Basic Qualification Question Bank for Amateur Radio Operator Certificate Examinations

Antennas

B-006-06-01 (1)
What device might allow use of an antenna on a band it was not designed for?

An antenna tuner
An SWR meter
A low pass filter
A high pass filter

B-006-06-02 (1)
What does an antenna matching unit do?

It matches a transceiver to a mismatched antenna system
It helps a receiver automatically tune in stations that are far away
It switches an antenna system to a transmitter when sending, and to a receiver when listening
It switches a transceiver between different kinds of antennas connected to one feed line

B-006-06-03 (2)
What would you use to connect a coaxial cable of 50 ohms impedance to an antenna of 35 ohms impedance?

An SWR meter
An impedance-matching device
A low pass filter
A terminating resistor

B-006-06-04 (3)
When will a power source deliver maximum output to the load?

When air wound transformers are used instead of iron-core transformers
When the power-supply fuse rating equals the primary winding current
When the impedance of the load is equal to the impedance of the source
When the load resistance is infinite

B-006-06-05 (2)
What happens when the impedance of an electrical load is equal to the internal impedance of the power source?

The electrical load is shorted
The source delivers maximum power to the load
No current can flow through the circuit
The source delivers minimum power to the load

B-006-06-06 (4)
Why is impedance matching important?

So the load will draw minimum power from the source
To ensure that there is less resistance than reactance in the circuit
To ensure that the resistance and reactance in the circuit are equal
So the source can deliver maximum power to the load

B-006-06-07 (3)
To obtain efficient power transmission from a transmitter to an antenna requires:

high load impedance
low ohmic resistance
matching of impedances
inductive impedance

B-006-06-08 (2)
To obtain efficient transfer of power from a transmitter to an antenna, it is important that there is a:

high load impedance
matching of impedance
proper method of balance
low ohmic resistance

B-006-06-09 (4)
If an antenna is correctly matched to a transmitter, the length of transmission line:

must be a full wavelength long
must be an odd number of quarter-wave
must be an even number of half-waves
will have no effect on the matching

B-006-06-10 (2)
The reason that an RF transmission line should be matched at the transmitter end is to:

ensure that the radiated signal has the intended polarization transfer
the maximum amount of power to the antenna
prevent frequency drift
overcome fading of the transmitted signal

B-006-06-11 (4)
If the centre impedance of a folded dipole is approximately 300 ohms, and you are using RG8U (50 ohms) coaxial lines, what is the ratio required to have the line and the antenna matched?

2:1
4:1
10:1
6:1

B-006-07-01 (3)
What does horizontal wave polarization mean?

The electric and magnetic lines of force of a radio wave are perpendicular to the earth's surface
The electric lines of force of a radio wave are perpendicular to the earth's surface
The electric lines of force of a radio wave are parallel to the earth's surface
The magnetic lines of force of a radio wave are parallel to the earth's surface

B-006-07-02 (2)
What does vertical wave polarization mean?

The magnetic lines of force of a radio wave are perpendicular to the earth's surface
The electric lines of force of a radio wave are perpendicular to the earth's surface
The electric and magnetic lines of force of a radio wave are parallel to the earth's surface
The electric lines of force of a radio wave are parallel to the earth's surface

B-006-07-03 (2)
What electromagnetic wave polarization does a Yagi antenna have when its elements are parallel to the earth's surface?

Helical
Horizontal
Vertical
Circular

B-006-07-04 (4)
What electromagnetic wave polarization does a half-wavelength antenna have when it is perpendicular to the earth's surface?

Circular
Horizontal
Parabolical
Vertical

B-006-07-05 (2)
Polarization of an antenna is determined by:

the height of the antenna
the electric field
the type of antenna
the magnetic field

B-006-07-06 (1)
An isotropic antenna is a:

hypothetical point source
infinitely long piece of wire
dummy load
half-wave reference dipole

B-006-07-07 (4)
What is the antenna radiation pattern for an isotropic radiator?

A parabola
A cardioid
A unidirectional cardioid
A sphere

B-006-07-08 (3)
VHF signals from a mobile station using a vertical whip antenna will normally be best received using a:

random length of wire
horizontal ground-plane antenna
vertical ground-plane antenna
horizontal dipole antenna

B-006-07-09 (4)
A dipole antenna will emit a vertically polarized wave if it is:

fed with the correct type of RF
too near to the ground
parallel with the ground
mounted vertically

B-006-07-10 (2)
If an electromagnetic wave leaves an antenna vertically polarized, it will arrive at the receiving antenna, by ground wave:

polarized at right angles to original
vertically polarized
horizontally polarized
polarized in any plane

B-006-07-11 (4)
Compared with a horizontal antenna, a vertical antenna will receive a vertically polarized radio wave:

at weaker strength
without any comparative difference
if the antenna changes the polarization
at greater strength

B-006-08-01 (1)
If an antenna is made longer, what happens to its resonant frequency?

It decreases
It increases
It stays the same
It disappears

B-006-08-02 (2)
If an antenna is made shorter, what happens to its resonant frequency?

It stays the same
It increases
It disappears
It decreases

B-006-08-03 (3)
The wavelength for a frequency of 25 MHz is:

15 metres (49.2 ft)
4 metres (13.1 ft)
12 metres (39.4 ft)
32 metres (105 ft)

B-006-08-04 (1)
The velocity of propagation of radio frequency energy in free space is:

300 000 kilometres per second
3000 kilometres per second
150 kilometres per second
186 000 kilometres per second

B-006-08-05 (3)
Adding a series inductance to an antenna would:

increase the resonant frequency
have little effect
decrease the resonant frequency
have no change on the resonant frequency

B-006-08-06 (3)
The resonant frequency of an antenna may be increased by:

lowering the radiating element
increasing the height of the radiating element
shortening the radiating element
lengthening the radiating element

B-006-08-07 (2)
The speed of a radio wave:

is infinite in space
is the same as the speed of light
is always less than half speed of light
varies directly with frequency

B-006-08-08 (1)
At the end of suspended antenna wire, insulators are used. These act to:

limit the electrical length of the antenna
increase the effective antenna length
allow the antenna to be more easily held vertically
prevent any loss of radio waves by the antenna

B-006-08-09 (2)
To lower the resonant frequency of an antenna, the operator should:

shorten it
lengthen it
ground one end
centre feed it with TV ribbon feeder

B-006-08-10 (2)
One solution to multiband operation with a shortened radiator is the "trap dipole" or trap vertical. These "traps" are actually:

large wire-wound resistors
a coil and capacitor in parallel
coils wrapped around a ferrite rod
hollow metal cans

B-006-08-11 (2)
The wavelength corresponding to a frequency of 2 MHz is:

360 m (1181 ft)
150 m (492 ft)
1500 m (4921 ft)
30 m (98 ft)

B-006-09-01 (3)
What is a parasitic beam antenna?

An antenna where the driven element obtains its radio energy by induction or radiation from director elements
An antenna where all elements are driven by direct connection to the feed line
An antenna where some elements obtain their radio energy by induction or radiation from a driven element
An antenna where wave traps are used to magnetically couple the elements

B-006-09-02 (2)
How can the bandwidth of a parasitic beam antenna be increased?

Use traps on the elements
Use larger diameter elements
Use tapered-diameter elements
Use closer element spacing

B-006-09-03 (2)
If a slightly shorter parasitic element is placed 0.1 wavelength away from an HF dipole antenna, what effect will this have on the antenna's radiation pattern?

A major lobe will develop in the horizontal plane, parallel to the two elements
A major lobe will develop in the horizontal plane, toward the parasitic element
A major lobe will develop in the vertical plane, away from the ground
The radiation pattern will not be affected

B-006-09-04 (3)
If a slightly longer parasitic element is placed 0.1 wavelength away from an HF dipole antenna, what effect will this have on the antenna's radiation pattern?

A major lobe will develop in the horizontal plane, parallel to the two elements
A major lobe will develop in the vertical plane, away from the ground
A major lobe will develop in the horizontal plane, away from the parasitic element, toward the dipole
The radiation pattern will not be affected

B-006-09-05 (1)
The property of an antenna, which defines the range of frequencies to which it will respond, is called its:

bandwidth
front-to-back ratio
impedance
polarization

B-006-09-06 (4)
Approximately how much gain does a half-wave dipole have over an isotropic radiator?

1.5 dB
3.0 dB
6.0 dB
2.1 dB

B-006-09-07 (4)
What is meant by antenna gain?

The numerical ratio of the signal in the forward direction to the signal in the back direction
The numerical ratio of the amount of power radiated by an antenna compared to the transmitter output power
The final amplifier gain minus the transmission line losses
The numerical ratio relating the radiated signal strength of an antenna to that of another antenna

B-006-09-08 (4)
What is meant by antenna bandwidth?

Antenna length divided by the number of elements
The angle between the half- power radiation points
The angle formed between two imaginary lines drawn through the ends of the elements
The frequency range over which the antenna may be expected to perform well

B-006-09-09 (1)
In free space, what is the radiation characteristic of a half-wave dipole?

Minimum radiation from the ends, maximum broadside
Maximum radiation from the ends, minimum broadside
Omnidirectional
Maximum radiation at 45 degrees to the plane of the antenna

B-006-09-10 (1)
The gain of an antenna, especially on VHF and above, is quoted in dBi. The "i" in this expression stands for:

isotropic
ideal
ionosphere
interpolated

B-006-09-11 (2)
The front-to-back ratio of a beam antenna is:

the forward power of the major lobe to the power in the backward direction
both being measured at the 3 dB points
the ratio of the maximum forward power in the major lobe to the maximum backward power radiation
undefined the ratio of the forward power at the 3 dB points to the power radiated in the backward direction

B-006-10-01 (3)
How do you calculate the length in metres (feet) of a quarter-wavelength vertical antenna?

Divide 468 (1532) by the antenna's operating frequency (in MHz)
Divide 300 (982) by the antenna's operating frequency (in MHz)
Divide 71.5 (234) by the antenna's operating frequency (in MHz)
Divide 150 (491) by the antenna's operating frequency (in MHz)

B-006-10-02 (2)
If you made a quarter-wavelength vertical antenna for 21.125 MHz, how long would it be?

3.6 metres (11.8 ft)
3.36 metres (11.0 ft)
7.2 metres (23.6 ft)
6.76 metres (22.2 ft)

B-006-10-03 (1)
If you made a half-wavelength vertical antenna for 223 MHz, how long would it be?

64 cm (25.2 in)
128 cm (50.4 in)
105 cm (41.3 in)
134.6 cm (53 in)

B-006-10-04 (2)
Why is a 5/8-wavelength vertical antenna better than a 1/4-wavelength vertical antenna for VHF or UHF mobile operations?

A 5/8-wavelength antenna has less corona loss
A 5/8-wavelength antenna has more gain
A 5/8-wavelength antenna is easier to install on a car
A 5/8-wavelength antenna can handle more power

B-006-10-05 (3)
If a magnetic-base whip antenna is placed on the roof of a car, in what direction does it send out radio energy?

Most of it is aimed high into the sky
Most of it goes equally in two opposite directions
It goes out equally well in all horizontal directions
Most of it goes in one direction

B-006-10-06 (3)
What is an advantage of downward sloping radials on a ground plane antenna?

It increases the radiation angle
It brings the feed point impedance closer to 300 ohms
It brings the feed point impedance closer to 50 ohms
It lowers the radiation angle

B-006-10-07 (1)
What happens to the feed point impedance of a ground-plane antenna when its radials are changed from horizontal to downward-sloping?

It increases
It decreases
It stays the same
It approaches zero

B-006-10-08 (4)
Which of the following transmission lines will give the best match to the base of a quarter-wave ground-plane antenna?

300 ohms balanced feed line
75 ohms balanced feed line
300 ohms coaxial cable
50 ohms coaxial cable

B-006-10-09 (1)
The main characteristic of a vertical antenna is that it will:

receive signals equally well from all compass points around it
be very sensitive to signals coming from horizontal antennas
require few insulators
be easy to feed with TV ribbon feeder

B-006-10-10 (1)
Why is a loading coil often used with an HF mobile vertical antenna?

To tune out capacitive reactance
To lower the losses
To lower the Q
To improve reception

B-006-10-11 (2)
What is the main reason why so many VHF base and mobile antennas are 5/8 of a wavelength?

The angle of radiation is high giving excellent local coverage
The angle of radiation is low
It is easy to match the antenna to the transmitter
It's a convenient length on VHF

B-006-11-01 (4)
How many directly driven elements do most Yagi antennas have?

None
Two
Three
One

B-006-11-02 (4)
Approximately how long is the driven element of a Yagi antenna for 14.0 MHz?

5.21 metres (17 feet)
10.67 metres (35 feet)
20.12 metres (66 feet)
10.21 metres (33 feet and 6 inches)

B-006-11-03 (2)
Approximately how long is the director element of a Yagi antenna for 21.1 MHz?

5.18 metres (17 feet)
6.4 metres (21 feet)
3.2 metres (10.5 feet)
12.8 metres (42 feet)

B-006-11-04 (2)
Approximately how long is the reflector element of a Yagi antenna for 28.1 MHz?

4.88 metres (16 feet)
5.33 metres (17.5 feet)
10.67 metres (35 feet)
2.66 metres (8.75 feet)

B-006-11-05 (4)
What is one effect of increasing the boom length and adding directors to a Yagi antenna?

SWR increases
Weight decreases
Wind load decreases
Gain increases

B-006-11-06 (1)
What are some advantages of a Yagi with wide element spacing?

High gain, less critical tuning and wider bandwidth
High gain, lower loss and a low SWR
High front-to-back ratio and lower input resistance
Shorter boom length, lower weight and wind resistance

B-006-11-07 (4)
Why is a Yagi antenna often used for radiocommunications on the 20-metre band?

It provides excellent omnidirectional coverage in the horizontal plane
It is smaller, less expensive and easier to erect than a dipole or vertical antenna
It provides the highest possible angle of radiation for the HF bands
It helps reduce interference from other stations off to the side or behind

B-006-11-08 (2)
What does "antenna front-to- back ratio" mean in reference to a Yagi antenna?

The relative position of the driven element with respect to the reflectors and directors
The power radiated in the major radiation lobe compared to the power radiated in exactly the opposite direction
The power radiated in the major radiation lobe compared to the power radiated 90 degrees away from that direction
The number of directors versus the number of reflectors

B-006-11-09 (1)
What is a good way to get maximum performance from a Yagi antenna?

Optimize the lengths and spacing of the elements
Use RG-58 feed line
Use a reactance bridge to measure the antenna performance from each direction around the antenna
Avoid using towers higher than 9 metres (30 feet) above the ground

B-006-11-10 (4)
The spacing between the elements on a three-element Yagi antenna, representing the best overall choice, is ____ of a wavelength.

0.15
0.5
0.75
0.2

B-006-11-11 (2)
If the forward gain of a six- element Yagi is about 10 dB, what would the gain of two of these antennas be if they were "stacked"?

7 dB
13 dB
20 dB
10 dB

B-006-12-01 (4)
If you made a half-wavelength dipole antenna for 28.550 MHz, how long would it be?

10.5 metres (34.37 ft)
28.55 metres (93.45 ft)
5.08 metres (16.62 ft)
10.16 metres (33.26 ft)

B-006-12-02 (3)
What is one disadvantage of a random wire antenna?

It usually produces vertically polarized radiation
It must be longer than 1 wavelength
You may experience RF feedback in your station
You must use an inverted T matching network for multi-band operation

B-006-12-03 (1)
What is the low angle radiation pattern of an ideal half-wavelength dipole HF antenna installed parallel to the earth?

It is a figure-eight, perpendicular to the antenna
It is a circle (equal radiation in all directions)
It is two smaller lobes on one side of the antenna, and one larger lobe on the other side
It is a figure-eight, off both ends of the antenna

B-006-12-04 (2)
The impedances in ohms at the feed point of the dipole and folded dipole are, respectively:

73 and 150
73 and 300
52 and 100
52 and 200

B-006-12-05 (4)
A dipole transmitting antenna, placed so that the ends are pointing North/South, radiates:

mostly to the South and North
mostly to the South
equally in all directions
mostly to the East and West

B-006-12-06 (4)
How does the bandwidth of a folded dipole antenna compare with that of a simple dipole antenna?

It is essentially the same
It is less than 50%
It is 0.707 times the bandwidth
It is greater

B-006-12-07 (2)
What is a disadvantage of using an antenna equipped with traps?

It is too sharply directional at lower frequencies
It will radiate harmonics
It must be neutralized
It can only be used for one band

B-006-12-08 (1)
What is an advantage of using a trap antenna?

It may be used for multi- band operation
It has high directivity at the higher frequencies
It has high gain
It minimizes harmonic radiation

B-006-12-09 (1)
The "doublet antenna" is the most common in the amateur service. If you were to cut this antenna for 3.75 MHz, what would be its approximate length?

38 meters (125 ft.)
32 meters (105 ft.)
45 meters (145 ft.)
75 meters (245 ft.)

B-006-13-01 (3)
What is a cubical quad antenna?

A center-fed wire 1/2-electrical wavelength long
A vertical conductor 1/4- electrical wavelength high, fed at the bottom
Two or more parallel four- sided wire loops, each approximately one-electrical wavelength long
Four straight, parallel elements in line with each other, each approximately 1/2- electrical wavelength long

B-006-13-02 (1)
What is a delta loop antenna?

A type of cubical quad antenna, except with triangular elements rather than square
A large copper ring or wire loop, used in direction finding
An antenna system made of three vertical antennas, arranged in a triangular shape
An antenna made from several triangular coils of wire on an insulating form

B-006-13-03 (1)
Approximately how long is each side of a cubical quad antenna driven element for 21.4 MHz?

3.54 metres (11.7 feet)
0.36 metres (1.17 feet)
14.33 metres (47 feet)
143 metres (469 feet)

B-006-13-04 (2)
Approximately how long is each side of a cubical quad antenna driven element for 14.3 MHz?

21.43 metres (70.3 feet)
5.36 metres (17.6 feet)
53.34 metres (175 feet)
7.13 metres (23.4 feet)

B-006-13-05 (4)
Approximately how long is each leg of a symmetrical delta loop antenna driven element for 28.7 MHz?

2.67 metres (8.75 feet)
7.13 metres (23.4 feet)
10.67 metres (35 feet)
3.5 metres (11.5 feet)

B-006-13-06 (2)
Which statement about two- element delta loops and quad antennas is true?

They perform very well only at HF
They compare favorably with a three element Yagi
They are effective only when constructed using insulated wire
They perform poorly above HF

B-006-13-07 (1)
Compared to a dipole antenna, what are the directional radiation characteristics of a cubical quad antenna?

The quad has more directivity in both horizontal and vertical planes
The quad has more directivity in the horizontal plane but less directivity in the vertical plane
The quad has less directivity in the horizontal plane but more directivity in the vertical plane
The quad has less directivity in both horizontal and vertical planes

B-006-13-08 (3)
Moving the feed point of a multi element quad antenna from a side parallel to the ground to a side perpendicular to the ground will have what effect?

It will change the antenna polarization from vertical to horizontal
It will significantly decrease the antenna feed point impedance
It will change the antenna polarization from horizontal to vertical
It will significantly increase the antenna feed point impedance

B-006-13-09 (2)
What does the term "antenna front-to back ratio" mean in reference to a delta loop antenna?

The relative position of the driven element with respect to the reflectors and directors
The power radiated in the major radiation lobe compared to the power radiated in exactly the opposite direction
The power radiated in the major radiation lobe compared to the power radiated 90 degrees away from that direction
The number of directors versus the number of reflectors

B-006-13-10 (2)
The cubical "quad" or "quad" antenna consists of two or more square loops of wire. The driven element has an approximate overall length of:

three-quarters of a wavelength
one wavelength
two wavelengths
one-half wavelength

B-006-13-11 (2)
The delta loop antenna consists of two or more triangular structures mounted on a boom. The overall length of the driven element is approximately:

one-quarter of a wavelength
one wavelength
two wavelengths
one-half of a wavelength