Electronics

Time Allowed :3 Hours	**Maximum Marks :**300	**Total questions : 75**

General Instructions

General Instructions:

1. Question Paper contains 75 Questions .
2. Each correct answer will have +4 marks and wrong asnwer will lead to -1
3. Use of any electronic appliances is strictly prohibited.

1. A quadratic function of two variables is given as $f(x_1, x_2) = x_1^2 + 2x_2^2 + 3x_1 + 3x_2 + 1$. The magnitude of maximum rate of change of the function at the point (1,1) is

(A) 10

(B) 64

(C) 100

(D) 14

---

2. For a given vector $W^T = [1, 2, 3]$, the vector is normal to the plane defined by $W^T \cdot X = 1$.

(A) $[-2, -2, 2]^T$

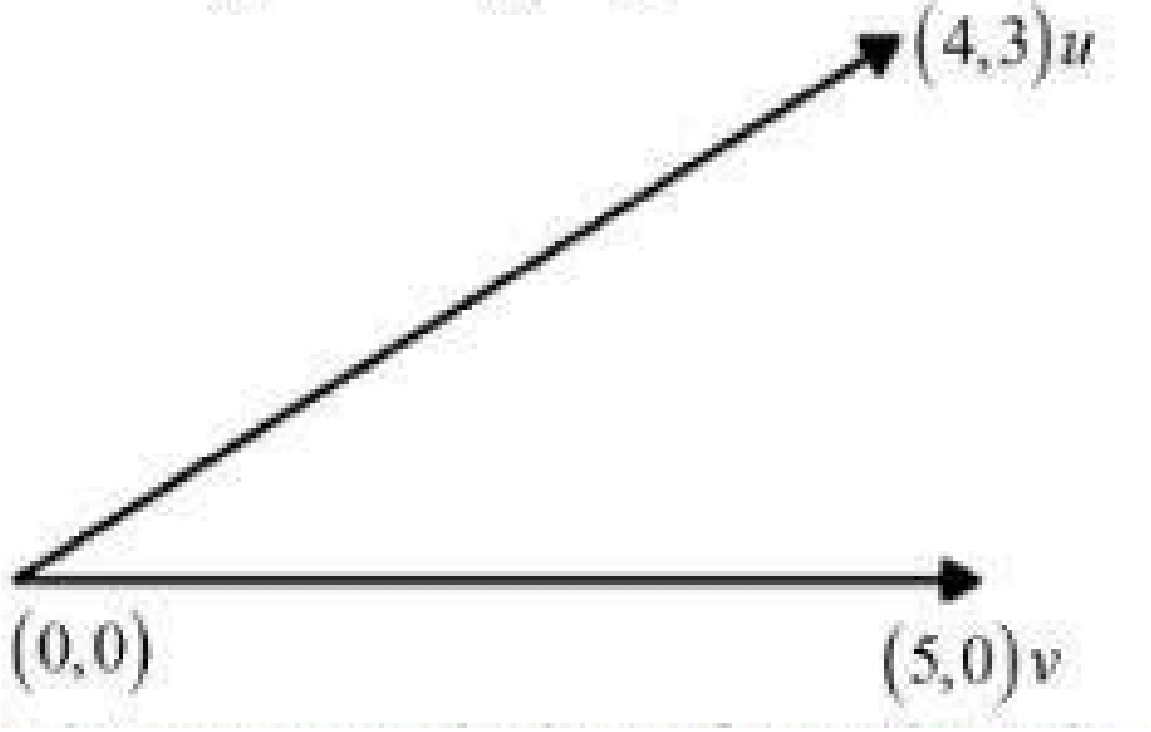
(B) $[3, 0, -1]^T$

(C) $[3, 2, 1]^T$

(D) $[1, 2, 3]^T$

---

3. In the given figure, the vectors u and v are related as $Au = v$ by a transformation matrix A. The correct choice of matrix A is u = (4,3), v = (5,0)



(A) $\begin{bmatrix} \frac{4}{5} & -\frac{3}{5} \\ -\frac{3}{5} & \frac{4}{5} \end{bmatrix}$

(B) $\begin{bmatrix} \frac{4}{5} & \frac{3}{5} \\ \frac{3}{5} & \frac{4}{5} \end{bmatrix}$

(C) $\begin{bmatrix} \frac{4}{5} & \frac{3}{5} \\ -\frac{3}{5} & \frac{4}{5} \end{bmatrix}$

(D) $\begin{bmatrix} \frac{4}{5} & -\frac{3}{5} \\ \frac{3}{5} & \frac{4}{5} \end{bmatrix}$

---

4. Let the probability density function of a random variable x be given as $f(x) = ae^{-2|x|}$. The value of 'a' is

(A) 0.1

(B) 0.5

(C) 1

(D) 1.5

---

5. For a real number $n > 1$, $\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} = 1$. The value of n is

(A) 4

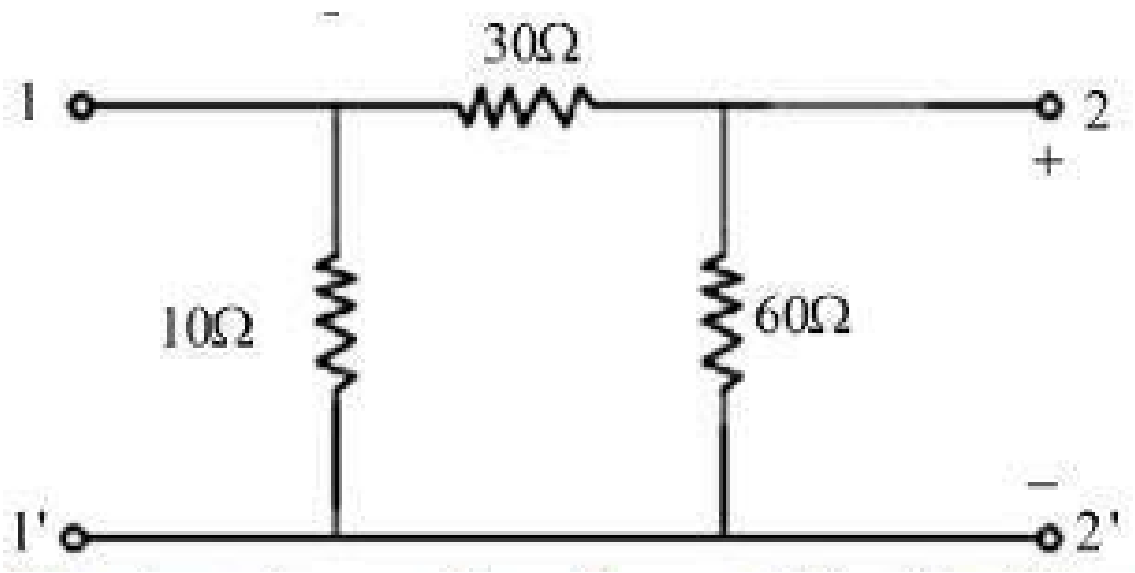
(B) 12

(C) 24

(D) 36

---

6. For the two port network shown below, The impedances $Z_{11}, Z_{12},$ and Z_{22} (in Ω) are A. 6Ω, B. 9Ω, C. 24Ω. Choose the correct sequence of Z_{11}, Z_{12}, Z_{22} in answer from the options given below:



(A) A, B, C

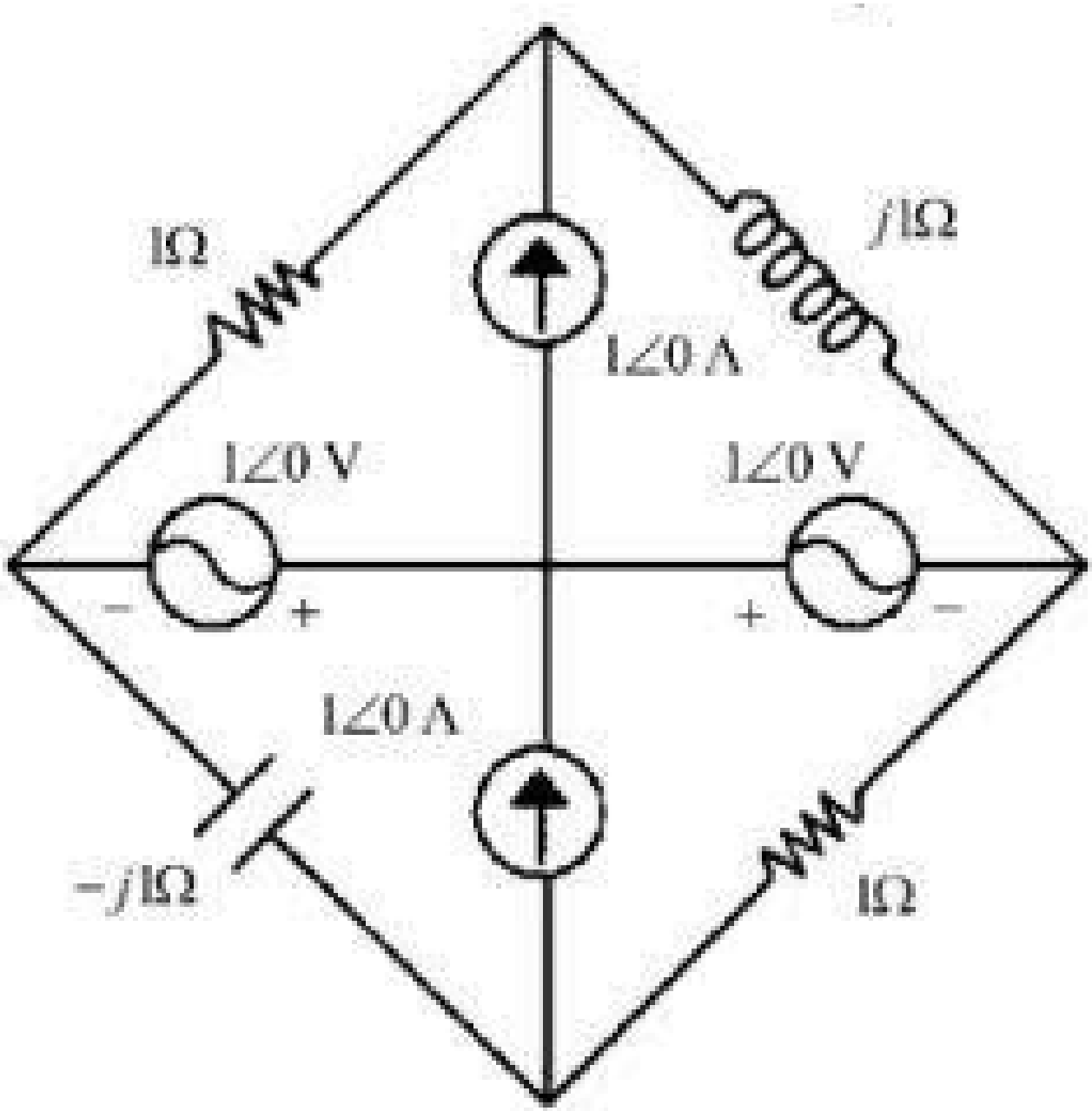
(B) A, C, B

(C) B, A, C

(D) C, B, A

---

7. In the circuit shown below, the current through the inductor (in A) is



(A) $\frac{2}{1+j}$

(B) $\frac{-1}{1+j}$

(C) $\frac{1}{1+j}$

(D) 0

---

8. The nodal method of circuit analysis is based on

(A) KVL and Ohm's law

(B) KCL and Ohm's law

(C) KCL and KVL

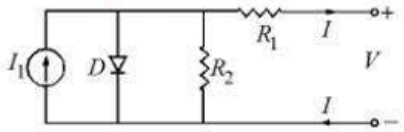
(D) KCL, KVL and Ohm's law

---

9. Consider the diode circuit shown below. The diode, D, obeys the current-voltage characteristic $I_D = I_s(\exp(V_D/nV_T) - 1)$. The circuit is biased so that voltage $V > 0$ and current $I < 0$. If you had to design this circuit to transfer maximum power from the current source (I_1) to a resistive load (not shown) at the output, what values for R1 and R2 would you choose? A. Small R_1, B. Large R_1, C. Small R_2, D. Large R_2. Choose the correct answer from the options given below:

$$I_D = I_s\left(\exp\left(\frac{V_D}{nV_T}\right) - 1\right)$$

Where, $n > 1, V_T > 0, V_D$ is the voltage across the diode and I_D is the current through it. The circuit is biased so that voltage $V > 0$ and current, $I < 0$ If you had to design this circuit to transfer maximum power from the current source (I_1) to a resistive load (not shown) at the output, what values R_1 and R_2 would you choose?



(A) A and C

(B) B and C

(C) A and D

(D) B and D

---

10. If the number of zeros is less than the number of poles, i.e. $Z < P$, then the value of the transfer function becomes zero for $s \to \infty$. Hence, some zeros are located at infinity and the order of such zeros will be:

(A) Z

(B) P + Z

(C) Z - P

(D) P - Z

11. A periodic signal $x(t)$ of period T_0 is given by $x(t) = \begin{cases} 1, & |t| < T_1 \\ 0, & T_1 < |t| < \frac{T_0}{2} \end{cases}$. The dc component of $x(t)$ is

(A) $\frac{T_1}{T_0}$

(B) $\frac{T_1}{2T_0}$

(C) $\frac{2T_1}{T_0}$

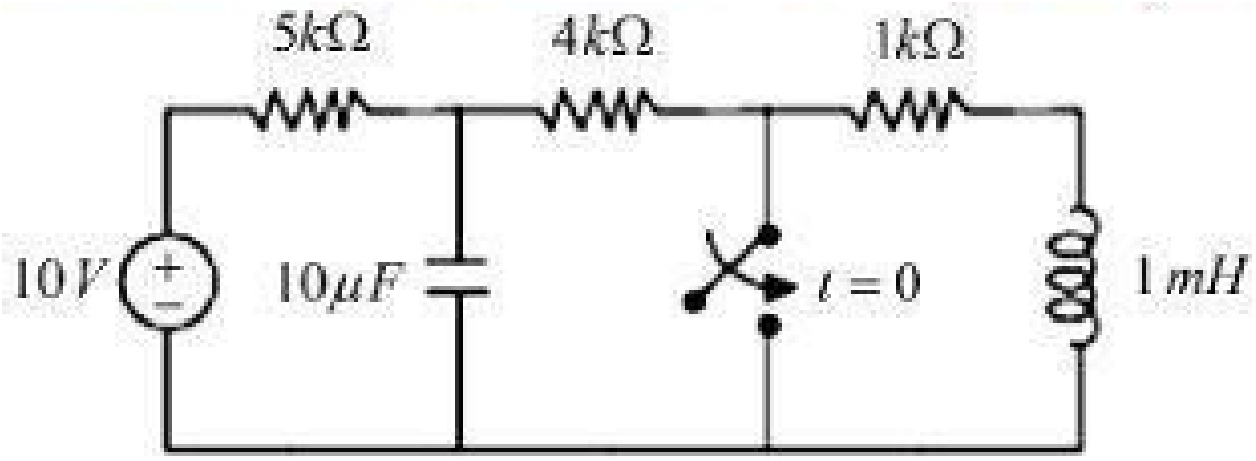
(D) $\frac{T_0}{T_1}$

---

12. Signals and their Fourier Transforms are given in the table below. Match LIST-I with LIST-II and choose the correct answer.

Signal (LIST-I)	Fourier Transform (LIST-II)
A. $e^{-at}u(t)$, $a > 0$	II. $\frac{1}{j\omega + a}$
B. $\cos \omega_0 t$	I. $\pi[\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]$
C. $\sin \omega_0 t$	IV. $-j\pi[\delta(\omega - \omega_0) - \delta(\omega + \omega_0)]$
D. $te^{-at}u(t)$, $a > 0$	III. $\frac{1}{(j\omega + a)^2}$

Table 1: Matching of Signals and Their Fourier Transforms



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

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

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

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

---

13. In the figure shown below, the ideal switch has been open for a long time. If it is closed at $t = 0$, then the magnitude of the current (in mA) through the 4 kΩ resistor at $t = 0+$ is

(A) 1 mA

(B) 1.25 mA

(C) 1.5 mA

(D) 1.75 mA

---

14. Consider an LTI system with a system function $H(z) = \frac{1}{1-\frac{1}{4}z^{-1}}$. Its difference equation will be

(A) $y[n] - \frac{1}{2}y[n-1] = x[n]$

(B) $y[n] - \frac{1}{4}y[n+1] = x[n]$

(C) $y[n] + \frac{1}{2}y[n-1] = x[n]$

(D) $y[n] - \frac{1}{4}y[n-1] = x[n]$

---

15. A discrete-time system has an input-output relationship: $y[n] = \begin{cases} x[n], & n \geq 1 \\ 0, & n = 0 \\ x[n+1], & n \leq -1 \end{cases}$.

The given system may have the properties: A. Linearity, B. Time-invariance, C. Causality, D. Stability. Choose the correct properties.

(A) A and D only

(B) A and B only

(C) A, B and C only

(D) A, B, C, D

---

16. The convolution of $x(-t)$ with impulse function $\delta(-t - t_0)$ is equal to

(A) $x(t + t_0)$

(B) $x(t - t_0)$

(C) $x(-t + t_0)$

(D) $x(-t - t_0)$

---

17. A 1 kHz signal is flat-top sampled at the rate of 1800 samples/sec and the samples are applied to an ideal rectangular low pass filter with a cut-off frequency of 1100 Hz. Then the output of the filter contains:

(A) 800 Hz and 1000 Hz components.

(B) 800 Hz and 900 Hz components.

(C) 800 Hz, 900 Hz and 1000 Hz components.

(D) only 800 Hz component.

---

18. Due to illumination by light, the electron and hole concentrations in a heavily doped N-type semiconductor increase by Δn and Δp, respectively. If n_i is the intrinsic concentration, then

(A) $\Delta n < \Delta p$

(B) $\Delta n > \Delta p$

(C) $\Delta n = \Delta p$

(D) $\Delta n \times \Delta p = n_i^2$

---

19. Under high electric fields, in a semiconductor with an increasing electric field,

(A) the mobility of the charge carriers decreases and the velocity of the charge carriers saturates.

(B) the mobility of the carriers and the velocity of the charge carriers, both increase.

(C) the mobility of the charge carriers decreases and the velocity of the charge carriers becomes zero.

(D) the mobility of the carriers increases and the velocity of the charge carriers becomes zero.

---

20. At room temperature, the energy band gap of different materials have been listed in the table below. Correctly match the energy band gap (List-I) with the corresponding

material (List-II).

LIST-I (Energy band gap)	**LIST-II (Material)**
A. $E_g = 0.67$ eV	I. Polymer
B. $E_g = 1.1$ eV	II. Germanium
C. $E_g = 1.43$ eV	III. Silicon
D. $E_g > 5$ eV	IV. Gallium Arsenide

Table 2: Matching of Energy Band Gaps and Materials

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

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

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

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

---

21. Crossover distortion behavior is characteristic of

(A) Class A amplifier.

(B) Class B amplifier.

(C) Class AB amplifier.

(D) Common-base amplifier.

---

22. In a p-type Si sample, the hole concentration is 2.25×10^{15} cm^{-3} and the intrinsic carrier concentration is 1.5×10^{10} cm^{-3}. The value of electron concentration will be

(A) Zero

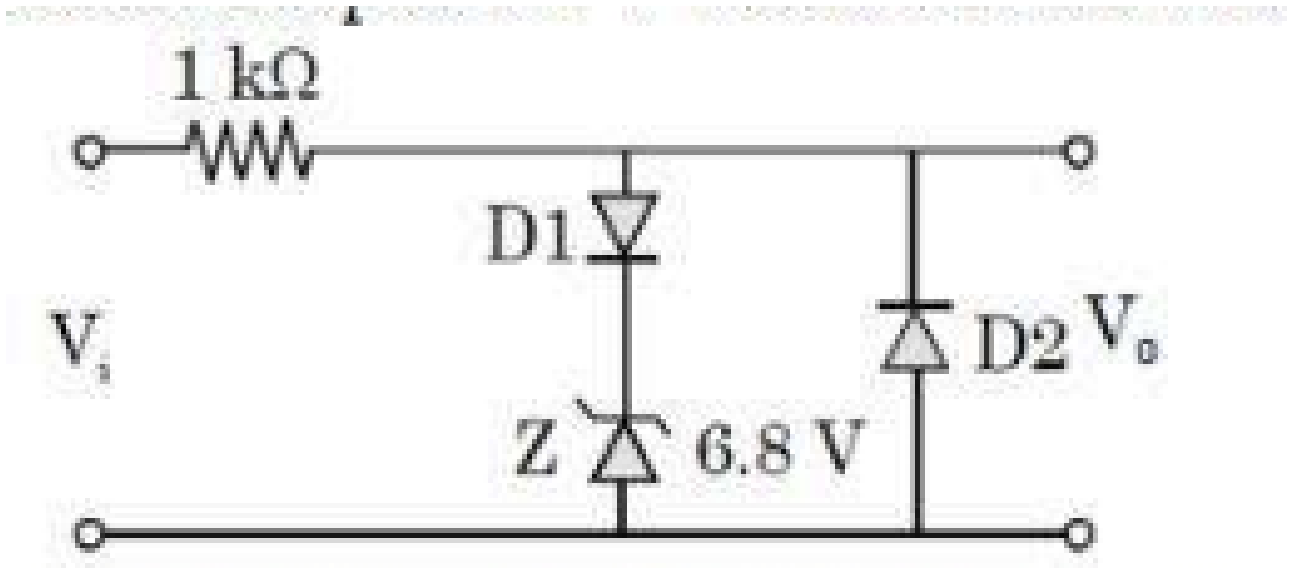
(B) 10^{10} cm^{-3}

(C) 10^{5} cm^{-3}

(D) 1.5×10^{25} cm^{-3}

---

23. In the following limiter circuit, the input voltage $V_i = 10\sin(100\pi t)V$ is applied. Assume that the diode drop is 0.7 V when it is forward biased and the Zener breakdown voltage is 6.8 V. The maximum and minimum values of the output voltage, respectively, are



(A) 6.1 V, -0.7 V

(B) 0.7 V, -7.5 V

(C) 7.5 V, -0.7 V

(D) 7.5 V, -7.5 V

---

24. The different diodes and their applications are shown in List-I and List-II, respectively.

LIST-I	**LIST-II**
A. Varactor diode	III. Tuned circuits
B. PIN Diode	II. High-frequency switch
C. Zener diode	I. Voltage reference
D. Schottky diode	IV. Current controlled attenuator

Table 3: Matching of Diodes and Their Applications

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

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

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

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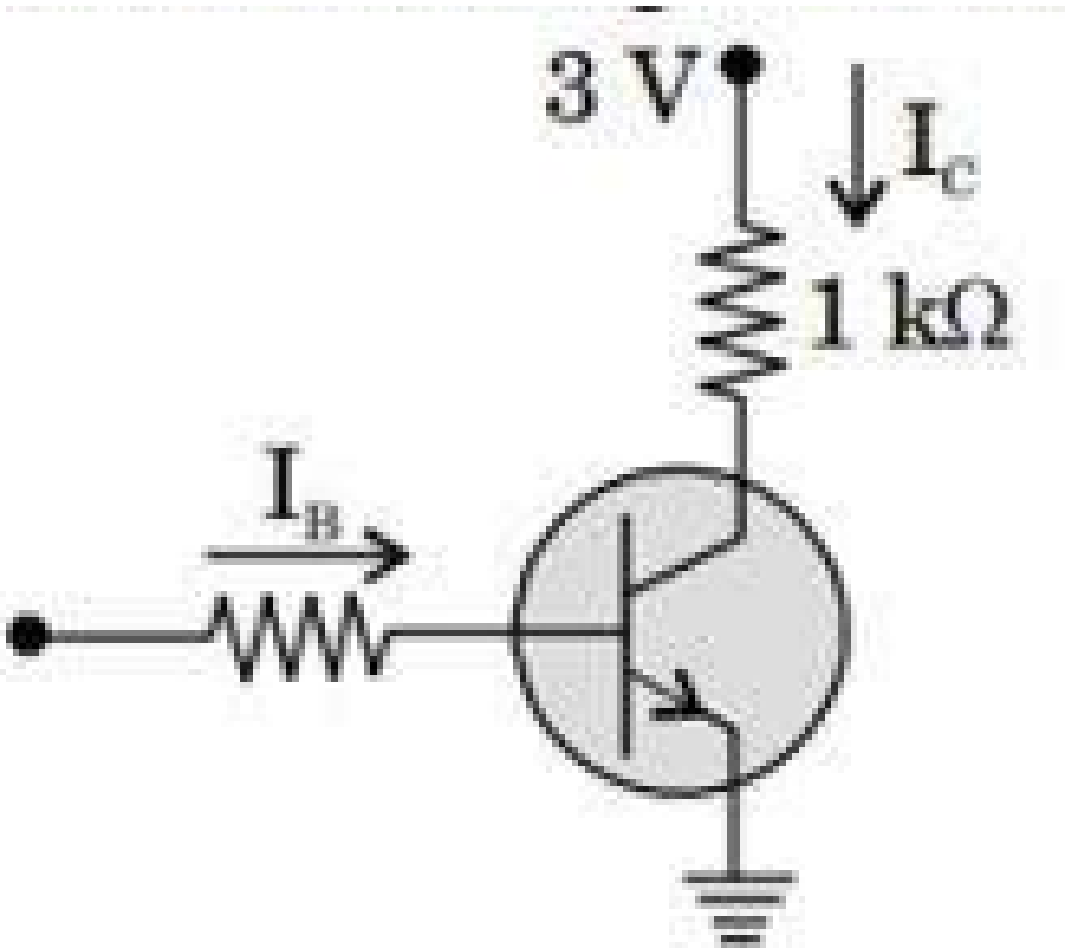
25. Assuming $V_{CEsat} = 0.2$ V and $\beta = 50$, the minimum base current (I_{Bmin}) required to drive the transistor in the figure to saturation is



(A) 56 μA

(B) 140 μA

(C) 60 μA

(D) 4.3 μA

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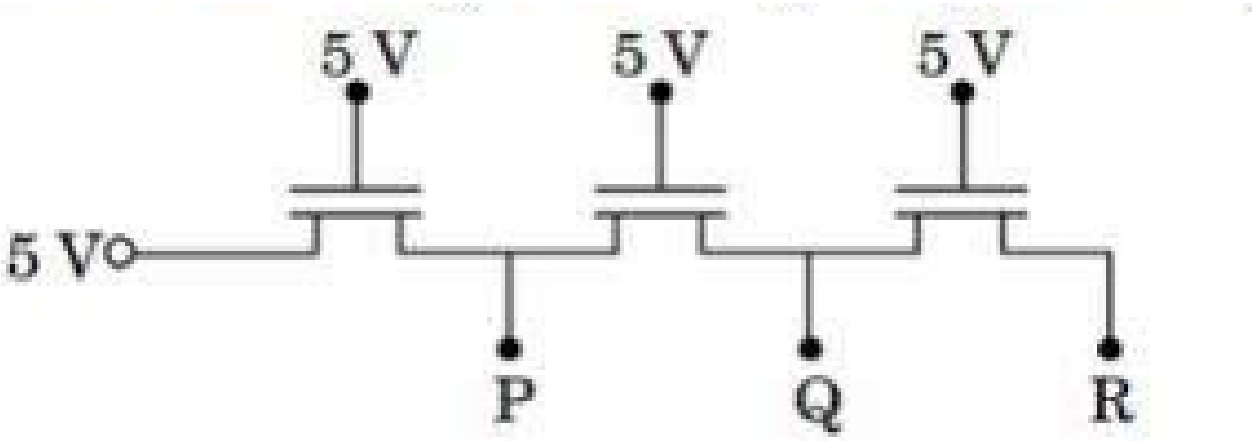
26. The following circuit employing pass transistor logic, all NMOS transistors are identical with a threshold voltage of 1 V. Ignoring the body-effect, the output voltages at P, Q and R are,



(A) 4V, 4V, 4V

(B) 4V, 3V, 2V

(C) 5V, 5V, 5V

(D) 5V, 4V, 3V

---

27. If fixed positive charges are present in the gate oxide of an n-channel enhancement type MOSFET, it will lead to

(A) a decrease in the threshold voltage

(B) channel length modulation

(C) an increase in substrate leakage current

(D) an increase in accumulation capacitance

---

28. The early-effect in a BJT is caused by

(A) fast turn-on

(B) fast turn-off

(C) large collector-base reverse bias

(D) large emitter-base forward bias

---

29. Negative feedback in amplifiers A. improves the signal-to-noise ratio at the input. B. improves the signal-to-noise ratio at the output. C. does not affect the signal-to-noise ratio at the output. D. reduces distortion. Choose the correct answer from the options

given below:

(A) A, C and D only

(B) B, C and D only

(C) A and C only

(D) B and D only

---

30. A circuit which resonates at 1 MHz has a Q of 10. Bandwidth between half-power points is

(A) 1 kHz

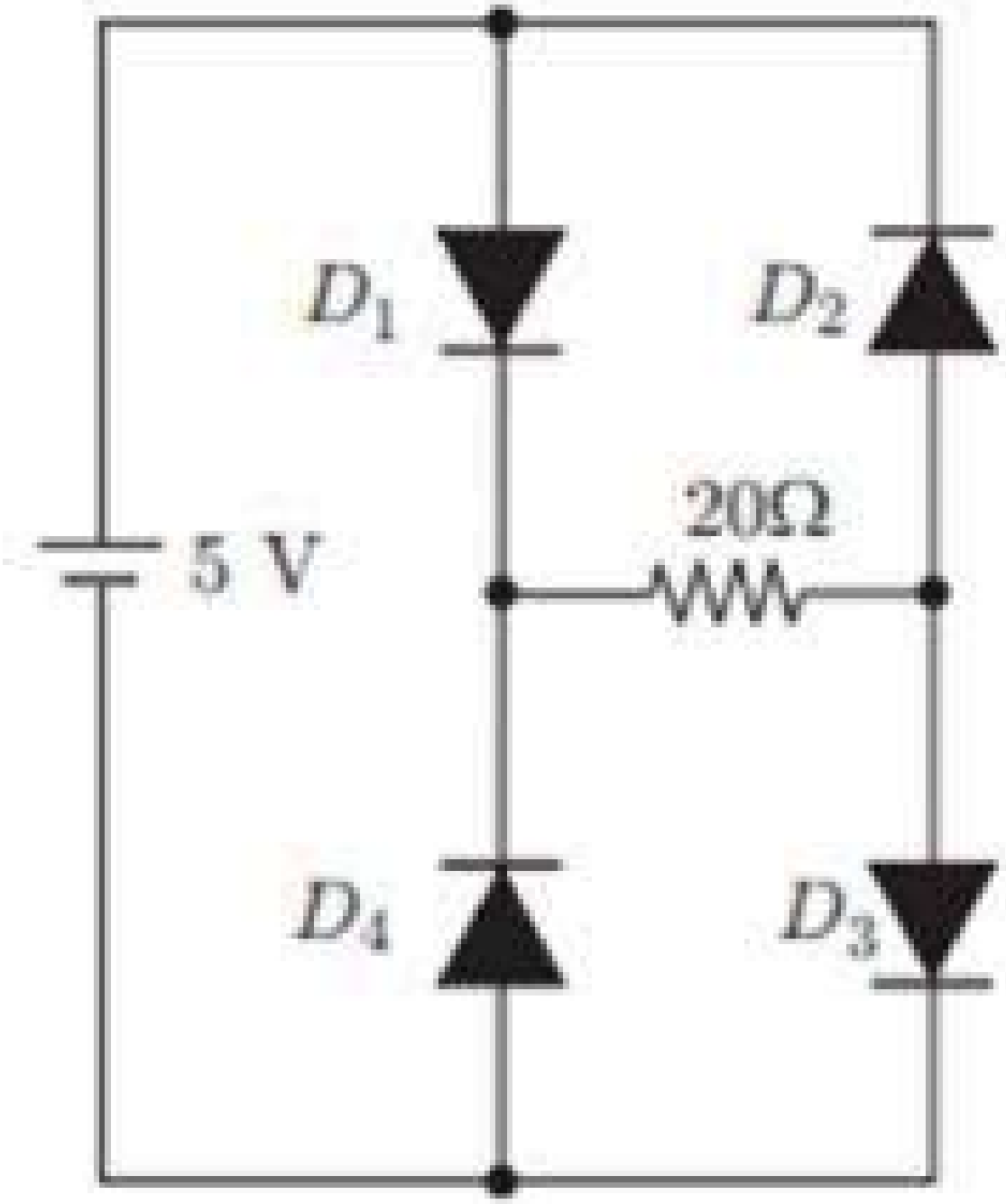
(B) 10 kHz

(C) 100 kHz

(D) 100 Hz

---

31. The circuit shown in the figure, the forward voltage of the diode is 0.7 V and its dynamic resistance is 2 Ω. The current through the 20 Ω resistor is



(A) 150 mA

(B) 200 mA

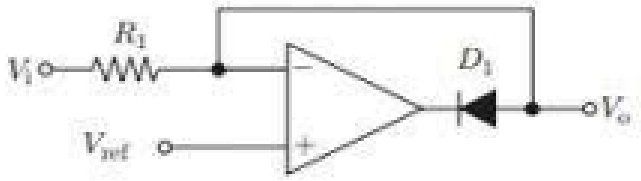
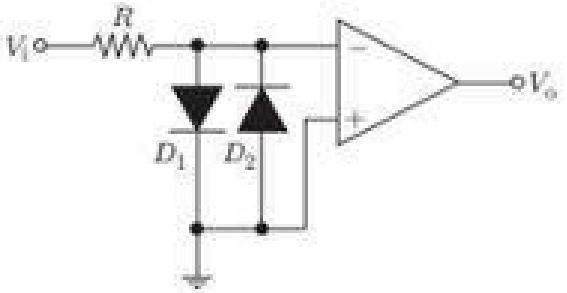
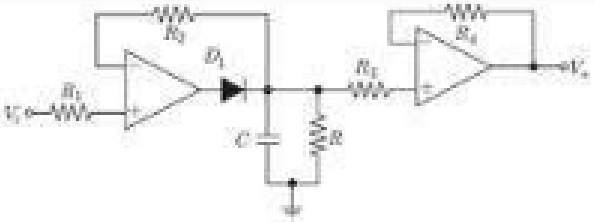
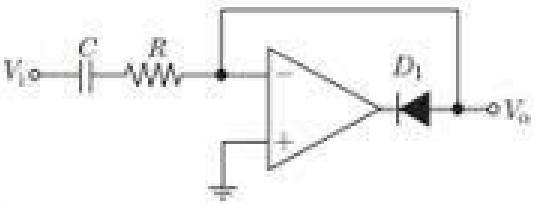
(C) 300 mA

(D) 400 mA

---

32. The circuit name (List-I) and their circuit diagram (List-II) are given in the table

below. Match List-I with List-II.

LIST-I (Name of the circuit)		LIST-II (Circuit diagram)	
(A)	Zero Crossing Detector	I.	
(B)	Clipper	II.	
(C)	Clamper	III.	
(D)	Peak Detector	IV.	

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

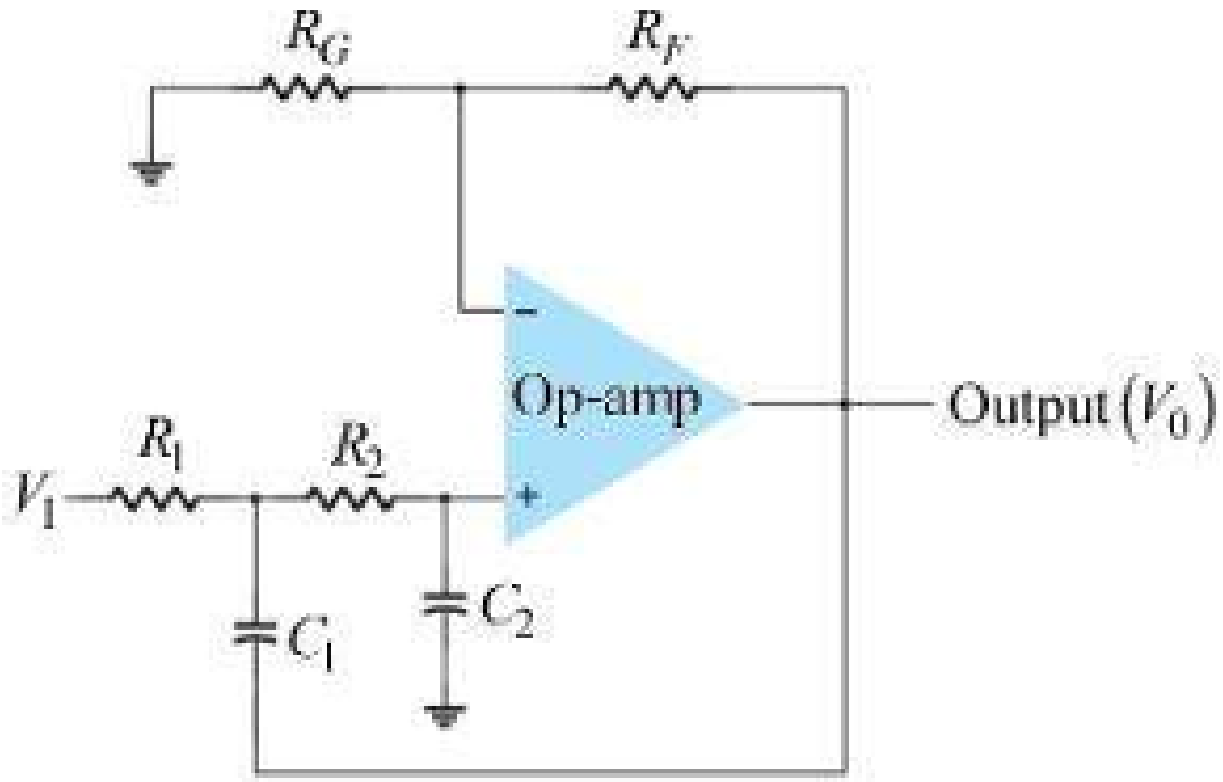
(B) A - III, B - II, C - I, D - IV

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

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

---

33. The circuit in the given figure is,



(A) low-pass filter

(B) high-pass filter

(C) band-pass filter

(D) band-reject filter

---

34. The internal blocks in the Voltage-controlled-Oscillator (VCO) IC-566 are given below. A. Current Sources, B. Buffer Amplifier, C. Schmitt Trigger, D. Modulation Input. Choose the correct sequence (input towards output) of internal blocks of VCO from the options given below from input side to output side:

(A) D, B, C, A

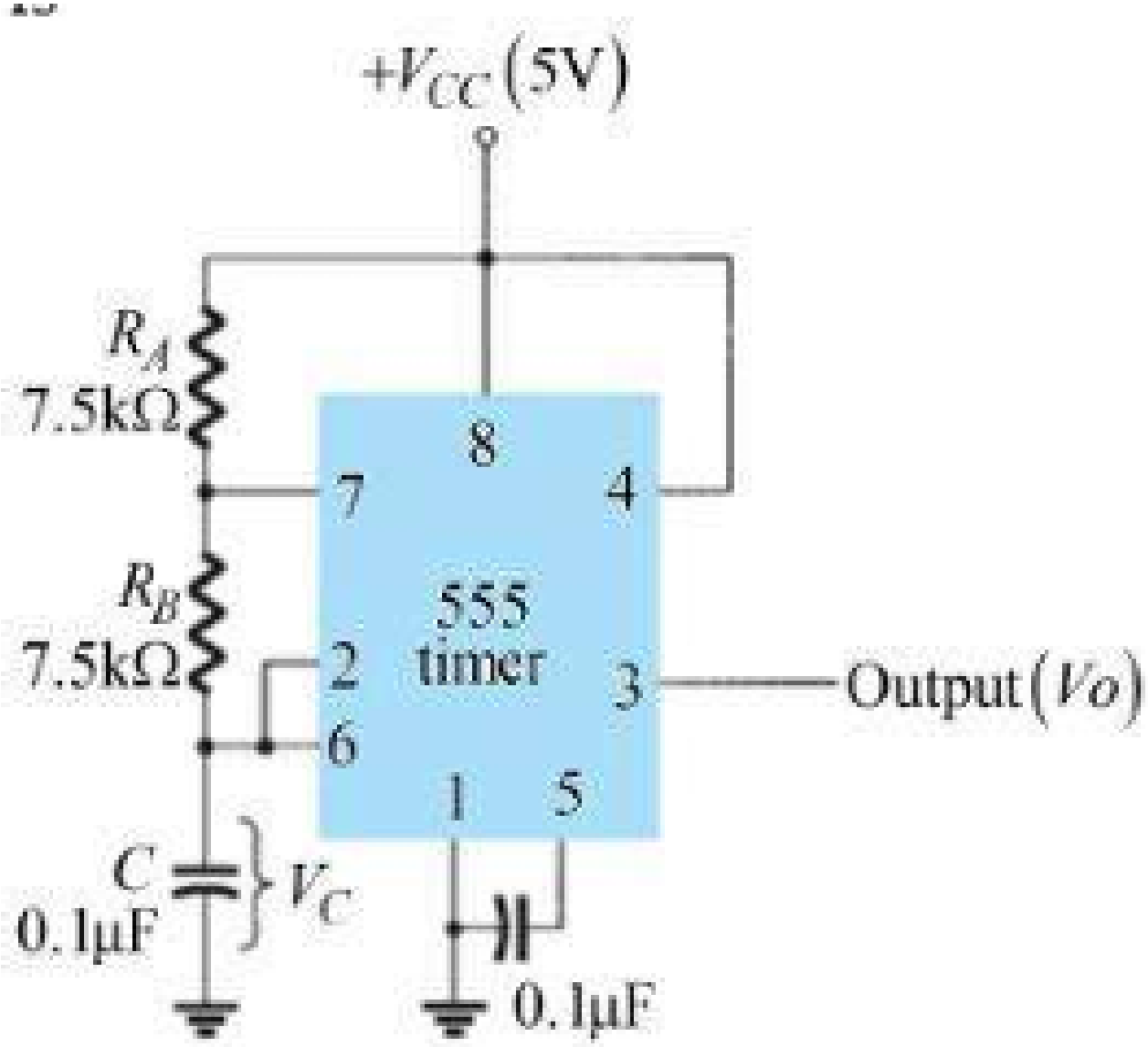
(B) D, C, B, A

(C) D, A, B, C

(D) D, A, C, B

---

35. In the astable multivibrator circuit shown in the figure, the frequency of oscillation at the output is



(A) 544 Hz

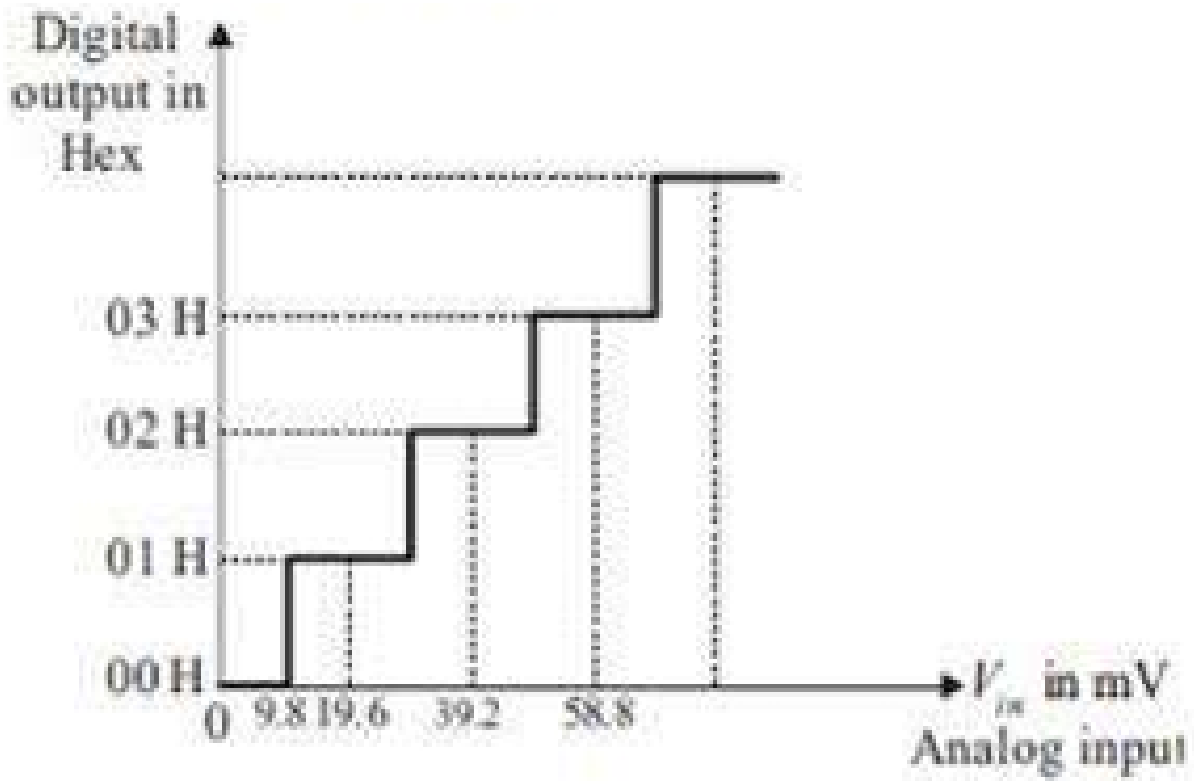
(B) 54.4 Hz

(C) 64.4 Hz

(D) 644 Hz

---

36. An 8-bit ADC converts analog voltage in the range of 0 to +5 V to the corresponding digital code as per the conversion characteristics shown in the figure. For V_{in} = 1.9922 volt, which of the following digital output, given in hex, is true?



(A) 64 H

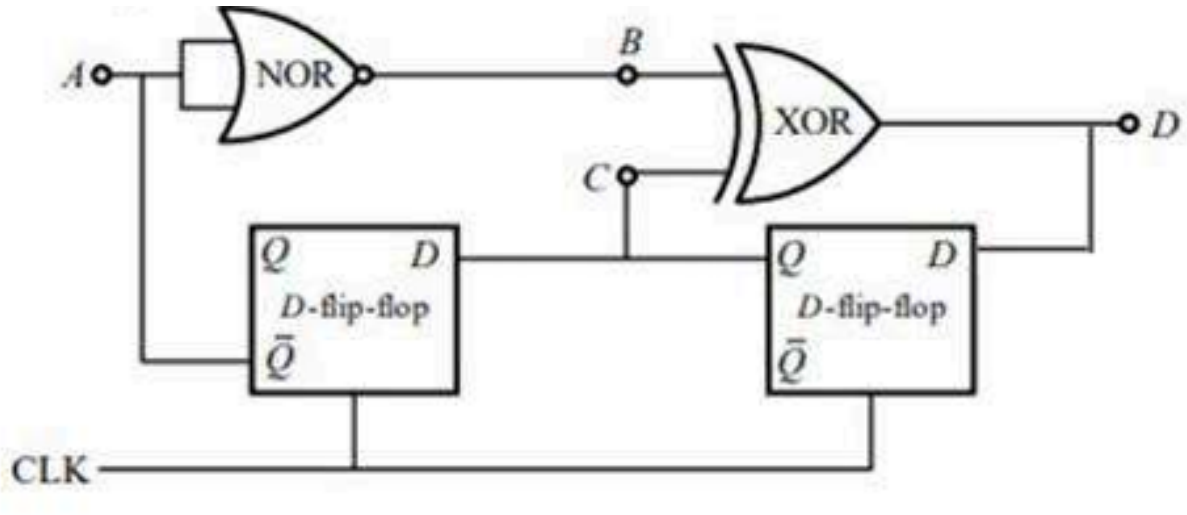
(B) 65 H

(C) 66 H

(D) 67 H

---

37. Neglecting the delays due to the logic gates in the circuit shown in the figure, the decimal equivalent of the binary sequence [ABCD] of initial logic states, which will not change with the clock, is



(A) 4

(B) 6

(C) 8

(D) 10

---

38. A MOD 2 and a MOD 5 up-counter when cascaded together results in a MOD _____ counter.

(A) 3

(B) 7

(C) 10

(D) 20

---

39. The maximum clock frequency in MHz of a 4-stage ripple counter, utilizing flip-flops, with each flip-flop having a propagation delay of 20 ns, is

(A) 12

(B) 12.5

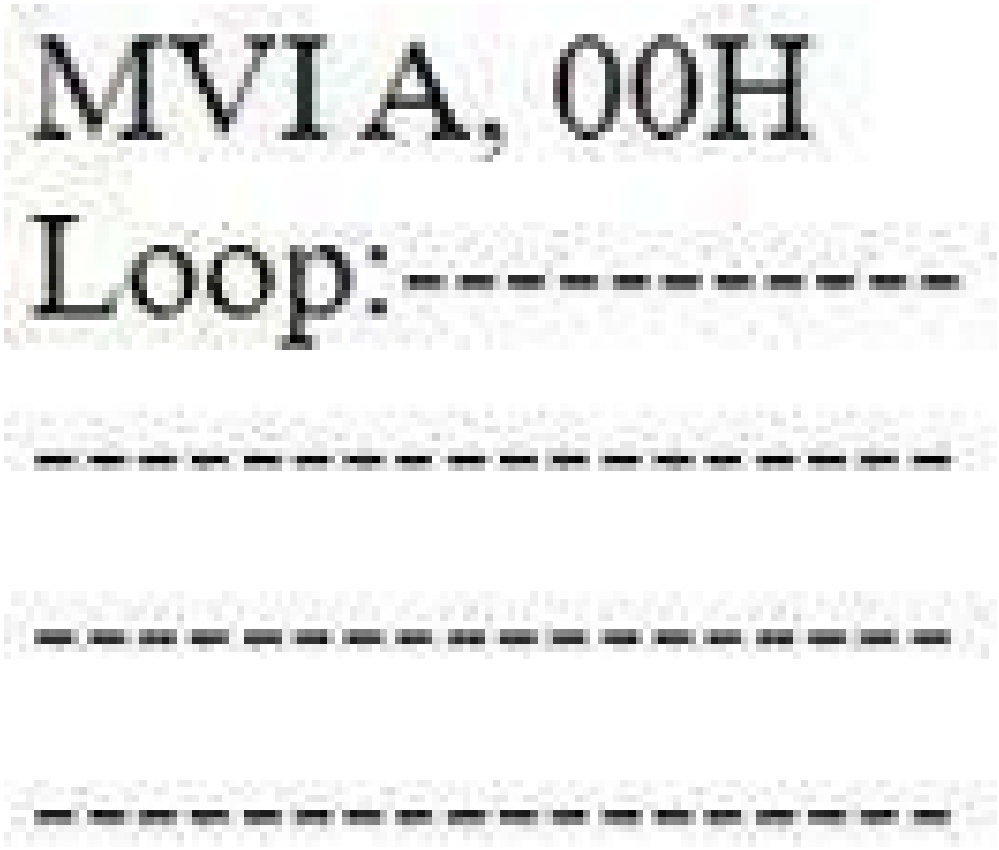
(C) 13

(D) 13.5

---

40. It is desired to multiply the numbers 0AH by 0BH and store the result in the accumulator. The numbers are available in registers B and C, respectively. A part of

the 8085 program for this purpose is given below: MVI A, 00H; Loop:—; —; —; —. The sequence of remaining 4 instructions to complete the program would be



(A) A, B, C, D

(B) A, C, B, D

(C) B, A, C, D

(D) C, B, D, A

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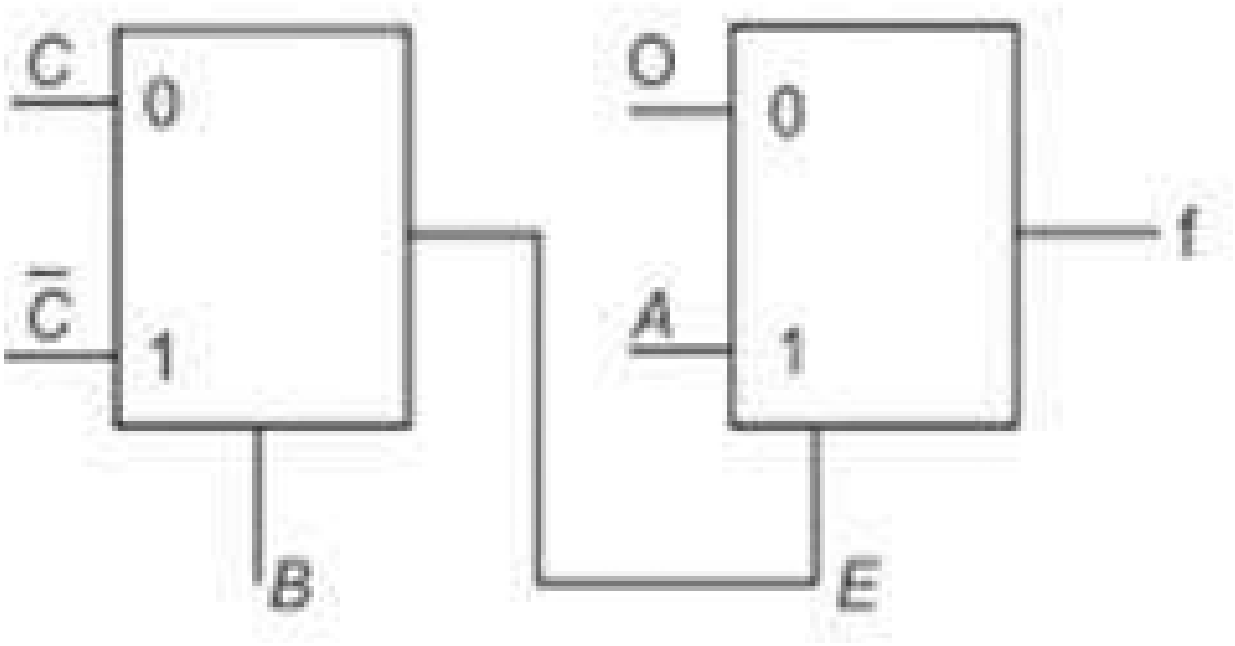
41. The Boolean function f implemented in the figure using two input multiplexers is



(A) $\overline{A}B\overline{C} + AB\overline{C}$

(B) $AB\overline{C} + A\overline{BC}$

(C) $\overline{A}B\overline{C} + \overline{ABC}$

(D) $ABC + \overline{A}BC$

---

42. In the root locus plot, the breakaway points A. Need not always be on the real axis alone. B. Must lie on the root loci. C. Must lie between 0 and -1. Choose the correct answer from the options given below:

(A) A, B and C only

(B) A and B only

(C) A and C only

(D) B and C only

---

43. The value of the steady state error for first order system, $\frac{1}{sT+1}$ with Unit Ramp Function will be

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

(B) T

(C) $\frac{1}{T}e^{\frac{-t}{T}}$

(D) $T(1-e^{\frac{-t}{T}})$

---

44. Which one of the following statements regarding the effect of the phase lead network is not correct?

(A) The velocity constant is usually increased.

(B) The slope of the magnitude curve is reduced at the gain crossover frequency, as a result relative stability improves.

(C) Phase margin increased.

(D) The bandwidth decreased.

---

45. Bounded-input bounded-output stability implies asymptotic stability for A. Completely controllable system B. Completely observable system C. Uncontrollable system D. Unobservable system Which of the above statements is/are correct? Choose the correct answer from the options given below:

(A) A and D only

(B) A and B only

(C) B and C only

(D) C and D only

---

46. A second order control system has a damping ratio $\zeta = 0.8$ and the natural frequency of oscillation $\omega_n = 12$ rad/sec. Determine the damped frequency of oscillation.

(A) 12 rad/sec.

(B) 15 rad/sec.

(C) 9.6 rad/sec.

(D) 7.2 rad/sec.

---

47. Choose the correct statements from the following A. The lag-compensation has a pole nearer to the origin. B. The lag-compensation has a zero nearer to the origin. C.

The lag-compensator decreases the bandwidth. D. The lag-compensator increases the bandwidth.

(A) A and D

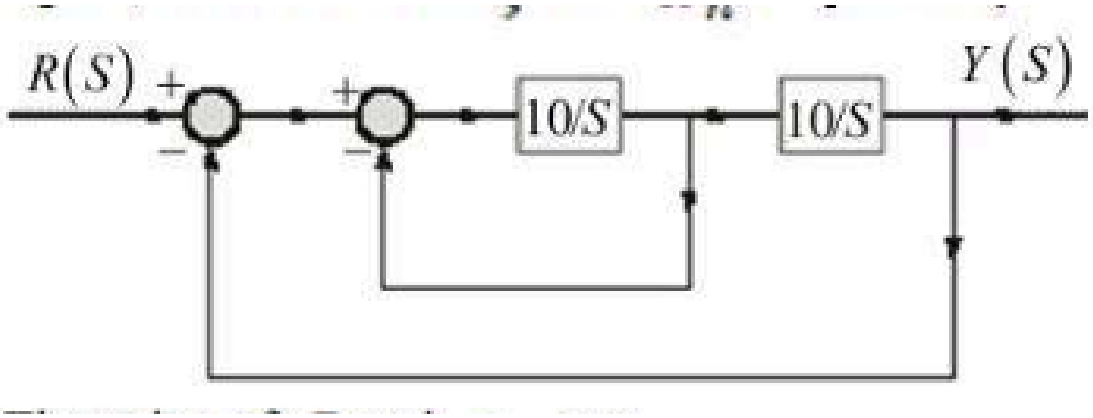
(B) A and C

(C) B and D

(D) B and C

---

48. The damping ratio and undamped natural frequency of a closed loop system as shown in the figure, are denoted as ζ and ω_n respectively. The value of ζ and ω_n are: (A) $\zeta = 0.5$ (B) $\zeta = 0.707$ (C) $\omega_n = 10$ rad/s (D) $\omega_n = 100$ rad/s Choose the correct answer from the options given below:



(A) A and C

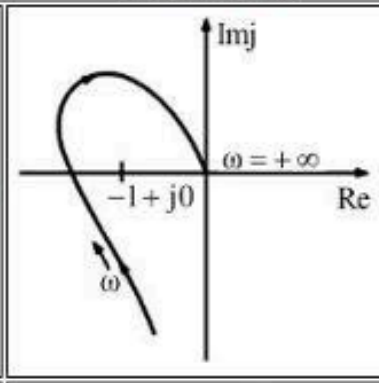
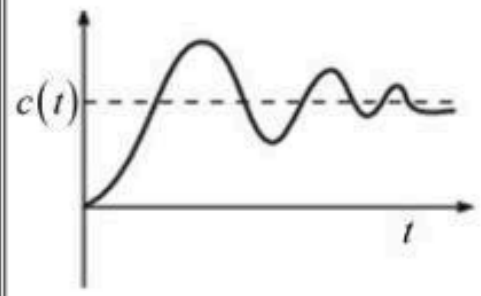
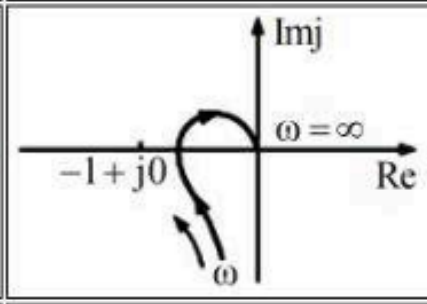
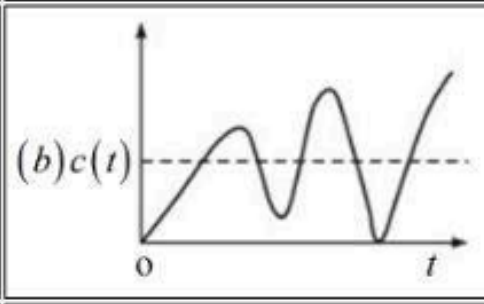
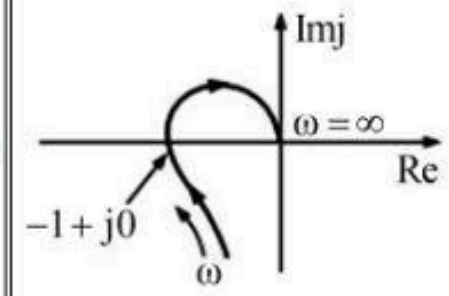
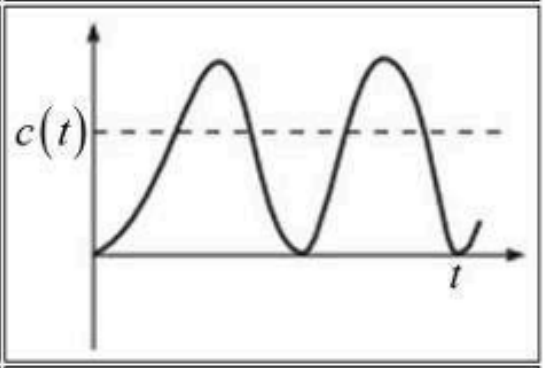
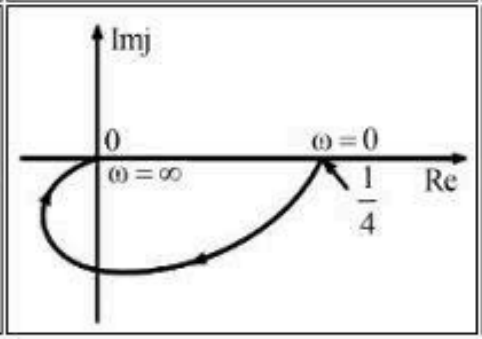
(B) A and D

(C) B and D

(D) B and C

---

49. The Nyquist plot and step response/transfer function is given. Match List-I (Nyquist plot) with List-II (corresponding step response/transfer function).

LIST-I (Nyquist plot)		LIST-II (Step response/Transfer function)	
(A)		(I)	
(B)		(II)	
(C)		(III)	
(D)		(IV)	$\frac{1}{(S+2)^2}$

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

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

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

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

50. In binary data transmission, DPSK is preferred over PSK because

(A) more protection is provided against impulse noise

(B) for a given energy per bit, the probability of error is less

(C) the 180° phase shifts of the carrier are unimportant

(D) a coherent carrier is not required to be generated at the receiver

---

51. Coherent demodulation of FSK signal can be detected using

(A) discriminator detection

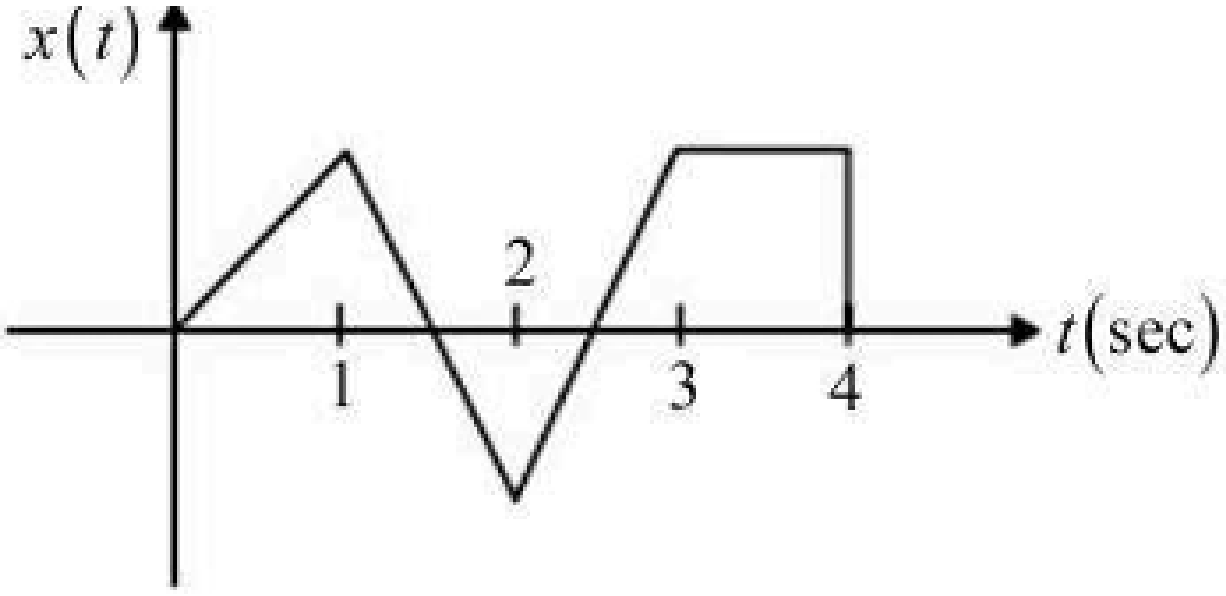
(B) bandpass filter and envelope detectors

(C) matched filter

(D) correlation receiver

---

52. Consider the signal x(t) shown in the figure. Let h(t) denote the impulse response of the filter matched to x(t), with h(t) being non-zero only in the interval 0 to 4 sec. The slope of h(t) in the interval 3 greater than t greater than 4 sec is



(A) 0.5 sec^{-1}

(B) -0.5 sec^{-1}

(C) 1 sec^{-1}

(D) -1 sec^{-1}

53. A baseband PCM system with a matched filter at the receiver is implemented with ± 5 V bipolar with a pulse duration of 72μ sec. If the noise PSD is $1.0 \times 10^{-4} V^2/Hz$, the probability of error in this system is given by

(A) 1.15×10^{-5}

(B) 1.85×10^{-5}

(C) 2.8×10^{-5}

(D) 2.36×10^{-5}

---

54. Match List-I (modulation/generation techniques) with List-II (disadvantages/generated signal) and select the correct answer from the given codes:

LIST-I	LIST-II
A. Ring Modulato	I Granular noise
B. Pulse Code Modulation (PCM)	(II) Threshold effect.
C. Delta Modulation (DM)	III) DSB-SC (Double-Sideband Suppressed-Carrier)
D. Frequency Modulation (FM)	(IV) Quantization noise

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

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

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

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

---

55. A 10 kW carrier is sinusoidally modulated by two carriers corresponding to a modulation index of 30% and 40%, respectively. The total radiated power is

(A) 11.25 kW

(B) 12.50 kW

(C) 15 kW

(D) 17 kW

---

56. The subsystems in an FM receiver are A. Mixer B. RF amplifier C. Limiter D. IF amplifier Choose the correct sequence of subsystems in an FM receiver from the options given below:

(A) A, B, C, D

(B) A, C, B, D

(C) B, A, D, C

(D) C, B, D, A

---

57. The image channel rejection in a superheterodyne receiver comes from

(A) detector and RF stages only

(B) detector, RF and IF stages

(C) IF stages only

(D) RF stages only

---

58. X is a continuous random variable with probability density function given by $f(x) = \{kx$ **for** $0 \leq x < 2; 2k$ **for** $2 \leq x < 4; -kx + 6k$ **for** $4 \leq x < 6\}$**. The value of k will be**

(A) 2/3

(B) 1

(C) 8

(D) 1/8

---

59. An image uses 512×512 **picture elements. Each of the picture elements can take any of the 8 distinguishable intensity levels. The maximum entropy associated with one image pixel will be**

(A) 3

(B) 8

(C) 512

(D) 786432

---

60. Theorem/law and its corresponding specified quality are given in the table below. Match List-I with List-II

LIST-I	LIST-II
A. Shannon Source Theorem	(I) Channel capacity
B. Dimensionality Theorem	(II) Storage space of a signal.
C. Wiener-Kintchine Theorem	(III) Power spectral
D. Shannon-Hartley Law	(IV) Optimum code length

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

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

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

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

---

61. Consider the following codes: A. Hamming Code, B. Huffman Code, C. Shannon-Fano Code, D. Convolution Code. Which of these are source codes?

(A) A, B and D only

(B) B and C only

(C) A and D only

(D) B, C and D only

---

62. A dipole antenna, with some excitation in free space was radiating a certain amount of power. If this antenna is immersed in a lake where water is non-magnetic and non-dissipative but has a dielectric constant of 81, the radiated power with the same excitation will

(A) decrease to finite non-zero value

(B) remain the same

(C) increase

(D) decrease to zero

---

63. Solution of Laplace's equation, which are continuous through the second derivative, are called

(A) Bessel functions

(B) Odd functions

(C) Harmonic functions

(D) Fundamental functions

---

64. A rectangular waveguide 2.29 cm $\times$ 1.02 cm operates at a frequency of 11 GHz and a cut-off frequency of 6.55 GHz in TE10 mode. If the maximum potential gradient of the signal is 5 kV/cm, then the maximum power handling capacity of the waveguide will be

(A) 31.11 mW

(B) 31.11 W

(C) 31.11 kW

(D) 3.111 mW

---

65. The law/Theory and equations are given in the table below. Match List-I with List-II

LIST-I (Law/Theory)		**LIST-II (Equation)**	
(A)	Continuity equation	(I)	$\nabla \times \vec{j} = -\frac{\partial \overrightarrow{\rho_v}}{\partial t}$
(B)	Ampere's law	(II)	$\nabla \times \vec{H} = \vec{j} + \frac{\partial \vec{D}}{\partial t}$
(C)	Displacement current	(III)	$\vec{j} = \frac{\partial \vec{D}}{\partial t}$
(D)	Faraday's law	(IV)	$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$

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

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

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

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

---

66. A plane wave whose electric field is given by $\vec{E} = 100\cos(\omega t - 6\pi x)\hat{z}$ passes normally from a material 'A' having $\epsilon_r = 4, \mu_r = 1$ and $\sigma = 0$ to a material 'B' having $\epsilon_r = 9, \mu_r = 4$ and $\sigma = 0$. The values of some of its parameters are given below:

A. 6π**,**

B. 80π**,**

C. $1/7$**,**

D. $8/7$**.**

Choose the correct sequence: intrinsic impedance of medium B, Reflection coefficient, Transmission Coefficient and Phase shift constant of medium B, respectively, from the options given below:

(A) A, C, D, B

(B) A, C, B, D

(C) B, A, D, C

(D) C, B, D, A

---

67. In an impedance Smith chart, a clockwise movement along a constant resistance circle gives rise to

(A) a decrease in the value of reactance

(B) an increase in the value of reactance

(C) no change in the reactance value

(D) no change in the impedance value

---

68. The input impedance of a $\frac{\lambda}{8}$ section of a lossless transmission line of the characteristic impedance 50Ω is found to be real when the other end is terminated by a load $Z_L = (R + jX)\Omega$. If X is 30Ω the value of R (in Ω) is

(A) 40Ω

(B) 50Ω

(C) 80Ω

(D) 100Ω

69. Consider an air filled rectangular waveguide with dimensions a = 2.286 cm and b = 1.016 cm. The increasing order of the cut-off frequencies for different modes is:

A. TE_{10},

B. TE_{01},

C. TE_{20},

D. TE_{11}.

Choose the correct answer from the options given below:

(A) A, B, C, D

(B) A, C, B, D

(C) B, A, D, C

(D) C, B, D, A

---

70. IoT Communication Protocols and their architecture name are given in the following table. Match List-I (Protocol Name) with List-II (Architecture).

LIST-I (Protocol Name)		LIST-II (Architecture)	
A.	AMPQ	I.	Bus
B.	CoAP	II.	Client server
C.	DDS	III.	P2P
D.	XMPP	IV.	Tree

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

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

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

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

---

71. _____ is a language for creating Web pages.

(A) HTML

(B) C++

(C) C Shell

(D) Perl

---

72. The commonly used operating systems for IoT devices are

A. Contiki

B. TinyOS

C. Linux

D. Nano-RK

Choose the correct answer from the options given below:

(A) A, B and D only

(B) A, B and C only

(C) A, B, C and D

(D) B, C and D only

---

73. Communication Protocols that are currently used in IoT are:

A. HTTP/Rest,

B. IPv6,

C. TCP,

D. MAC.

The Communication Protocols used at each layer of IoT Network Stack: Application Layer, Transport Layer, Network Layer, Link Layer, respectively, in a sequence are

(A) A, B, C, D

(B) A, C, B, D

(C) B, A, D, C

(D) C, B, D, A

---

74. Which application allows a user to access and change remote files without actual transfer over a complete network?

(A) TELNET

(B) NFS

(C) FTP

(D) DNS

---

75. Consider the following statements on TCP/IP

A. At the physical and data link layers, TCP/IP does not define any specific protocol.

B. At the internetwork layer, TCP/IP supports the Internetworking Protocol.

C. At the transport layer, TCP/IP defines five protocols.

Choose the correct answer from the options given below:

(A) A only

(B) A and C only

(C) A and B only

(D) A, B and C
