Earth station is transmitted to the satellite on board via an uplink (frequency band 6 GHz), amplified by a transponder and then retransmitted to another Earth station via a downlink (frequency band 4 GHz)

60. Which of the following are technology in mobile communication?

a) WiMAX
b) Edge
c) Wibro
d) All the above

Explanation

Recently, the mobile communication technology has evolved through various stages like 2G, 3G, 4G, 5G, WiMAX, Wibro, EDGE, GPRS and many others. This helps to increase the speed of communication and the range of coverage. The connectivity issues have decreased with reliable and secure connections. The GPS (Global Positioning System) and GSM (Global System for Mobile communication) technology play an important role in mobile communication. This increases the utilization of bandwidth of the network, sharing of the networks, error detections, etc. Many methods like digital switching, TDMA, CDMA have been used to ease the communication process.