GENERAL APTITUDE

Q. No. 1 - 5 Carry One Mark Each

1. The ninth and the tenth of this month are Monday and Tuesday ___________.

(A) figuratively (B) retrospectively (C) respectively (D) rightfully

Answer: (C)

---

2. 500 students are taking one or more courses out of Chemistry, Physics, and Mathematics. Registration records indicate course enrolment as follows: Chemistry (329). Physics (186). Mathematics (295). Chemistry and Physics (83), Chemistry and Mathematics (217), and Physics and Mathematics (63). How many students are taking all 3 subjects?

(A) 37 (B) 43 (C) 47 (D) 53

Answer: (D)

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3. It is _________ to read this year's textbook __________ the last year's.

(A) easier, than (B) most easy, than

(C) easier, from (D) easiest, from

Answer: (A)

---

4. Fatima starts from point P, goes North for 3 km, and then East for 4km to reach point Q. She then turns to face point P and goes 15km in that direction. She then goes North for 6km. How far is she from point P, and in which direction should she go to reach point P?

(A) 8km, East (B) 12 km, North (C) 6km, East (D) 10km, North

Answer: (A)

5. A rule states that in order to drink beer one must be over 18 years old. In a bar, there are 4 people. P is 16 years old, Q is 25 years old, R is drinking milkshake and S is drinking beer. What must be checked to ensure that the rule is being followed?

(A) Only P's drink (B) Only P's drink and S's age

(C) Only S's age (D) Only P's drink, Q's drink and S's age

Answer: (B)

Q. No. 6- 10 Carry Two Marks Each

6. Each of P, Q, R, S, W, X, Y and Z has been married at most once. X and Y are married and have two children P and Q. Z is the grandfather of the daughter S of P. Z and W are married and are parents of R. Which one of the following must necessarily be FALSE?

(A) X is the mother-in-law of R (B) P and R are not married to each other

(C) P is a son of X and Y (D) Q cannot be married to R

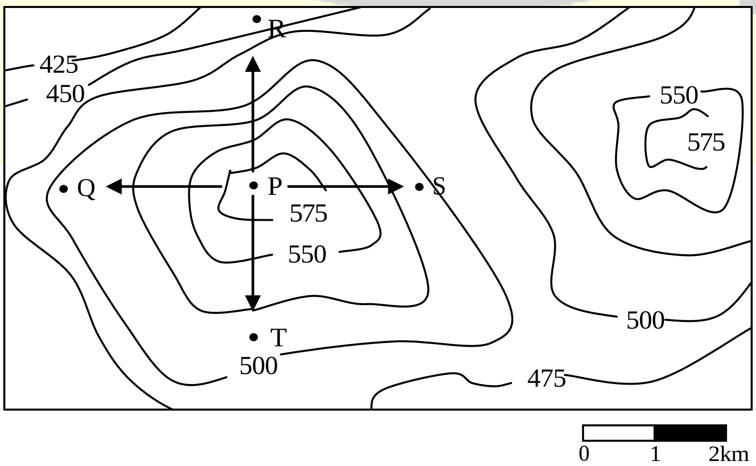
Answer: (D)

7. The number of 3-digit numbers such that the digit 1 is never to the immediate right of 2 is

(A) 781 (B) 791 (C) 881 (D) 891

Answer: (C)

8. A contour line joins locations having the same height above the mean sea level. The following is a contour plot of a geographical region. Contour lines are shown at 25m intervals in this plot.



Which of the following is the steepest path leaving from P?

(A) P to Q (B) P to R (C) P to S (D) P to T

Answer: (B)

---

9. 1200 men and 500 women can build a bridge in 2weeks. 900men and 250 women will take 3 weeks to build the same bridge. How many men will be needed to build the bridge in one week?

(A) 3000 (B) 3300 (C) 3600 (D) 3900

Answer: (C)

---

10. "If you are looking for a history of India, or for an account of the rise and fall of the British Raj, or for the reason of the cleaving of the subcontinent into two mutually antagonistic parts and the effects this mutilation will have in the respective section, and ultimately on Asia, you will not find it in these pages; for though I have spent a lifetime in the country, I lived too near the seat of events, and was too intimately associated with the actors, to get the perspective needed for the impartial recording of these matters."

Which of the following statements best reflects the author's opinion?

(A) An intimate association does not allow for the necessary perspective.

(B) Matters are recorded with an impartial perspective.

(C) An intimate association offers an impartial perspective.

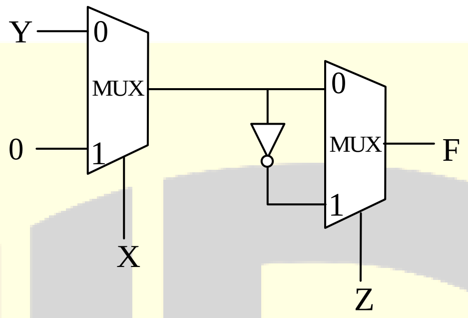
(D) Actors are typically associated with the impartial recording of matters.

Answer: (A)

ELECTRONICS AND COMMUNICATION ENGINEERING

Q. No. 1 – 25 Carry One Mark Each

1. Consider the circuit shown in the figure.



The Boolean expression F implemented by the circuit is

(A) $\overline{X}\,\overline{Y}\,\overline{Z}+XY+\overline{Y}Z$

(B) $\overline{X}Y\overline{Z}+XZ+\overline{Y}Z$

(C) $\overline{X}Y\overline{Z}+XY+\overline{Y}Z$

(D) $\overline{X}\,\overline{Y}\,\overline{Z}+XY+\overline{Y}Z$

Answer: (B)

---

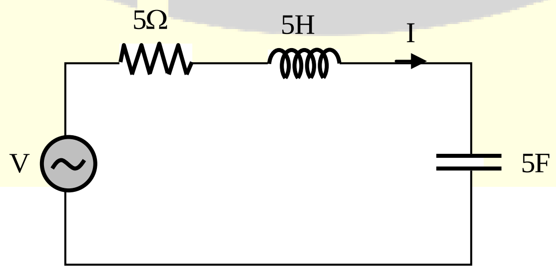
2. An LTI system with unit sample response $h[n]=5\delta[n]-7\delta[n-1]+7\delta[n-3]-5\delta[n-4]$ is a

(A) Low – pass filter (B) high – pass filter (C) band – pass filter (D) band – stop filter

Answer: (C)

---

3. In the circuit shown, V is a sinusoidal voltage source. The current I is in phase with voltage V.



The ratio $\dfrac{\text{amplitude of voltage across the capacitor}}{\text{amplitude of voltage across the resistor}}$ is __________.

Answer: (0.2) Click here to watch video explanation

4. In a DRAM,

(A) periodic refreshing is not required

(B) information is stored in a capacitor

(C) information is stored in a latch

(D) both read and write operations can be performed simultaneously

Answer: (B)

---

5. Consider an n-channel MOSFET having width W, length L, electron mobility in the channel μ_n and oxide capacitance per unit area C_{ox}. If gate-to-source voltage V_{GS}=0.7V, drain-to-source voltage V_{DS}=0.1V, $(\mu_n C_{ox}) = 100\mu A / V^2$, threshold voltage V_{TH}=0.3 V and (W/L) =50, then the transconductance g_m (in mA/V) is ___________.

Answer: (0.5) Click here to watch video explanation

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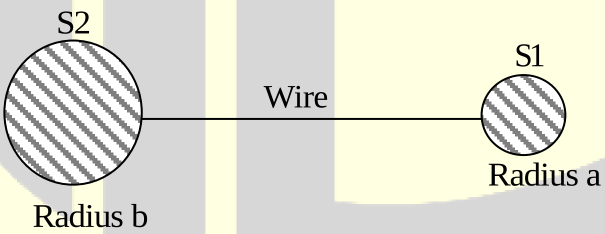
6. Two conducting spheres S1 and S2 of radii a and b (b>a) respectively, are placed far apart and connected by a long, thin conducting wire, as shown in the figure.



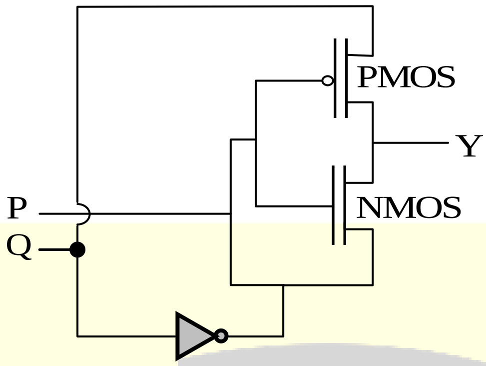
For some charge placed on this structure, the potential and surface electric field on S1 are V_a and E_a, and that on S2 are V_b and E_b, respectively, which of the following is CORRECT?

(A) $V_a = V_b$ and $E_a < E_b$ (B) $V_a > V_b$ and $E_a > E_b$

(C) $V_a = V_b$ and $E_a > E_b$ (D) $V_a > V_b$ and $E_a = E_b$

Answer: (C) Click here to watch video explanation

7. For the circuit shown in the figure, P and Q are the inputs and Y is the output.



The logic implemented by the circuit is

(A) XNOR (B) XOR (C) NOR (D) OR

Answer: (*)

---

8. An n-channel enhancement mode MOSFET is biased at $V_{GS} > V_{TH}$ and $V_{DS} > (V_{GS} - V_{TH})$, where V_{GS} is the gate-to-source voltage, V_{DS} is the drain-to-source voltage and V_{TH} is the threshold voltage. Considering channel length modulation effect to be significant, the MOSFET behaves as a

(A) voltage source with zero output impedance

(B) voltage source with non-zero output impedance

(C) current source with finite output impedance

(D) current source with infinite output impedance

Answer: (C) Click here to watch video explanation

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9. A connection is made consisting of resistance A in series with a parallel combination of resistances B and C. Three resistors of value $10\Omega, 5\Omega, 2\Omega$ are provided. Consider all possible permutations of the given resistors into the positions A,B,C, and identify the configurations with maximum possible overall resistance, and also the ones with minimum possible overall resistance. The ratio of maximum to minimum values of the resistances (up to second decimal place) is ____________.

Answer: (2.14) Click here to watch video explanation

10. Annpn bipolar junction transistor (BJT) is operating in the active region. If the reverse bias across the base – collector junction is increased, then

(A) the effective base width increases and common – emitter current gain increases

(B) the effective base width increases and common – emitter current gain decreases

(C) the effective base width decreases and common – emitter current gain increases

(D) the effective base width decreases and common – emitter current gain decreases

Answer: (C) Click here to watch video explanation

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11. Consider the state space realization

$$\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & -9 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 45 \end{bmatrix} u(t), \text{ with the initial condition } \begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix},$$

where u(t) denotes the unit step function. The value of $\lim_{t\to\infty} \left| \sqrt{x_1^2(t) + x_2^2(t)} \right|$ is _______.

Answer: (5)

---

12. The rank of the matrix $\begin{bmatrix} 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 \\ 0 & 1 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & -1 \end{bmatrix}$ is ___________.

Answer: (4) Click here to watch video explanation

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13. A two – wire transmission line terminates in a television set. The VSWR measured on the line is 5.8. The percentage of power that is reflected from the television set is ___________.

Answer: (49.82) Click here to watch video explanation

14. The input x(t) and the output y (t) of a continuous-time system are related as $y(t)=\int_{t-T}^{t}x(u)du$. The system is

(A) Linear and time-variant (B) Linear and time-invariant

(C) Non-linear and time-variant (D) Non-linear and time-invariant

Answer: (D)

15. Which of the following statements is incorrect?

(A) Lead compensator is used to reduce the settling time.

(B) Lag compensator is used to reduce the steady state error.

(C) Lead compensator may increase the order of a system.

(D) Lag compensator always stabilizes an unstable system.

Answer: (D)

16. The residues of a function

$f(z)=\frac{1}{(z-4)(z+1)^3}$ are

(A) $\frac{-1}{27}$ and $\frac{-1}{125}$ (B) $\frac{1}{125}$ and $\frac{-1}{125}$

(C) $\frac{-1}{27}$ and $\frac{1}{5}$ (D) $\frac{1}{125}$ and $\frac{-1}{5}$

Answer: (B) Click here to watch video explanation

17. A sinusoidal message signal is converted to a PCM signal using a uniform quantizer. The required signal-to-quantization noise ratio (SQNR) at the output of the quantizer is 40dB. The minimum number of bits per sample needed to achieve the desired SQNR is ______.

Answer: (7) Click here to watch video explanation

18. The general solution of the differential equation $\frac{d^2y}{dx^2}+2\frac{dy}{dx}-5y=0$ in terms of arbitrary constants K_1 and K_2 is

(A) $K_1e^{(-1+\sqrt{6})x}+K_2e^{(-1-\sqrt{6})x}$

(B) $K_1e^{(-1+\sqrt{8})x}+K_2e^{(-1-\sqrt{8})x}$

(C) $K_1e^{(-2+\sqrt{6})x}+K_2e^{(-2-\sqrt{6})x}$

(D) $K_1e^{(-2+\sqrt{8})x}+K_2e^{(-2-\sqrt{8})x}$

Answer: (A) Click here to watch video explanation

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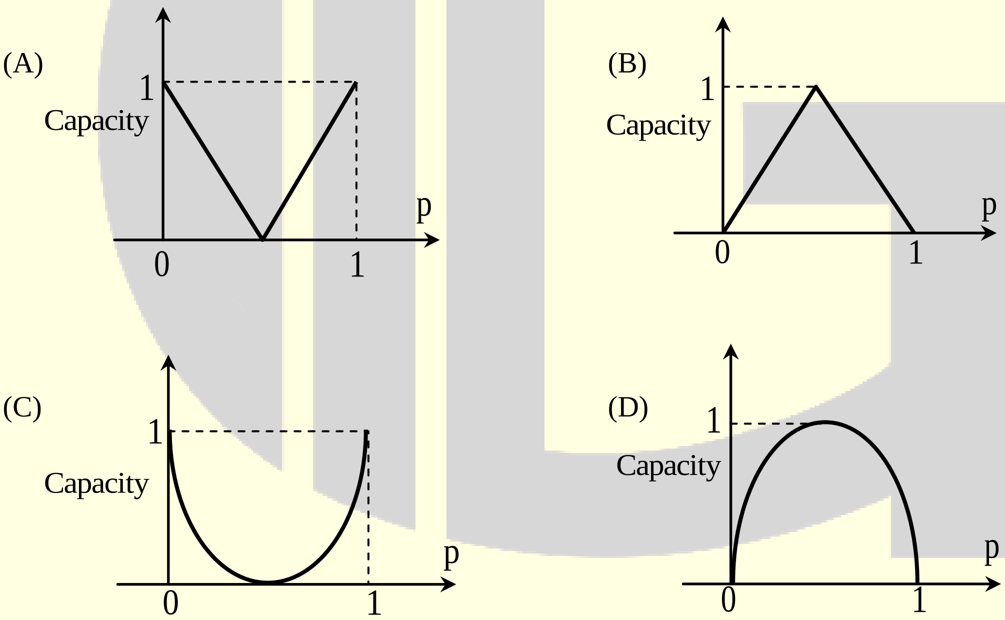
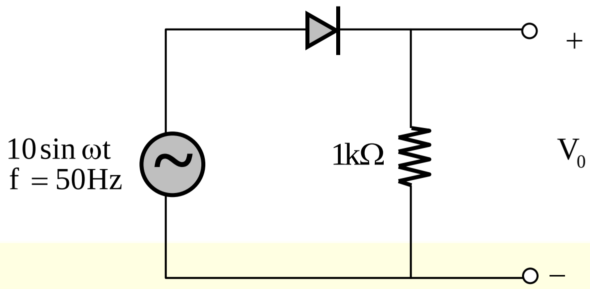
19. Which one of the following graphs shows the Shannon capacity (channel capacity) in bits of a memory less binary symmetric channel with crossover probability P?



Answer: (C) Click here to watch video explanation

20. The output V_o of the diode circuit shown in the figure is connected to an averaging DC voltmeter.



The reading on the DC voltmeter in Volts, neglecting the voltage drop across the diode, is ________.

Answer: (3.1847) Click here to watch video explanation

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21. Consider the random process $X(t) = U + Vt$, where U is a zero-mean Gaussian random variable and V is a random variable uniformly distributed between 0 and 2. Assume that U and V are statistically independent. The mean value of the random process at t = 2 is ____________

Answer: (2)

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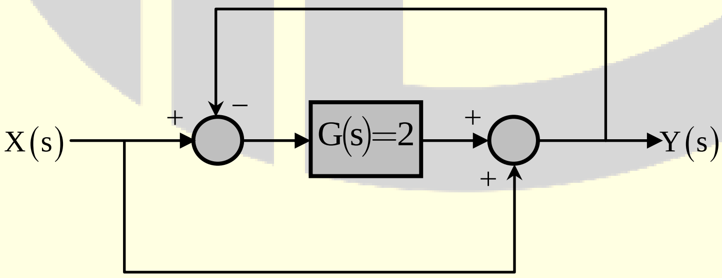
22. For the system shown in the figure,



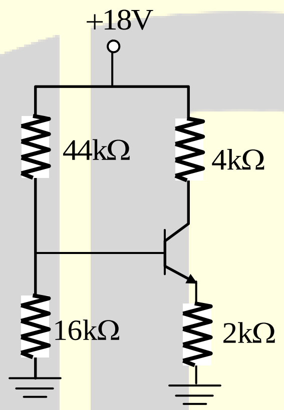
$\frac{Y(s)}{X(s)} =$ _________.

Answer: (1)

23. The smaller angle (in degrees) between the planes x + y + z =1 and 2x – y + 2z = 0 is ________.

Answer: (54.73) Click here to watch video explanation

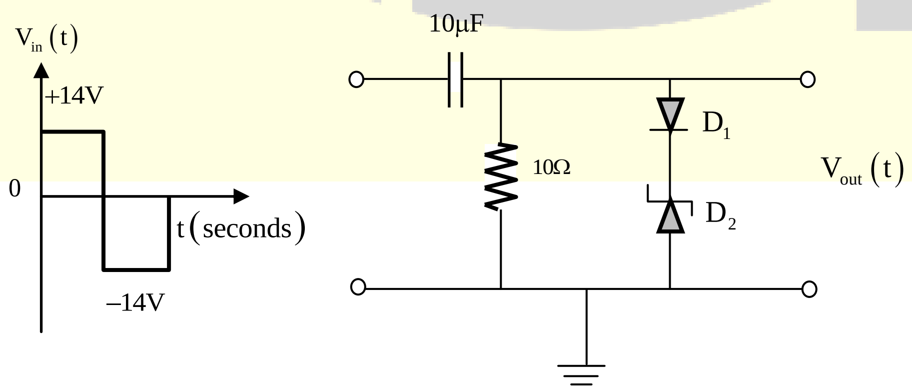
24. Consider the circuit shown in the figure. Assume base-to- emitter voltage V_{BE}=0.8 V and common base current gain (α) of the transistor is unity.



The value of the collector- to – emitter voltage V_{CE} (in volt) is _______.

Answer: (6) Click here to watch video explanation

25. In the figure, D_1 is a real silicon pn junction diode with a drop of 0.7V under forward bias condition and D_2 is a zener diode with breakdown voltage of -6.8V.



The input $V_{in}(t)$ is a periodic square wave of period T, whose one period is shown in the figure. Assuming $10\tau >> T$ where is the time constant of the circuit, the maximum and minimum values of the output waveform are respectively,

(A) 7.5 V and –20.5V (B) 6.1 V and –21.9V

(C) 7.5 V and –21.2 V (D) 6.1 V and –22.6 V

Answer: (A) Click here to watch video explanation

Q. No. 26 to 55 Carry Two Marks Each

26. If the vector function

$$\vec{F} = \widehat{a_x}(3y - k_1 z) + \widehat{a_y}(k_2 x - 2z) - \widehat{a_z}(k_3 y + z)$$

is irrotational, then the values of the constants k_1, k_2 and k_3' respectively, are

(A) 0.3, –2.5, 0.5 (B) 0.0, 3.0, 2.0

(C) 0.3, 0.33, 0.5 (D) 4.0, 3.0, 2.0

Answer: (B) Click here to watch video explanation

27. The un-modulated carrier power in an AM transmitter is 5kW. This carrier is modulated by a sinusoidal modulating signal. The maximum percentage of modulation is 50%. If it is reduced to 40%, then the maximum un-modulated carrier power (in kW) that can be used without overloading the transmitter is ___.

Answer: (5.21) Click here to watch video explanation

28. Consider an LTI system with magnitude response

$$|H(f)| = \begin{cases} 1 - \frac{|f|}{20}, & |f| \le 20 \\ 0, & |f| > 20 \end{cases}$$

And phase response $\text{Arg}\{H(f)\} = -2f$.

If the input to the system is

$$x(t)=8\cos\left(20\pi t+\frac{\pi}{4}\right)+16\sin\left(40\pi t+\frac{\pi}{8}\right)+24\cos\left(80\pi t+\frac{\pi}{16}\right).$$

Then the average power of the output signal y (t) is _________.

Answer: (8)

---

29. A MOS capacitor is fabricated on p-type Si (silicon) where the metal work function is 4.1 eV and electron affinity of Si is 4.0 eV. E_C-F_F=0.9 eV, where E_C and E_F are the conduction band minimum and the Fermi energy levels of Si, respectively. Oxide $\in_r=3.9, \in_0=8.85\times10^{-14}\,F/cm.$ oxide thickness t_{ox}= 0.1 μm and electronic charge $q=1.6\times10^{-19}\,C.$ If the measured flat band voltage of the capacitor is –1V, then the magnitude of the fixed charge at the oxide-semiconductor interface,in (nC/cm^2), is __________.

Answer: (6.9) Click here to watch video explanation

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30. An electron (q_1) is moving in free space with velocity 10^5 m/s towards a stationary electron (q_2) far away. The closest distance that this moving electron gets to the stationary electron before the repulsive force diverts its path is ________ $\times10^{-8}$ m.

Given: Mass of electron, $m=9.11\times10^{-31}\,kg.$

Charge of electrons $e=-1.6\times10^{-19}\,C$

and Permittivity, $\varepsilon_0=\frac{1}{36\pi}\times10^{-9}$ F/m

Answer: (5.06)

---

31. The values of the integrals

$$\int_0^1\left(\int_0^1\frac{x-y}{(x+y)^3}dy\right)dx \text{ and } \int_0^1\left(\int_0^1\frac{x-y}{(x+y)^3}dx\right)dy \text{ are}$$

(A) same and equal to 0.5

(B) same and equal to -0.5

(C) 0.5 and – 0.5, respectively

(D) – 0.5 and 0.5, respectively

Answer: (C) [Click here to watch video explanation]

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32. Passengers try repeatedly to get a seat reservation in any train running between two stations until they are successful. If there is 40% chance of getting reservation in any attempt by a passenger, then the average number of attempts that passengers need to make to get a seat reserved is _________.

Answer: (2.5) [Click here to watch video explanation]

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33. Figure I shows a 4-bits ripple carry adder realized using full adders and Figure II shows the circuit of a full-adder (FA). The propagation delay of the XOR, ANDand OR gates in Figure II are 20 ns, 15 ns and 10 ns respectively. Assume all the inputs to the 4-bit adder are initially reset to 0.

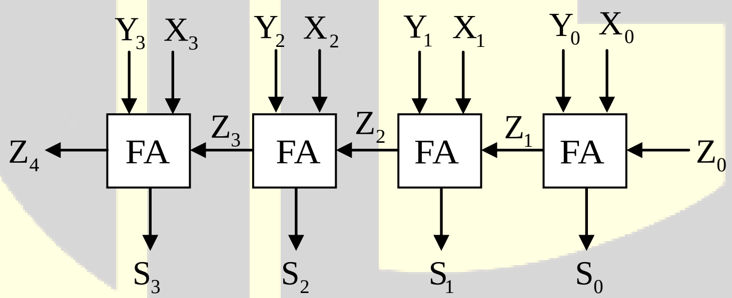


Figure – I

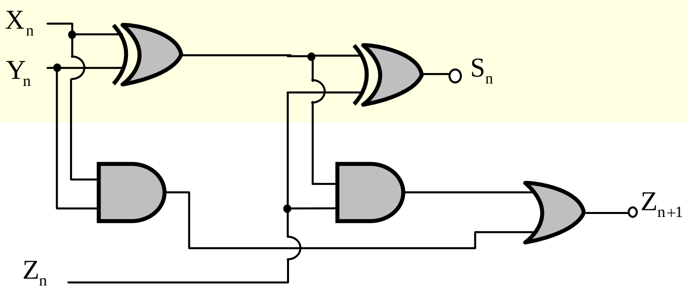


Figure – II

At t=0, the inputs to the 4-bit adder are changed to

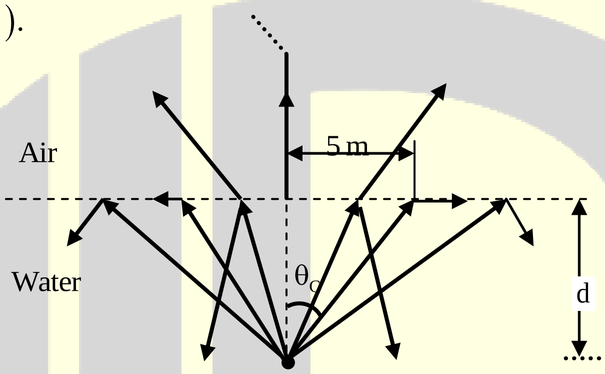
$X_3X_2X_1X_0 = 1100$, $Y_3Y_2Y_1Y_0 = 0100$ and $Z_0 = 1$.

The output of the ripple carry adder will be stable at t (in ns) = ___________.

Answer: (50)

---

34. The permittivity of water at optical frequencies is 1.75 ε_0. It is found that an isotropic light source at a distance d under water forms an illuminated circular area of radius 5 m as shown in the figure. The critical angle is (θ_C).



The value of d (in m) is _________________.

Answer: (4.33) Click here to watch video explanation

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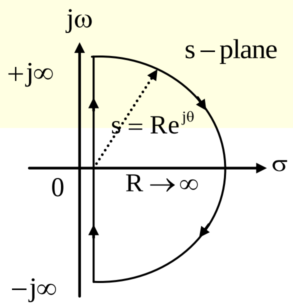
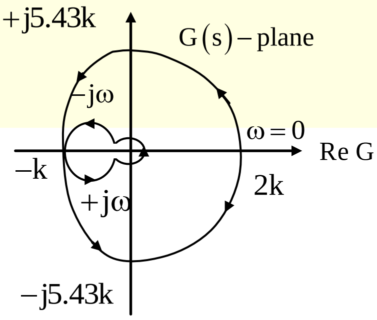
35. A unity feedback control system is characterized by the open-loop transfer function

$$G(s) = \frac{10k(s+2)}{s^2 + 3s^2 + 10}$$

The Nyquist path and the corresponding Nyquist plot of G(s) are shown in the figures below.



Nyquist path for $G(s)$



Nyquist Plot of $G(s)$

If $0 < k < 1$, then the number of poles of the closed-loop transfer function that lie in the right – half of the s-plane is

(A) 0 (B) 1 (C) 2 (D) 3

Answer: (C)

---

36. The signal $x(t) = \sin(14000\pi t)$, where t is in seconds is sampled at a rate of 9000 samples per second. The sampled signal is the input to an ideal low pass filter with frequency response H(f) as follows:

$$H(f) = \begin{cases} 1, & |f| \le 12\text{kHz} \\ 0, & |f| > 12\text{kHz}. \end{cases}$$

What is the number of sinusoids in the output and their frequencies in kHz?

(A) Number = 1, frequency = 7

(B) Number = 3, frequencies= 2,7,11

(C) Number = 2, frequencies = 2,7

(D) Number = 2, frequencies = 2,11

Answer: (B)

---

37. A unity feedback control system is characterized by the open-loop transfer function

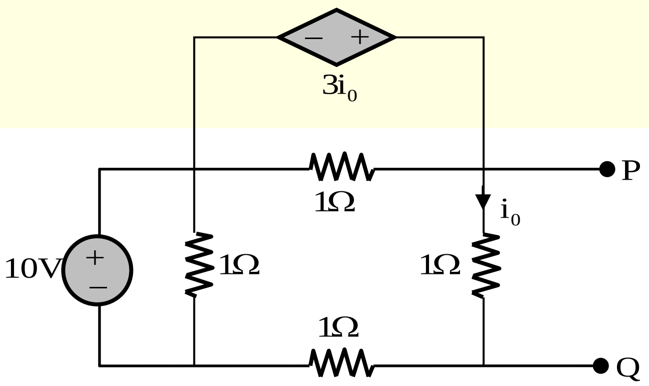
$$G(s) = \frac{2(s+1)}{s^3 + ks^2 + 2s + 1}$$

The value of k for which the system oscillates at 2 rad/s is ________.

Answer: (0.75)

---

38. Consider the circuit shown in the figure.



The Thevenin equivalent resistance (in Ω) across P – Q is _________.

Answer: (-1) Click here to watch video explanation

39. The transfer function of a causal LTI system is H(s) = 1/s. If the input to the system is x(t) = $[\sin(t)/\pi t]u(t)$, where u(t) is a unit step function, the system output y(t) as $t \to \infty$ is ______.

Answer: (0.5)

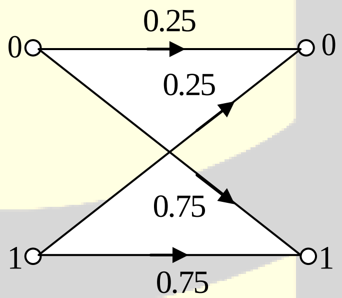
40. An integral I over a counter clock wise circle C

is given by $I = \oint_C \frac{z^2-1}{z^2+1} e^z dz$. If C is defined as |z| = 3, then the value of I is

(A) $-\pi i \sin(1)$ (B) $-2\pi i \sin(1)$ (C) $-3\pi i \sin(1)$ (D) $-4\pi i \sin(1)$

Answer: (D) Click here to watch video explanation

41. Consider a binary memory less channel characterized by the transition probability diagram shown in the figure. The channel is .



(A) Lossless

(B) Noiseless

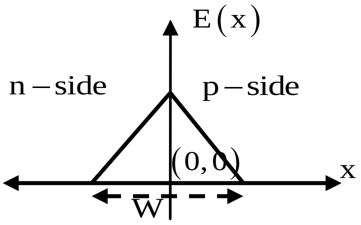
(C) Useless

(D) Deterministic

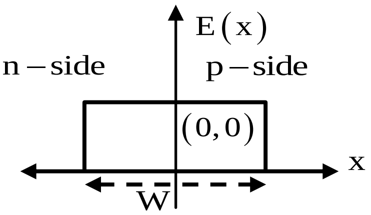
Answer: (C) Click here to watch video explanation

42. An abrupt pn junction (located at x = 0) is uniformly doped on both p and n sides. The width of the depletion region is W and the electric field variation in the x-direction is E(x). Which of the following figures represents the electric field profile near the pn junction?

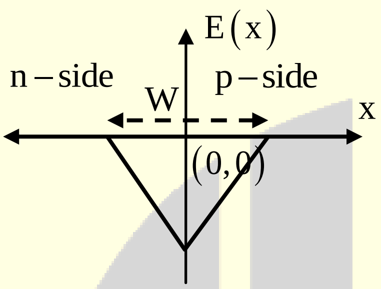
(A)



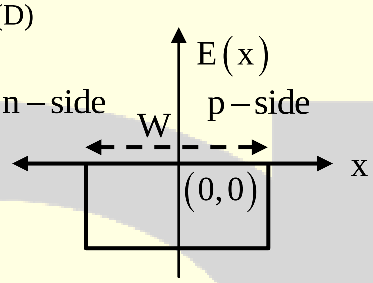
(B)



(C)



(D)



Answer: (A) Click here to watch video explanation

43. A second – order LTI system is described by the following state equations,

$$\frac{d}{dt}x_1(t) - x_2(t) = 0$$

$$\frac{d}{dt}x_2(t) + 2x_1(t) + 3x_2(t) = r(t)$$

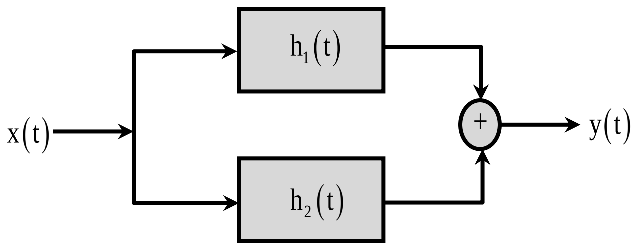
Where $x_1(t)$ and $x_2(t)$ are the two state variables and r(t) denotes the input. The output c(t) = x_1(t). The system is.

(A) Undamped (oscillatory) (B) Under damped

(C) Critically damped (D) Over damped

Answer: ((D)

44. Consider the parallel combination of two LTI systems shown in the figure.



The impulse responses of the systems are

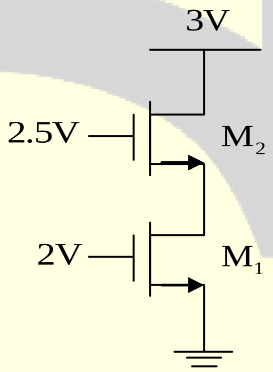
$$h_1(t) = 2\delta(t+2) - 3\delta(t+1)$$
$$h_2(t) = \delta(t-2).$$

If the input x(t) is a unit step signal, then the energy of y(t) is ____________.

Answer: **(7)**

---

45. Assuming that transistors M_1 and M_2 are identical and have a threshold voltage of 1V, the state of transistors M_1 and M_2 are respectively.



(A) Saturation, Saturation

(B) Linear, Linear

(C) Linear, Saturation

(D) Saturation, Linear

Answer: **(C)** Click here to watch video explanation

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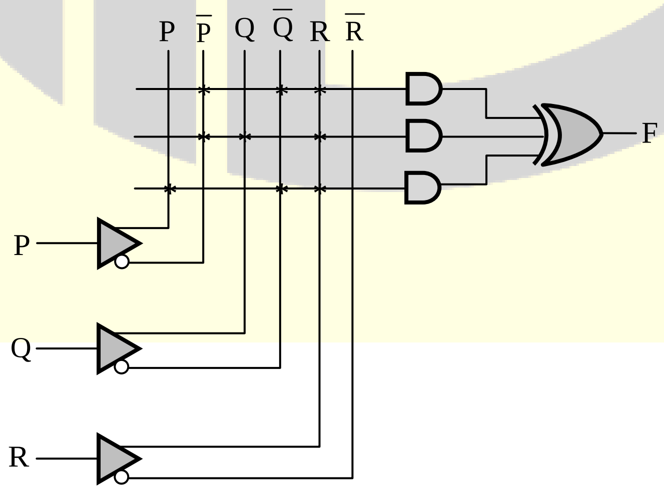
46. A programmable logic array (PLA) is shown in the figure.



The Boolean function F implemented is

(A) $\overline{P}\,\overline{Q}R + \overline{P}QR + P\overline{Q}\,\overline{R}$ (B) $\left(\overline{P}+\overline{Q}+R\right)\left(\overline{P}+Q+R\right)\left(P+\overline{Q}+\overline{R}\right)$

(C) $\overline{P}\,\overline{Q}R + \overline{P}QR + P\overline{Q}R$ (D) $\left(\overline{P}+\overline{Q}+R\right)\left(\overline{P}+Q+R\right)\left(P+\overline{Q}+R\right)$

Answer: (C)

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47. A modulating signal given By x(t) = 5 $\sin\left(4\pi 10^3 t - 10\pi\cos 2\pi 10^3 t\right)$V is fed to a phase modulator with phase deviation constant k_p=5rad/V. If the carrier frequency is 20 kHz, the instantaneous frequency (in kHz) at t = 0.5 ms is __________

Answer: (70) Click here to watch video explanation

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48. The minimum value of the function $f(x) = \frac{1}{3}x\left(x^2 - 3\right)$ in the interval $-100 \le x \le 100$ occurs at x = ________.

Answer: (–100) Click here to watch video explanation

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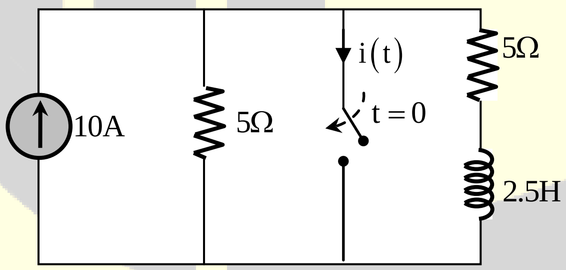
49. The switch in the circuit, shown in the figure, was open for a long time and is closed at t = 0.



The current i(t) (in ampere) at t = 0.5 seconds is ________

Answer: (8.16) Click here to watch video explanation

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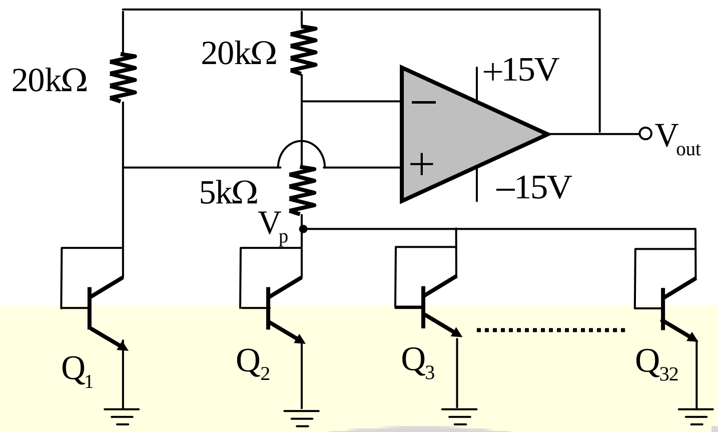
50. In the voltage reference circuit shown in the figure, the op-amp is ideal and the transistors Q_1 Q_2….., Q_{32} are identical in all respects and have infinitely large values of common emitter current the relation $I_C = I_S \exp\left(\left(V_{BE}/V_T\right)\right)$, where $I_s$is the saturation current. Assume that the voltage V_P shown in the figure is 0.7 V and the thermal voltage V_T = 26mV.



The output voltage V_{out}(in volts) is ________.

Answer: (1.1 to 1.2) [Click here to watch video explanation]

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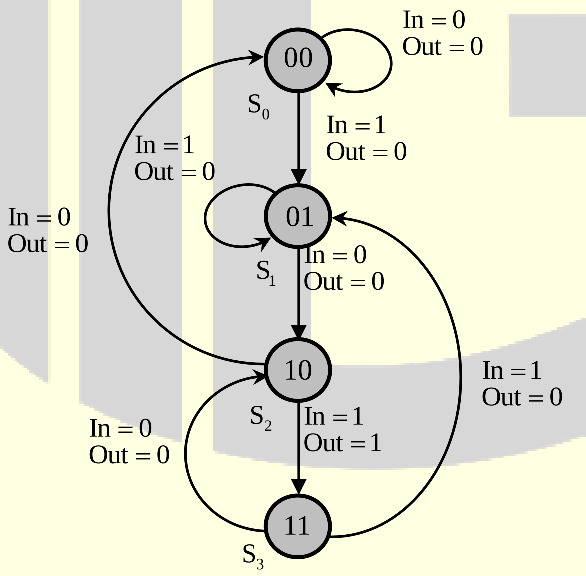
51. The state diagram of a finite state machine (FSM) designed to detect an overlapping sequence of three bits is shown in the figure. The FSM has an input 'In' and an output 'Out'. The initial state of the FSM is S_0.



If the input sequence is 10101101001101, starting with the left-most bit, then the number times 'Out' will be 1 is ___________.

Answer: (4)

52. Standard air-filled rectangular waveguides of dimensions a=2.29 cm and b=1.02 cm are designed for radar applications. It is desired that these waveguides operate only in the dominant TE_{10} mode with operating frequency at least 25% above the cutoff frequency of the TE_{10} mode but not higher than 95% of next higher cutoff frequency. The range of allowable operating frequency f is

(A) $8.19\,GHz \le f \le 13.1\,GHz$

(B) $8.19\,GHz \le f \le 12.45\,GHz$

(C) $6.55\,GHz \le f \le 13.1\,GHz$

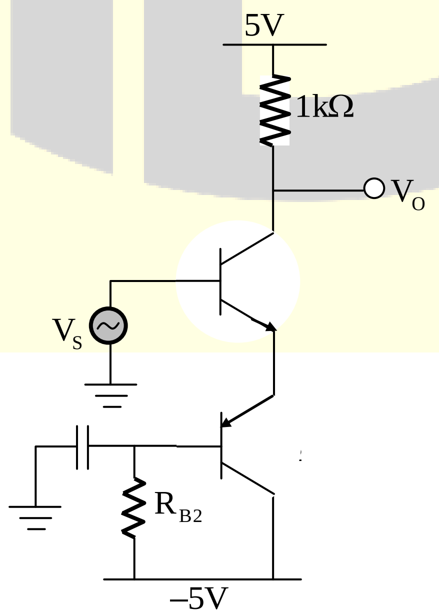
(D) $1.64\,GHz \le f \le 10.24\,GHz$

Answer: (B) Click here to watch video explanation

53. For a particular intensity of incident light on a silicon p-n junction solar cell, the photocurrent density (J_L) is 2.5 mA/cm^2 and the open-circuit voltage (V_{oc}) is 0.451 V. Consider thermal voltage (V_T) to be 25mV. If the intensity of the incident light is increased by 20 times, assuming that the temperature remains unchanged. V_{oc} (in volts) will be ___________.

Answer: (0.53) Click here to watch video explanation

54. In the circuit shown, transistors Q_1 and Q_2 are biased at a collector current of 2.6mA.



Assuming that transistor current gains are sufficiently large to assume collector current equal to emitter current and thermal voltage of 26 mV, the magnitude of voltage gain V_0/V_s in the mid-band frequency range is ____ (up to second decimal place).

Answer: (50) Click here to watch video explanation

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55. Two n-channel MOSFETs, T1 and T2, are identical in all respects except that the width of T2 is double that of T1. Both the transistors are biased in the saturation region of operation, but the gate overdrive voltage $(V_{GS}-V_{TH})$ of T2 is double that of T1, where V_{GS} and V_{TH} are the gate – to – source voltage and threshold voltage of the transistors, respectively. If the drain current and transconductance of T1 are I_{D1} and g_{m1} respectively, the corresponding values of these two parameters for T2 are

(A) $8I_{D1}$ and $2g_{m1}$

(B) $8I_{D1}$ and $4g_{m1}$

(C) $4I_{D1}$ and $4g_{m1}$

(D) $4I_{D1}$ and $2g_{m1}$

Answer: (B) Click here to watch video explanation

★★★ END OF THE PAPER ★★★