1. In a sky wave with a frequency of 50 MHz is incident on the D-region at an angle of 30° then the angle of refraction is

(a) 15° (b) 60°

(c) 30° (d) 5.5°

2. Tropospheric scatter communication is used for which frequency band ?

(a) HF (b) LF

(c) UHF (d) VLF

3. Which one of the following technique is not suitable for automatic satellite tracking ?

(a) monopulse (b) step tracking

(c) conical scanning (d) lobe switching

4. Communication satellite are allotted a bandwidth of 500 MHz. This can be increased by using

(a) frequency and polarisation reuse.

(b) time division multiplexing

(c) frequency division multiplexing

(d) triple modulator redundancy

5. If n_1 and n_2 are refractive indices of the core and cladding respectively, the maximum acceptance angle at air-core interface should be.

(a) $\tan^{-1}\frac{n_2}{n_1}$ (b) $\sin^{-1}\sqrt{n_2^2 - n_1^2}$

(c) $\sin^{-1}\sqrt{n_1^2 - n_2^2}$ (d) $\tan^{-1}\frac{n_1}{n_2}$

6. A certain fibre has refractive index of core $n_1 = 1.40$ and that of cladding $n_2 = 1.05$. Its numerical aperture will be

(a) 0.8575 (b) 0.9260

(c) 0.3500 (d) 0.1585

7. The topology with highest reliability is

(a) BUS (b) STAR

(c) RING (d) MESH

8. The file transfer protocol FTP requires a reliable transport service. Which protocol of the TCP/IP suite does it use ?

(a) TCP (b) UDP

(c) Telnet (d) None of these

9. Two microwave signal traveling in the free space have a path length difference of 3 cm when operating at 10 GHz. What is relative phase difference of the signals?

(a) 2π (b) π

(c) 3π (d) 4π

10. Suppose that everyone in a group of N people wants to communicate secretly with the N–1 others using symmetric key cryptographic system. The communication between any two persons should not be decodable by the others in the group. The number of keys required in the system as a whole to satisfy the confidentiality requirement is

(a) 2 N (b) N(N–1)

(c) N(N–1)/2 (d) $(N-1)^2$

11. The Esland B formula can be used to calculate

(a) Total traffic (b) blocking

(c) lines (d) All of the above

12. Which of the following is an analog cellular phone system using FDMA?

(a) AMPS (b) CDMA

(c) NAMPS (d) both (a) and (c)

13. The skip distance is

(a) same for each layer

(b) independent of frequency

(c) independent of state of ionization

(d) independent of transmitted power

14. In an LOS communication system, the ground below the direct path is the first Fresnel zone and is smooth reflecting. The phase difference between direct and reflected waves at the receiving antenna will be

(a) 180° (b) 360°

(c) 270° (d) 450°

15. What is the goal of CTS.

(a) Maximum IR (b) Minimum EM

(c) Mini Skew (d) Mini Slack

16. Usually hold is fixed.
(a) Before placement (b) After placement
(c) Before CTS (d) After CTS

17. Filler cells are added _____
(a) Before placement of standard cells
(b) After placement of standard cells
(c) Before floor planning
(d) Before digital routing

18. Search and repair is used for
(a) Reducing IR drop (b) Reducing DRC
(c) Reducing EM (d) None

19. With the use of following device (s) and cables can a LAN based on star topology be setup
(a) router (b) bridge
(c) switch (d) repeater

20. More IR drop is due to
(a) Increase in metal width
(b) Increase in metal length
(c) Dicrease the metal length
(d) Let of metal layers

21. The minimum height and width of a cell can occupy in the design is called as
(a) Unit tile cell (b) Multi heighten cell
(c) LVT cell (d) HVT cell

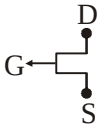
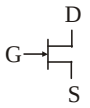
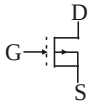
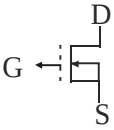
22. CRPR stands for
(a) Cell convergence pessimism removal
(b) Cell convergence preset removal
(c) Clock convergence pessimism removal
(d) Clock convergence preset removal

23. Delay between shortest path and longest path in clock is called
(a) Useful skew (b) Local skew
(c) Global skew (d) Slack

24. Three primary physical character of digital design are
(a) Speed (b) Area
(c) Power (d) All of above

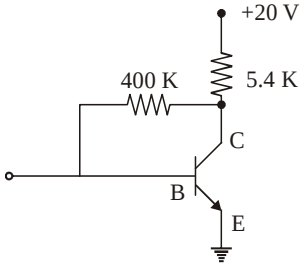
25. In OCV timing check, for setup time
(a) Maximum delay used for launch path and minimum delay for capture path
(b) Minimum delay for launch path and maximum delay for capture path
(c) Both maximum delay is used for launch path and capture
(d) Both minimum delay is used for launch and capture paths

26. Match the following

List-I		List-II
A. n-channel JFET	1.	
B. Depletion MOSFET	2.	
C. p-channel JFET	3.	
D. Enhancement MOSFET	4.	

Codes :	**A**	**B**	**C**	**D**
(a)	3	4	2	1
(b)	3	2	4	1
(c)	2	4	1	3
(d)	3	4	1	2

27. In figure V_{BE} = 0.6V, β = 99. Then V_C and I_C are



(a) 4.6 V and 0.02 mA respectively
(b) 4.6 V and 1.98 mA respectively
(c) 9.3 V and 1.98 mA respectively
(d) 9.3 V and 0.02 mA respectively

28. ***Assertion (A) :*** CE amplifier is the most widely used BJT amplifier

Reason (R) : CE amplifier has zero phase difference between input and output

(a) Both A and R are correct and R is correct explanation of A

(b) Both A and R are correct and R is not correct explanation of A

(c) A is correct R is wrong

(d) A is wrong R is correct

29. ***Assertion (A) :*** A push-pull amplifier gives more output per active device for a given amount distortion.

Reason (R) : Even harmonics are absent in the output of push-pull amplifier.

(a) Both A and R are correct and R is correct explanation of A

(b) Both A and R are correct and R is not correct explanation of A

(c) A is correct R is wrong

(d) A is wrong R is correct

30. Consider the following statements.

Timer 555 can be used as

1. monostable multivibrator
2. bistable multivibrator
3. astable multivibrator

Which of the above statements are correct?

(a) 1 & 2 (b) 1 & 3

(c) 2 & 3 (d) 1, 2 & 3

31. Consider the following statements.

1. ECL has least propagation delay
2. TTL has largest fan out
3. CMOS has highest noise margin
4. TTL has lowest power dissipation

Which of these are correct?

(a) 1 & 3 (b) 2 & 4

(c) 3 & 4 (d) 1 & 2

32. A DRAM cell which holds 5V has to be refreshed every 20 ms so that the stored voltage does not fall by more than 0.5V. If the cell has a constant discharge current of 0.1 pA, the storage capacitance of cell is

(a) 4×10^{-6} F (b) 4×10^{-9} F

(c) 4×10^{-12} F (d) 4×10^{-15} F

33. For a junction FET in the cut off region, as the drain voltage is increased, the drain current

(a) becomes zero

(b) remains constant

(c) abruptly decreases

(d) abruptly increases

34. The maximum theoretical efficiency of a class B push-pull transistor amplifier as approximately.

(a) 78.6 % (b) 50 %

(c) 25% (d) 70.7 %

35. The coupling capacitor in amplifier circuits

(a) does not affect DC biasing

(b) affects DC biasing to some extent

(c) affects DC biasing

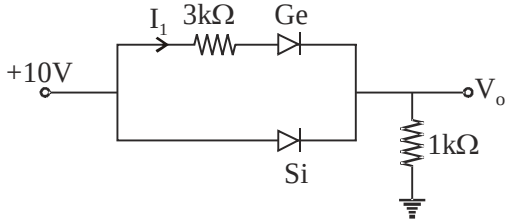
(d) both (b) and (c)

36. The bandwidth of an n-stage tuned amplifier, with each stage having a bandwidth of B is given by

(a) $\frac{B}{\sqrt{n}}$ (b) $\frac{B}{n}$

(c) $\frac{B}{\sqrt{2^{1/n}-1}}$ (d) $B\sqrt{2^{1/n}-1}$

37. Find V_0 and I_1 in the given circuit



(a) 9.7 V, 0.1667 mA

(b) 9.3 V, 1.667 mA

(c) 9.3 V, 0.1667 mA

(d) 9.7 V, 9.5 mA

38. Which of the following pairs of semiconductors and current carriers is correctly matched ?

(a) Intrinsic $\rightarrow$ No. of electrons = No. of holes.

(b) n-type $\rightarrow$ No. of electrons < No. of holes.

(c) p-type $\rightarrow$ No. of electrons > No. of holes.

(d) Bulk $\rightarrow$ No. of electrons < No. of holes.

39. An LED mode using GaAs emits radiation in

(a) visible region

(b) Infrared region

(c) microwave frequency region

(d) ultraviolet region

40. Which of the following is not a linear IC?

(a) Comparator

(b) Passive filter

(c) Voltage controlled oscillator

(d) Phase locked loop

41. Find the correct match between Group-I and Group-II

	Group-I	**Group-II**
A.	Varactor diode	1. Voltage reference
B.	PIN diode	2. High frequency switch
C.	Zener diode	3. Tuned circuit
D.	Schottky diode	4. Current controlled attenuator

Codes :	**A**	**B**	**C**	**D**
(a)	4	2	1	3
(b)	2	4	1	3
(c)	3	4	1	2
(d)	1	3	2	4

42. To avoid thermal runaway in the design of an analog circuit, the operating point of BJT should be such that, It satisfied the condition

(a) $V_{CE} = \frac{1}{2}V_{CC}$ (b) $V_{CE} < \frac{1}{2}V_{CC}$

(c) $V_{CE} \geq \frac{1}{2}V_{CC}$ (d) $V_{CE} \leq 0.78\ V_{CC}$

43. The probability that an electron in a metal occupies the fermi level at any temperature (>0°k)

(a) 0 (b) 0.1

(c) 0.5 (d) 1

44. The voltage gain of basic CMOS is approximately

(a) $(g_m r_o)/2$ (b) $2g_m r_o$

(c) $\frac{1}{2g_m r_o}$ (d) $2g_m/r_o$

45. **Assertion (A) :** When diode used as rectifier the reverse breakdown voltage should not be exceeded.

Reason (R) : A high reverse voltage can destroy a p-n junction.

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A.

(c) A is true but R is wrong

(d) A is false but R is true.

46. **Assertion (A) :** A JFET behaves as a resistor when $V_{GS} < V_p$

Reason (R) : When $V_{GS} < V_p$ the drain current in a JFET is almost constant.

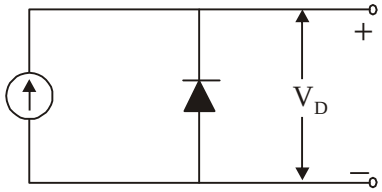
(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A.

(c) A is true but R is wrong

(d) A is false but R is true.

47. In given figure a silicon diode is carrying a constant current of 1mA. When the temperature of the diode is 20°C, V_D is found to be 700 mV. If the temperature rises to 40°C. V_D becomes approximately equal to



(a) 700 (b) 680
(c) 747 (d) 660

48. Consider the following statements : The function of oxide layer in an IC device is to

1. Mask against diffusion or non implant
2. Insulate the surface electrically
3. Increase the melting point of silicon.
4. Produce a chemically stable point.

Correct statement is

(a) 1, 3 & 4 (b) 2, 3 & 4
(c) 1, 2 & 4 (d) 1, 2 & 3

49. ***Assertion (A) :*** The image charge must be located in the conducting region.

Reason (R) : Due to image charge in conducting region, it satisfy the laplace equation.

(a) Both A and R are true & R is the correct explanation of A
(b) Both A and R are true & R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

50. Consider the following statement

(i) Electric field intensity depends on medium.
(ii) Electric flux density depends on medium.

Which is the correct statement among above

(a) only (i) (b) only (ii)
(c) both (i) and (ii) (d) None

51. Uniform plane wave is given by

$$\vec{E} = 8\cos(\omega t - 4x - 3z)\hat{a}_y \frac{V}{m}$$

is incident on the dielectric slab (Z = const.) with $\mu_r = 1$, $\epsilon_r = 2.5$, $\sigma = 0$. Wave is

(a) Horizontally polarized
(b) Vertically polarized
(c) Elliptically polarized
(d) Circularly polarized

52. Two identical co-axial circular coil carry the same current but in opposite direction. The magnitude of the magnetic field B at a point on the axis midway between the coil is

(a) Zero
(b) Same as that produced by one coil
(c) Twice that produced by one coil
(d) Half that produced by one coil.

53. An air filled waveguide having cross-section 5 cm × 2 cm is operated at 15 GHz. The component of electric field in the waveguide is given as

$E_z = 20 \sin 40\pi x \sin 50\ \pi y\ e^{-j\beta z}$ V/m

The mode which being propagated is

(a) TE_{21} (b) TM_{21}
(c) TE_{12} (d) TM_{12}

54. Input impedance of short circuited lossless line of length l where $\frac{\lambda}{4} < l < \frac{\lambda}{2}$ will be.

(a) Resistive (b) Inductive
(c) Capacitive (d) None

55. Charge needed within unit sphere centred at origin for producing a potential field $V = -\frac{6r^5}{\epsilon_0}$ for $r \le 1$ is

(a) 30 πC (b) 120 πC
(c) 60 πC (d) 180 πC

56. Radiation intensity of dipole at frequency f is I. Radiation intensity of dipole at frequency $\frac{f}{4}$ will be

(a) $\frac{I}{4}$ (b) 4I

(c) 16I (d) $\frac{I}{2}$

57. An Antenna consisting of 50 m long vertical conductor operates over a perfectly conducting ground plane. It is base fed at a frequency of 600 KHz. The radiation resistance of antenna in ohms is

(a) $\frac{2\pi^2}{5}$ (b) $\frac{\pi^2}{5}$

(c) $\frac{4\pi^2}{5}$ (d) $20\pi^2$

58. A (75 – j40) load is connected to the co-axial line of Z_0 = 75 Ω at 6 MHz. The load matching on the line can be accomplished by connecting

(a) A short circuit stub at the load

(b) An inductance at the load

(c) A short circuit stub at a specific distance from the load

(d) A capacitance at a specific distance from the load

59. A plane wave is characterized by

$$\vec{E} = (0.5\hat{a}_x + e^{j\pi/2}\hat{a}_y)e^{j\omega t}e^{-j\beta z}$$

The wave is

(a) linear polarized

(b) circularly polarized

(c) elliptically polarized

(d) unpolarized

60. The depth of penetration of EM wave in a medium having conductivity $\sigma >> \omega\in$ at a frequency of 1 MHz is 25 cm. The depth of penetration at a frequency of 4 MHz will be

(a) 6.25 cm (b) 12.5 cm

(c) 50 cm (d) 100 cm

61. In a 100 turn coil, if flux through each turn is (t^3 – 2t) mWb. The magnitude of induced emf in the coil at time t = 4 sec. is

(a) 46 mV (b) 56 mV

(c) 4.6 V (d) 5.6 V

62. A plane intersects the coordinate axis at x = 2/3, y = 1/3, z = 1/2. What is the miller index of this plane?

(a) (932) (b) (432)

(c) (423) (d) (364)

63. Find the correct relation?

(a) $\bar{P} = \varepsilon_0(\varepsilon_r - 1)\bar{E}$ (b) $\bar{P} = \left(\frac{\varepsilon_0}{\varepsilon_r - 1}\right)\bar{E}$

(c) $\bar{P} = \left(\frac{\varepsilon_0}{\varepsilon_r + 1}\right)\bar{E}$ (d) $\bar{P} = \varepsilon_0(\varepsilon_r + 1)\bar{E}$

64. There are 10^{27} HCL molecules per cubic meter in a vapour. Determine the orientational polarization at room temperature if the vapour is subjected to an electrical field of 10^6 V/m. The permanent dipole moment of HCL molecule being 1.04 debye unit.

1 debye unit = 3.33×10^{-30} coulomb - meter

(a) 0.875×10^{-38} Farad – meter^2

(b) 0.875×10^{-39} Farad – meter^2

(c) 0.966×10^{-39} Farad – meter^2

(d) 0.966×10^{-6} Coulomb / meter^2

65. The magnetization M of a super conductor in a field of H is.

(a) Extremely small (b) –H

(c) –1 (d) Zero

66. Which law is synonymous to the occurrence of diamagnetism?

(a) Ampere's law (b) Maxwell's law

(c) Coulomb's law (d) Lenz's law

67. As per curie-weiss law, the magnetic susceptibility of a material varies as

(a) T^{-2} (b) 1/T

(c) T (d) T^2

68. German silver contains.

(a) 12.5% Silver (b) 5% Silver

(c) 1% Silver (d) No Silver

69. In HRC confridge fuse we use.

(a) Gold (b) Silver

(c) Copper (d) Aluminium

70. If the frequency of light falling on a metal plate is doubled, the kinetic energy of emitted electrons will be:

(a) Exactly double

(b) Slightly more than double

(c) Slightly less than double

(d) Four times

71. Consider the following steps.

1. Etching
2. Exposure to UV radiation
3. Stripping
4. Developing

After a wafer has been coated with photoresist the correct sequence of these steps in photolithography is.

(a) 2, 4, 3, 1 (b) 2, 4, 1, 3

(c) 4, 2, 1, 3 (d) 4, 2, 3, 1

72. An advantage of semiconductor strain gauge as compared to conventional strain gauge is

(a) Excellent (b) High fatigue life

(c) Smaller size (d) All of these

73. Creation of temperature difference by applying a voltage between two elecrtrode connect to a sample of semiconductor material.

(a) Pelteir effect

(b) Seeback effect

(c) Thomson effect

(d) Half effect

74. In a two - wattmeter method of measuring power in a balanced 3-phase circuit, the ratio of the two wattmeter reading is 2 : 1. The circuit power factor is

(a) 0.707 (b) 0.5

(c) 0.866 (d) 1

75. What is meant by a single - chip data acquisition system

(a) A single integrated circuit containing A DAC and a demultiplexer

(b) A single integrated circuit containing on ADC and a multiplexer

(c) A single IC containing all the element of DAS

(d) A single IC Containing an ADC and A DAC

76. A signal contains components with frequencies up to 10 KHz, although no useful information is contained at frequencies 6 KHz. What is the minimum frequency at which the signal should be sampled?

(a) 6 kHz (b) 12 kHz

(c) 14.4 kHz (d) 20 kHz

77. Match List-I (instrument type) with List-II (used for) the following

	List-I	**List-II**
A.	PMMC	1. DC only
B.	Moving Iron conected with CT	2. AC only
C.	Reactifier	3. AC and DC
D.	Electrodynamometer	

Codes :	**A**	**B**	**C**	**D**
(a)	1	2	1	3
(b)	1	3	1	2
(c)	1	2	3	3
(d)	3	1	2	2

78. While measuring of 3-phase balanced load by two-wattmeter method, the reading are 100 W and 250 W. The power factgor of the load is

(a) 0.802 (b) 0.602

(c) 0.702 (d) 0.902

79. A 100 μA ammeter has an internal resistance of 100Ω. For extending its range to measure 500 μA the shunt required of resistance

(a) 20.0 Ω (b) 22.22 Ω

(c) 25.0 Ω (d) 50.0 Ω

80. The percentage limiting error, in the case of an instrument reading of 8.3V with a 0 to 150V voltmeter having a guaranteed accuracy of 1% full scale reading is

(a) 1.810 % (b) 0.181 %

(c) 0.0018 % (d) 18.10 %

81. ***Assertion (A):***The screen of a CRT is coated with phosphor on the inside

Reason(R): Phosphor absorbs the KE of the bombarding electrons and reemits energy at a frequency in the visible region.

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

82. Match List-I with List-II

List-I	**List-II**
A. Megger	1. Measurement of loss angle in a dielectric
B. Spectrum analyzer	2. Measurement of frequency
C. Schering bridge	3. Measurement of insulation resistance
D. Digital counter	4. Measurement of harmomics

Codes :	**A**	**B**	**C**	**D**
(a)	1	2	3	4
(b)	3	2	1	4
(c)	3	1	4	2
(d)	1	4	3	2

83. A 12 bit counter type ADC counter uses a 1 MHz clock. If the full scale output is +10V, its resolution output is

(a) 2.44 mV (b) 2.4 mV

(c) 0.02 V (d) 0.02 mV

84. In case of power measurement by two wattmeter method in a balanced 3-ϕ system with a pure inductive load

(a) Both the wattmeter will indicate the same but of opposite sign

(b) Both the wattmeters will indicate zero

(c) Both the wattmeter will indicate same vlaue and of the same sign

(d) One wattmeter will indicate zero and the other non-zero value

85. Which of the following is not primary transducer.

(a) Bourdon tubes

(b) Bellows

(c) LVDT (for displacement measurement)

(d) LVDT (for pressure measurement)

86. Mechanical impedance is the ratio of

(a) rms force to rms velocity

(b) rms force to rms displacement

(c) rms velocity to rms displacement

(d) None of the above

87. Find the inverse laplace transform of

$$f(s) = \frac{2s+12}{s^2+2s+5}$$

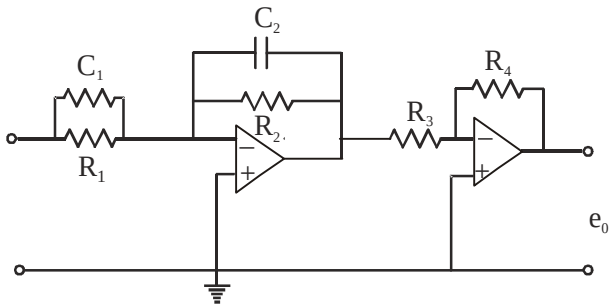
(a) $2\,e^{-t}\sin 2t + 5\,e^{-t}\cos 2t$

(b) $2\,e^{-t}\sin 2t - 5\,e^{-t}\cos 2t$

(c) $5\,e^{-t}\sin 2t + 2\,e^{-t}\cos 2t$

(d) $5\,e^{-t}\sin 2t - 2\,e^{-t}\cos 2t$

88. The given circuit is



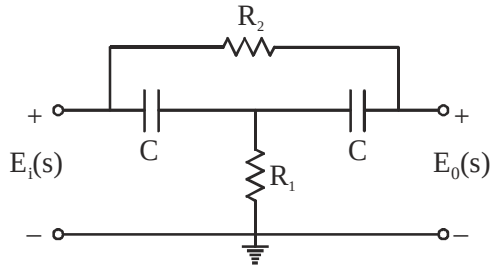
(a) PID controllers

(b) Lag-lead compensators

(c) Lead or lag compensators

(d) None of above

89. Obtain the transfer function $\frac{E_0(s)}{E_i(s)}$ of the bridge T network shown in fig.



(a) $\frac{RC_1RC_2s^2 + 2RC_2s + 1}{RC_1RC_2s^2 + (2RC_2 + RC_1)s + 1}$

(b) $\frac{RC_1RC_2s^2 + (2RC_1 + RC_1)s + 1}{RC_1RC_2s^2 + 2RC_2s + 1}$

(c) $\frac{RC_1C_2s^2 + 2RC_2S + 1}{RC_1C_2s^2 + (2RC_2 + RC_1)s + 1}$

(d) None of above

90. ***Assertion (A) :*** The steady state response, of a stable, linear, time invariant system, to sinusoidal input depends on initial conditions.

Reason (R) : Frequency response, in steady state, is obtained by replacing s in the transfer function by jω.

(a) Both A and R are correct and R is correct explanation of A

(b) Both A and R are correct but R is not correct explanation of A

(c) A is correct but R is wrong

(d) R is correct but A is wrong

91. ***Assertion (A):*** An LTI discrete system represented by the difference equation

$y(n + 2) – 5y(n + 1) + 6y(n) = x(n)$ is unstable.

Reason (R): A system is unstable if the roots of the characteristic equation lie outside the unit circle.

(a) Both A and R are correct and R is correct explanation of A

(b) Both A and R are correct but R is not correct explanation of A

(c) A is correct but R is wrong

(d) R is correct but A is wrong

92. A lag, lead compensator is essentially a

(a) low pass filter, High pass filter

(b) low pass filter, low pass filter

(c) High pass filter, Band pass filter

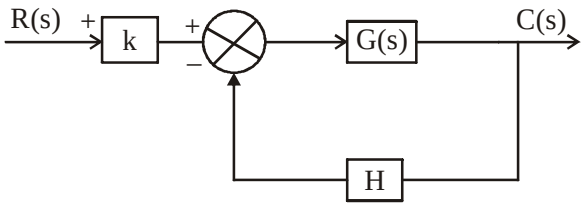
(d) High pass filter, low pass filter

93. In bode diagram (log magnitude plot) the factor $\frac{1}{j\omega}$ in the transfer function having slope

(a) – 20 dB/octave (b) – 2 dB/octave

(c) – 10 dB/octave (d) – 6 dB/octave

94. A control system shown in figure what is the sensitivity of the system transfer function T with respect to k and H respectively. [where k = 10V/rad, H = 10 V/rad and $G(s) = \frac{100}{s(s+1)}$]



(a) $1, \frac{s(s+1)}{s^2+s+1000}$

(b) $\frac{1000}{s^2+s+1000}, 1$

(c) $1, -\frac{1000}{s^2+s+1000}$

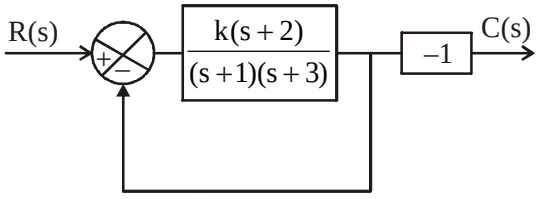
(d) $\frac{1000}{s^2+s+1000}, -\frac{1000}{s^2+s+1000}$

95. Match list-I (compensation) with list-II (characteristic) and select the correct answer using the code given below the lists.

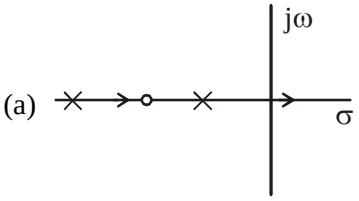
	List-I		**List-II**
A.	lead	1.	Attenuation
B.	Rate	2.	Increase bandwidth
C.	Lag	3.	Increase damping factor
D.	Lag-lead	4.	Second order

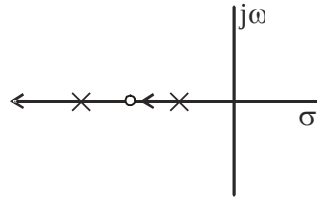
Codes :	**A**	**B**	**C**	**D**
(a)	1	3	4	2
(b)	2	3	1	4
(c)	2	4	1	3
(d)	1	3	2	4

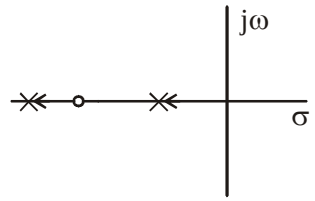
96. Consider the feedback system shown in figure

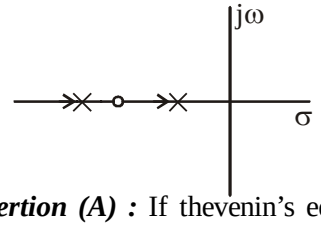


For this system root locus is

(a) 

(b) 

(c) 

(d) 

97. ***Assertion (A) :*** If thevenin's equivalent of a circuit is known, its norton equivalent is also known.

Reason(R) : Norton's equivalent is reciprocal of thevenin's equivalent.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true, but R is not the correct explanation of A

(c) A is true, but R is false

(d) R is true, but A is false

98. Five cells, each with an emf of 2V and internal resistance of 0.5Ω are connected in series. The resulting battery will have

(a) An e.m.f. of 2V and an internal resistance of 0.5 Ω

(b) An e.m.f. of 10V and an internal resistance of 2.5 Ω

(c) An e.m.f. of 2V and an internal resistance of 0.1 Ω

(d) An e.m.f. of 10V and an internal resistance of 0.15 Ω

99. Which of the following statement is false?

(a) A leclancha cell is suitable for use in torches

(b) A nickel-cadmium cell is an example of primary cell

(c) A secondary cell may be recharged after used

(d) when a cell is being charged its terminal potential difference exceeds the cell emf

100. Consider the following statement regarding the batteries.

1. A zinc carbon battery is rechargeable and is not classified as hazardous
2. A nickel cadmium battery is not rechargeable and is classified as hazardous
3. A lithium battery is used in watches and is not rechargeable
4. The negative pole of a dry cell is made of zinc.

Which of the statements is true?

(a) 1, 2, and 3 (b) 1, and 4

(c) 3 and 4 (d) 1 and 3

101. Consider the following statement regarding KCL & KVL

1. KCL is used for DC and AC analysis.
2. KCL states that algebraic sum of all current entering and leaving at node is zero
3. KVL is given idea about conservation of energy while KCL for conservation of charge
4. KVL is give idea about conservation of charge while KCL for conservation of energy which Of the following statement is WRONG ?

(a) 1, 2, and 3 (b) 1 and 2

(c) 4 Only (d) 1 Only

102. Faraday's law of induction is the fundamental operating principle of

(a) Generator

(b) Transformers

(c) Inductors

(d) All of these

103. In dc motor, which can provide zero speed regulation of full load without any controller

(a) series

(b) shunt

(c) cumulative compound

(d) differential compound

104. Match list-I (Performance variable) with List-II (Proportional to) and select the correct answer using the codes given below

List-I	**List-II**
A. Armature emf(E)	1. Flux (ϕ), Speed(ω) Armature current (I_a)
B. Developed torque(T)	2. ϕ and ω only
C. Developed power(P)	3. ϕ and I_a only
	4. I_a and ϕ only

Code:	**A**	**B**	**C**
(a)	3	4	1
(b)	3	2	1
(c)	2	3	4
(d)	2	3	1

105. In a transformer, zero voltage regulation at full load is

(a) not possible

(b) possible of unity power factor load

(c) possible at leading power factor load

(d) possible at lagging power factor load

106. The following motor definitely has permanent magnet rotor

(a) DC cumulated motor

(b) Brushless dc motor

(c) Stepper motor

(d) reluctance motor

107. Out of the following plant categories

1. Nuclear
2. Run of river
3. Pump storage
4. Diesel

The base load power plants are

(a) 1 and 2 (b) 2 and 3

(c) 1, 2 and 4 (d) 1, 3, and 4

108. Consider the following conclusion regarding nuclear power plant

List-I	List-II
A. Control Rods	1. Graphite
B. Coolant	2. Uranium
C. Fuel	3. Boron
D. Moderator	4. Water

Code:	A	B	C	D
(a)	1	3	2	4
(b)	3	2	1	4
(c)	3	4	2	1
(d)	4	1	3	2

109. A smaller air gap in a poly phase induction motor helps to

(a) Reduce the chance of crawling

(b) Increase the starting power factor

(c) Reduce the chance of cogging

(d) Reduce the magnetizing current

110. The rankine cycle efficiency of stream power plant is

(a) 60-80% (b) 45-80%

(c) 30-35% (d) 20-30%

111. In case of a signal band limited to f_m is sampled at a rate less than $2f_m$, the constructed signal will be

(a) distorted less

(b) small in amplitude

(c) having higher frequencies suppressed

(d) distored

112. Which one of the following address technique is not used on 8085 microprocessor?

(a) Register (b) Immediate

(c) Register Indirect (d) Relative

113. Which logical operation is performed by ALU of 8085 to complement a number ?

(a) AND (b) NOT

(c) OR (d) EX-OR

114. The saving in power in a DSBSC system modulated at 80% is

(a) Nil (b) 80%

(c) 75.76% (d) 50%

115. The diode load in the discriminator of direct FM modulator has

(a) 10 ns

(d) small time constant

(c) large time constant

(d) negligible time constant

116. RMS quantization error in a 64 step binary PCM system with a reference scale from 0 to 6.4 volts

(a) 0.04 Volt (b) 0.001 Volt

(c) 0.03 Volt (d) 0.02 Volt

117. The amplitude specturm of a Gaussian pulse is

(a) Uniform (b) a sine function

(c) Gaussian (d) An impulse function

118. Spectral density of flicker noise varies as

(a) f (b) f^2

(c) $\frac{1}{f}$ (d) $\frac{1}{f^2}$

119. Frequency frogging is used in carrier system to

(a) reduce cross talk (b) conserve frequencies

(c) reduce distortion (d) All of the above

120. Number of output pins in 8085 microprocessor are?

(a) 21 (b) 27

(c) 23 (d) 25

121. In a super heterodyne receiver, the IF is 455 kHz. It it is tuned to 1200 kHz the image frequency will be

(a) 910 kHz (b) 1655 kHz

(c) 2110 kHz (d) 745 kHz

122. If status signal $S_1 = 1$ & $S_0 = 0$, which operation is performed?

(a) Read (b) Write

(c) Opcode fetch (d) None

123. Crystal frequency in 8085 microprocessor is

(a) 8 MHz (b) 3 MHz

(c) 6 MHz (d) 4 MHz

124. A certain Network N feeds a load resistance R as shown in figure-I. It consumes a power of 'P'Watt. If an identical network is added as shown in figure-II the power consumed by R will be

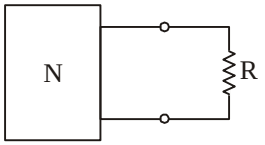


Figure I

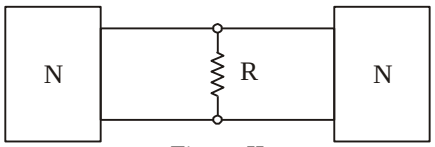
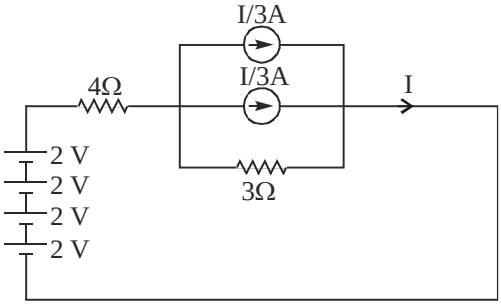


Figure II

(a) less than P (b) equal to P

(c) between P and 4P (d) more than 4P.

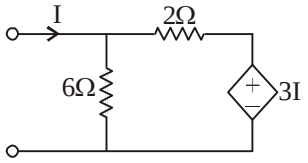
125. In the circuit, the voltage across 3Ω resistance is



(a) 8V (b) 8/3V

(c) 8/5V (d) 8/4V

126. The circuit shown in the figure is equivalent to a load of



(a) (6/12)Ω (b) 6 Ω

(c) (15/4)Ω (d) 2 Ω

127. Consider the following statements regarding driving-point admittance function having two complex conjugate poles.

1. Closer the poles to jω-axis, Higher Q of the circuit.
2. Value of Q varies inversely as the damping ratio
3. A circuit with low R has low quality.

Of these statements

(a) 1 and 3 are correct

(b) 1 and 2 are correct

(c) 2 and 3 are correct

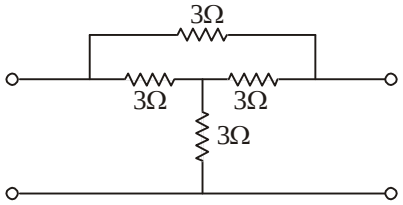
(d) 1, 2 and 3 are correct

128. An RLC resonant circuit has resonance frequency of 1.5 MHz and a bandwidth of 10 kHz. If C = 150 pF, then the effective resistance of the circuit will be

(a) 9.4 Ω (b) 4.7 Ω

(c) 10.75 Ω (d) 29.5 Ω

129. The y_{21} parameter of the network shown in the given figure will be



(a) $-\frac{1}{3}$ mho (b) $-\frac{4}{6}$ mho

(c) $-\frac{4}{9}$ mho (d) –6

130. Which one of the following is positive real function?

(a) $\frac{s^2+3s^2+2s+1}{4s}$

(b) $\frac{s(s^4+3s^2+1)}{(s+1)(s+2)(s+3)(s+4)}$

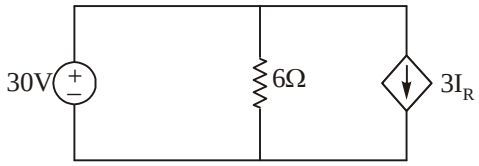
(c) $\frac{s(s^2+4)}{(s^2+1)(s^2+6)}$ (d) $\frac{s(s^2-4)}{(s^2+1)(s^2+6)}$

131. A 15V car battery is connected to a 2μF capacitor computing energy that will be stored in the capacitor is

(a) 30×10^{-6} joule (b) 2.25×10^{-4} joule

(c) 15×10^{-6} joule (d) none of the above

132. Consider the circuit in the figure below. The power delivered by the 30 V source is



(a) 400 W (b) 60 W

(c) 600 W (d) 40 W

133. ***Assertion (A):*** Millaman's theorem helps in replacing a number of current sources in parallel by a single current source

Reason (R): Maximum power transfer theorem is applicable only for dc, circuits.

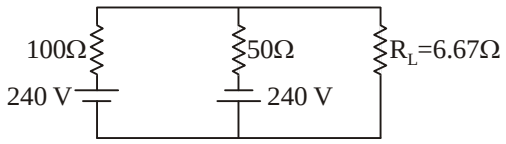
(a) Both Assertion (A) and Reason (R) are individually true and Reason (R) is the correct explanation of Assertion (A)

(b) Both Assertion (A) and Reason (R) are individually true but Reason (R) is not the correct explanation of Assertion (A)

(c) Assertion (A) is true but Reason (R) is false

(d) Assertion (A) is false but Reason (R) is true

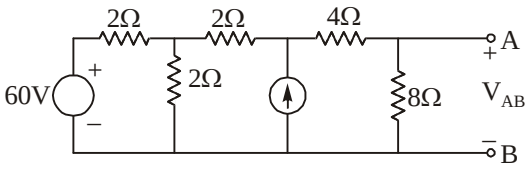
134. In the circuit shown in the given figure, the current I through R_L is



(a) 2 A (b) –2 A

(c) 10 A (d) –5 A

135. Find V_{AB} for the circuit shown below



(a) 105 V (b) 60 V

(c) 56 V (d) 43 V

136. Optical fibers are preferred as communication links for laser because they

(a) prevent interference by other lasers

(b) ensure that the beam does not spread

(c) prevent atmospheric interference

(d) ensure amplification of the signal

137. Match List-I with List II and select the correct answer using the codes given in the below list

List I (Network Theorems)	**List II (Property)**
A. Reciprocity	1. Impedance matching
B. Tellegen's	2. Bilateral
C. Superposition	3. $\sum_{k=0}^{b} V_k I_k = 0$
D. Maximum Power transfer	4. Linear
	5. Non linear

Code:	**A**	**B**	**C**	**D**
(a)	2	4	3	1

(b) 2 3 4 1

(c) 2 3 5 1

(d) 1 2 3 5

138. Asssume the valence electron is removed from a copper atom. The net charge of the atom becomes

(a) +1 (b) +4

(c) 0 (d) –1

139. Surface leakage current is part of the

(a) forward current

(b) Reverse current

(c) Reverse breakdown

(d) Forward breakdown

140. When a diode is forward biased, the recombination of free electrons and holes may produce

(a) Heat (b) Radiation

(c) Light (d) All of the above

141. A geostationary satellite located at about 35000 km from earth can cover

(a) complete surface of earth
(b) one hemisphere in one pass
(c) one side of earth
(d) an area depending on antenna used.

142. Which one of the following is not an LED material

(a) GaAs (b) GaP

(c) SiC (d) SiO_2

143. Consider the following statements for a photoconducting material:

1. Its dark conductivity is small
2. With the absorption of radiation, equal number of electrons and holes are produced

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

144. Hall effect can be used to measure

1. Conductivity of the charge carrier.
2. Mobility of the charge carrier
3. The number of valence electrons per atom
4. Band gap of the material.

Which of the following is correct?

(a) 2 and 3 (b) 1 and 2

(c) 3 and 4 (d) 1 and 4

145. The minority carrier life time and diffusion constant in a semiconductor material are 100 μs and 100 cm^2/s, respectively. The diffusion length will be

(a) 100 cm (b) 0.01 cm

(c) 0.1 cm (d) 0.2 cm

146. The load instruction is mostly used to designate a transfer from memory to a processor register known as

(a) Accumulator (b) Instruction register

(c) Program counters

(d) Memory address register

147. A group of bits that tell the computer to perform a specific operation is known as

(a) Instruction code (b) Micro-operation
(c) Accumulator (d) Register

148. The time interval between adjacent bits is called

(a) Word-time (b) Bit-time
(c) Turn around time (d) Slice time

149. The average time required to reach a storage location in memory and obtain its contents is called as

(a) seek time (b) turnaround time

(c) access time (d) transfer time

150. $(2FAOC)_{16}$ is equivalent to

(a) $(195084)_{10}$

(b) $(00101111101000001100)_2$

(c) Both (a) and (b)

(d) None of these

ANSWER & EXPLANATION

1. ***Ans. (b)***

2. ***Ans. (c)***

3. ***Ans. (b)***

4. ***Ans. (a)***

5. ***Ans. (c)***

6. ***Ans. (b)***

7. ***Ans. (d)***

8. ***Ans. (a)***

9. ***Ans. (a)***

10. ***Ans. (c)***

11. ***Ans. (d)***

12. ***Ans. (d)***

13. ***Ans. (d)***

14. ***Ans. (a)***

15. ***Ans. (c)***

16. ***Ans. (d)***

17. ***Ans. (d)***

18. ***Ans. (b)***

19. ***Ans. (c)***

20. ***Ans. (b)***

21. ***Ans. (a)***

22. ***Ans. (c)***

23. ***Ans. (c)***

24. ***Ans. (d)***

25. ***Ans. (a)***

26. ***Ans. (c)***

27. ***Ans. (c)***

$$I_c = \frac{20 - 0.6}{5.4 + \frac{400}{9}} = 1.98 \text{ mA}$$

$$V_c = 20 - 1.98 \times 10^{-3} + 5.4 \times 10^{3}$$

$$= 9.3 \text{ V}$$

28. ***Ans. (c)***

29. ***Ans. (b)***

30. ***Ans. (b)***

31. ***Ans. (a)***

32. ***Ans. (d)***

33. ***Ans. (b)***

34. ***Ans. (a)***

35. ***Ans. (a)***

36. ***Ans. (d)***

37. ***Ans. (c)***

38. ***Ans. (a)***

39. ***Ans. (b)***

40. ***Ans. (b)***

41. ***Ans. (c)***

42. ***Ans. (b)***

43. ***Ans. (d)***

44. ***Ans. (a)***

45. ***Ans. (a)***

46. ***Ans. (c)***

47. ***Ans. (c)***

$$I_d = I_o(e^{V_D/\eta V_T} - 1)$$

By considering $\frac{V_D}{\eta V_T} >> 1$ then

$$\frac{I_d}{I_o} = e^{V_D/\eta V_T}$$

$$\frac{V_D}{\eta V_T} = ln\left(\frac{I_d}{I_o}\right)$$

I_d is constant according to question,

$$\frac{V_{D1}}{V_{D2}} = \frac{T_1}{T_2} \Rightarrow V_{D2} = \frac{V_{D1}.T_2}{T_1}$$

$$= \frac{700\times10^{-3}(273+40)}{(20+273)}$$

$$= 747.78 \text{ mV}$$

48. ***Ans. (c)***

49. ***Ans.. (a)***

50. ***Ans.. (a)***

51. ***Ans. (b)***

Propagation vector

$$K_i = 4a_x + 3a_z$$

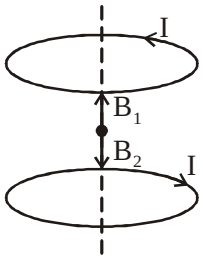
Unit normal vector to the inter face = $\hat{a}_z$

Plane containing K_i and $\hat{a}_z$ is y = constant

Since E_i is normal to the plane

So vertically polarized.

52. ***Ans. (a)***



Since current in the both coil is equal

So $|B_1| = |B_2|$

and in opposite direction

$$\vec{B} = \vec{B}_1 + \vec{B}_2 = 0$$

53. ***Ans. (b)***

Compare the equation

$$E_Z = E_0 \sin\frac{m\pi}{a}.x \sin\frac{n\pi}{b}.y\, e^{-j\beta z}$$

a = 5 cm, b = 2 cm

$$\frac{m\pi}{a} = 40\pi$$

$$m = 40a = 40 \times .05 = 2$$

$$\frac{n\pi}{b} = 50\pi$$

$$n = 50b = 50 \times .02 = 1$$

Since E_z will present and wave propagate in z-direction

So $H_z = 0$

54. ***Ans.. (c)***

$$Z_{in} = Z_0\left(\frac{Z_L + jZ_0 \tan\beta l}{Z_0 + jZ_L \tan\beta l}\right)$$

For short circuit load $Z_L = 0$

$$Z_{sc} = jZ_0 \tan \beta l$$

for $\frac{\lambda}{4} < l < \frac{\lambda}{2} \Rightarrow \frac{2\pi}{\lambda}.\frac{\lambda}{4} < \beta l < \frac{2\pi}{\lambda}.\frac{\lambda}{2}$

$$\frac{\pi}{2} < \beta l < \pi$$

between $\left(\frac{\pi}{2}, \pi\right)$ $\tan \beta l$ must be –ve

So input impedance will be capacitive.

55. ***Ans. (b)***

$$E = -\frac{dV}{dr} = -\frac{d}{dr}\left(-\frac{6r^5}{\epsilon_0}\right)$$

$$= \frac{30r^4}{\epsilon_0}$$

Electric field at r = 1

$$\frac{30}{\epsilon_0} = \frac{Q}{4\pi\epsilon_0}$$

$$Q = 120\pi$$

56. ***Ans. (a)***

Radiation intensity α frequency

$$\frac{I_1}{I_2} = \frac{f_1}{f_2}$$

$$\frac{I}{I_2} = \frac{f}{f/4}$$

$$I_2 = \frac{I}{4}$$

57. ***Ans. (a)***

$$R = 40\pi^2\left(\frac{l}{\lambda}\right)^2$$

$$\lambda = \frac{c}{f} = \frac{3\times10^8}{600\times10^3} = \frac{1}{2}\times10^3 \text{m}$$

$$R = 40\pi^2\left(\frac{50}{500}\right)^2 = 0.4\pi^2$$

$$= \frac{2\pi^2}{5}$$

58. ***Ans. (b)***

$Z_0 = 75$ (Resistive)

$Z_L = 75 - j40$ (Capacitive load)

To match the line, matching load must be inductive.

59. ***Ans. (c)***

Phase difference between E_x and $E_y = 90°$

$$|E_x| \neq |E_y|$$

So elliptically polarized wave.

60. ***Ans. (b)***

$\delta = \sqrt{\frac{2}{\omega\mu\sigma}}$ for conducting medium

$$\frac{\delta_1}{\delta_2} = \sqrt{\frac{f_2}{f_1}}$$

$$\delta = \sqrt{\frac{f_1}{f_2}}\cdot\delta_1$$

$$= \sqrt{\frac{1}{4}}\cdot\delta_1 = \frac{\delta_1}{2} = 12.5 \text{ cm}$$

61. ***Ans. (c)***

$$V = -N\frac{d\phi}{dt}$$

$$= -100\frac{d}{dt}(t^3 - 2t)\,\text{mV}$$

at $t = 4$ sec.

$V = -100\,[46]$ mV

$= -4600$ mV $= -4.6$V

$|V| = 4.6$V

62. ***Ans. (d)***

63. ***Ans. (a)***

64. ***Ans. (d)***

Permanent dipole moment

= 1.04 debye unit

$= 1.04 \times 3.33 \times 10^{-30}$ coulomb-meter

Boltzman constant $K = 1.38 \times 10^{-23}$ J/k

Room temperature T = 300 k

$$\alpha_0 = \frac{P_P^2}{3kT}$$

$$= \frac{(1.04\times3.33\times10^{-30})^2}{3\times1.3\times10^{-23}\times300}$$

$= 0.966 \times 10^{-39}$ Farad-meter^2

$N = 10^{27}$ m^{-3}

$E = 10^6$ V/m

So orientational polarization

$$P_0 = N\,\alpha_0 E$$

$= 10^{27} \times 0.966 \times 10^{-39} \times 10^6$

$= 0.966 \times 10^{-6}$ coulomb meter^{-2}

65. ***Ans. (b)***

66. ***Ans. (d)***

67. ***Ans. (b)***

68. ***Ans. (d)***

69. ***Ans. (b)***

70. ***Ans. (b)***

71. ***Ans. (b)***

72. ***Ans. (d)***

73. ***Ans. (a)***

74. ***Ans. (c)***

75. ***Ans. (b)***

76. ***Ans. (d)***

77. ***Ans. (c)***

78. ***Ans. (a)***

79. ***Ans. (c)***

80. ***Ans. (d)***

81. ***Ans. (a)***

82. ***Ans. (b)***

83. ***Ans. (a)***

84. ***Ans. (a)***

85. ***Ans. (d)***

86. ***Ans. (a)***

87. ***Ans. (c)***

88. ***Ans. (c)***

lead or lag.

89. ***Ans. (a)***

90. ***Ans. (d)***

Steady state response does not depend on initial conditions.

91. ***Ans. (a)***

92. ***Ans. (a)***

93. ***Ans. (d)***

$\frac{1}{j\omega}$ for term the slope is –20 dB/decade or –6 dB/octave because –20 log 2 = – 6 dB

94. ***Ans. (c)***

With respect to k

$$S_k^T = 1$$

with respect to H

$$S_k^H = \frac{-GH}{1+GH}$$

$$= -\frac{\frac{100\times 10}{s(s+1)}}{1+\frac{100\times 10}{s(s+1)}}$$

$$= -\frac{1000}{s(s+1)+1000}$$

$$= -\frac{1000}{s^2+s+1000}$$

95. ***Ans. (b)***

96. ***Ans. (a)***

97. ***Ans. (c)***

98. ***Ans. (b)***

99. ***Ans. (d)***

100. ***Ans. (c)***

101. ***Ans. (c)***

102. ***Ans. (d)***

103. ***Ans. (d)***

104. ***Ans. (d)***

105. ***Ans. (c)***

106. ***Ans. (b)***

107. ***Ans. (a)***

108. ***Ans. (c)***

109. ***Ans. (b)***

110. ***Ans. (c)***

111. ***Ans. (d)***

112. ***Ans. (d)***

113. ***Ans. (b)***

114. ***Ans. (c)***

115. ***Ans. (c)***

116. ***Ans. (c)***

$$e^2(t) = \frac{(\Delta V)^2}{12}$$

$$\Delta V = \frac{A}{S} = \frac{6.4}{64} = 0.1$$

$$\text{RMS Value} = \sqrt{e^2(t)}$$

$$= \frac{\Delta V}{\sqrt{12}} = \frac{0.1}{\sqrt{12}} = 0.03\,\text{Volt}$$

117. ***Ans. (c)***

118. ***Ans. (c)***

119. ***Ans. (a)***

120. ***Ans. (b)***

121. ***Ans. (c)***

Given that

f_i = 455 kHz

f_s = 1200 kHz

Image frequency = $f_s + 2f_i$

= 1200 + 2 × 455

= 2110 kHz

122. ***Ans. (a)***

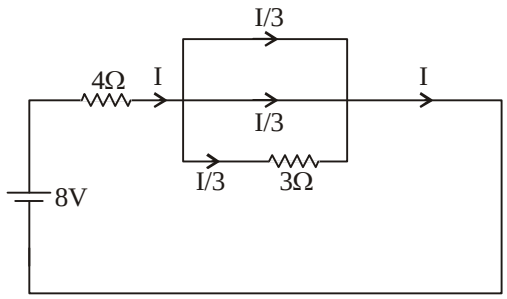
123. ***Ans. (c)***

124. ***Ans. (c)***

125. ***Ans. (c)***

Three branch are parallel and net current is I. Current through 3W

$$I' = \frac{I}{3}$$



Applying KVL in the loop, we get

$$-8 + 4I + 3\times\frac{I}{3} = 0$$

$$I = \frac{8}{5}$$

voltage across 3Ω resistance $= 3\times\frac{I}{3}$

$$= 3\times\frac{\frac{8}{5}}{3} = \frac{8}{5}\,\text{V}.$$

126. ***Ans. (c)***

Applying KCL

$$\frac{V}{6} + \frac{V-3I}{2} = I$$

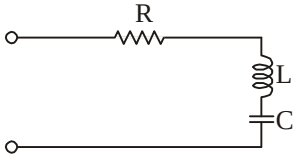
$$\frac{V+3V-9I}{6} = I$$

$$4V = 6I + 9I$$

$$V/I = \frac{15}{4}\Omega$$

127. ***Ans. (b)***

Consider the series RLC circuit



$$y = \frac{1}{z} = \frac{1}{R + Ls + \frac{1}{Cs}}$$

$$= \frac{Cs}{LCs^2 + RCs + 1}$$

$$= \frac{\frac{1}{L}s}{s^2 + \frac{R}{L}s + \frac{1}{LC}}$$

poles of the function

$$S_1, S_2 = \frac{R}{L} \pm \sqrt{\frac{RL}{L^2} - \frac{4}{LC}}$$

closer the poles jω-axis means smaller is the value of (R/L). Thus,

$$Q = \frac{\omega_o L}{R}$$

If R is small, then higher the value of Q.
Thus,

$$2\xi\omega_0 = \frac{R}{L}$$

$$\xi = \frac{R}{2\omega_0 L} = \frac{1}{2Q}$$

The value of Q varies inversely as the damping ratio is $Q = \frac{1}{2\delta}$ A circuit with low R has high Q, since $Q = \frac{\omega_o L}{R}$

Hence, Statements (1) and (2) are correct

128. ***Ans. (b)***

In series resonance circuit

$$Q = \frac{f_0}{BW} = \frac{1}{\omega_0 CR}$$

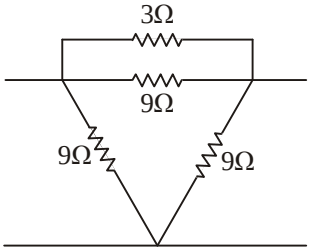
$$R = \frac{BW}{2\pi f_0 C f_0}$$

$$= \frac{10 \times 10^5}{2\pi \times 1.5 \times 10^6 \times 150 \times 10^{-6} \times 1.5 \times 10^{-6}}$$

$= 4.7\ \Omega$

129. ***Ans. (c)***

Convert star to delta network as shown in the following figure



$$y_{21} = \left.\frac{I_2}{V_1}\right|_{V_2 = 0}$$

$$= -\left(\frac{1}{3} + \frac{1}{9}\right)$$

$$= -\frac{3+1}{9} = -\frac{4}{9}\text{mho}$$

130. ***Ans. (c)***

$$f(s) = \frac{s^3 + 2s^2 + 2s + 1}{4s}$$

is not positive real function as the difference in power of highest degree terms in N(s) and D(s) is more than 1. For this f(s) difference is 2.

$$f(s) = \frac{s(s^4 + 3s^2 + 1)}{(s+1)(s+2)(s+3)(s+4)}$$

is not a positive real function as N(s) have missing term of s^4.

$$f(s) = \frac{s(s^2 + 4)}{(s^2 + 1)(s^2 + 6)}$$

represent an LC immittance function with pole zero on jω and alternator.
Hence, it is positive real function

$$f(s) = \frac{s(s^2 - 4)}{(s^2 + 1)(s^2 + 6)}$$ is not positive real function as it has a zero in the RHS of the s-plane at s = 2.

131. ***Ans. (b)***

$$\text{Energy} = \frac{1}{2}CV^2$$

$$= \frac{1}{2}\times 2\times 10^{-6}\times 225$$

$$= 225 \times 10^{-6}$$

$$= 2.25 \times 10^{-4} \text{ Joules}$$

132. ***Ans. (c)***

In the two parallel branches the voltage should be the same

$$6 \times I_R = 3I_R \times R_{eq}$$

$$R_{eq} = 2\Omega$$

Hence, current control source can be replaced by a resistance of 2Ω.

Hence net resistance of the network is

$$R = 6\|2 = 1.5\Omega$$

$$\text{Power} = \frac{V^2}{R}$$

$$= \frac{(30)^2}{1.5\Omega} = 600\text{W}$$

133. ***Ans. (c)***

134. ***Ans. (b)***

$$\text{Thevenin's voltage} = \frac{240}{150}\times 50 - \frac{240}{150}\times 100$$

$$= 80 - 160 = -80\text{V}$$

Thevenin's resistance = $100\|50$

$$= \frac{100}{3}$$

$$\text{Therefore current} = \frac{-80}{\frac{100}{3} + 6.67} = -2\text{A}$$

135. ***Ans. (c)***

136. ***Ans. (c)***

137. ***Ans. (b)***

138. ***Ans. (a)***

139. ***Ans. (b)***

140. ***Ans. (d)***

141. ***Ans. (c)***

142. ***Ans. (d)***

LED Material	Colour of light
GaAs	Red
GaP	Green
Si C	Blue

143. ***Ans. (c)***

144. ***Ans. (b)***

145. ***Ans. (c)***

$$L = \sqrt{D\tau}$$

$$= \sqrt{100\times 100\times 10^{-6}}$$

$$= 0.1 \text{ cm}$$

146. ***Ans. (a)***

147. ***Ans. (a)***

148. ***Ans. (b)***

149. ***Ans. (c)***

150. ***Ans. (b)***

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