

SIGNALS AND SYSTEMS / NEURAL NETWORKS

1. Which among the following assertions represents a necessary condition for the existence of Fourier Transform of discrete time signal (DTFT)?

- a) Discrete Time Signal should be absolutely summable
- b) Discrete Time Signal should be absolutely multipliable
- c) Discrete Time Signal should be absolutely integrable
- d) Discrete Time Signal should be absolutely differentiable

2. Which property of periodic signal in DTFS gets completely clarified / identified by the equation

$$x(n - n_0)?$$

- a) Conjugation
- b) Time Shifting
- c) Frequency Shifting
- d) Time Reversal

3. If the signal to be analyzed is an analog signal, we would pass it through an anti-aliasing filter with B as the bandwidth of the filtered signal and then the signal is sampled at a rate:

- a) $F_s \leq 2B$
- b) $F_s \leq B$
- c) $F_s \geq 2B$
- d) $F_s = 2B$

4. If $x(n) = \cos \omega_0 n$ and $W(\omega)$ is the Fourier transform of the rectangular signal $w(n)$, then what is the Fourier transform of the signal $x(n) \cdot w(n)$?

- a) $\frac{1}{2}[W(\omega - \omega_0) - W(\omega + \omega_0)]$.
- b) $\frac{1}{2}[W(\omega - \omega_0) + W(\omega + \omega_0)]$.

c) $[W(\omega-\omega_0)+W(\omega+\omega_0)]$.

d) $[W(\omega-\omega_0)-W(\omega+\omega_0)]$

5. If $\{x(n)\}$ is the signal to be analyzed, limiting the duration of the sequence to L samples, in the interval $0 \leq n \leq L-1$, is equivalent to multiplying $\{x(n)\}$ by:

a) Kaiser window

b) Hamming window

c) Hanning window

d) Rectangular window

6. If $x(n)$ and $X(k)$ are an N -point DFT pair, then $X(k+N)=?$

a) $X(-k)$

b) $-X(k)$

c) $X(k)$

d) None of the mentioned

7. If $x(n)$ is a real sequence and $X(k)$ is its N -point DFT, then which of the following is true?

a) $X(N-k)=X(-k)$

b) $X(N-k)=X^*(k)$

c) $X(-k)=X^*(k)$

d) All of the mentioned

8. If $x_1(n)$ and $x_2(n)$ are two real valued sequences of length N , and let $x(n)$ be a complex valued sequence defined as $x(n)=x_1(n)+jx_2(n)$, $0 \leq n \leq N-1$, then what is the value of $x_2(n)$?

a) $(x(n)-x^*(n))/2$

b) $(x(n)+x^*(n))/2$

c) $(x(n)+x^*(n))/2j$

d) $(x(n)-x^*(n))/2j$

9. How many complex multiplications are need to be performed for each FFT algorithm?

- a) $(N/2)\log N$
- b) $N\log 2N$
- c) $(N/2)\log 2N$
- d) None of the mentioned

10. How many complex additions are required to be performed in linear filtering of a sequence using FFT algorithm?

- a) $(N/2)\log N$
- b) $2N\log 2N$
- c) $(N/2)\log 2N$
- d) $N\log 2N$

11. For a decimation-in-time FFT algorithm, which of the following is true?

- a) Both input and output are in order
- b) Both input and output are shuffled
- c) Input is shuffled and output is in order
- d) Input is in order and output is shuffled

12. Which property of periodic signal in DTFS gets completely identified by the equation $x(n+17)$?

- a) Time scaling
- b) Time Shifting
- c) Frequency Shifting
- d) Time Reversal

13. Which among the following assertions represents a necessary condition for the existence of Fourier Transform of discrete time signal (DTFT)?

- a) Discrete Time Signal should be absolutely summable
- b) Discrete Time Signal should be absolutely multipliable
- c) Discrete Time Signal should be absolutely integrable
- d) Discrete Time Signal should be absolutely differentiable

14. The 4-point discrete Fourier Transform (DFT) of a discrete time sequence $\{1, 0, 2, 3\}$ is

- a) $[0, -2+2j, 2, -2-2j]$
- b) $[2, 2+2j, 6, 2-2j]$
- c) $[6, 1-3j, 2, 1+3j]$
- d) $[6, -1+3j, 0, -1-3j]$

15. How many complex additions are performed in computing the N-point DFT of a sequence using divide-and-conquer method if $N=LM$?

- a) $N(L+M+2)$
- b) $N(L+M-2)$
- c) $N(L+M-1)$
- d) $N(L+M+1)$

16. The first six points of the 8-point DFT of a real valued sequence are $5, 1-j3, 0, 3-4j$, and $3+j4$. The last two points of the DFT are respectively

- a) $0, 1-j3$
- b) $0, 1+j3$
- c) $1+j3, 5$
- d) $1-j3, 5$

17. Fourier transform and its inverse are infinitely

- a) aperiodic
- b) periodic
- c) linear
- d) non linear

18. What is the circular convolution of the sequences $x_1(n)=\{2,1,2,1\}$ and $x_2(n)=\{1,2,3,4\}$?

- a) $\{14,14,16,16\}$
- b) $\{16,16,14,14\}$
- c) $\{2,3,6,4\}$
- d) $\{14,16,14,16\}$

19. Which of the following is true regarding the number of computations required to compute DFT at any one value of 'k'?

- a) $4N-2$ real multiplications and $4N$ real additions
- b) $4N$ real multiplications and $4N-4$ real additions
- c) $4N-2$ real multiplications and $4N+2$ real additions
- d) $4N$ real multiplications and $4N-2$ real additions

20. What is the value of $x(n)*h(n)$, $0 \leq n \leq 11$ for the sequences $x(n)=\{1,2,0,-3,4,2,-1,1,-2,3,2,1,-3\}$ and $h(n)=\{1,1,1\}$ if we perform using overlap add fast convolution technique?

- a) $\{1,3,3,1,1,3,5,2,2,2,3,6\}$
- b) $\{1,2,0,-3,4,2,-1,1,-2,3,2,1,-3\}$
- c) $\{1,2,0,3,4,2,1,1,2,3,2,1,3\}$
- d) $\{1,3,3,-1,1,3,5,2,-2,2,3,6\}$

21. What is the total number of quantization errors in the computation of single point DFT of a sequence of length N ?

- a) $2N$

- b) $4N$
- c) $8N$
- d) $12N$

22. What is/are the crucial purposes of using the Fourier Transform while analyzing any elementary signals at different frequencies?

- a) Transformation from time domain to frequency domain
- b) Plotting of amplitude & phase spectrum
- c) Transformation from time domain to frequency domain and plotting of amplitude & phase spectrum
- d) None of these

23. Given that $W = e^{-j(2\pi/N)}$, where $N=3$. Then $F = WN$ can be computed as $F =$

- a) 0
- b) 1
- c) -1
- d) e

24. Given that $W = e^{-j(2\pi/N)}$, where $N=3$. Then $F = W(N/2)$ can be computed as $F =$

- a) 0
- b) 1
- c) -1
- d) e

25. DTFT is the representation of

- a) Periodic Discrete time signals
- b) Aperiodic Discrete time signals
- c) Aperiodic continuous signals

d) Periodic continuous signals

26. A system which is linear is said to obey the rules of

- a) scaling
- b) additivity
- c) both scaling and additivity
- d) none of the mentioned

27. A time invariant system is a system whose output

- a) increases with a delay in input
- b) decreases with a delay in input
- c) remains same with a delay in input
- d) vanishes with a delay in input

28. A system is said to be defined as non causal, when

- a) the output at the present depends on the input at an earlier time
- b) the output at the present does not depend on the factor of time at all
- c) the output at the present depends on the input at the current time
- d) the output at the present depends on the input at a time instant in the future

29. All causal systems must have the component of

- a) memory
- b) time invariance
- c) stability
- d) linearity

30. $H(S)$ is a transfer function of LTI system, the system is causal when

- a) The ROC is left side of leftmost pole
- b) The ROC is right side of rightmost pole
- c) ROC covers the entire S-Plane
- d) No ROC

31. Which property of delta function indicates the equality between the area under the product of function with shifted impulse and the value of function located at unit impulse instant?

- a) Replication
- b) Sampling
- c) Scaling
- d) Product

32. The trigonometric Fourier series of an even function of time does not have

- a) dc term
- b) cosine term
- c) sine term
- d) odd harmonic terms

33. An equalizer used to compensate the distortion in the communication system by faithful recovery of an original signal is nothing but an illustration of

- a) Static system
- b) Dynamic system
- c) Invertible system
- d) None of the mentioned

34. A LTI system is said to be initially relaxed system only if _____

- a) Zero input produces zero output

- b) Zero input produces non-zero output
- c) Unity input produces zero output
- d) Unity input produces infinite output

35. Which theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual fourier coefficients?

- a) Parseval's Theorem
- b) Rayleigh's Theorem
- c) Both a & b
- d) None of the mentioned

36. What causes the gibbs phenomenon?

- a) Abruptly integrating the signals
- b) Abruptly terminating the signals
- c) $x(t)$ should be continuous only
- d) Signal should be discontinuous

37. When is fourier convergence theorem applicable?

- a) Continuous function limit
- b) Discrete function limit
- c) Infinite series limit
- d) Break point limits

38. The impulse response $h[n]$ of a linear time invariant system is given by $h[n] = U[n + 3] + U[n - 2] - 2U[n - 7]$. The above system is

- a) stable but non-casual

- b) stable and casual
- c) casual but unstable
- d) unstable and not casual

39. If $f(t)$ is in volts, then $F(j\omega)$ is in

- a) volts
- b) volts sec
- c) volts/sec
- d) volts/(sec)²

40.

A 1 kHz sinusoidal signal is ideally sampled at 1500 samples/sec and the sampled signal is passed through an ideal low pass filter with cut off frequency 800 Hz. The output signal has the frequency.

- a) 0 Hz
- b) 0.75 kHz
- c) 0.25 kHz
- d) 0.5 kHz

41. The impulse fourier transform of impulse function is

- a) unit step function
- b) unit ramp function
- c) unit impulse function
- d) one

42. The Nyquist theorem for sampling

- 1) Relates the conditions in time domain and frequency domain
- 2) Helps in quantization

3) Limits the bandwidth requirement

4) Gives the spectrum of the signal

a) 1, 2 and 3 are correct

b) 1 and 2 are correct

c) 1 and 3 are correct

d) All the four are correct

43. Effect caused by under sampling is called

a) smoothing

b) sharpening

c) summation

d) aliasing

44. Product of two functions in spatial domain is what, in frequency domain

a) correlation

b) convolution

c) Fourier transform

d) fast Fourier transform

45. Which one of the following statement is not true for a continuous time causal and stable LTI system?

a) All poles should lie on the left side of the $j\omega$ axis

b) Zeros of the systems can lie anywhere in the S -plane

c) All the poles must lie within the $|s|=1$

d) All the roots of the characteristic equation must be located on the left of $j\omega$ axis

46. Two systems $h_1(t)$ and $h_2(t)$ are connected in cascade. Then overall response of the system is

- a) product of $h_1(t)$ and $h_2(t)$
- b) sum of $h_1(t)$ and $h_2(t)$
- c) convolution of $h_1(t)$ and $h_2(t)$
- d) correlation of $h_1(t)$ and $h_2(t)$

47. A bandlimited signal with a maximum frequency of 5kHz is to be sampled. According to the sampling theorem the sampling frequency which is not valid is

- a) 5 kHz
- b) 10 kHz
- c) 15 kHz
- d) 12 kHz

48. The system $y(n) = nx(-n)$ is a

- 1. Dynamic
- 2. non causal
- 3. linear
- 4. Time invariant

- a) 1,2,3,4
- b) 1,3,4
- c) 1,2,3
- d) 2,3,4

49. . If $x[n]$ and $h[n]$ both are odd signals, that is, $x[-n] = -x[n]$ and $h[-n] = -h[n]$, then the output signal $y[n]$ will be a

- a) an even signal
- b) an odd signal
- c) such that $y[0] = 0$

d) none of the mentioned

50. If an LTI system has a unit-pulse response with a finite number of nonzero values, and the input signal has a finite number of nonzero values, then the output signal

a) is all zeros

b) is constant

c) has a finite number of nonzero values

d) none of the mentioned

51. What is the set of all values of z for which $X(z)$ attains a finite value?

a) Radius of convergence

b) Radius of divergence

c) Feasible solution

d) None of the mentioned

52. What is the ROC of the signal $x(n)=\delta(n-k), k>0$?

a) $z=0$

b) $z=\infty$

c) Entire z -plane, except at $z=0$

d) Entire z -plane, except at $z=\infty$

53. What is the ROC of the z -transform of the signal $x(n)=a^n u(n)+b^n u(-n-1)$?

a) $|a|<|z|<|b|$

b) $|a|>|z|>|b|$

c) $|a|>|z|<|b|$

d) $|a|<|z|>|b|$

54. What is the ROC of z-transform of finite duration anti-causal sequence?

- a) $z=0$
- b) $z=\infty$
- c) Entire z-plane, except at $z=0$
- d) Entire z-plane, except at $z=\infty$

55. What is the ROC of the system function $H(z)$ if the discrete time LTI system is BIBO stable?

- a) Entire z-plane, except at $z=0$
- b) Entire z-plane, except at $z=\infty$
- c) Contain unit circle
- d) None of the mentioned

56. What are the values of z for which the value of $X(z)=0$?

- a) Poles
- b) Zeros
- c) Solutions
- d) None of the mentioned

57. What are the values of z for which the value of $X(z)=\infty$?

- a) Poles
- b) Zeros
- c) Solutions
- d) None of the mentioned

58. The z-transform $X(z)$ of the signal $x(n)=a^n u(n)$ has:

- a) One pole at $z=0$ and one zero at $z=a$

- b) One pole at $z=0$ and one zero at $z=0$
- c) One pole at $z=a$ and one zero at $z=a$
- d) One pole at $z=a$ and one zero at $z=0$

59. The frequency ω_P is called as:

- a) Pass band ripple
- b) Stop band ripple
- c) Pass band edge ripple
- d) Stop band edge ripple

60. What is the pass band edge frequency of an analog low pass normalized filter?

- a) 0 rad/sec
- b) 0.5 rad/sec
- c) 1 rad/sec
- d) 1.5 rad/sec

61. If all the poles have small magnitudes, then the rate of decay of signal is:

- a) Slow
- b) Constant
- c) Rapid
- d) None of the mentioned

62. If the phase $\Theta(\omega)$ of the system is linear, then the group delay of the system:

- a) Increases with frequency of signal
- b) Constant
- c) Decreases with frequency of signal
- d) Independent of frequency of signal

63. If the low pass filter described by the difference equation $y(n)=0.9y(n-1)+0.1x(n)$ is converted into a high pass filter, then what is the frequency response of the high pass filter?

- a) $0.1/(1+0.9e^{j\omega})$
- b) $0.1/(1+0.9e^{-j\omega})$
- c) $0.1/(1-0.9e^{j\omega})$
- d) None of the mentioned

64. The filter with the system function $H(z)=z^{-k}$ is a:

- a) Notch filter
- b) Band pass filter
- c) All pass filter
- d) None of the mentioned

65. As the value of the frequency Ω tends to ∞ , then $|H(j\Omega)|$ tends to:

- a) 0
- b) 1
- c) ∞
- d) None of the mentioned

66. If a system is said to be invertible, then:

- a) One-to-one correspondence between its input and output signals
- b) One-to-many correspondence between its input and output signals
- c) Many-to-one correspondence between its input and output signals
- d) None of the mentioned

67. If the frequency response of an FIR system is given as $H(z)=6+z^{-1}-z^{-2}$, then the system is:

- a) Minimum phase
- b) Maximum phase
- c) Mixed phase
- d) None of the mentioned

68. If the frequency response of an FIR system is given as $H(z)=1-z^{-1}-z^{-2}$, then the system is:

- a) Minimum phase
- b) Maximum phase
- c) Mixed phase
- d) None of the mentioned

69. If M and N are the orders of numerator and denominator of rational system function respectively, then how many multiplications are required in direct form-I realization of that IIR filter?

- a) $M+N-1$
- b) $M+N$
- c) $M+N+1$
- d) $M+N+2$

70. If we reverse the directions of all branch transmittances and interchange the input and output in the flow graph, then the resulting structure is called as:

- a) Direct form-I
- b) Transposed form
- c) Direct form-II
- d) None of the mentioned

71. What is the duration of the unit sample response of a digital filter?

- a) Finite
- b) Infinite
- c) Impulse(very small)
- d) Zero

72. Which of the following methods are used to convert analog filter into digital filter?

- a) Approximation of Derivatives
- b) Bilinear transformation
- c) Impulse invariance
- d) All of the mentioned

73. Low pass Butterworth filters are also called as:

- a) All-zero filter
- b) All-pole filter
- c) Pole-zero filter
- d) None of the mentioned

74. Which of the following is not suitable either as low pass or a high pass filter?

- a) $h(n)$ symmetric and M odd
- b) $h(n)$ symmetric and M even
- c) $h(n)$ anti-symmetric and M odd
- d) $h(n)$ anti-symmetric and M even

75.

What is the region between origin and the pass band frequency in the magnitude frequency response of a low pass filter?

- a) Stop band
- b) Pass band
- c) Transition band
- d) None of the mentioned

76. One sine wave has a period of 2 ms, another has a period of 5ms, and other has a period of 10ms. Which sine wave is changing at a faster rate?

- a) sine wave with period 2 ms
- b) sine wave with period of 5 ms
- c) all are at the same rate
- d) Sine wave with a period of 10ms

77. How many cycles does a sine wave go through in 10 s when its frequency is 60Hz?

- a) 10 cycles
- b) 60 cycles
- c) 600 cycles
- d) 6 cycles

78. A sine wave has a positive going zero crossing at 0° and an rms value of 20V. What is its instantaneous value at 145° .

- a) 7.32V
- b) 16.22V
- c) 26.57V
- d) 21.66V

79. A sine wave voltage is applied across a capacitor, when the frequency of the voltage is increased, the current

- a) increases

- b) decreases
- c) remains the same
- d) is zero

80. A sine wave voltage is applied across an inductor, when the frequency of the voltage is increased, the current

- a) increases
- b) decreases
- c) remains the same
- d) is zero

81. A 1 KHz sinusoidal voltage is applied to an RL circuit, what is the frequency of the resulting current?

- a) 1 KHz
- b) 0.1KHz
- c) 100KHz
- d) 2KHz

82. A series RL circuit has a resistance of $33\text{ K}\Omega$, and an inductive reactance of $50\text{ K}\Omega$. What is its impedance and phase angle?

- a) $56.58\text{ }\Omega$, 59.9°
- b) $59.9\text{ K}\Omega$, 56.58°
- c) $59.9\text{ }\Omega$, 56.58°
- d) $5.99\text{ }\Omega$, 56.58°

83. When the frequency of the applied voltage in a series RL circuit is increased, what happens to the inductive reactance?

- a) decreases
- b) remains the same
- c) increases
- d) becomes zero

84. What is the phase angle between the inductor current and the applied voltage in a parallel RL circuit?

- a) 0°
- b) 45°
- c) 90°
- d) 30°

85. When the resistance in an RC circuit is greater than the capacitive reactance, the phase angle between the applied voltage and the total current is closer to

- a) 90°
- b) 0°
- c) 45°
- d) 120°

86. In a certain series RC circuit, $V_R = 4\text{ V}$ and $V_C = 6\text{ V}$. What is the magnitude of the total voltage?

- a) 7.2 V
- b) 4 V
- c) 6 V
- d) 52 V

87. In a given series RLC circuit, X_C is $150\ \Omega$, and X_L is $80\ \Omega$, what is the total reactance? What is the type of reactance?

- a) $70\ \Omega$, inductive
- b) $70\ \Omega$, capacitive
- c) $70\ \Omega$, resistive
- d) $150\ \Omega$, capacitive

88. In a certain series RLC circuit $V_R = 24\text{ V}$, $V_L = 15\text{ V}$ and $V_C = 45\text{ V}$. What is the source voltage.

- a) 38.42 V
- b) 45 V
- c) 15 V
- d) 24 V

89. The phasor combination of resistive power and reactive power is called

- a) true power
- b) apparent power
- c) reactive power
- d) average power

90. In a certain series RC circuit, the true power is 2 W , and the reactive power is 3.5 VAR . What is the apparent power?

- a) 3.5 VA
- b) 2 VA
- c) 4.03 VA
- d) 3 VA

91. Maximum power transfer occurs at a

- a) 100% efficiency
- b) 50% efficiency

- c) 25% efficiency
- d) 75% efficiency

92. The Laplace transform of first derivative of a function $f(t)$ is

- a) $F(s)/s$
- b) $sF(s) - f(0)$
- c) $F(s) - f(0)$
- d) $f(0)$

93. The Laplace transform of integral of function $f(t)$ is

- a) $(1/s)F(s)$
- b) $sF(s) - f(0)$
- c) $F(s) - f(0)$
- d) $f'(0)$

94. The initial value of $20 - 10t - e^{25t}$ is

- a) 20
- b) 19
- c) 10
- d) 25

95. The final value of $(2S + 1)/(s^4 + 8s^3 + 16s^2 + s)$ is

- a) 2
- b) infinite
- c) zero
- d) 1

96. The inverse laplace transform of $1/s(1 - e^{-as})$ is

- a) $u(t) - u(t-a)$
- b) $u(t)$
- c) $u(t-a)$
- d) zero

97. In the solution of network differential equations, the constants in the complementary function have to be evaluated from the initial conditions, and then the particular integral is to be added. This procedure is

- a) correct.
- b) incorrect.
- c) the one to be followed for finding the natural response.
- d) the one to be followed for finding the natural and forced responses.

98. A unit impulse voltage is applied to one port network having two linear components. If the current through the network is 0 for $t < 0$ and decays exponentially for $t > 0$ then the network consists of

- a) R and L in series
- b) R and L in parallel
- c) R and C in parallel
- d) R and C in series

99. Wave $A = 100 \sin \omega t$ and wave $B = 100 \cos \omega t$. Then

- a) rms values of the two waves are equal
- b) rms values of A is more than that of B
- c) rms values of A is less than that of B
- d) rms values of the two waves may or may not be equal

100. The impedance of an RC series circuit is $12\ \Omega$ at $f = 50\text{ Hz}$. At $f = 200\text{ Hz}$, the impedance will be

- a) more than 12
- b) less than 3
- c) more than $3\ \Omega$ but less than $12\ \Omega$
- d) more than $12\ \Omega$ but less than $24\ \Omega$

101. An RL low-pass filter consists of a 5.6 mH coil and a $3.3\text{ k}\Omega$ resistor. The output voltage is taken across the resistor. The circuit's cut-off frequency is

- a) 93.8 kHz
- b) 93.8 Hz
- c) 861 Hz
- d) 86.12 kHz

102. The maximum output voltage of a certain low-pass filter is 15 V . The output voltage at the cut-off frequency is

- a) 0 V
- b) 15 V
- c) 10.60 V
- d) 21.21 V

103. A sinusoidal voltage with a peak-to-peak value of 18 V is applied to an RC low-pass filter. If the reactance at the input frequency is zero, the output voltage is

- a) 18 V peak-to-peak

- b) zero
- c) 9 V peak-to-peak
- d) 12.74 V peak-to-peak

104. What do the high pass filters generally comprise of?

- a) Capacitive series arm
- b) Capacitive shunt arm
- c) Resistive series arm
- d) None of these

105. Which of the following is also known as a notch filter?

- a) low-pass
- b) high-pass
- c) bandpass
- d) band-reject

106. A band pass filter is one which :

- a) attenuates frequencies between two designated cut-off frequencies and passes all other frequencies
- b) passes frequencies between two designated cut-off frequencies, and attenuates all other frequencies
- c) passes all frequencies
- d) none of these

107. A voltage source supplies a signal of constant amplitude, from 0 to 40 kHz, to an RC lowpass filter. A load resistor, connected in parallel across the capacitor, experiences the maximum voltage at

- a) dc
- b) 10KHz
- c) 20KHz
- d) 40KHz

108. In a certain parallel resonant band-pass filter, the resonant frequency is 14 kHz. If the bandwidth is 4 kHz, the lower frequency

- a) 7 kHz
- b) 10 kHz
- c) 12 kHz
- d) cannot be determined

109. A parallel resonant band-pass filter consists of a 90 ohm resistor in series with a parallel network made up of a 60 mH coil and a 0.02 uF capacitor.

The output is taken across the capacitor/coil. The coil winding has a resistance of 20 ohm. What is the center frequency of the filter?

- a) 459 Hz
- b) 4,591 Hz
- c) 999 Hz
- d) 2,176 Hz

110. A parallel resonant band-pass filter consists of a 6.8 ohm resistor in series with a parallel network made up of an 8 uH coil and a 120 pF capacitor.

The output is taken across the capacitor/coil. What is the center frequency of the filter?

- a) 5.14 MHz
- b) 514 kHz
- c) 5.03 MHz
- d) 503 kHz

111. A series resonant band-pass filter consists of a 2 mH coil, a 0.005 μF capacitor, and a 120 ohm resistor. The winding resistance of the coil is 12 ohm. The output voltage is taken off the resistor. Input voltage is 12 Vrms. What is the output voltage magnitude at the center frequency?

- a) 10.9 V
- b) 1.09 V
- c) 1.1 V
- d) 12 V

112. A sinusoidal voltage with a peak-to-peak value of 18 V is applied to an RC high-pass filter. If the reactance at the input frequency is zero, the output voltage is

- a) 18 V peak-to-peak
- b) zero
- c) 9 V peak-to-peak
- d) 12.73 V peak-to-peak

113. How much inductance is needed to resonate at 5 kHz with a capacitance of 12 nF?

- a) 2,652 H
- b) 11.844 H
- c) 3.333 H

d) 84.43 mH

114. In a series RLC circuit, which of these quality factors has the steepest magnitude response curve near resonance

a) $Q=20$

b) $Q=12$

c) $Q=08$

d) $Q=04$

115. Which among the following represents the precise condition of reciprocity for transmission parameters?

a) $AB - CD = 1$

b) $AD - BC = 1$

c) $AC - BD = 1$

d) None of the mentioned

116. If the two ports are connected in cascade configuration, then which arithmetic operation should be performed between the individual transmission parameters in order to determine overall transmission parameters?

a) Addition

b) Subtraction

c) Multiplication

d) Division

117. If the two ports are connected in series configuration, then which arithmetic operation should be performed between the individual Z parameters in order to determine overall Z parameters?

a) Addition

b) Subtraction

c) Multiplication

d) Division

118. The poles of driving point impedance are those frequencies corresponding to _____ conditions?

a) short circuit

b) voltage source

c) open circuit

d) current source

119. The zeros of driving point impedance are those frequencies corresponding to _____ conditions?

a) current source

b) open circuit

c) voltage source

d) short circuit

120. Transfer admittance function is the ratio of Laplace transforms of _____

a) Current at one port to voltage at other port

b) Voltage at one port to current at other port

c) Current at one port to current at other port

d) Voltage at one point to voltage at other port

121. When a network function is expressed as a ratio of Laplace transforms of output to input variables of a system, then it is regarded as _____

a) System function

b) Transfer function

c) Impedance

d) Admittance

122. Power factor of a series RLC resonant circuit will be

- a) 0.5
- b) 0.75
- c) 1
- d) cannot be determined

123. The reactance offered by a capacitor to ac of frequency 50 Hz is 10Ω . If the frequency is increased to double, reactance becomes

- a) 20 ohm
- b) 5 ohm
- c) 2.5 ohm
- d) 10 ohm

124. Quality factor of a series RLC circuit possessing resonant frequency of 10 Hz and bandwidth of 5 Hz is

- a) 0.5
- b) 2
- c) 2.5
- d) 50

125. A parallel resonant circuit has a resistance of $2K\Omega$ and half power frequencies of 96 KHz and 100 KHz. The value of capacitor is

- a) 6 μF
- b) 20 nF
- c) 2 nF
- d) 60 μF

126. For a voltage source to be neglected, the terminals across the source should be

- a) Replaced by an inductance
- b) Short circuited
- c) Open circuited
- d) Replaced by a resistance

127. Pick the incorrect statement among the following

- a) Capacitor is a passive element
- b) Resistor is a passive element
- c) Current source is a passive element
- d) Voltage source is an active element

128. In a practical voltage source, the terminal voltage

- a) cannot be less than source voltage
- b) is twice the source voltage
- c) is always less than source voltage
- d) is always equal to source voltage

129. A practical current source can be represented as

- a) A resistance in parallel with an ideal voltage source
- b) A resistance in series with an ideal current source
- c) A resistance in series with an ideal voltage source
- d) A resistance in parallel with an ideal current source

130. Which element(s) behave as an open circuit especially under the consideration of direct current (d.c.)?

- a) Inductor
- b) Resistor
- c) Capacitor
- d) All of these

131. A network has 12 branches, 8 independent loops. How many nodes are there in the network

- a) 4
- b) 5
- c) 6
- d) 7

132. Three resistances $60\ \Omega$, $60\ \Omega$ and $30\ \Omega$ are connected in parallel. Their combined resistance is

- a) $30\ \Omega$
- b) $15\ \Omega$
- c) $20\ \Omega$
- d) $45\ \Omega$

133. Kirchhoff's voltage law states that

- a) Net current flow at the junction is positive
- b) Algebraic sum of the currents meeting at the junction is zero
- c) Algebraic sum of the voltages meeting at the junction is zero
- d) Algebraic sum of the voltages around the loop is zero

134. The maximum current that a 2W , $80\text{K}\Omega$ resistor can safely conduct is

- a) 5mA
- b) 2mA

c) 40mA

d) 10mA

135. The current through a branch in a network is 2A when input voltage is 10V. If the voltage is changed to 1V, then the current through the branch is

a) 4.5A

b) 0.2A

c) 0.5A

d) 2A

136. Which law plays a significant role in the loop analysis of the network?

a) Kirchhoff's Current Law

b) Kirchhoff's Voltage Law

c) Law of Superposition Theorem

d) Ohm's Law

137. Regarding loop/mesh analysis (in application level), which among the following statements is/are true?

a) Utilizes loop currents instead of branch currents for writing equations

b) Appropriate for circuit containing more nodes than meshes.

c) Better choice than the nodal analysis when the circuit has more nodes than meshes

d) All of these

138. In which among the following cases, the nodal analysis becomes a clearly better choice than the mesh analysis

a) Circuit has more nodes than meshes

b) Circuit has equal number of nodes and meshes

c) Circuit has a crossover

d) None of these

139. The number of loops within a mesh is

a) 1

b) 2

c) 3

d) 0

140. In nodal analysis, how many nodes are taken as reference nodes?

a) 1

b) 2

c) 3

d) 4

141. The superposition theorem is applicable to

a) voltage only

b) current only

c) both current and voltage

d) current, voltage and power

142. In Superposition theorem, while considering a source, all other current sources are

a) short circuited

b) kept as such

c) open circuited

d) removed from the circuit

143. What should be done, if any dependent voltage source is present in a circuit while applying the Superposition Theorem?

- a) Replace it by an open circuit
- b) Replace it by a short circuit
- c) Keep it in its original form without replacing by either open or short circuit
- d) None of the these

144. The superposition theorem requires as many circuits to be solved as there are

- a) sources, nodes and meshes
- b) sources and nodes
- c) sources
- d) nodes

145. While calculating the equivalent resistance in Thevenin's /Norton's theorem

- a) all independent sources are made dead
- b) only current sources are made dead
- c) only voltage sources are made dead
- d) all sources are made dead

146. Which among the following is not required while applying Thevenin's theorem?

- a) Calculation of Thevenin's equivalent voltage
- b) Removal of branch impedance for which the current flow is to be estimated
- c) Estimation of equivalent impedance between the two terminals of the branch
- d) Calculation of Norton's equivalent current

147. Application of Norton's theorem to a circuit yields

- a) equivalent current source and impedance in series

- b) equivalent current source and impedance in parallel
- c) equivalent impedance
- d) equivalent current source

148. For transfer of maximum power, the internal resistance of the source should be

- a) equal to the load resistance
- b) less than the load resistance
- c) more than the load resistance
- d) twice the load resistance

149. Consider a source transferring the maximum power to a load resistance, through a network. The ratio of the power transferred to the load to the total power transferred by the source

- a) is always 0.5
- b) is 0.5 or less
- c) is 0.5 or more
- d) is always 1

150. If the source impedance is complex, then the maximum power transfer occurs when the load impedance is

- a) equal to the source impedance
- b) negative of the source impedance
- c) complex conjugate of the source impedance
- d) negative of complex conjugate of the source impedance

-----Key-----

1. (a)
2. (b)
3. (c)
4. (b)
5. (d)
6. (c)
7. (d)
8. (d)
9. (c)
10. (b)
11. (c)
12. (b)
13. (a)
14. (d)
15. (b)
16. (b)
17. (b)
18. (d)
19. (d)
20. (a)
21. (b)
22. (c)
23. (b)
24. (c)
25. (b)

26. (c)

27. (c)

28. (d)

29. (a)

30. (b)

31. (b)

32. (c)

33. (c)

34. (a)

35. (a)

36. (b)

37. (c)

38. (a)

39. (b)

40. (d)

41. (d)

42. (c)

43. (d)

44. (b)

45. (d)

46. (c)

47. (a)

48. (c)

49. (b)

50. (c)

51. (a)

52. (c)

53. (a)

54. (d)

55. (c)

56. (b)

57. (a)

58. (d)

59. (c)

60. (c)

61. (c)

62. (b)

63. (b)

64. (c)

65. (a)

66. (a)

67. (a)

68. (b)

69. (c)

70. (b)

71. (b)

72. (d)

73. (b)

74. (c)

75. (b)

76. (a)

77. (c)

78. (b)

79. (a)

- 80. (b)
- 81. (a)
- 82. (b)
- 83. (c)
- 84. (c)
- 85. (b)
- 86. (a)
- 87. (b)
- 88. (a)
- 89. (b)
- 90. (c)
- 91. (b)
- 92. (b)
- 93. (a)
- 94. (b)
- 95. (b)
- 96. (a)
- 97. (a)
- 98. (d)
- 99. (a)
- 100. (c)
- 101. (a)
- 102. (c)
- 103. (b)
- 104. (a)
- 105. (d)
- 106. (b)

107. (a)

108. (c)

109. (b)

110. (a)

111. (a)

112. (a)

113. (d)

114. (a)

115. (b)

116. (c)

117. (a)

118. (c)

119. (d)

120. (a)

121. (b)

122. (c)

123. (b)

124. (b)

125. (b)

126. (b)

127. (c)

128. (c)

129. (d)

130. (c)

131. (b)

132. (b)

133. (d)

134. (a)

135. (b)

136. (b)

137. (d)

138. (c)

139. (d)

140. (a)

141. (d)

142. (c)

143. (c)

144. (c)

145. (a)

146. (d)

147. (b)

148. (a)

149. (a)

150. (c)