Basic Qualification Question Bank for Amateur Radio Operator Certificate Examinations

PROPAGATION

B-007-01-01 (4)
What type of propagation usually occurs from one hand- held VHF transceiver to another nearby?

Tunnel propagation
Sky-wave propagation
Auroral propagation
Line-of-sight propagation

B-007-01-02 (4)
How does the range of sky-wave propagation compare to ground- wave propagation?

It is much shorter
It is about the same
It depends on the weather
It is much longer

B-007-01-03 (3)
When a signal is returned to earth by the ionosphere, what is this called?

Tropospheric propagation
Ground-wave propagation
Sky-wave propagation
Earth-moon-earth propagation

B-007-01-04 (1)
How are VHF signals propagated within the range of the visible horizon?

By direct wave
By sky wave
By plane wave
By geometric wave

B-007-01-05 (1)
Skywave is another name for:

ionospheric wave
tropospheric wave
ground wave
inverted wave

B-007-01-06 (4)
That portion of the radiation which is directly affected by the surface of the earth is called:

tropospheric wave
ionospheric wave
inverted wave
ground wave

B-007-01-07 (4)
At HF frequencies, line-of-sight transmission between two stations uses mainly the:

troposphere
skip wave
ionosphere
ground wave

B-007-01-08 (3)
The distance travelled by ground waves

depends on the maximum usable frequency
is more at higher frequencies
is less at higher frequencies
is the same for all frequencies

B-007-01-09 (3)
The radio wave which follows a path from the transmitter to the ionosphere and back to earth is known correctly as the:

F layer
surface wave
ionospheric wave
skip wave

B-007-01-10 (2)
Reception of high frequency (HF) radio waves beyond 4000 km is generally possible by:

ground wave
ionospheric wave
skip wave
surface wave

B-007-02-01 (2)
What causes the ionosphere to form?

Lightning ionizing the outer atmosphere
Solar radiation ionizing the outer atmosphere
Release of fluorocarbons into the atmosphere
Temperature changes ionizing the outer atmosphere

B-007-02-02 (3)
What type of solar radiation is most responsible for ionization in the outer atmosphere?

Microwave
Ionized particle
Ultraviolet
Thermal

B-007-02-03 (2)
Which ionospheric region is closest to the earth?

The E region
The D region
The F region
The A region

B-007-02-04 (3)
Which region of the ionosphere is the least useful for long distance radio-wave propagation?

The F2 region
The F1 region
The D region
The E region

B-007-02-05 (4)
What two sub-regions of ionosphere exist only in the daytime?

Troposphere and stratosphere
Electrostatic and electromagnetic
D and E
F1 and F2

B-007-02-06 (3)
When is the ionosphere most ionized?

Dawn
Midnight
Midday
Dusk

B-007-02-07 (1)
When is the ionosphere least ionized?

Shortly before dawn
Just after noon
Just after dusk
Shortly before midnight

B-007-02-08 (4)
Why is the F2 region mainly responsible for the longest distance radio-wave propagation?

Because it exists only at night
Because it is the lowest ionospheric region
Because it does not absorb radio waves as much as other ionospheric regions
Because it is the highest ionospheric region

B-007-02-09 (2)
What is the main reason the 160, 80 and 40 metre amateur bands tend to be useful only for short-distance communications during daylight hours?

Because of auroral propagation
Because of D-region absorption
Because of magnetic flux
Because of a lack of activity

B-007-02-10 (4)
During the day, one of the ionospheric layers splits into two parts called:

D1 & D2
E1 & E2
A & B
F1 & F2

B-007-02-11 (2)
The position of the E layer in the ionosphere is:

below the D layer
below the F layer
sporadic
above the F layer

B-007-03-01 (3)
What is a skip zone?

An area which is too far away for ground-wave or sky-wave propagation
An area covered by sky-wave propagation
An area which is too far away for ground-wave propagation, but too close for sky-wave propagation
An area covered by ground- wave propagation

B-007-03-02 (3)
What is the maximum distance along the earth's surface that is normally covered in one hop using the F2 region?

None; the F2 region does not support radio-wave propagation
2160 km (1200 miles)
4500km (2500 miles)
325 km (180 miles)

B-007-03-03 (1)
What is the maximum distance along the earth's surface that is normally covered in one hop using the E region?

2160 km (1200 miles)
325 km (180 miles)
4500 km (2500 miles)
None; the E region does not support radio-wave propagation

B-007-03-04 (3)
Skip zone is:

a zone of silence caused by lost sky waves
a zone between any two refracted waves
a zone between the end of the ground wave and the point where the first refracted wave returns to earth
a zone between the antenna and the return of the first refracted wave

B-007-03-05 (3)
The distance to Europe from your location is approximately 5000 km. What sort of propagation is the most likely to be involved?

sporadic "E"
back scatter
multihop
tropospheric scatter

B-007-03-06 (4)
For radio signals, the skip distance is determined by the:

power fed to the final
angle of radiation
type of transmitting antenna used
height of the ionosphere and the angle of radiation

B-007-03-07 (3)
The distance from the transmitter to the nearest point where the sky wave returns to the earth is called the:

skip zone
angle of radiation
skip distance
maximum usable frequency

B-007-03-08 (1)
Skip distance is the:

the minimum distance reached by a signal after one reflection by the ionosphere
the maximum distance reached by a signal after one reflection by the ionosphere
the minimum distance reached by a ground-wave signal
the maximum distance a signal will travel by both a ground wave and reflected wave

B-007-03-09 (1)
Skip distance is a term associated with signals from the ionosphere. Skip effects are due to:

reflection and refraction from the ionosphere
selective fading of local signals
high gain antennas being used
local cloud cover

B-007-03-10 (3)
The skip distance of a sky wave will be greatest when the:

polarization is vertical
ionosphere is most densely ionized
angle between ground and radiation is smallest
signal given out is strongest

B-007-03-11 (3)
If the height of the reflecting layer of the ionosphere increases, the skip distance of a high frequency (HF) transmission:

stays the same
varies regularly
becomes greater
decreases

B-007-04-01 (1)
What effect does the D region of the ionosphere have on lower frequency HF signals in the daytime?

It absorbs the signals
It bends the radio waves out into space
It refracts the radio waves back to earth
It has little or no effect on 80-metre radio waves

B-007-04-02 (2)
What causes the ionosphere to absorb radio waves?

The presence of ionized clouds in the E region
The ionization of the D region
The splitting of the F region
The weather below the ionosphere

B-007-04-03 (1)
Two or more parts of the radio wave follow different paths during propagation and this may result in phase
differences at the receiver. This "change" at the receiver is called:

fading
baffling
absorption
skip

B-007-04-04 (4)
A change or variation in signal strength at the antenna, caused by differences in path lengths, is called:

absorption
fluctuation
path loss
fading

B-007-04-05 (3)
When a transmitted radio signal reaches a station by a one-hop and two-hop skip path, small changes in the ionosphere can cause:

consistent fading of received signal
consistently stronger signals
variations in signal strength
a change in the ground-wave signal

B-007-04-06 (2)
The usual effect of ionospheric storms is to:

produce extreme weather changes
cause a fade-out of sky- wave signals
prevent communications by ground wave
increase the maximum usable frequency

B-007-04-07 (1)
On the VHF and UHF bands, polarization of the receiving antenna is very important in relation to the transmitting antenna, yet on HF bands it is relatively unimportant. Why is that so?

The ionosphere can change the polarization of the signal from moment to moment
The ground wave and the sky wave continually shift the polarization
Anomalies in the earth's magnetic field produce a profound effect on HF polarization
Greater selectivity is possible with HF receivers making changes in polarization redundant

B-007-04-08 (1)
What causes selective fading?

Phase differences between radio wave components of the same transmission, as experienced at the receiving station
Small changes in beam heading at the receiving station
Time differences between the receiving and transmitting stations
Large changes in the height of the ionosphere at the receiving station ordinarily occurring shortly before sunrise and sunset

B-007-04-09 (2)
How does the bandwidth of a transmitted signal affect selective fading?

It is the same for both wide and narrow bandwidths
It is more pronounced at wide bandwidths
Only the receiver bandwidth determines the selective fading effect
It is more pronounced at narrow bandwidths

B-007-04-10 (1)
Polarization change often takes place on radio waves that are propagated over long distances. Which of these does not cause polarization change?

Parabolic interaction
Reflections
Passage through magnetic fields (Faraday rotation)
Refractions

B-007-04-11 (1)
Reflection of a SSB transmission from the ionosphere causes:

little or no phase-shift distortion phase-shift distortion
signal cancellation at the receiver
a high-pitch squeal at the receiver

B-007-05-01 (1)
How do sunspots change the ionization of the atmosphere?

The more sunspots there are, the greater the ionization
The more sunspots there are, the less the ionization
Unless there are sunspots, the ionization is zero
They have no effect

B-007-05-02 (3)
How long is an average sunspot cycle?

17 years
5 years
11 years
7 years

B-007-05-03 (3)
What is solar flux?

A measure of the tilt of the earth's ionosphere on the side toward the sun
The number of sunspots on the side of the sun facing the earth
The radio energy emitted by the sun
The density of the sun's magnetic field

B-007-05-04 (3)
What is the solar-flux index?

Another name for the American sunspot number
A measure of solar activity that compares daily readings with results from the last six months
A measure of solar activity that is taken at a specific frequency
A measure of solar activity that is taken annually

B-007-05-05 (3)
What influences all radiocommunication beyond ground-wave or line-of-sight ranges?

The F2 region of the ionosphere
The F1 region of the ionosphere
Solar activity
Lunar tidal effects

B-007-05-06 (4)
Which two types of radiation from the sun influence propagation?

Subaudible and audio-frequency emissions
Polar region and equatorial emissions
Infra-red and gamma-ray emissions
Electromagnetic and particle emissions

B-007-05-07 (1)
When sunspot numbers are high, how is the ionosphere affected?

Frequencies up to 40 MHz or higher are normally usable for long-distance communication
High frequency radio signals are absorbed
Frequencies up to 100 MHz or higher are normally usable for long-distance communication
High frequency radio signals become weak and distorted

B-007-05-08 (4)
All communication frequencies throughout the spectrum are affected in varying degrees by the:

ionosphere
aurora borealis
atmospheric conditions
sun

B-007-05-09 (1)
Average duration of a solar cycle is:

11 years
3 years
6 years
1 year

B-007-05-10 (1)
The ability of the ionosphere to reflect high frequency radio signals depends on:

the amount of solar radiation
the power of the transmitted signal
the receiver sensitivity
upper atmosphere weather conditions

B-007-05-11 (1)
Propagation cycles have a period of approximately 11:

years
months
days
centuries

B-007-06-01 (1)
What happens to signals higher in frequency than the critical frequency?

They pass through the ionosphere
They are absorbed by the ionosphere
Their frequency is changed by the ionosphere to be below the maximum usable frequency
They are reflected back to their source

B-007-06-02 (1)
What causes the maximum usable frequency to vary?

The amount of radiation received from the sun, mainly ultraviolet
The temperature of the ionosphere
The speed of the winds in the upper atmosphere
The type of weather just below the ionosphere

B-007-06-03 (4)
What does maximum usable frequency mean?

The lowest frequency signal that will reach its intended destination
The highest frequency signal that is most absorbed by the ionosphere
The lowest frequency signal that is most absorbed by the ionosphere
The highest frequency signal that will reach its intended destination

B-007-06-04 (1)
What can be done at an amateur station to continue HF communications during a sudden ionospheric disturbance?

Try a higher frequency
Try the other sideband
Try a different antenna polarization
Try a different frequency shift

B-007-06-05 (1)
What is one way to determine if the maximum usable frequency (MUF) is high enough to support 28 MHz propagation between your station and western Europe?

Listen for signals on the 10-metre beacon frequency
Listen for signals on the 20-metre beacon frequency
Listen for signals on the 39-metre broadcast frequency
Listen for WWVH time signals on 20 MHz

B-007-06-06 (3)
What usually happens to radio waves with frequencies below the maximum usable frequency (MUF) when they are sent into the ionosphere?

They are changed to a frequency above the MUF
They are completely absorbed by the ionosphere
They are bent back to the earth
They pass through the ionosphere

B-007-06-07 (3)
At what point in the solar cycle does the 20-metre band usually support worldwide propagation during daylight hours?

Only at the minimum point of the solar cycle
Only at the maximum point of the solar cycle
At any point in the solar cycle
At the summer solstice

B-007-06-08 (2)
If we transmit a signal, the frequency of which is so high we no longer receive a reflection from the ionosphere, the signal frequency is above the:

skip distance
maximum usable frequency
speed of light
sunspot frequency

B-007-06-09 (1)
Communication on the 80 metre band is generally most difficult during:

daytime in summer
evening in winter
evening in summer
daytime in winter

B-007-06-10 (3)
The optimum working frequency provides the best long range HF communication. Compared with the maximum usable frequency (MUF), it is usually:

double the MUF
half the MUF
slightly lower
slightly higher

B-007-06-11 (1)
During summer daytime, which bands are the most difficult for communications beyond ground wave?

160 and 80 metres
40 metres
30 metres
20 metres

B-007-07-01 (3)
Which ionospheric region most affects sky-wave propagation on the 6 metre band?

The F2 region
The F1 region
The E region
The D region

B-007-07-02 (4)
What effect does tropospheric bending have on 2-metre radio waves?

It causes them to travel shorter distances
It garbles the signal
It reverses the sideband of the signal
It lets you contact stations farther away

B-007-07-03 (3)
What causes tropospheric ducting of radio waves?

Lightning between the transmitting and receiving stations
An aurora to the north
A temperature inversion
A very low pressure area

B-007-07-04 (3)
That portion of the radiation kept close to the earth's surface due to bending in the atmosphere is called the:

inverted wave
ground wave
tropospheric wave
ionospheric wave

B-007-07-05 (1)
What is a sporadic-E condition?

Patches of dense ionization at E-region height
Partial tropospheric ducting at E-region height
Variations in E-region height caused by sunspot variations
A brief decrease in VHF signals caused by sunspot variations

B-007-07-06 (3)
On which amateur frequency band is the extended-distance propagation effect of sporadic-E most often observed?

160 metres
20 metres
6 metres
2 metres

B-007-07-07 (2)
In the northern hemisphere, in which direction should a directional antenna be pointed to take maximum advantage of auroral propagation?

East
North
West
South

B-007-07-08 (2)
Where in the ionosphere does auroral activity occur?

At F-region height
At E-region height
In the equatorial band
At D-region height

B-007-07-09 (3)
Which emission modes are best for auroral propagation?

RTTY and AM
FM and CW
CW and SSB
SSB and FM

B-007-07-10 (2)
Excluding enhanced propagation modes, what is the approximate range of normal VHF tropospheric propagation?

2400 km (1500 miles)
800 km (500 miles)
3200 km (2000 miles)
1600 km (1000 miles)

B-007-07-11 (2)
What effect is responsible for propagating a VHF signal over 800 km (500 miles)?

Faraday rotation
Tropospheric ducting
D-region absorption
Moon bounce

B-007-08-01 (4)
What kind of propagation would best be used by two stations within each other's skip zone on a certain frequency?

Scatter-mode
Sky-wave
Ducting
Ground-wave

B-007-08-02 (3)
If you receive a weak, distorted signal from a distance, and close to the maximum usable frequency, what type of propagation is probably occurring?

Ground-wave
Line-of-sight
Scatter
Ducting

B-007-08-03 (2)
What is a characteristic of HF scatter signals?

Reversed modulation
A wavering sound
Reversed sidebands
High intelligibility

B-007-08-04 (1)
What makes HF scatter signals often sound distorted?

Energy scattered into the skip zone through several radio-wave paths
Auroral activity and changes in the earth's magnetic field
Propagation through ground waves that absorb much of the signal
The state of the E-region at the point of refraction

B-007-08-05 (2)
Why are HF scatter signals usually weak?

Propagation through ground waves absorbs most of the signal energy
Only a small part of the signal energy is scattered into the skip zone
The F region of the ionosphere absorbs most of the signal energy
Auroral activity absorbs most of the signal energy

B-007-08-06 (3)
What type of radio-wave propagation allows a signal to be detected at a distance too far for ground-wave
propagation but too near for normal skywave propagation?

Short-path skip
Sporadic-E skip
Scatter
Ground wave

B-007-08-07 (4)
When does scatter propagation on the HF bands most often occur?

When the sunspot cycle is at a minimum and D-region absorption is high
At night
When the F1 and F2 regions are combined
When communicating on frequencies above the maximum usable frequency (MUF)

B-007-08-08 (4)
Which of the following IS NOT a scatter mode?

Meteor scatter
Tropospheric scatter
Ionospheric scatter
Absorption scatter

B-007-08-09 (2)
Meteor scatter is most effective on what band?

40 metres
6 metres
15 metres
160 metres

B-007-08-10 (3)
Which of the following IS NOT a scatter mode?

Side scatter
Back scatter
Inverted scatter
Forward scatter

B-007-08-11 (1)
In which frequency range is meteor scatter most effective for extended-range communication?

30 - 100 MHz
10 - 30 MHz
3 - 10 MHz
100 - 300 MHz