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POLYTECHNIC TRB

ELECTRONICS AND COMMUNICATION ENGINEERING



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Module Name : Electronics and communication Engineering-E
Exam Date : 12-Dec-2021 Batch : 14:00-17:00

PART-A

1. The eigen values of $2A^2$, where $A = \begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$ are :

A) 2, 50 - **(Correct Answer)**

B) 1, 50

C) 4, 2

D) 1, 25

2. Area of a plane region as a line integral over the boundary C is :

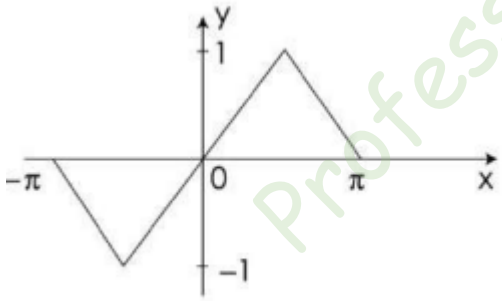
A) $\frac{1}{3}\oint_C xdy - ydx$

B) $\frac{1}{2}\oint_C xdy - ydx$ - **(Correct Answer)**

C) $\frac{1}{3}\oint_C xdy + ydx$

D) $2\oint_C xdx - ydy$

3. The value of the Fourier coefficient a_0 from the following graph is :



A) 1

B) 0 - **(Correct Answer)**

C) $\frac{1}{2}\cos x$

D) $\frac{1}{3}\sin x$

4. Given that $f_x = y - 2x - 2; f_y = x - 2y - 2; f_{xx} = -2; f_{yy} = -2f_{xy} = -2f_{xy} = 1$. The discriminant of $f(x, y)$ at $(-2, -2)$ is :

A) 1

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B) 0

C) 2

D) 3 - **(Correct Answer)**

5. The ordinary differential equation $y' + p(x)y = g(x)y^a$; a is any real number, is calleD)

A) Cauchy's equation

B) Bernoulli equation - **(Correct Answer)**

C) Laplace's equation

D) Poisson's equation

6. The complete solution of the partial differential equation $p^2 + q^2 = 4pq$;

$p = \frac{\partial z}{\partial x}; q = \frac{\partial z}{\partial y}$, is :

A) $z = a^2 + b^2 - 4ab$

B) $z = ax + (\sqrt{3} \pm i)ay + c$

C) $z = ax + (2 \pm \sqrt{3})ay + c$ — **(Correct Answer)**

D) $z = (2 \pm \sqrt{3})ax + ay$

7. If $f(z)$ is analytic and its derivative $f'(z)$ is continuous at all points on and inside a simple closed curve C, then $\int_C f(z)dz =$

A) 0 - **(Correct Answer)**

B) 1

C) ∞

D) C

8. The empirical relationship between mean, mode and median is :

A) Mode = 2 median -3 mean

B) Mode = mean - median

C) Mode = 3 median - 2 mean - **(Correct Answer)**

D) Mean $= 3$ mode $+ \frac{1}{2}$ median

9. A particular case of Runge - Kutta method of second order is :

A) Taylor's method

B) Picard's method

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C) Modified Euler's method - **(Correct Answer)**

D) Milne's method

10. Given that $y' = 1 - 2xy; y(0) = 0$. Then the value of y at $x = 0.2$ is :

A) 0.1948 - **(Correct Answer)**

B) 1.1948

C) 2.1948

D) -0.1948

11. Superposition theorem is valid only for :

A) Linear circuits - **(Correct Answer)**

B) Non-linear circuits

C) Both linear and non-linear

D) Neither of the two linear and non-linear circuits

12. Transfer impedance in a two port network is defined as the ratio of :

A) voltage transform at one port to voltage transform at another port

B) current transform at one port to current transform at another port

C) current transform at one port to voltage transform at another port

D) voltage transform at one port to current transform at another port - **(Correct Answer)**

13. Thevenin's impedance is founD)

A) by short-circuiting the given two terminals

B) between any two open terminals

C) by connecting load across the given two terminals

D) between the given two terminals open - **(Correct Answer)**

14. An inductor in the s-domain consists of :

A) current source in series with an inductor

B) voltage source in parallel with an inductor

C) voltage source in series with an inductor - **(Correct Answer)**

D) All current source in series with an inductor, voltage source in parallel with an inductor and voltage source in series with an inductor

15. The initial value of $20 - \omega t - e^{15t}$ is :

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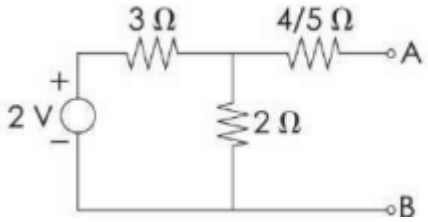
A) 10

B) 15

C) 19 - **(Correct Answer)**

D) 20

16. Norton equivalent current I_{SC} of the circuit is :



A) 5/2 A

B) 2/5 A — **(Correct Answer)**

C) 4/5 A

D) 5/4 A

17. When two two-port networks are connected in series and represented as a single two-port network, the parameters of the network are obtained by adding the individual :

A) z-parameter matrix - **(Correct Answer)**

B) y-parameter matrix

C) h-parameter matrix

D) ABCD-parameter matrix

18. The following parameters are called short-circuit parameters :

A) z parameters

B) y parameters - **(Correct Answer)**

C) h parameters

D) g parameters

19. A circuit consists of two resistances, R_1 and R_2 in parallel. The total current passing through the circuit is I_T. The current passing through R_1 is :

A) $I_T R_1/(R_1 + R_2)$

B) $I_T(R_1 + R_2)/R_1$

C) $I_T R_2/(R_1 + R_2)$ - **(Correct Answer)**

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D) $I_T(R_1 + R_2)/R_2$

20. The transfer function of multiple independent sources can easily be obtained by :

A) Superposition theorem - **(Correct Answer)**

B) Thevenin's theorem

C) Norton's theorem

D) Reciprocity theorem

21. Unit of magnetic field intensity is :

A) F/m

B) Weber/ m^2

C) A/m - **(Correct Answer)**

D) H/m

22. Which of the following is correct boundary condition for dielectric-conductor interface ?

A) $E_{\dagger_1} = E_{\dagger_2}$ **(Correct Answer)**

B) $D_{n_1} = D_{n_2}$

C) $B_{n_1} = 0$

D) $H_{t_1} = J_s$

23. For the low loss dielectriC)

A) $\tan\delta \ll 1$ - **(Correct Answer)**

B) $\tan\delta \gg 1$

C) $\tan\delta = 1$

D) $\tan\delta = \infty$

24. Some unknown material has a conductivity of $10^6 \hat{U}$/m, and a permeability of $4\pi \times 10^{-7}$H/m. The skin depth for the material at 1 GHz is :

A) 5.9μ m

B) 25.9μ m

C) 35.9μ m

D) 15.9μ m - **(Correct Answer)**

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25. If the normalized load impedance of a transmission line is $3 + j4\Omega$, the normalized admittance is :

A) 0.6-j0.8 mho

B) $1 - j1.0$mho

C) $1 + j1.0$mho

D) 0.6-0.8 mho

Correct Answer:-*

26. Which of the following statement is false for the loss-less transmission line ?

A) Real power is dependent of length - **(Correct Answer)**

B) Resistive power calculated at any point on line is same as that power delivered to the load

C) Reactive power varies along the transmission line

D) Impedance is purely resistive at the location of voltage maxima

27. If $a = 2$ cm, $b = 1$ cm for a rectangular waveguide, the cut-off frequency for TE_{10} mode is :

A) 0.75 GHz

B) 7.5 GHz - **(Correct Answer)**

C) 1.5 GHz

D) 1.5 MHz

28. Which of the following is not a common microwave application ?

A) Satellite communication

B) Mobile radio

C) Radar

D) Telephone - **(Correct Answer)**

29. If the reflection coefficient of a two port network is 0.75 then the return loss in the network is :

A) - 1.25 dB

B) 1.25 dB

C) 2.5 dB - **(Correct Answer)**

D) - 2.5 dB

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30. An IMPATT diode has the following parameters :

i) Carrier drift velocity : 2×10^7 cm/s

ii) Drift region length : 6μ m

iii) Maximum operating voltage : 100 V

iv) Maximum operating current : 200 mA

v) Efficiency : 15%

vi) Breakdown voltage : 90 V.

What would be its resonant frequency ?

A) 16.67 GHz - **(Correct Answer)**

B) 16.67 MHz

C) 1.667 GHz

D) 1.667 MHz

31. The slew rate of the op-amp is defined as :

A) $SR = \left.\frac{dV_O}{dt}\right|_{max.}$ – **(Correct Answer)**

B) $SR = \left.\frac{dV_O}{dt}\right|_{min.}$.

C) $SR = \left.\frac{dV_{in}}{dt}\right|_{max.}$

D) $SR = \left.\frac{dV_{in}}{dt}\right|_{min.}$.

32. Differential amplifier functions as an automatic gain control by varying ___ .

A) V_d

B) V_T

C) I_C

D) I_Q – **(Correct Answer)**

33. Design an adder circuit using an op-amp to get the output expression as, $V_o = -(10\,V_1 + 5\,V_2 + V_3)$ where V_1, V_2, V_3 are the inputs.

A) $R_f = 20k\Omega, R_1 = 1k\Omega, R_2 = 5k\Omega, R_3 = 10k\Omega$

B) $R_f = 10k\Omega, R_1 = 1k\Omega, R_2 = 5k\Omega, R_3 = 10k\Omega$

C) $R_f = 5k\Omega, R_1 = 1k\Omega, R_2 = 10k\Omega, R_3 = 10k\Omega$

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D) $R_f = 10k\Omega, R_1 = 10k\Omega, R_2 = 5k\Omega, R_3 = 1k\Omega$

Correct Answer:-*

34. Determine common emitter forward current amplification factor,

When

$I_{C_1} = 3.2$ mA, $I_{C_2} = 4.2$ mA, $I_{B_1} = 30\mu$ A, $I_{B_2} = 40\mu$ A

A) 120

B) 50

C) 110

D) 100 - **(Correct Answer)**

35. In PN junction, with an applied forward bias voltage, the net electric field is always from ___ .

A) n to p region - **(Correct Answer)**

B) p to n region

C) No electric field

D) None of the options

36. The reverse saturation currents of PN junction diode $I_S = 10^{-12}$ A. Determine the forward bias voltage required to produce 1 mA in each diode.

A) 0.639 V

B) 0.739 V

C) 0.539 V - **(Correct Answer)**

D) 0.45 V

37. In MOSFET, when the voltage is applied to the gate to create an inversion layer, then the mode is ___ .

A) Enhancement Mode - **(Correct Answer)**

B) Inversion Mode

C) Depletion Mode

D) Multiplication Mode

38. Assume a common emitter current gain of $\beta = 150$ and a base current of $I_B = 15\mu$ A. Also assume that the transistor is biased in forward active mode. Calculate the collector and emitter currents.

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A) $I_C = 2.25\ mA, I_E = 2.27\ mA$ - **(Correct Answer)**

B) $I_C = 2.5\mu\ A, I_E = 2.7\mu\ A$

C) $I_C = 2.27\ mA, I_E = 2.25\mu\ A$

D) $I_C = 3\mu\ A, I_E = 2.27\ mA$

39. Calculate the intrinsic carrier density n_i at 250 K :

A) $1.5 \times 10^8/cm^3$

B) $1.5 \times 10^{10}/cm^3$

C) $1.8 \times 10^8/cm^3$

D) $1.7 \times 10^{10}/cm^2$

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

A) Heat

B) Light

C) Radiation

D) Heat, Light and Radiation — **(Correct Answer)**

41. The sum of BCD numbers 10000110+00010011 equal to :

A) 99 - **(Correct Answer)**

B) 90

C) 89

D) 79

42. The output expression for an AND - OR - Invert circuit having one AND gate with inputs A, B, C and D and one AND gate with E and F is :

A) ABCD + EF

B) $\overline{A} + \overline{B} + \overline{C} + \overline{D} + \overline{E} + \overline{F}$

C) (A + B + C + D)(E + F) with bar over the entire expression

D) $(\overline{A} + \overline{B} + \overline{C} + \overline{D})(\overline{E} + \overline{F})$ with bar over the entire expression — **(Correct Answer)**

43. Each of the eight full-adders in an 8-bit parallel ripple carry adder exhibits the following propagation delays A to sum and C_{out} : 40 ns B to sum and C_{out} : 40 ns

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C_{in} to sum : 35 ns

C_{in} to C_{out} : 25 ns

Determine the total (maximum) time for the addition of two 8-bit numbers.

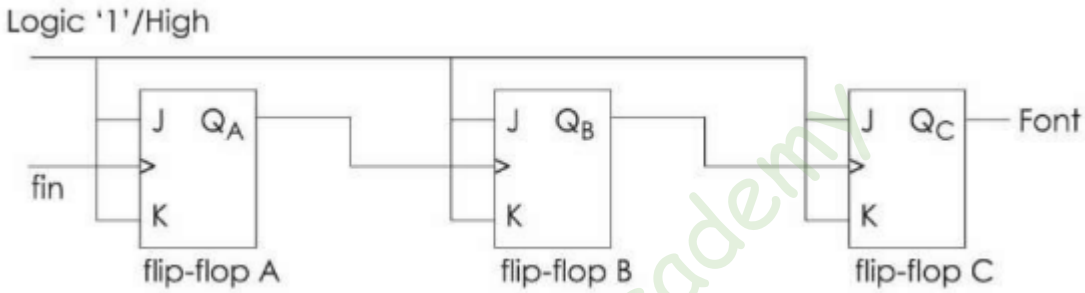
A) 225 ns - **(Correct Answer)**

B) 320 ns

C) 230 ns

D) 290 ns

44. What is the font, for the circuit shown in the following figure, when 8 kHz square wave is applied as clock input of flip-flop A.



A) 1 kHz - **(Correct Answer)**

B) 2 kHz

C) 4 kHz

D) 8 kHz

45. When a 8-bit serial in serial out shift register is used for a 24μ s time delay, the clock frequency must be :

A) 41.67 kHz

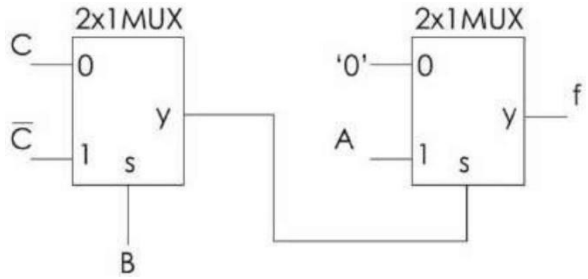
B) 333.3 kHz - **(Correct Answer)**

C) 125 kHz

D) 8 MHz

46. The Boolean function ' f ' implemented in the following figure using 2×1 multiplexers is:

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A) $A\overline{B}C + AB\overline{C}$ — **(Correct Answer)**

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

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

D) $A\overline{B}\overline{C} + \overline{A}BC$

47. Which of these is not a feature of RISC architecture ?

A) Processors have variable instruction size - **(Correct Answer)**

B) Processors have a small instruction set

C) 95% of instructions are executed with only one clock cycle

D) Processors have separate buses for data and code

48. The output y of a 2 bit comparator is logic '1' whenever 2-bit input A is greater than the 2-bit input B. The number of combinations for which the output is logic '1' is :

A) 4

B) 6 - **(Correct Answer)**

C) 8

D) 10

49. Simplified expression for the Boolean function F is, $(w, x, y, z) = \Sigma(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ **:**

A) $F = y + w'z' + x'z$

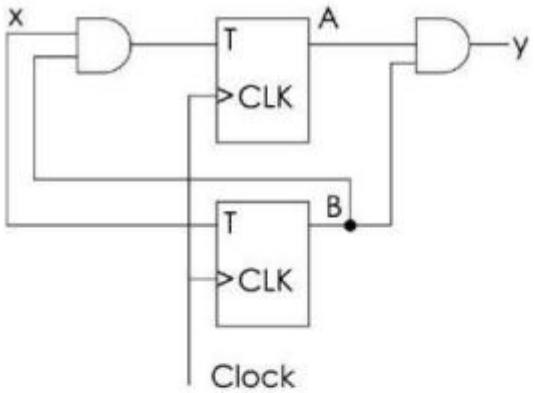
B) $F = y' + w'z' + xz'$ — **(Correct Answer)**

$C: F = y' + w'z' + x'z$

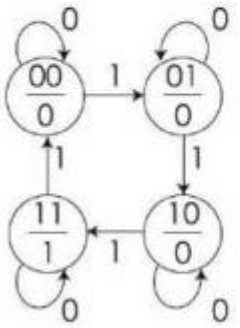
D) $F = y + wz + xz'$

50. The state diagram for the logic circuit shown in the following figure is :

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A :

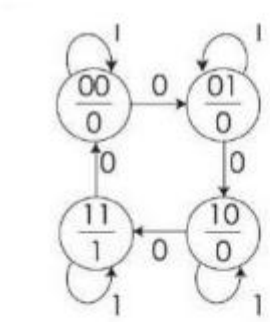


– (Correct Alternative)

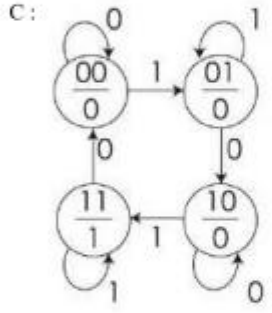
B :

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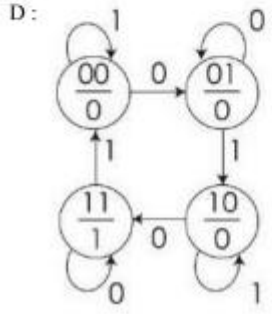
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C:



D:



51. When both pull down and pull up networks are off in the CMOS inverter, the output logic level is :

A) 0

B) 1

C) Z (high impedance) - **(Correct Answer)**

D) Crowbarred (x)

52. The MOS transistor is a ___ device in which ___ in conducting channel is controlled by ___ in gate.

A) minority, current, voltage

B) majority, voltage, current

C) minority, voltage, current

D) majority, current, voltage — **(Correct Answer)**

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53. In a fully complementary CMOS gate, NMOS transistor is A)

A) Load

B) Pull up network

C) Pull down network - **(Correct Answer)**

D) Not used

54. Which model cannot be used to identify the faults ?

A) Stuck at faults

B) Stuck open

C) Stuck closed

D) Stuck delay - **(Correct Answer)**

55. Compared to NMOS inverter, NMOS NAND gate area requirement and gate delay are :

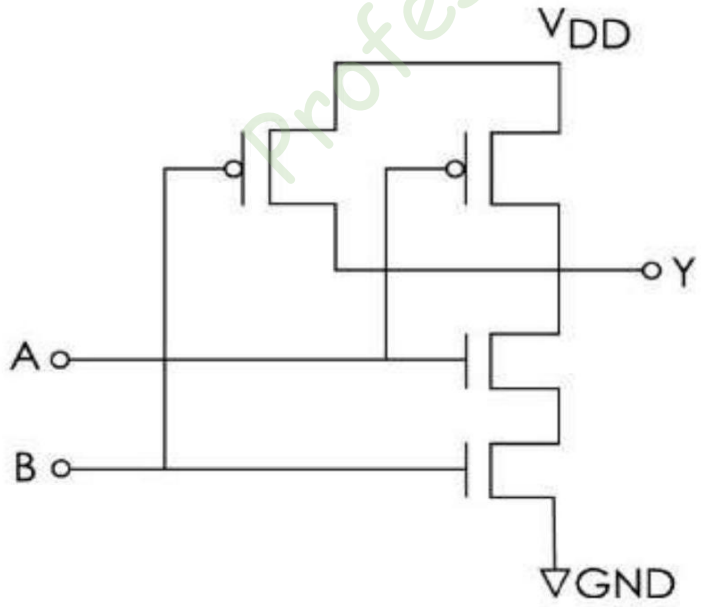
A) high and increased indirect proportion to the number of inputs added - **(Correct Answer)**

B) low and decreased indirect proportion to the number of inputs added

C) low and increased indirect proportion to the number of inputs added

D) high and decreased indirect proportion to the number of inputs added

56. The schematic given below represents :



A) 2 input NAND gate - **(Correct Answer)**

B) 2 input OR gate

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C) 2 input AND gate

D) 2 input XOR gate

57. In VLSI design, 2 criteria to be met are :

A) minimization of hardware and maximization of clock speed - **(Correct Answer)**

B) minimization of hardware and minimization of clock speed

C) maximization of hardware and maximization of clock speed

D) maximization of hardware and minimization of clock speed

58. The hard errors that cause integrated circuits to fail permanently is :

A) Electromigration

B) Latch up

C) Over voltage failure

D) Electromigration, Latch up and Overvoltage failure - **(Correct Answer)**

59. Which of the following is the drawbacks of ratioed circuits ?

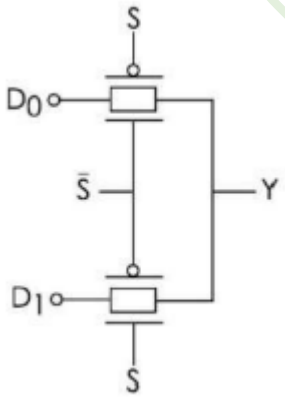
A) Slow rising transition

B) Contention on the falling transitions

C) Static power dissipation and non-zero V_{OL}

D) Slow rising transition, Contention on the falling transitions and Static power dissipation and non-zero V_{OL} - **(Correct Answer)**

60. The schematic in the above represents :



A) Inverting multiplexer

B) Transmission gate multiplexer - **(Correct Answer)**

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C) Tristate inverter

D) Tristate buffer

61. The frequency response of an LTI system characterized by the differential equation is

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$

A) $H(\omega) = \frac{2}{3+j4\omega}$

B) $H(\omega) = \frac{j\omega}{4+3j\omega}$

C) $H(\omega) = \frac{j\omega+2}{3+j\omega^2}$

D) $H(\omega) = \frac{j\omega+2}{(j\omega)^2+4(j\omega)+3}$ - **(Correct Answer)**

62. The convolution of the pairs of signals $y(n) = x_1(n) * x_2(n), x_1(n) = \left(\frac{1}{2}\right)^n u(n); x_2(n) = \cos(\pi n)u(n)$ is given by:

A) $y(n) = 1/3(0.5)^n u(n) + 2/3(-1)^n u(n) -$ **(Correct Answer)**

B) $y(n) = 2/3(-1)^n u(n)$

C) $y(n) = 1/3(0.5)^n u(n) - 2/3(-1)^n u(n)$

D) $y(n) = -2/3(-1)^n u(n)$

63. The power and energy of the unit step sequence is :

A) $\mathrm{P} = \frac{1}{2}, \mathrm{E} = \frac{1}{2}$

B) $\mathrm{P} = \frac{1}{2}, \mathrm{E} = \infty$ - **(Correct Answer)**

C) $\mathrm{P} = \infty, \mathrm{E} = 1/2$

D) $\mathrm{P} = \infty, \mathrm{E} = \infty$

64. The normalized autocorrelation sequence of the signal $x[n] = \begin{cases} 1, & -N \le n \le N \\ 0, & \text{otherwise} \end{cases}$ is given by :

A) $\rho_{xx}(I) = \frac{1}{2N+1}, -2N \le 1 \le 2N$

B) $\rho_{\mathrm{xx}}(1) = 2\,\mathrm{N} + 1 - |1|, -2\,\mathrm{N} \le 1 \le 2\,\mathrm{N}$

C) $\rho_{xx}(I) = \frac{1-|I|}{2N+1}, -2N \le 1 \le 2N$

D) $\rho_{xx}(I) = \frac{1}{2N+1}(2N + 1 - |||), -2N \le 1 \le 2N$ – **(Correct Answer)**

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65. Consider a continuous - time signal x(t) that has been prefiltered by a low-pass filter with a cut-off frequency of 10 kHz . The spectrum of x(t) is estimated by use of the N-point DFT. The desired frequency resolution is 0.1 Hz. Determine the required value of 'N' and the necessary data length T_L.

A) $N = 2^{18},\ T_L = 13.1072$ s – **(Correct Answer)**

B) $N = 2^{4},\ T_L = 12$ s

C) $N = 2^{10},\ T_L = 10.1072$ s

D) $N = 2^{6},\ T_L = 14.33$ s

66. What is the gain of the "signal path" that goes from x[1] to x[2] in an eight-point Decimation-in-time [DTT] flow graph ?

A) - j

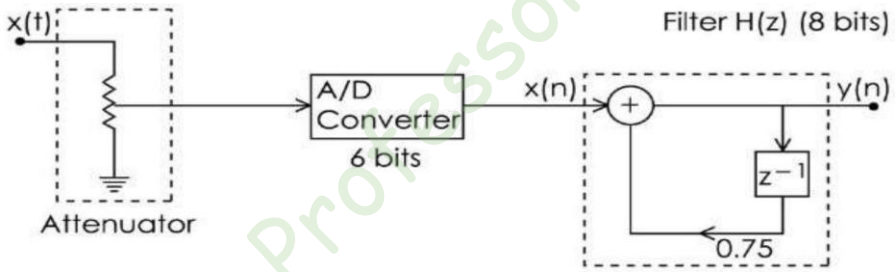
B) + j

C) j^2

D) 1

Correct Answer:-*

67. The digital system shown in below figure.



uses a 6-bit (including sign) fixed-point 2's complement A/D converter and H(z) is implemented using 8-bit (including sign) fixed-point 2's complement fractional arithmetic. The input x(t) is a zero-mean uniformly distributed random process having auto correlation $\gamma_{XX}(\tau) = 3\delta(\tau)$. What value of attenuation should be applied prior to the A/D converter to assure that it does not overflow ?

A) $A_x = 1/\sqrt{2}$

B) $A_x = 1/\sqrt{3}$

C) $A_x = 2/\sqrt{3}$

D) $A_x = 4/\sqrt{3}$

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68. The order of a low pass Butterworth filter having -3 dB bandwidth of 500 Hz and an attenuation of 40 dB at 1000 Hz is :

A) 7 - **(Correct Answer)**

B) 6

C) 5

D) 8

69. The noise power due to each product quantization, is given by (r - round off error; q − quantization step) :

A) $\sigma_r^2 = \frac{q^2}{12}$ – (Correct Alternative)

B) $\sigma_r^2 = \frac{q^2}{128}$

C) $\sigma_r^2 = \frac{q^2}{144}$

D) $\sigma_r^2 = \frac{q^2}{256}$

70. An FIR filter of length 3 is defined by a symmetric impulse response [i.e. [0] = h[z]]. Let the input to this filter be a sum of two cosine sequences of angular frequencies 0.2 rad/samples and 0.5 rad/samples respectively. The impulse response coefficients passing only the high - frequency components of the input are :

A) $h[0] = 8.5631, h[1] = -4.8788$

B) h[0] = -4.8788, h[1] = 9.5631

C) $h[0] = 7.8788, h[1] = -4.8788$

D) $h[0] = 9.5631, h[1] = 8.5631$

Correct Answer:-*

71. In the Force-voltage analogy, which one of the following is electrical equivalent of displacement ' x ' :

A) voltage e

B) current i

C) charge q - **(Correct Answer)**

D) inductance L

72. The Laplace transform of the Ramp signal is : (assume amplitude is ' A ').

A)

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B) $\frac{A}{(S)^3}$

C) $\frac{A}{(S)^2}$ – (Correct Alternative)

D) $A(S)^2$

73. The steady-state error due to unit step input for type-0 system is :

A) 0

B) $\frac{1}{1+k_p}$ – (Correct Alternative)

C) ∞ (infinity)

D) $\frac{1}{k_v}$

74. The addition of a pole to the open-loop transfer function generally has the effect of :

A) decreasing the bandwidth of the closed loop system - **(Correct Answer)**

B) increasing the bandwidth of the closed loop system

C) no change in the bandwidth

D) decreasing the maximum peak overshoot

75. Advantage of the integral controller is/are :

A) make the system stable

B) eliminates the steady-state error - **(Correct Answer)**

C) make the system unstable

D) increase or decrease the amplitude

76. If a single pair of root are on the imaginary axis of s-plane, the impulse response and the stability of the system is :

A) exponentially decaying and stable

B) exponentially increasing and stable

C) oscillatory and marginally stable - **(Correct Answer)**

D) damped sinusoidal and stable

77. If a root of the transfer function is lying on negative real axis, the impulse response and the stability is :

A) exponentially increasing and unstable

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B) exponentially decaying and stable - **(Correct Answer)**

C) damped sinusoidal oscillation and stable

D) oscillatory and marginally stable

78. Acceleration error constant is defined as :

A) $K_a = \lim_{s\to 0} sG(s)H(s)$

B) $K_a = \lim_{s\to 0} s^2G(s)H(s)$

C) $K_a = \lim_{s\to \infty} sG(s)H(s)$

D) $K_a = \lim_{s\to \infty} s^2G(s)H(s)$

79. The damped ramp signal is mathematically represented in time domain as :

A) e^{-at}

B) te^{-at} - **(Correct Answer)**

C) e^{at}

D) te^{at}

80. $G(s)H(s) = \frac{k(s+1)}{s(s+2)(s+3)}$. For the given equation, how many root loci will be there?

A) 1

B) 2

C) 3 - **(Correct Answer)**

D) 4

81. Consider the angle modulated signal $S(t)S(t) = 20\cos[2\pi \times 10^8 t + 1000\cos 2000\pi t]$. The average power of $S(t)$ is :

A) 20 watts

B) 200 watts - **(Correct Answer)**

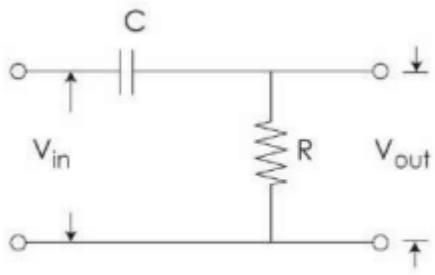
C) 100 watts

D) 400 watts

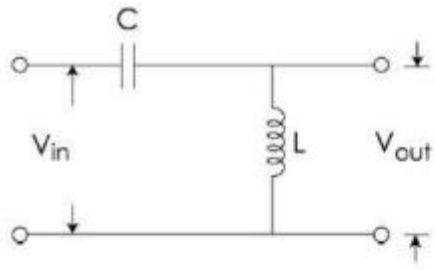
82. Which of the following is a de-emphasis filter in FM receiver?

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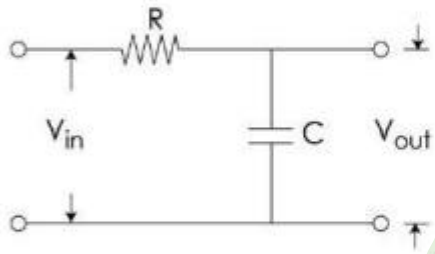
A :



B :

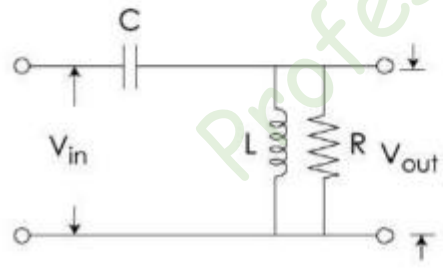


C :



– (Correct Alternative)

D :



83. A sinusoidal signal is sampled at 8 kHz and quantized by 8 – bits by a quantizer. The value of bit rate is :

A) 128 Kbps

B) 64 Kbps - **(Correct Answer)**

C) 8 Kbps

D) 640 Kbps

84. Iridium that has a constellation of :

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A) 66 - satellites - **(Correct Answer)**

B) 3 - satellites

C) 24 - satellites

D) 11 - satellites

85. The number of GEO satellites used to cover the entire earth is :

A) 3 - **(Correct Answer)**

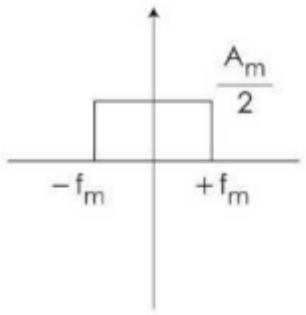
B) 5

C) 22

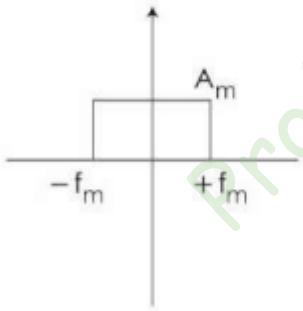
D) 8

86. Spectral Pattern of the waveform $A_m \cos \omega_m t$:

A :

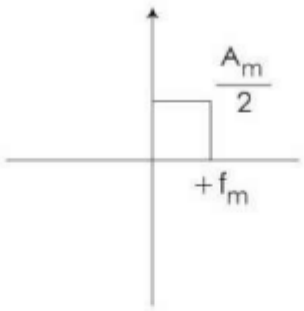


B :

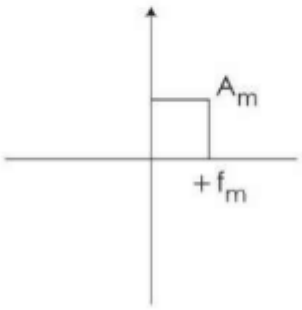


C :

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D :



Correct Answer:-*

87. The modulation that is least affected by noise is :

A) Amplitude modulation

B) DSB - SC modulation

C) Constant envelope modulation - **(Correct Answer)**

D) VSB modulation

88. In a pulse code modulation scheme, the difference Δ(t) is encoded with just a single bit is :

A) DPCM

B) DM - **(Correct Answer)**

C) ADM

D) CVSDM

89. The maximum frequency deviation allowed by FCC organization is :

A) 50 kHz

B) 200 kHz

C) 10 kHz

D) 75 kHz - **(Correct Answer)**

90. The average information of two messages equally likely :

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A) H = 1 bit / symbol - **(Correct Answer)**

B) 2 bits / symbol

C) 1.5 bits / symbol

D) 3 bits / symbol

91. In the Data Link Layer, among Medium Access Control Sub-layer and Logical Link Control :

A) Medium Access Control is higher sub-layer compared to Logical Link Control

B) Logical Link Control is higher compared to Medium Access Control - **(Correct Answer)**

C) Medium Access Control and Logical Link Control share the same sub-layer position

D) Depending on application, Medium Access Control or Logical Link Control occupy Higher Level

92. When all the users happen to transmit at different start times, in a CDMA scheme :

A) All user's codes still remain orthogonal

B) Orthogonality is lost, at least partially - **(Correct Answer)**

C) User's codes are independent of synchronous nature or otherwise of transmissions

D) The CDMA scheme's performance degrades abruptly

93. OFDM is multicarrier modulation which enables :

A) Changing slow fading wireless channel to flat fading one

B) Changing fast fading wireless channel to flat fading one

C) Changing frequency selective fading nature of wireless channel to a flat fading one - **(Correct Answer)**

D) Changing fast fading nature of wireless channel to slow fading nature

94. Bit stuffing is done to :

A) avoid consecutive ones or zeros

B) avoid consecutive ones

C) fill up vacant slots in a flag

D) insure uniqueness of the flag - **(Correct Answer)**

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95. Flooding in multidestination routing is :

A) Requiring less bandwidth and yet robust in case of node failures

B) Requiring more bandwidth and yet robust in case of node failures - **(Correct Answer)**

C) Requiring less bandwidth and is not robust in case of node failures

D) Requires more bandwidth and is not robust in case of node failures

96. An even parity check coded stream is 0100001.

A) there is no error

B) there is a single error

C) zero error or any even number of errors is possible - **(Correct Answer)**

D) odd number of errors are possible

97. In CDMA, the number of users is increased by :

A) Extensive error control procedures along with long codes - **(Correct Answer)**

B) Short codes with moderately efficient error control procedures

C) Short codes with extensive error control procedures

D) Long codes and normal error control procedures

98. In AMPS, the very first mobile communication standard (1G) :

A) digital communication techniques were used

B) analog communication techniques were used - **(Correct Answer)**

C) both digital and analog communication techniques were used

D) cellular concept was not used

99. A mobile communication network architecture makes use of (Choose the incorrect answer) :

A) PSTN

B) MSC

C) Base station

D) VSAT - **(Correct Answer)**

100. An analog signal (when digitized) carries 4 bits in each signaling interval. If 8000 signaling intervals are sent per sec., the bit rate is :

A) 32 kbps - **(Correct Answer)**

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B) 8 kbps

C) 4 kbps

D) 16 kbps

101. During later Chola's period the dancing girls in temple were called as :

A) Talaicheri Pendugal - **(Correct Answer)**

B) Karanas

C) Nritya Perayan

D) Aadal Magalir

102. If the three angles of a triangle are in the ratio 1 : 2 : 3. What was the greatest angle ?

A) 105º

B) 120°

C) 80°

D) 90° - **(Correct Answer)**

103. The S.I. unit of Power is ___ .

A) watt - **(Correct Answer)**

B) joule

C) newton

D) hertz

104. Which one of the following is a biodegradable co-polymer ?

A) vinyon

B) saran

C) PHBV - **(Correct Answer)**

D) Dacron

105. Which one is the birth place of "Boothathalvar" ?

A) Kanchipuram

B) Thanjavur

C) Mamallapuram - **(Correct Answer)**

D) Gangaikonda Cholapuram

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106. Kanchi Vaikunda Perumal temple was built by :

A) Rajasimhan - **(Correct Answer)**

B) Simhavarman

C) Nandivarman

D) Simha Vishnu

107. Which Pandiya King excavated the Rock-cut cave temple at Malayadikkuruchi ?

A) Kadungon

B) Arikesari Maravarman

C) Maran Sendan - **(Correct Answer)**

D) Maravarman Avanisulamani

108. Who was the first Deputy Prime Minister of India ?

A) Dr. Rajendra Prasad

B) Mothilal Nehru

C) Sardar Vallabhai Patel - **(Correct Answer)**

D) Lord Mountbatten

109. 'Sargasso sea' is found in the :

A) North Atlantic Ocean - **(Correct Answer)**

B) South Atlantic Ocean

C) Indian Ocean

D) Pacific Ocean

110. Where was the first rock painting discovered in Tamil Nadu ?

A) Nilagiri

B) Mallapadi - **(Correct Answer)**

C) Attirapakkam

D) Pudukottai

PART-B

1. The directional derivative of $f(x, y, z) = 2x^2 + 3y^2 + z^2$ at P: $(2, 1, 3)$ in the direction of $\vec{a} = \vec{i} - 2\vec{j}$ is :

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A) $-\frac{4}{\sqrt{5}}$

B) $\frac{4}{\sqrt{5}}$

C) $\frac{\sqrt{5}}{4}$

D) $-\frac{\sqrt{5}}{4}$

2. The net outward flux of the vector field $\vec{F} = \frac{x\vec{i}+y\vec{j}+z\vec{k}}{e^3}; e = \sqrt{x^2+y^2+z^2}$ across the boundary of the region D: $0 < b^2 \leq x^2 + y^2 + z^2 \leq a^2$, is :

A) π

B) 2π

C) 4π **– (Correct Answer)**

D) $\frac{\pi}{2}$

3. The auxiliary equation of ordinary differential equation with constant coefficients corresponding to the differential equation $(x^2D^2 + xD + 1)y = \text{Sin}(2\log x)$. $\text{Sin}(\log x)$ is :

A) $(\theta^2 + 1)y = \frac{1}{2}(\sin 3t + \sin t);\ \theta = \frac{d}{dt}$ and $x = e^{\dagger}$

B) $(\theta^2 - 1)y = \sin 3t + \sin t; \theta = \frac{d}{dt}$ and $x = e^t$

C) $(\theta^2 + 1)y = 0; \theta = \frac{d}{dt}$ and $x = e^t$

D) $m^2 + 1 = 0$ - **(Correct Answer)**

4. The integrating factor of the differential equation $x\frac{dy}{dx} = x^2 + 3y; x > 0$ is :

A) $\frac{1}{x^3}$ – **(Correct Answer)**

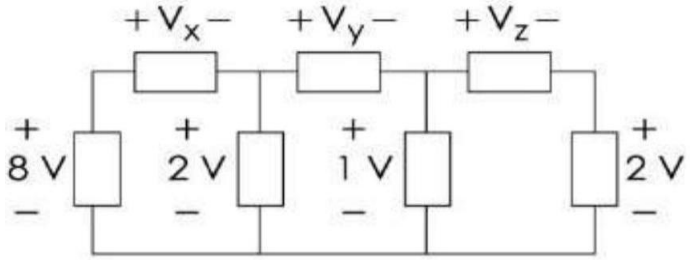
B) $2x^3$

C) $e^{\ln x^3}$

D) $\log_e x^3$

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5. The value of V_x, V_y and V_z in the figure shown are :



A: −6,3, −3

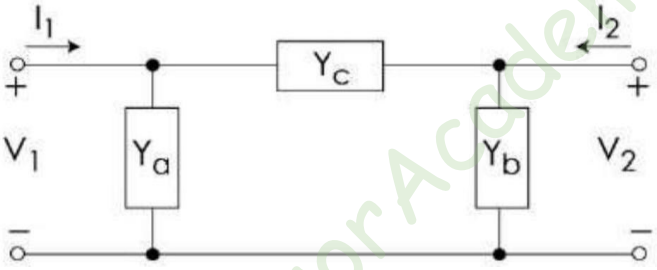
B) -6, -3, 1

C) 6, 3, 3

D) 6, 1, 3

Correct Answer:-*

6. For the network shown in the figure, admittance parameters are y_{11} = 8mho, $y_{12} = y_{21} = -6$ mho and $y_{22} = 6$ mho. The values of Y_A, Y_B and Y_C (in mho) will be :



A) 2, 6, -6

B) 2, 6, 0

C) 2, 0, 6 - **(Correct Answer)**

D) 2, 6, 8

7. An input voltage $V(t) = 10\sqrt{2}\cos(t + 10^\circ) + 10\sqrt{5}\cos(2t + 10^\circ)V$ is applied to a series combination of $R = 1\Omega$ and an inductance $L = 1H$. The resulting steady state current $i(t)$ in ampere is :

A) $10\cos(t + 55^\circ) + 10\cos(2t + 10^\circ + \tan^{-1} 2)$

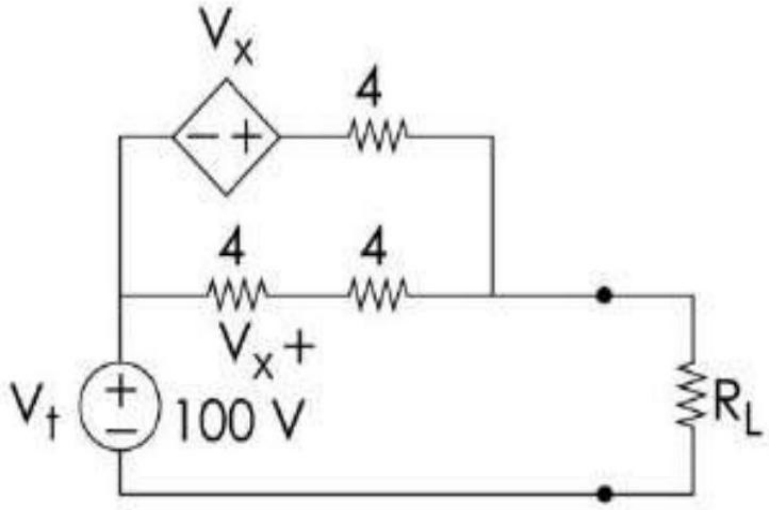
B) $10\cos(t + 55^\circ) + 10\sqrt{3}\cos(2t + 55^\circ)$

C: $10\cos(t - 35^\circ) + 10\cos(2t + 10^\circ - \tan^{-1} 2)$ – (Correct Alternative)

D) $10\cos(t - 35^\circ) + 10\sqrt{3}\cos(2t + 35^\circ)$

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8. In the circuit shown, what value of R_L maximizes the power delivered to R_L ?



A) 2.4Ω

B) 8/3 Ω

C) 4Ω - **(Correct Answer)**

D) 6Ω

9. There exists a boundary dividing region 1 with $\sigma_1 = 0, \boldsymbol{E_1} = (\bar{a}_x + 2\bar{a}_y + 3\bar{a}_z)$V/m and region 2 with $\sigma_2 = 0, |\boldsymbol{E_2}|$ of ___ . Assume that the interface is charge free.

A) $|E_2| = 8.1$ V/m

B) $|E_2| = 3.8$ V/m-**(Correct Answer)**

C) $|E_2| = 6.6$ V/m

D) $|E_2| = 9.10$ V/m

10. If the reflection coefficient of a line is $0.08 + j0.32$, the transmission coefficient is :

A) 1

B) 1.08 + j0.32 - **(Correct Answer)**

C) j0.32

D) 0.04 + j0.16

11. A very small wire antenna of length $\frac{\pi}{80}$ has a radiation resistance of :

A) $\pi^2/40\Omega$

B) $\frac{\pi^2}{6400}\Omega$

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C) $\pi^2/80\Omega$ - **(Correct Answer)**

D) $\pi^2/1600\Omega$

12. Which of the following microwave device is non-reciprocal ?

A) E plane Tee

B) H plane Tee

C) Directional Coupler

D) Circulator - **(Correct Answer)**

13. Match List - I with List - II :

List – I	List - II
(P) Zener Diode	(i) Negative Resistance
(Q) Tunnel Diode	(ii) Voltage Regulator
(R) Pin Diode	(iii) Rectifier
(S) Silicon Diode	(iv) High Speed Switch

A) P-(ii), Q-(i), R-(iv), S-(iii) - **(Correct Answer)**

B) P-(ii), Q-(i), R-(iii), S-(iv)

C) P-(iv), Q-(i), R-(iv), S-(iii)

D) P-(iii), Q-(i), R-(iv), S-(ii)

14. The output voltage of double ended differential amplifier :

A) $V_0 = \frac{R_C}{r_e} V_1$

B) $V_O = \frac{R_C}{2r_e}[V_2 - V_1]$ – **(Correct Answer)**

C) $R_C[V_2 - V_1] = V_o$

D) $V_0 = \frac{R_C}{r_e} V_2$

15. For a MOSFET device the transconductance g_m is :

A) $g_m = \frac{1}{\lambda I_d}$

B) $g_m = \frac{\Delta I_d}{\Delta V_{GS}}$ - **(Correct Answer)**

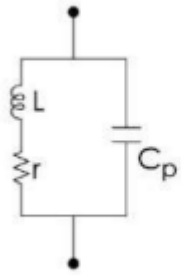
C) $g_m = A_v R_d$

D) $g_m = \frac{2I_D}{V_{GS} - V_p}$

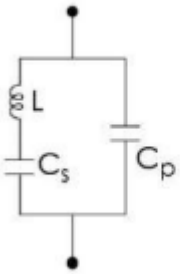
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16. Equivalent circuit of crystal :

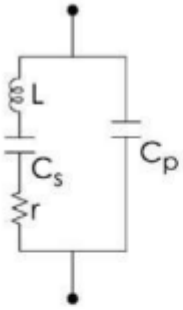
A :



B :

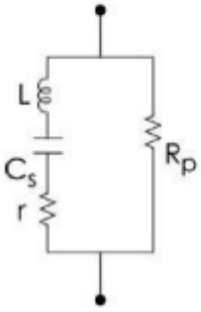


C :



– (Correct Alternative)

D :



17. A 10 MHz clock frequency is applied to a cascaded counter consisting of a Modulus-5 counter, a modulus-8 counter, and two modulus-10 counters. The lowest output frequency possible is :

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A) 10 kHz

B) 2.5 kHz - **(Correct Answer)**

C) 5 kHz

D) 25 kHz

18. In a computer the BIOS programs are stored in the :

A) ROM - **(Correct Answer)**

B) RAM

C) SRAM

D) DRAM

19. In a binary weighted DAC, the lowest value resistor corresponds to :

A) the highest binary weighted input - **(Correct Answer)**

B) the lowest binary weighted input

C) the first input

D) the last input

20. What is in register 'A' after the execution of the following 8051 microcontroller's code ? MOV A, #85H

SWAP A

ANL A, #0F0H

A) 58H

B) F0H

C) 50H - **(Correct Answer)**

D) 80H

21. Architecture HA_CONCURRENT of HALF_ADDER is begin

Sum <= A_{xoR} B after 8 ns;

Carry <= A and B after 4 ns ;

end HA_CONCURRENT;

The above half adder entity is based on :

A) Structural modelling

B) Data flow modelling - **(Correct Answer)**

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C) Behavioural modelling

D) Combination of structural modelling and behavioural modelling

22. 1100 - Multiplicand

0101 - Multiplier

The product is :

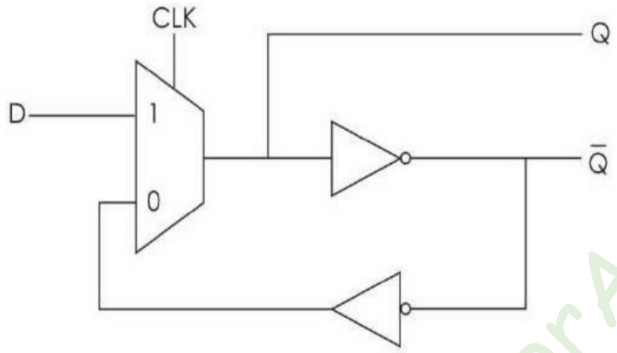
A) 00111100 - **(Correct Answer)**

B) 01001100

C) 01111000

D) 10001000

23. CMOS positive level sensitive schematic given below is A)



A) SR Latch

B) D Latch - **(Correct Answer)**

C) Multiplexer

D) Multiplier

24. The length of the instruction register in the basic test architecture has to be at least :

A) 1 bit

B) 2 bit long - **(Correct Answer)**

C) 3 bit long

D) 4 bit long

25. State which of the following statements are true:

a) Continuous time signals have a periodic spectrum.

b) Discrete - time signals have periodic spectrum.

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c) A periodic finite energy signals have discrete spectrum.

d) Periodicity with period T in time domain automatically implies discretization with spacing $\frac{1}{T}$ in the frequency domain and vice versa.

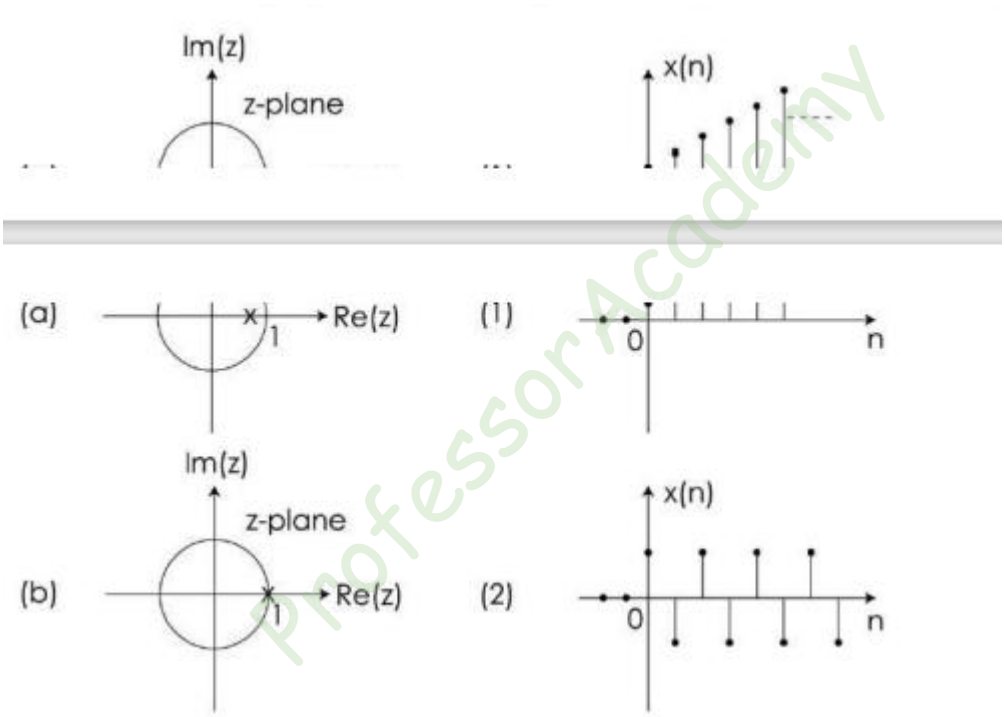
A) (a) – (F), (b) – (T), (c) – (T), (d) – (T)

B) (a)-(T), (b)-(T), (c)-(T), (d)-(T)

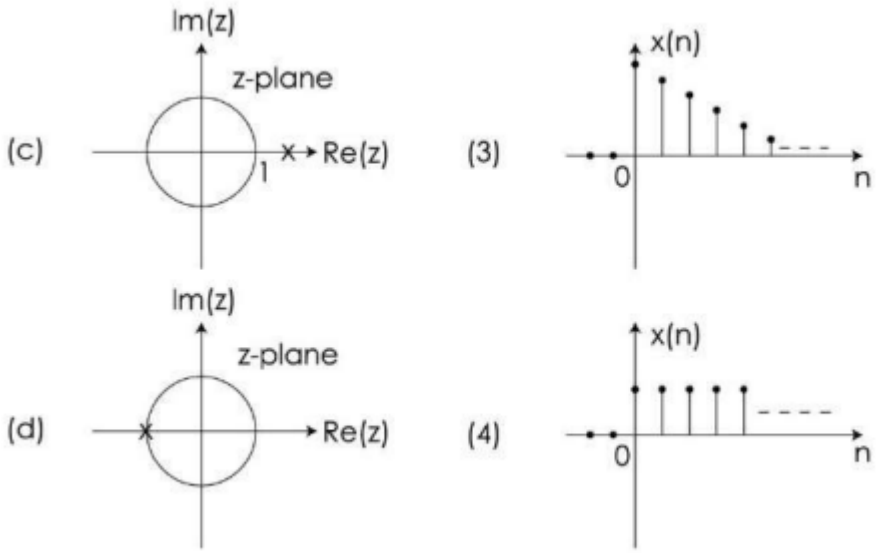
C) (a)-(T), (b)-(T), (c)-(F), (d)-(T) - **(Correct Answer)**

D) (a)-(T), (b)-(T), (c)-(F), (d)-(F)

26. Match the following figures where X represents the pole locations in the z-plane :



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A) (a) − (2), (b) − (1), (c) − (4), (d) − (3)

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

C) (a)-(3), (b)-(4), (c)-(1), (d)-(2) - **(Correct Answer)**

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

27. A continuous time signal $x(t) = 2\cos(160\pi t)$ is sampled at a rate of $s = 60$ Hz. The corresponding discrete time signal is :

A) $2\cos\frac{2\pi}{3}n$ − **(Correct Answer)**

B) $2\cos\frac{6\pi}{3}n$

C) $\frac{(s+2)(s-4)}{4s}$

D) $\frac{(S-2)(S+4)}{4S}$

28. Consider a single pole system described by the difference equation $y[n] = \frac{3}{4}y[n-1] + x[n]$. If this system is implemented with fixed-point arithmetic based on four bits for the magnitude plus a sign bit, and an input $x[n] = \frac{15}{16}\delta[n]$ is given, the dead band of the system is :

A) $\pm\frac{1}{16}$

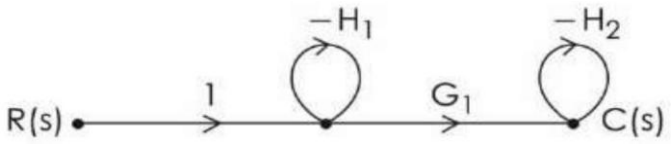
B) $\pm\frac{1}{8}$ − **(Correct Answer)**

C) $\pm\frac{1}{4}$

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D) $\pm\frac{3}{4}$

29. The overall transfer function $\frac{C(s)}{R(s)}$ of the system represented by the following signal flow graph is :



A) G_1

B) $\frac{G_1}{1+H_2}$

C) $\frac{G_1}{(1+H_1)(1+H_2)}$ − **(Correct Answer)**

D) $\frac{G_1}{1+H_1+H_2}$

30. Identify which of the following is an underdamped system :

A) $G(s) = \frac{9}{s^2+9s+9}$

B) $G(s) = \frac{9}{s^2+2s+9}$ − (Correct Alternative)

C) $G(s) = \frac{9}{s^2+9}$

D) $G(s) = \frac{9}{s^2+6s+9}$

31. The open loop transfer function of a unity feedback system is $G(s) = \frac{1+s}{s(1+0.5\,s)}$

The corner frequencies are :

A) 0 and 2

B) 0 and 1

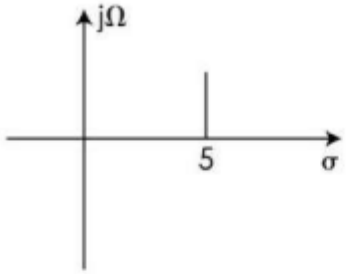
C) 0 and -1

D) 1 and 2 - **(Correct Answer)**

32. For the transfer function $G(s) = 5 + s$, the corresponding Nyquist plot for positive frequency has the form :

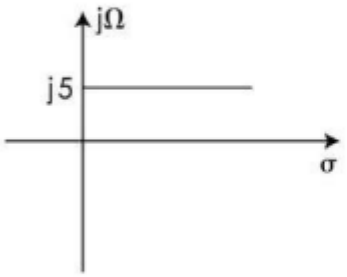
A)

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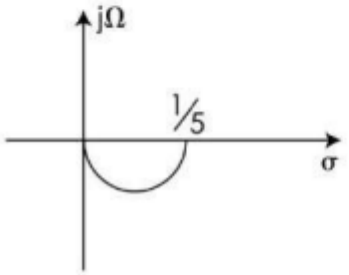


– (Correct Alternative)

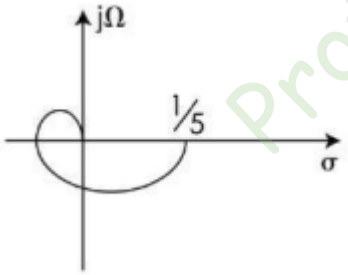
B :



C :



D)



33. A Carrier is phase modulated with a frequency deviation of 20 kHz by a single tone frequency of 2 kHz. If the single tone frequency is increased to 3 kHz, the bandwidth of the signal is : [Assume phase deviation remains constant]

A) 22 kHz

B) 20 kHz

C) 4 kHz

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D) 66 kHz — **(Correct Answer)**

34. Power spectral density of double sided white noise spectrum is :

A) $S_{Xx}(\omega) = \frac{\eta}{2}$ - **(Correct Answer)**

B) $S_{xx}(\omega) = 0$

C) $S_{xx}(\omega) = \eta$

D) $S_{xx}(\infty) = \infty$

35. The envelope of the AM signal having $E_{max} = 15$ V, and $E_{min} = 5$ V, and what is the value of Modulation Index (m) ?

A) m = 0.5 - **(Correct Answer)**

B) m = 0.33

C) m = 1

D) m = 0

36. An AM broadcast receive has an IF of 455 kHz and is tuned to 1000 kHz , then Image (f_{image}) frequency of the receiver is :

A) $f_{image} = 445$kHz

B) $f_{image} = 1000$kHz

C) $f_{image} = 1910$kHz - **(Correct Answer)**

D) $f_{image} = 1455$kHz

37. A code scheme has a Hamming distance $d_{min} = 4$. What is the error detection and correction capability of this scheme ?

A) 3 and 1 - **(Correct Answer)**

B) 2 and 2

C) 2 and 1

D) 2 and 3

38. Find the far-field distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHz.

A) 6 m - **(Correct Answer)**

B) 7 m

C) 8 m

D) 9 m

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39. Given the message $X^7 + X^4 + X^3 + X^2 + 1$ and the pattern " P " is chosen as 1001 . Using CRC, the transmitted codeword is :

A) 10011101110

B) 10011101101

C) 10011101100 - **(Correct Answer)**

D) 10011101111

40. The FDMA channel carries how many phone circuits at a time.

A) one - **(Correct Answer)**

B) two

C) ten

D) several

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