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PHYSICS · JEE MAIN

Communication Systems

Previous Year Questions with answers

104 questions · **103** papers · **2011–2023** · newest paper first

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What is in this PDF: every Communication Systems question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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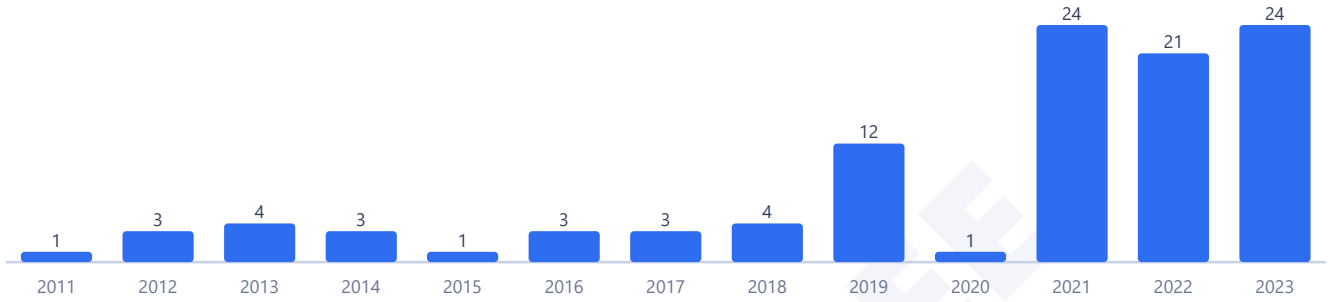
Chapter at a glance

1.8%	104	81 of 162	85 / 19
of Physics questions, 2019–2026	questions, 2011–2023	papers asked it, 2019–2026	MCQ / numerical, 2011–2023

Trend. Rising: 1 questions per paper in 2021–2023 against 0.4 in 2019–2020.

Questions per year



Counts are the questions we hold: 104 in 103 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2011–2023)

Modulation	56
Communication Basics	48

How often it comes up

Communication systems was previously in the Class 12 physics syllabus before being removed in 2024, holding rank 27 among 29 physics chapters with a 1.8 percent share of total physics questions. Between 2019 and 2026, the question pool recorded 82 questions across 162 papers, representing an average of 0.5 questions per shift. The topic featured in 81 of those 162 papers. Because it was removed in 2024, zero questions were set in 2024, 2025, or 2026. Over the recent 2024 to 2026 period, its testing count dropped to 0 questions across 58 papers, yielding a 0.0 percent share. This demonstrates a trend that is down compared to both the 1.6 percent share in the 2002 to 2018 era and the 1.8 percent share across 2019 to 2026. Across 2019 to 2026, 19 questions appeared in numerical answer format, with the remainder being multiple choice items on modulation parameters and communication terminology.

Most-asked topics

Historical questions fall into two primary subject divisions:

- **Modulation**: 56 questions since 2011, with 44 asked between 2019 and 2026, last tested in 2023. This area examines amplitude modulation principles, modulation index mu from peak-to-peak signal limits, sideband frequencies, carrier power, total radiated power, and transmission bandwidth.
- **Communication Basics**: 48 total questions, including 38 from 2019 to 2026, last tested in 2023. Core concepts assess line-of-sight radio horizon distances for elevated antennas, space wave propagation, sky wave ionospheric reflection, tropospheric ground waves, terminology matching, and frequency band allocations for television, FM, and satellite services.

What the questions look like

Past questions from this chapter featured straightforward numerical evaluations and conceptual matching:

- **Modulation index from waveform envelopes**: Finding the modulation index from maximum and minimum peak-to-peak voltages of an amplitude-modulated carrier wave.

- **Line-of-sight horizon distance**: Calculating the maximum line-of-sight communication range between two elevated antennas of specified heights above the Earth.
- **Transmission bandwidth**: Determining the total bandwidth required for transmitting an audio message on a high-frequency carrier wave.
- **Matching communication terminology**: Matching terms like attenuation, transducer, repeater, and demodulation with their definitions.

How to practise it

Because communication systems is excluded from the current syllabus, students preparing exclusively for JEE Main should not allocate active preparation time to this chapter.

If revising past year papers for general practice or state engineering entrances that retain the topic, focus on the modulation index formula A max minus A min divided by A max plus A min, alongside the line-of-sight distance formula square root of two R h.

Learn basic definitions of attenuation, amplification, modulation, and demodulation. Familiarize yourself with standard broadcast frequency allocations for radio and television.

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Q1 JEE Main 2023 · 15 Apr · Shift 1 MCQ

The height of transmitting antenna is 180 m and the height of the receiving antenna is 245 m. The maximum distance between them for satisfactory communication in line of sight will be: (given R = 6400 km)

(A) 96 km
(B) 56 km
(C) 48 km
(D) 104 km

Answer: (D) 104 km · Key from source paper

Q2 JEE Main 2023 · 13 Apr · Shift 1 MCQ

Match List-I with List-II
List-I (Layer of atmosphere) | List-II (Approximate height over earth's surface)
(A) F_1-Layer | (I) 10 km
(B) D-Layer | (II) 170 - 190 km
(C) Troposphere | (III) 100 km
(D) E-Layer | (V) 65 - 75 km
Choose the correct answer from the options given below.

(A) A-II, B-IV, C-I, D-III
(B) A-II, B-IV, C-III, D-I
(C) A-III, B-IV, C-I, D-II
(D) A-II, B-I, C-IV, D-III

Answer: (A) A-II, B-IV, C-I, D-III · Key from source paper

Q3 JEE Main 2023 · 13 Apr · Shift 2 MCQ

To radiate EM signal of wavelength λ with high efficiency, the antennas should have a minimum size equal to:

(A) 2λ
(B) $\frac{\lambda}{2}$
(C) $\frac{\lambda}{4}$
(D) λ

Answer: (C) $\frac{\lambda}{4}$ · Key from source paper

Q4 JEE Main 2023 · 12 Apr · Shift 1 MCQ

The amplitude of $15\sin(1000\,\pi t)$ is modulated by $10\sin(4\,\pi t)$ signal. The amplitude modulated signal contains frequencies of
A. 500 Hz

B. 2 Hz
C. 250 Hz
D. 498 Hz
E. 502 Hz
Choose the correct answer from the options given below

(A) A and B only
(B) A and C only
(C) A and D only
(D) A, D and E only

Answer: (D) A, D and E only · Key from source paper

Q5 JEE Main 2023 · 11 Apr · Shift 1 MCQ

A transmitting antenna is kept on the surface of the earth. The minimum height of receiving antenna required to receive the signal in line of sight at 4 km distance from it is $x \times 10^{-2}$ m. The value of x is _____.
(Let, radius of earth $R = 6400$ km)

(A) 125
(B) 1250
(C) 12.5
(D) 1.25

Answer: (A) 125 · Key from source paper

Q6 JEE Main 2023 · 11 Apr · Shift 2 MCQ

In satellite communication, the uplink frequency band used is:

(A) $420 - 890$ MHz
(B) $5.925 - 6.425$ GHz
(C) $76 - 88$ MHz
(D) $3.7 - 4.2$ GHz

Answer: (B) $5.925 - 6.425$ GHz · Key from source paper

Q7 JEE Main 2023 · 10 Apr · Shift 1 MCQ

A carrier wave of amplitude 15 V is modulated by a sinusoidal base band signal of amplitude 3 V. The ratio of maximum amplitude to minimum amplitude in an amplitude modulated wave is

(A) 2
(B) $\frac{3}{2}$
(C) 1
(D) 5

Answer: (B) $\frac{3}{2}$ · Key from source paper

Q8 JEE Main 2023 · 10 Apr · Shift 2 MCQ

A massage signal of frequency 3 kHz is used to modulate a carrier signal of frequency 1.5 MHz. The bandwidth of the amplitude modulated wave is

(A) 6 MHz
(B) 6 kHz
(C) 3 MHz
(D) 3 kHz

Answer: (B) 6 kHz · Key from source paper

Q9 JEE Main 2023 · 8 Apr · Shift 1 MCQ

A TV transmitting antenna is 98 m high and the receiving antenna is at the ground level. If the radius of the earth is 6400 km, the surface area covered by the transmitting antenna is approximately:

(A) $1240\ \text{km}^2$
(B) $3942\ \text{km}^2$
(C) $4868\ \text{km}^2$
(D) $1549\ \text{km}^2$

Answer: (B) $3942\ \text{km}^2$ · Key from source paper

Q10 JEE Main 2023 · 8 Apr · Shift 2 MCQ

The power radiated from a linear antenna of length l is proportional to (Given, λ = Wavelength of wave):

(A) $\frac{l}{\lambda}$
(B) $\left(\frac{l}{\lambda}\right)^2$
(C) $\frac{l}{\lambda^2}$
(D) $\frac{l^2}{\lambda}$

Answer: (B) $\left(\frac{l}{\lambda}\right)^2$ · Key from source paper

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Q11 JEE Main 2023 · 6 Apr · Shift 1 MCQ

By what percentage will the transmission range of a TV tower be affected when the height of the tower is increased by 21%?

(A) 15%
(B) 12%
(C) 10%
(D) 14%

Answer: (C) 10% · Key from source paper

Q12 JEE Main 2023 · 6 Apr · Shift 2 MCQ

For an amplitude modulated wave the minimum amplitude is $3\ \mathrm{V}$, while the modulation index is 60%. The maximum amplitude of the modulated wave is:

(A) $5\ \mathrm{V}$
(B) $15\ \mathrm{V}$
(C) $12\ \mathrm{V}$
(D) $10\ \mathrm{V}$

Answer: (C) $12\ \mathrm{V}$ · Key from source paper

Q13 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Which of the following frequencies does not belong to FM broadcast.

(A) 106 MHz
(B) 64 MHz
(C) 99 MHz
(D) 89 MHz

Answer: (B) 64 MHz · Key from source paper

Q14 JEE Main 2023 · 1 Feb · Shift 2 MCQ

In an amplitude modulation, a modulating signal having amplitude of X V is superimposed with a carrier signal of amplitude Y V in first case. Then, in second case, the same modulating signal is superimposed with different carrier signal of amplitude $2Y$ V. The ratio of modulation index in the two case respectively wil be :

(A) 1 : 2
(B) 1 : 1
(C) 2 : 1
(D) 4 : 1

Answer: (C) 2 : 1 · Key from source paper

Q15 JEE Main 2023 · 31 Jan · Shift 1 MCQ

The amplitude of $15\sin(1000\pi t)$ is modulated by $10\sin(4\pi t)$ signal. The amplitude modulated signal contains frequency (ies) of

(A) 500 Hz
(B) 2 Hz
(C) 250 Hz
(D) 498 Hz
(E) 502 Hz
Choose the correct answer from the options given below:

(A) A only
(B) A, D and E only
(C) B only
(D) A and B only

Answer: (B) A, D and E only · Key from source paper

Q16 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Given below are two statements
Statement I : For transmitting a signal, size of antenna (l) should be comparable to wavelength of signal (at least $l = \frac{\lambda}{4}$ in dimension).
Statement II : In amplitude modulation, amplitude of carrier wave remains constant (unchanged).
In the light of the above statements, choose the most appropriate answer from the options given below

(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is incorrect but Statement II is correct
(D) Statement I is correct but Statement II is incorrect

Answer: (D) Statement I is correct but Statement II is incorrect · Key from source paper

Q17 JEE Main 2023 · 30 Jan · Shift 1 MCQ

A sinusoidal carrier voltage is amplitude modulated. The resultant amplitude modulated wave has maximum and minimum amplitude of 120 V and 80 V respectively. The amplitude of each side band is :

(A) 15 V
(B) 10 V
(C) 20 V
(D) 5 V

Answer: (B) 10 V · Key from source paper

Q18 JEE Main 2023 · 30 Jan · Shift 2 MCQ

Match List I with List II

List I
A Attenuation
B Transducer
C Demodulation
D Repeater

List II
I Combination of a receiver and transmitter
II Process of retrieval of information from the carrier wave at receiver
III Converts one form of energy into another
IV Loss of strength of a signal while propagating through a medium

Choose the correct answer from the options given below :

(A) A-I, B-II, C-III, D-IV
(B) A-II, B-III, C-IV, D-I
(C) A-IV, B-III, C-I, D-II
(D) A-IV, B-III, C-II, D-I

Answer: (D) A-IV, B-III, C-II, D-I · Key from source paper

Q19 JEE Main 2023 · 29 Jan · Shift 1 MCQ

If the height of transmitting and receiving antennas are $80\ \mathrm{m}$ each, the maximum line of sight distance will be :

Given : Earth's radius $= 6.4 \times 10^6\ \mathrm{m}$.

(A) $32\ \mathrm{km}$
(B) $28\ \mathrm{km}$
(C) $36\ \mathrm{km}$
(D) $64\ \mathrm{km}$

Answer: (D) $64\ \mathrm{km}$ · Key from source paper

Q20 JEE Main 2023 · 29 Jan · Shift 2 MCQ

The modulation index for an A.M. wave having maximum and minimum peak to peak voltages of 14 mV and 6 mV respectively is :

(A) 1.4
(B) 0.4
(C) 0.2
(D) 0.6

Answer: (B) 0.4 · Key from source paper

Q21 JEE Main 2023 · 25 Jan · Shift 1 MCQ

A message signal of frequency $5\ \text{kHz}$ is used to modulate a carrier signal of frequency $2\ \text{MHz}$. The bandwidth for amplitude modulation is:

(A) $5\ \text{kHz}$
(B) $20\ \text{kHz}$
(C) $10\ \text{kHz}$
(D) $2.5\ \text{kHz}$

Answer: (C) $10\ \text{kHz}$ · Key from source paper

Q22 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Match List I with List II

List I	List II
A. Troposphere	I. Approximate $65 - 75$ km over Earth's surface
B. E-Part of Stratosphere	II. Approximate 300 km over Earth's surface
C. F_2-Part of Thermosphere	III. Approximate 10 km over Earth's surface
D. D-Part of Stratosphere	IV. Approximate 100 km over Earth's surface

Choose the correct answer from the options given below :

(A) A-III, B-IV, C-II, D-I
(B) A-I, B-II, C-IV, D-III
(C) A-I, B-IV, C-III, D-II
(D) A-III, B-II, C-I, D-IV

Answer: (A) A-III, B-IV, C-II, D-I · Key from source paper

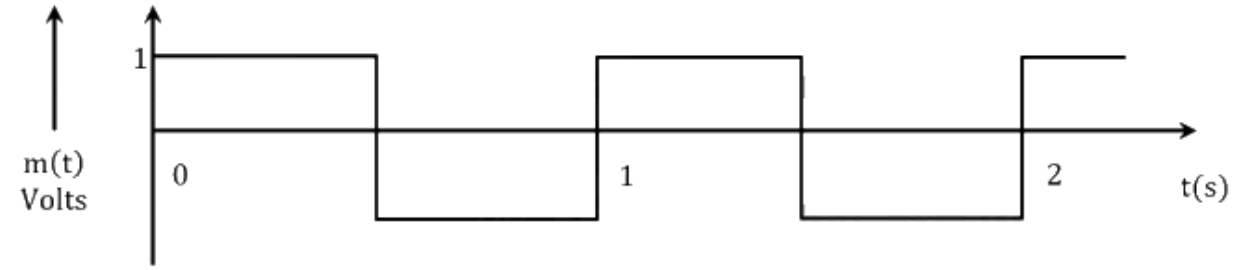
Q23 JEE Main 2023 · 24 Jan · Shift 1 MCQ

A modulating signal is a square wave, as shown in the figure.

(see the figure above)

If the carrier wave is given as $ct = 2\sin 8\pi t$ volts, the modulation index is:

Q20. A modulating signal is a square wave, as shown in the figure.



If the carrier wave is given as $ct = 2\sin 8\pi t$ volts, the modulation index is:

(1) $\frac{1}{4}$ (2) 1

(3) $\frac{1}{3}$ (4) $\frac{1}{2}$

(A) $\frac{1}{4}$

(B) 1

(C) $\frac{1}{3}$

(D) $\frac{1}{2}$

Answer: (D) $\frac{1}{2}$ · Key from source paper

Q24 JEE Main 2023 · 24 Jan · Shift 2 MCQ

Match List I with List II

LIST I	LIST II
A. AM Broadcast	I. $88 - 108$ MHz
B. FM Broadcast	II. $540 - 1600$ kHz
C. Television	III. $3.7 - 4.2$ GHz
D. Satellite Communication	IV. 54 MHz $- 590$ MHz

Choose the correct answer from the options given below:

(A) A-II, B-I, C-IV, D-III

(B) A-IV, B-III, C-I, D-II

(C) A-II, B-III, C-I, D-IV

(D) A-I, B-III, C-II, D-IV

Answer: (A) A-II, B-I, C-IV, D-III · Key from source paper

Q25 JEE Main 2022 · 29 Jul · Shift 1 MCQ

Find the modulation index of an AM wave having 8 V variation where maximum amplitude of the AM wave is 9 V.

(A) 0.8
(B) 0.5
(C) 0.2
(D) 0.1

Answer: (A) 0.8 · Key from source paper

Q26 JEE Main 2022 · 29 Jul · Shift 2 Numerical

A modulating signal $2\sin 6.28 \times 10^6 t$ is added to the carrier signal $4\sin 12.56 \times 10^9 t$ for amplitude modulation. The combined signal is passed through a non-linear square law device. The output is then passed through a band pass filter. The bandwidth of the output signal of band pass filter will be _____ MHz.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q27 JEE Main 2022 · 28 Jul · Shift 1 MCQ

In the case of amplitude modulation to avoid distortion the modulation index μ should be :

(A) $\mu \leq 1$
(B) $\mu \geq 1$
(C) $\mu = 2$
(D) $\mu = 0$

Answer: (A) $\mu \leq 1$ · Key from source paper

Q28 JEE Main 2022 · 28 Jul · Shift 2 MCQ

A FM Broad cast transmitter, using modulating signal of frequency $20\ \text{kHz}$ has a deviation ratio of 10. The Bandwidth required for transmission is :

(A) $220\ \text{kHz}$
(B) $180\ \text{kHz}$
(C) $360\ \text{kHz}$
(D) $440\ \text{kHz}$

Answer: (D) $440\ \text{kHz}$ · Key from source paper

Q29 JEE Main 2022 · 27 Jul · Shift 1 MCQ

At a particular station, the TV transmission tower has a height of 100 m. To triple its coverage range, height of the tower should be increased to

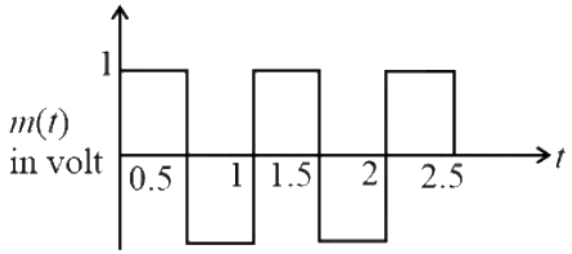
(A) 200 m
(B) 300 m
(C) 600 m
(D) 900 m

Answer: (D) 900 m · Key from source paper

Q30 JEE Main 2022 · 27 Jul · Shift 2 MCQ

A square wave of the modulating signal is shown in the figure. The carrier wave is given by $C(t) = 5\sin(8\pi t)$ Volt. The modulation index is
(see the figure above)

Q20. A square wave of the modulating signal is shown in the figure. The carrier wave is given by $C(t) = 5\sin(8\pi t)$ Volt. The modulation index is



(1) 0.2 (2) 0.1
(3) 0.3 (4) 0.4

(A) 0.2
(B) 0.1
(C) 0.3
(D) 0.4

Answer: (A) 0.2 · Key from source paper

Q31 JEE Main 2022 · 26 Jul · Shift 2 MCQ

The maximum and minimum voltage of an amplitude modulated signal are 60 V and 20 V respectively. The percentage modulation index will be

(A) 0.5%
(B) 50%
(C) 2%
(D) 30%

Answer: (B) 50% · Key from source paper

Q32 JEE Main 2022 · 25 Jul · Shift 1 Numerical

The required height of a TV tower which can cover the population of 6.03 lakh is h. If the average population density is 100 per square km and the radius of earth is 6400 km, then the value of h will

be _____ m.

Numerical value type: the answer is a number.

Answer: 150. · Key from source paper

Q33 JEE Main 2022 · 25 Jul · Shift 2 MCQ

In AM modulation, a signal is modulated on a carrier wave such that maximum and minimum amplitude are found to be 6 V and 2 V respectively. The modulation index is

(A) 100%
(B) 80%
(C) 60%
(D) 50%

Answer: (D) 50% · Key from source paper

Q34 JEE Main 2022 · 29 Jun · Shift 1 MCQ

Only 2% of the optical source frequency is the available channel bandwidth for an optical communicating system operating at $1000\ \text{nm}$. If an audio signal requires a bandwidth of $8\ \text{kHz}$, how many channels can be accommodated for transmission

(A) 375×10^7
(B) 75×10^7
(C) 375×10^8
(D) 75×10^9

Answer: (B) 75×10^7 · Key from source paper

Q35 JEE Main 2022 · 29 Jun · Shift 2 MCQ

The TV transmission tower at a particular station has a height of $125\ \text{m}$. For doubling the coverage of its range, the height of the tower should be increased by

(A) $500\ \text{m}$
(B) $375\ \text{m}$
(C) $250\ \text{m}$
(D) $125\ \text{m}$

Answer: (B) $375\ \text{m}$ · Key from source paper

Q36 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Match List-I with List-II

List-I
(A) Television signal
(B) Radio signal

(C) High Quality Music
(D) Human speech

List-II
I. $03\ \mathrm{KHz}$
II. $20\ \mathrm{KHz}$
III. $02\ \mathrm{MHz}$
IV. $06\ \mathrm{MHz}$

(A) A – I, B – II, C – III, D – IV
(B) A – IV, B – III, C – I, D – II
(C) A – IV, B – III, C – II, D – I
(D) A – I, B – II, C – IV, D – III

Answer: (C) A – IV, B – III, C – II, D – I · Key from source paper

Q37 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Amplitude modulated wave is represented by $V_{\mathrm{AM}} = 10\left[1 + 0.4\cos\left(2\pi \times 10^4 t\right)\right]\cos\left(2\pi \times 10^7 t\right)$. The total bandwidth of the amplitude modulated wave is

(A) $10\ \mathrm{kHz}$
(B) $20\ \mathrm{MHz}$
(C) $20\ \mathrm{kHz}$
(D) $10\ \mathrm{MHz}$

Answer: (C) $20\ \mathrm{kHz}$ · Key from source paper

Q38 JEE Main 2022 · 27 Jun · Shift 1 Numerical

The height of a transmitting antenna at the top of a tower is $25\ \mathrm{m}$ and that of receiving antenna is, $49\ \mathrm{m}$. The maximum distance between them, for satisfactory communication in LOS (Line-Of-Sight) is $K\sqrt{5} \times 10^2\ \mathrm{m}$. The value of K is _____ .
(Assume radius of Earth is $64 \times 10^5\ \mathrm{m}$) [Calculate upto nearest integer value]

Numerical value type: the answer is a number.

Answer: 192. · Key from source paper

Q39 JEE Main 2022 · 27 Jun · Shift 2 MCQ

We do not transmit low frequency signal to long distances because
(a) The size of the antenna should be comparable to signal wavelength which is unreal solution for a signal of longer wavelength.
(b) Effective power radiated by a long wavelength baseband signal would be high.
(c) We want to avoid mixing up signals transmitted by different transmitter simultaneously.
(d) Low frequency signal can be sent to long distances by superimposing with a high frequency wave

as well.

Therefore, the most suitable option will be :

(A) All statements are true

(B) (a), (b) and (c) are true only

(C) (a), (c) and (d) are true only

(D) (b), (c) and (d) are true only

Answer: (C) (a), (c) and (d) are true only · Key from source paper

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Q40 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Choose the correct statement for amplitude modulation

(A) Amplitude of modulating signal is varied in accordance with the information signal.

(B) Amplitude of modulated signal is varied in accordance with the information signal.

(C) Amplitude of carrier signal is varied in accordance with the information signal.

(D) Amplitude of modulated signal is varied in accordance with the modulating signal.

Answer: (C) Amplitude of carrier signal is varied in accordance with the information signal. · Key from source paper

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Q41 JEE Main 2022 · 26 Jun · Shift 2 MCQ

A sinusoidal wave $y(t) = 40\sin(10 \times 10^6 \pi t)$ is amplitude modulated by another sinusoidal wave $x(t) = 20\sin(1000\pi t)$. The amplitude of minimum frequency component of modulated signal is

(A) 0.5

(B) 0.25

(C) 20

(D) 10

Answer: (D) 10 · Key from source paper

Q42 JEE Main 2022 · 25 Jun · Shift 1 MCQ

A signal of 100THz frequency can be transmitted with maximum efficiency by

(A) Coaxial cable

(B) Optical fibre

(C) Twisted pair of copper wires

(D) Water

Answer: (B) Optical fibre · Key from source paper

Q43 JEE Main 2022 · 25 Jun · Shift 2 MCQ

Match List I with List II

List I	List II
(A) Facsimile	(I) Static Document Image
(B) Guided media Channel	(II) Local Broadcast Radio
(C) Frequency Modulation	(III) Rectangular wave
(D) Digital Signal	(IV) Optical Fiber

Choose the correct answer from the following options

(A) A - IV, B - III, C - II, D - I

(B) A - I, B - IV, C - II, D - III

(C) A - IV, B - II, C - III, D - I

(D) A - I, B - II, C - III, D - IV

Answer: (B) A - I, B - IV, C - II, D - III · Key from source paper

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Q44 JEE Main 2022 · 24 Jun · Shift 1 MCQ

A baseband signal of $3.5\ \mathrm{MHz}$ frequency is modulated with a carrier signal of $3.5\ \mathrm{GHz}$ frequency using amplitude modulation method. What should be the minimum size of antenna required to transmit the modulated signal ?

(A) $42.8\ \mathrm{m}$

(B) $42.8\ \mathrm{mm}$

(C) $21.4\ \mathrm{mm}$

(D) $21.4\ \mathrm{m}$

Answer: (C) $21.4\ \mathrm{mm}$ · Key from source paper

Q45 JEE Main 2022 · 24 Jun · Shift 2 Numerical

An antenna is placed in a dielectric medium of dielectric constant 6.25. If the maximum size of that antenna is $5.0\ \mathrm{mm}$, it can radiate a signal of minimum frequency of _____ GHz. (Given $\mu_r = 1$ for dielectric medium)

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q46 JEE Main 2021 · 1 Sep · Shift 2 Numerical

A carrier wave with amplitude of 250 V is amplitude modulated by a sinusoidal base band signal of amplitude 150 V. The ratio of minimum amplitude to maximum amplitude for the amplitude modulated wave is $50 : x$, then value of x, is _____.

Numerical value type: the answer is a number.

Answer: 200. · Key from source paper

Q47 JEE Main 2021 · 31 Aug · Shift 1 Numerical

If the sum of the heights of transmitting and receiving antennas in the line of sight of communication is fixed at 160 m, then the maximum range of LOS communication is _____ km (Take radius of Earth $= 6400$ km)

Numerical value type: the answer is a number.

Answer: 64. · Key from source paper

Q48 JEE Main 2021 · 31 Aug · Shift 2 Numerical

A bandwidth of 6 MHz is available for $A.M.$ transmission. If the maximum audio signal frequency used for modulating the carrier wave is not to exceed 6 kHz. The number of stations that can be broadcasted within this band simultaneously without interfering with each other will be _____.

Numerical value type: the answer is a number.

Answer: 500. · Key from source paper

Q49 JEE Main 2021 · 27 Aug · Shift 1 Numerical

A transmitting antenna has a height of 320 m and that of receiving antenna is 2000 m. The maximum distance between them for satisfactory communication in line of sight mode is d. The value of d is _____ km.

Numerical value type: the answer is a number.

Answer: 224. · Key from source paper

Q50 JEE Main 2021 · 26 Aug · Shift 1 Numerical

An amplitude-modulated wave is represented by, $C_m(t) = 10\,(1 + 0.2\cos 12560t)\sin\left(111 \times 10^4 t\right)$ V. The modulating frequency in kHz will be

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q51 JEE Main 2021 · 26 Aug · Shift 2 MCQ

A transmitting antenna at top of a tower has a height of 50 m, and the height of receiving antenna is, 80 m. What is the range of communication for the line of sight (LOS) mode?
[use radius of the earth= 6400 km]

(A) 80.2 km
(B) 144.1 km
(C) 57.28 km
(D) 45.5 km

Answer: (C) 57.28 km · Key from source paper

Q52 JEE Main 2021 · 27 Jul · Shift 1 Numerical

The amplitude of upper and lower side bands of AM wave where a carrier signal with frequency $11.21\ \mathrm{MHz}$, peak voltage $15\ \mathrm{V}$ is amplitude modulated by a $7.7\ \mathrm{kHz}$ sine wave of $5\ \mathrm{V}$ amplitude are $\frac{a}{10}\ \mathrm{V}$ and $\frac{b}{10}\ \mathrm{V}$ respectively. Then the value of $\frac{a}{b}$ is _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q53 JEE Main 2021 · 27 Jul · Shift 2 Numerical

The maximum amplitude for an amplitude modulated wave is found to be $12\ \mathrm{V}$ while the minimum amplitude is found to be $3\ \mathrm{V}$. The modulation index is $0.6x$ where x is _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q54 JEE Main 2021 · 25 Jul · Shift 1 MCQ

In amplitude modulation, the message signal $V_{\mathrm{m}}(t) = 10 \sin 2\pi \times 10^5 t$ volts and carrier signal $V_{\mathrm{c}} t = 20 \sin 2\pi \times 10^7 t$ volts. The modulated signal now contains the message signal with lower side band and upper side band frequency, therefore the bandwidth of modulated signal is $\alpha\ \mathrm{kHz}$. The value of α is:

(A) $200\ \mathrm{kHz}$
(B) $500\ \mathrm{kHz}$
(C) $100\ \mathrm{kHz}$
(D) 0

Answer: (A) $200\ \mathrm{kHz}$ · Key from source paper

Q55 JEE Main 2021 · 25 Jul · Shift 2 Numerical

A message signal of frequency $20\ \mathrm{kHz}$ and peak voltage of $20\ \mathrm{V}$ is used to modulate a carrier wave of frequency $1\ \mathrm{MHz}$ and peak voltage of $20\ \mathrm{V}$. The modulation index will be:

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q56 JEE Main 2021 · 22 Jul · Shift 1 MCQ

What should be the height of transmitting antenna and the population covered if the television telecast is to cover a radius of $150\ \mathrm{km}$? The average population density around the tower is $2000\ \mathrm{km}^{-2}$ and the value of $R_e = 6.5 \times 10^6\ \mathrm{m}$.

(A) Height $= 1731\ \mathrm{m}$
Population Covered $= 1413 \times 10^5$

(B) Height $= 1241\ \mathrm{m}$
Population Covered $= 7 \times 10^5$

(C) Height $= 1600\ \mathrm{m}$
Population Covered $= 2 \times 10^5$

(D) Height $= 1800\ \mathrm{m}$
Population Covered $= 1413 \times 10^8$

Answer: (A) Height $= 1731\ \mathrm{m}$
Population Covered $= 1413 \times 10^5$ · Key from source paper

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Q57 JEE Main 2021 · 20 Jul · Shift 1 Numerical

A carrier wave $V_C(t) = 160 \sin\left(2\pi \times 10^6 t\right)$ volts is made to vary between $V_{\max} = 200\ \mathrm{V}$ and $V_{\min} = 120\ \mathrm{V}$ by a message signal $V_m(t) = A_m \sin\left(2\pi \times 10^3 t\right)$ volts. The peak voltage A_m of the modulating signal is,

Numerical value type: the answer is a number.

Answer: 40. · Key from source paper

Q58 JEE Main 2021 · 18 Mar · Shift 1 MCQ

Match List−I with List−II.
List−I
List−II
(a) $10\ \mathrm{km}$ height over earth's surface (i) Thermosphere
(b) $70\ \mathrm{km}$ height over earth's surface (ii) Mesosphere
(c) $180\ \mathrm{km}$ height over earth's surface (iii) Stratosphere
(d) $270\ \mathrm{km}$ height over earth's surface (iv) Troposphere

(A) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

(B) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

(C) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

(D) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

Answer: (A) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i) · Key from source paper

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Q59 JEE Main 2021 · 18 Mar · Shift 2 Numerical

A TV transmission tower antenna is at a height of $20\ \mathrm{m}$. Suppose that the receiving antenna is at.
(i) ground level
(ii) a height of $5\ \mathrm{m}$.
The increase in antenna range in case (ii) relative to case (i) is $n\%$. The value of n, to the nearest integer, is.

Numerical value type: the answer is a number.

Answer: 50. · Key from source paper

Q60 JEE Main 2021 · 17 Mar · Shift 1 Numerical

For VHF signal broadcasting, _____ km^2 of maximum service area will be covered by an antenna tower of height 30 m, if the receiving antenna is placed at ground. Let radius of the earth be $6400\ \mathrm{km}$. (Round off to the Nearest Integer) (Take π as 3.14)

Numerical value type: the answer is a number.

Answer: 1206. · Key from source paper

Q61 JEE Main 2021 · 17 Mar · Shift 2 MCQ

A carrier signal $C(t) = 25\sin\left(2.512 \times 10^{10}t\right)$ is amplitude modulated by a message signal $m(t) = 5\sin\left(1.57 \times 10^{8}t\right)$ and transmitted through an antenna. What will be the bandwidth of the modulated signal ?

(A) 8 GHz
(B) 2.01 GHz
(C) 1987.5 MHz
(D) 50 MHz

Answer: (D) 50 MHz · Key from source paper

Q62 JEE Main 2021 · 16 Mar · Shift 1 MCQ

A 25 m long antenna is mounted on an antenna tower. The height of the antenna tower is 75 m. The wavelength (in meter) of the signal transmitted by this antenna would be :

(A) 300
(B) 400
(C) 200
(D) 100

Answer: (D) 100 · Key from source paper

Q63 JEE Main 2021 · 16 Mar · Shift 2 MCQ

Two identical antennas mounted on identical towers are separated from each other by a distance of $45\ \mathrm{km}$. What should nearly be the minimum height of receiving antenna to receive the signals in line of sight ? (Assume radius of earth is $6400\ \mathrm{km}$)

EdLoop JEE

(A) $19.77\ \mathrm{m}$
(B) $39.55\ \mathrm{m}$
(C) $79.1\ \mathrm{m}$
(D) $158.2\ \mathrm{m}$

Answer: (B) $39.55\ \mathrm{m}$ · Key from source paper

Q64 JEE Main 2021 · 26 Feb · Shift 1 Numerical

The maximum and minimum amplitude of an amplitude modulated wave is $16\ \mathrm{V}$ and $8\ \mathrm{V}$ respectively. The modulation index for this amplitude modulated wave is $x \times 10^{-2}$. The value of x is _____. (Round off your answer to the nearest integer)

Numerical value type: the answer is a number.

Answer: 33. · Key from source paper

Q65 JEE Main 2021 · 26 Feb · Shift 2 Numerical

If the highest frequency modulating a carrier is $5\ \mathrm{kHz}$, then the number of AM broadcast stations accommodated in a $90\ \mathrm{kHz}$ bandwidth are

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q66 JEE Main 2021 · 25 Feb · Shift 1 MCQ

Given below are two statements:
Statement I : A speech signal of $2\ \mathrm{kHz}$ is used to modulate a carrier signal of $1\ \mathrm{MHz}$. The bandwidth requirement for the signal is $4\ \mathrm{kHz}$.
Statement II : The side band frequencies are $1002\ \mathrm{kHz}$ and $998\ \mathrm{kHz}$. In the light of the above statements, choose the correct answer from the options given below:

(A) Statement I is false but Statement II is true
(B) Both Statement I and Statement II are true
(C) Statement I is true but Statement II is false
(D) Both Statement I and Statement II are false

Answer: (B) Both Statement I and Statement II are true · Key from source paper

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Q67 JEE Main 2021 · 25 Feb · Shift 2 MCQ

If a message signal of frequency f_m is amplitude modulated with a carrier signal of frequency f_c and radiated through an antenna, the wavelength of the corresponding signal in air is

EdLoop JEE

(A) $\frac{c}{f_c - f_m}$
(B) $\frac{c}{f_m}$
(C) $\frac{c}{f_c}$
(D) $\frac{c}{f_c + f_m}$

Answer: (C) $\frac{c}{f_c}$ · Key from source paper

Q68 JEE Main 2021 · 24 Feb · Shift 1 Numerical

An audio signal $v_m = 20 \sin 2\pi 1500t$ amplitude modulates a carrier $v_c = 80 \sin 2\pi 100,000t$. The value of percent modulation is

Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q69 JEE Main 2021 · 24 Feb · Shift 2 Numerical

A signal of $0.1\ \mathrm{kW}$ is transmitted in a cable. The attenuation of cable is -5 dB per km and cable length is 20 km. The power received at the receiver is 10^{-x} W. The value of x is _____. [Gain in dB $= 10\ \log_{10}\left(\frac{P_o}{P_i}\right)$]

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q70 JEE Main 2020 · 2 Sep · Shift 1 MCQ

An amplitude modulated waves is represented by expression $\mathrm{v_m} = 5(1 + 0.6\ \cos\ 6280\mathrm{t})\ \sin(211 \times 10^4\mathrm{t})\ \mathrm{V}$. The minimum and maximum amplitudes of the amplitudes modulated wave are, respectively:

(A) $\frac{3}{2}\mathrm{V}, 5\mathrm{V}$
(B) $\frac{5}{2}\mathrm{V},\ 8\mathrm{V}$
(C) $5\mathrm{V}, 8\mathrm{V}$
(D) $3\mathrm{V}, 5\mathrm{V}$

Answer: (B) $\frac{5}{2}\mathrm{V},\ 8\mathrm{V}$ · Key from source paper

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Q71 JEE Main 2019 · 10 Apr · Shift 1 MCQ

Given below in the left column are different modes of communication using the kinds of waves given in the right column.
(1) Optical Fibre Communication (P) Ultrasound
(2) Radar (Q) Infrared Light
(3) Sonar (R) Microwaves
(4) Mobile Phones (S) Radio Waves
From the options given below, find the most appropriate match between entries in the left and the right column.

(A) $1-Q,\ 2-S,\ 3-P,\ 4-R$
(B) $1-S,\ 2-Q,\ 3-R,\ 4-P$
(C) $1-Q,\ 2-S,\ 3-R,\ 4-P$
(D) $1-R,\ 2-P,\ 3-S,\ 4-Q$

Answer: (A) $1-Q,\ 2-S,\ 3-P,\ 4-R$ · Key from source paper

Q72 JEE Main 2019 · 10 Apr · Shift 1 MCQ

A message signal of frequency $100\ \text{MHz}$ and peak voltage $100\ \text{V}$ is used execute amplitude modulation on a carrier wave of frequency $300\ \text{GHz}$ and peak voltage $400\ \text{V}$. The modulation index and difference between the two side band frequencies are:

(A) $4;\ 2\times10^{8}\ \text{Hz}$
(B) $0.25;\ 2\times10^{8}\ \text{Hz}$
(C) $4;\ 1\times10^{8}\ \text{Hz}$
(D) $0.25;\ 1\times10^{8}\ \text{Hz}$

Answer: (B) $0.25;\ 2\times10^{8}\ \text{Hz}$ · Key from source paper

Q73 JEE Main 2019 · 9 Apr · Shift 1 MCQ

A signal $A\cos\omega t$ is transmitted using $v_0\sin\omega_0 t$ as carrier wave. The correct amplitude modulated (AM) signal is:

(A) $v_0\sin[\omega_0(1+0.01A\sin\omega t)t]$
(B) $(v_0+A)\cos\omega t\ \sin\omega_0 t$
(C) $v_0\ \sin\omega_0 t+A\cos\omega t$
(D) $v_0\sin\omega_0 t+\frac{A}{2}\sin(\omega_0-\omega)t+\frac{A}{2}\sin(\omega_0+\omega)t$

Answer: (D) $v_0\sin\omega_0 t+\frac{A}{2}\sin(\omega_0-\omega)t+\frac{A}{2}\sin(\omega_0+\omega)t$ · Key from source paper

Q74 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The physical sizes of the transmitter and receiver antenna in a communication system are:

(A) proportional to carrier frequency
(B) independent of both carrier and modulation frequency
(C) inversely proportional to modulation frequency
(D) inversely proportional to carrier frequency

Answer: (D) inversely proportional to carrier frequency · Key from source paper

Q75 JEE Main 2019 · 8 Apr · Shift 1 MCQ

The wavelength of the carrier waves in a modern optical fiber communication network is close to:

(A) 2400 nm
(B) 900 nm
(C) 600 nm
(D) 1500 nm

Answer: (D) 1500 nm · Key from source paper

Q76 JEE Main 2019 · 8 Apr · Shift 2 MCQ

In a line of sight radio communication, a distance of about 50 km is kept between the transmitting and receiving antennas. If the height of the receiving antenna is 70 m, then the minimum height of the transmitting antenna should be: (Radius of the Earth = 6.4×10^6 m)

(A) 20 m
(B) 51 m
(C) 40 m
(D) 32 m

Answer: (D) 32 m · Key from source paper

Q77 JEE Main 2019 · 12 Jan · Shift 1 MCQ

A $100V$ carrier wave is made to vary between 160 V and 40 V by a modulating signal. What is the modulation index?

(A) 0.3
(B) 0.6
(C) 0.4
(D) 0.5

Answer: (B) 0.6 · Key from source paper

Q78 JEE Main 2019 · 12 Jan · Shift 2 MCQ

To double the covering range of a TV transmitting tower, its height should be multiplied by:

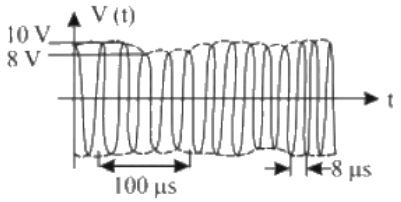
(A) $\frac{1}{\sqrt{2}}$
(B) 4
(C) 2
(D) $\sqrt{2}$

Answer: (B) 4 · Key from source paper

Q79 JEE Main 2019 · 11 Jan · Shift 2 MCQ

An amplitude modulated signal is plotted below:
(see the figure above)
Which one of the following best describes the above signal?

Q29.



An amplitude modulated signal is plotted below:

Which one of the following best describes the above signal?

(1) $\left(9+\sin\left(2.5\pi\times10^{5}\mathrm{t}\right)\right)\sin\left(2\pi\times10^{4}\mathrm{t}\right)\mathrm{V}$

(2) $\left(1+9\sin\left(2\pi\times10^{4}\mathrm{t}\right)\right)\sin\left(2.5\pi\times10^{5}\mathrm{t}\right)\mathrm{V}$

(3) $\left(9+\sin\left(2\pi\times10^{4}t\right)\right)\sin\left(2.5\pi\times10^{5}\mathrm{t}\right)\mathrm{V}$

(4) $\left(9+\sin\left(4\pi\times10^{4}t\right)\right)\sin\left(5\pi\times10^{5}\mathrm{t}\right)\mathrm{V}$

(A) $\left(9+\sin\left(2.5\pi\times10^{5}t\right)\right)\sin\left(2\pi\times10^{4}t\right)\mathrm{V}$

(B) $\left(1+9\sin\left(2\pi\times10^{4}t\right)\right)\sin\left(2.5\pi\times10^{5}t\right)\mathrm{V}$

(C) $\left(9+\sin\left(2\pi\times10^{4}t\right)\right)\sin\left(2.5\pi\times10^{5}t\right)\mathrm{V}$

(D) $\left(9+\sin\left(4\pi\times10^{4}t\right)\right)\sin\left(5\pi\times10^{5}t\right)\mathrm{V}$

Answer: (C) $\left(9+\sin\left(2\pi\times10^{4}t\right)\right)\sin\left(2.5\pi\times10^{5}t\right)\mathrm{V}$ · Key from source paper

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Q80 JEE Main 2019 · 10 Jan · Shift 1 MCQ

A TV transmission tower has a height of $140\ m$ and the height of the receiving antenna is $40\ m$. What is the maximum distance upto which signals can be broadcasted from this tower in LOS (Line of Sight) mode? (Given: radius of earth $= 6.4\times10^{6}\ m$).

(A) $48\ km$

(B) $40\ km$

(C) $80\ km$

(D) $65\ km$

Answer: (D) $65\ km$ · Key from source paper

Q81 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The modulation frequency of an AM radio station is $250kHz$, which is 10% of the carrier wave. If another AM station approaches you for license what broadcast frequency will you allot?

(A) $2750\ kHz$

(B) $2000\ kHz$

(C) $2250\ kHz$

(D) $2900kHz$

Answer: (B) $2000\ kHz$ · Key from source paper

Q82 JEE Main 2019 · 9 Jan · Shift 2 MCQ

In a communication system operating at wavelength $800\ nm$, only one percent of source frequency is available as signal bandwidth. The number of channels accommodated for transmitting TV signals of band width $6\ MHz$ are (Take velocity of light $c=3\times10^{8}\ m/s$, $h=6.6\times10^{-34}\ J\text{-}s$)

(A) 6.25×10^5
(B) 4.87×10^5
(C) 3.75×10^6
(D) 3.86×10^6

Answer: (A) 6.25×10^5 · Key from source paper

Q83 JEE Main 2018 · 16 Apr · Online MCQ

A carrier wave of peak voltage 14 V is used for transmitting a message signal. The peak voltage of the modulating signal given to achieve a modulation index of 80% will be:

(A) 22.4 V
(B) 7 V
(C) 11.2 V
(D) 28 V

Answer: (C) 11.2 V · Key from source paper

Q84 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The number of amplitude modulated broadcast stations that can be accommodated in a 300kHz band width for the highest modulating frequency 15kHz will be:

(A) 20
(B) 10
(C) 8
(D) 15

Answer: (B) 10 · Key from source paper

Q85 JEE Main 2018 · 15 Apr · Shift 2 MCQ

The carrier frequency of a transmitter is provided by a tank circuit of a coil of inductance $49\mu\text{H}$ and a capacitance of 2.5nF. It is modulated by an audio signal of 12kHz. The frequency range occupied by the side bands is:

(A) $18\text{kHz} - 30\text{kHz}$
(B) $63\text{kHz} - 75\text{kHz}$
(C) $442\text{kHz} - 466\text{kHz}$
(D) $13482\text{kHz} - 13494\text{kHz}$

Answer: (C) $442\text{kHz} - 466\text{kHz}$ · Key from source paper

Q86 JEE Main 2018 · 8 Apr · Offline MCQ

A telephonic communication service is working at a carrier frequency of $10\ \text{GHz}$. Only 10% of it is utilized for transmission. How many telephonic channels can be transmitted simultaneously if each

channel requires a bandwidth of $5\ \text{kHz}$?

(A) 2×10^6
(B) 2×10^3
(C) 2×10^4
(D) 2×10^5

Answer: (D) 2×10^5 · Key from source paper

Q87 JEE Main 2017 · 9 Apr · Online MCQ

A signal is to be transmitted through a wave of wavelength λ, using a linear antenna. The length l of the antenna and effective power radiated P_{eff} will be given, respectively, as-
(K is a constant of proportionality)

(A) $\frac{\lambda}{8}$, $P_{\text{eff}} = K\left(\frac{l}{\lambda}\right)$
(B) $\frac{\lambda}{16}$, $P_{\text{eff}} = K\left(\frac{l}{\lambda}\right)^3$
(C) $\frac{\lambda}{5}$, $P_{\text{eff}} = K\left(\frac{l}{\lambda}\right)^{\frac{1}{2}}$
(D) λ, $P_{\text{eff}} = K\left(\frac{l}{\lambda}\right)^2$

Answer: (D) λ, $P_{\text{eff}} = K\left(\frac{l}{\lambda}\right)^2$ · Key from source paper

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Q88 JEE Main 2017 · 8 Apr · Online MCQ

A signal of frequency 20 kHz and peak voltage of 5 Volt is used to modulate a carrier wave of frequency 1.2 MHz and peak voltage 25 Volts. Choose the correct statement.

(A) Modulation index = 5, side frequency bands are at 1400 kHz and 1000 kHz.
(B) Modulation index= 5, side frequency bands are at 21.2 kHz and 18.8 kHz.
(C) Modulation index = 0.2, side frequency bands are at 1220 kHz and 1180 kHz.
(D) Modulation index = 5, side frequency bands are at 24.2 kHz and 18.8 kHz.

Answer: (C) Modulation index = 0.2, side frequency bands are at 1220 kHz and 1180 kHz. · Key from source paper

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Q89 JEE Main 2017 · 2 Apr · Offline MCQ

In amplitude modulation, the sinusoidal carrier frequency used is denoted by ω_c and the signal frequency is denoted by ω_m. The bandwidth $\Delta\omega_m$ of the signal is such that $\Delta\omega_m \ll \omega_c$. Which of the following frequencies is not contained in the modulated wave?

(A) $\omega_c - \omega_m$
(B) ω_m
(C) ω_c
(D) $\omega_m + \omega_c$

Answer: (B) ω_m · Key from source paper

Q90 JEE Main 2016 · 10 Apr · Online MCQ

A modulated signal $C_m(t)$ has the form $C_m(t) = 30\sin 300\pi t + 10(\cos 200\pi t - \cos 400\pi t)$. The carrier frequency f_c' the modulating frequency(message frequency) f_ω and the modulation index μ are respectively given by :

(A) $f_c = 200\ Hz;\ \ f_m = 50\ Hz\ ;\ \ \mu = \frac{1}{2}$
(B) $f_c = 150\ Hz;\ \ f_m = 50\ Hz\ ;\ \ \mu = \frac{2}{3}$
(C) $f_c = 150\ Hz;\ \ f_m = 30\ Hz\ ;\ \ \mu = \frac{1}{3}$
(D) $f_c = 200\ Hz;\ \ f_m = 30\ Hz\ ;\ \ \mu = \frac{1}{2}$

Answer: (B) $f_c = 150\ Hz;\ \ f_m = 50\ Hz\ ;\ \ \mu = \frac{2}{3}$ · Key from source paper

Q91 JEE Main 2016 · 9 Apr · Online MCQ

An audio signal consists of two distinct sounds: one a human speech signal in the frequency band of 200 Hz to 2700 Hz, while the other is a high frequency music signal in the frequency band of 10200 Hz to 15200 Hz. The ratio of the AM signal band width required to send both the signals together to the AM signal band width required to send just the human speech is:

(A) 3
(B) 5
(C) 6
(D) 2

Answer: (C) 6 · Checked by our team

Q92 JEE Main 2016 · 3 Apr · Offline MCQ

Choose the correct statement:

(A) In frequency modulation the amplitude of the high frequency carrier wave is made to vary in proportion to the amplitude of the audio signal.
(B) In frequency modulation the amplitude of the high frequency carrier wave is made to vary in proportion to the frequency of the audio signal.
(C) In amplitude modulation the amplitude of the high frequency carrier wave is made to vary in proportion to the amplitude of the audio signal.
(D) In amplitude modulation the frequency of the high frequency carrier wave is made to vary in proportion to the amplitude of the audio signal.

Answer: (C) In amplitude modulation the amplitude of the high frequency carrier wave is made to vary in proportion to the amplitude of the audio signal. · Key from source paper

Q93 JEE Main 2015 · 4 Apr · Offline MCQ

A signal of $5\ \mathrm{kHz}$ frequency is amplitude modulated on a carrier wave of frequency $2\ \mathrm{MHz}$. The frequencies of the resultant signal is/are:

(A) $2000\ \text{kHz}$ and $1995\ \text{kHz}$
(B) $2\ \text{MHz}$ only
(C) $2005\ \text{kHz}$ and $1995\ \text{kHz}$
(D) $2005\ \text{kHz}$, $2000\ \text{kHz}$ and $1995\ \text{kHz}$

Answer: (D) $2005\ \text{kHz}$, $2000\ \text{kHz}$ **and** $1995\ \text{kHz}$ · Key from source paper

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Q94 JEE Main 2014 · 19 Apr · Online MCQ

Long-range radio transmission is possible when the radio waves are reflected from the ionosphere. For this to happen the frequency of the radio waves must be in the range:

(A) $150 - 500\ \text{kHz}$
(B) $80 - 150\ \text{MHz}$
(C) $1 - 3\ \text{MHz}$
(D) $8 - 25\ \text{MHz}$

Answer: (D) $8 - 25\ \text{MHz}$ · Key from source paper

Q95 JEE Main 2014 · 12 Apr · Online MCQ

For sky wave propagation, the radio waves must have a frequency range in between:

(A) 1MHz to 2MHz
(B) 5MHz to 25MHz
(C) 35MHz to 40MHz
(D) 45MHz to 50MHz

Answer: (B) 5MHz **to** 25MHz · Key from source paper

Q96 JEE Main 2014 · 9 Apr · Online MCQ

A transmitting antenna at the top of a tower has a height 32 m and the height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in line of sight (LOS) mode?

(A) 45.5 km
(B) 54.5 km
(C) 55.4 km
(D) 455 km

Answer: (A) 45.5 km · Key from source paper

Q97 JEE Main 2013 · 23 Apr · Online MCQ

Which of the following statement is NOT correct?

(A) Ground wave signals are more stable than the sky wave signals.

(B) The critical frequency of an ionospheric layer is the highest frequency that will be reflected back by the layer when it is vertically incident.

(C) Electromagnetic waves of frequencies higher than about 30MHz cannot penetrate the ionosphere.

(D) Sky wave signals in the broadcast frequency range are stronger at night than in the day time.

Answer: (C) Electromagnetic waves of frequencies higher than about 30MHz cannot penetrate the ionosphere. · Key from source paper

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Q98 JEE Main 2013 · 22 Apr · Online MCQ

This question has Statement-1 and Statement-2. Of the four choices given after the Statements, choose the one that best describes the two Statements. Statement-1: Short wave transmission is achieved due to the total internal reflection of the e-m wave from an appropriate height in the ionosphere. Statement-2: Refractive index of a plasma is independent of the frequency of e-m waves.

(A) Statement-1 is true, Statement- 2 is false.

(B) Statement-1 is false, Statement- 2 is true.

(C) Statement-1 is true, Statement- 2 is true but Statement -2 is not the correct explanation of statement-1.

(D) Statement-1 is true, Statement-2 is true and Statement -2 is the correct explanation of Statement-1.

Answer: (A) Statement-1 is true, Statement- 2 is false. · Key from source paper

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Q99 JEE Main 2013 · 9 Apr · Online MCQ

If a carrier wave c(t) $= A\sin\omega_c t$ is amplitude modulated by a modulator signal m(t) $= A\sin\omega_m t$ then the equation of modulated signal $[\mathrm{C_m}(t)]$ and its modulation index are respectively

(A) $C_m(t) = A\,(1+\sin\omega_m t)\sin\omega_c t$ and 2

(B) $C_m(t) = A\,(1+\sin\omega_m t)\sin\omega_m t$ and 1

(C) $C_m(t) = A\,(1+\sin\omega_m t)\sin\omega_c t$ and 1

(D) $C_m(t) = A\,(1+\sin\omega_c t)\sin\omega_m t$ and 2

Answer: (C) $C_m(t) = A\,(1+\sin\omega_m t)\sin\omega_c t$ **and 1** · Key from source paper

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Q100 JEE Main 2013 · 7 Apr · Offline MCQ

A diode detector is used to detect an amplitude modulated wave of 60% modulation by using a condenser of capacity 250 pico farad in parallel with a load resistance of 100 kilo ohm. Find the maximum modulated frequency which could be detected by it.

(A) 5.31 MHz
(B) 5.31 kHz
(C) 10.62 MHz
(D) 10.62 kHz

Answer: (D) 10.62 kHz · Key from source paper

Q101 AIEEE 2012 · 19 May · Online MCQ

Given the electric field of a complete amplitude modulated wave as
$\vec{E} = \hat{i}E_c\left(1 + \frac{E_m}{E_c}\cos\omega_m t\right)\cos\omega_c t$
Where the subscript c stands for the carrier wave and m for the modulating signal. The frequencies present in the modulated wave are

(A) ω_c and $\sqrt{\omega_c^2 + \omega_m^2}$
(B) $\omega_c, \omega_c + \omega_m$ and $\omega_c - \omega_m$
(C) ω_c and ω_m
(D) ω_c and $\sqrt{\omega_c\omega_m}$

Answer: (B) $\omega_c, \omega_c + \omega_m$ and $\omega_c - \omega_m$ · Key from source paper

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Q102 AIEEE 2012 · 7 May · Online MCQ

Broadcasting antennas are generally

(A) vertical type
(B) both vertical and horizontal type
(C) omni directional type
(D) horizontal type

Answer: (A) vertical type · Key from source paper

Q103 AIEEE 2012 · Offline MCQ

A radar has a power of $1\ \mathrm{Kw}$ and is operating at a frequency of $10\ \mathrm{GHz}$. It is located on a mountain top of height $500\ \mathrm{m}$. The maximum distance upto which it can detect object located on the surface of the earth (Radius of earth $= 6.4 \times 10^6\ \mathrm{m}$) is

(A) $80\ \mathrm{km}$
(B) $16\ \mathrm{km}$
(C) $40\ \mathrm{km}$
(D) $64\ \mathrm{km}$

Answer: (A) $80\ \mathrm{km}$ · Key from source paper

Q104 AIEEE 2011 MCQ

This question has Statement -1 and Statement -2. Of the four choices given after the statements, choose the one that best describes the two statements. Statement-1 : Sky wave signals are used for long distance radio communication. These signals are in general, less stable than ground wave signals. Statement-2 : The state of ionosphere varies from hour to hour, day to day and season to season.

(A) Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation of Statement-1.

(B) Statement-1 is true, Statement-2 is true; Statement-2 is not the correct explanation of Statement-1.

(C) Statement- 1 is false, Statement- 2 is true.

(D) Statement-1 is true, Statement- 2 is false.

Answer: (A) Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation of Statement-1. · Key from source paper

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