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2018

ELECTRONICS AND COMMUNICATION ENGINEERING
(Degree Standard)

Time Allowed : 3 Hours] **[Maximum Marks : 300**

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. The applicant will be supplied with Question Booklet 15 minutes before commencement of the examination.
2. This Question Booklet contains **200** questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there in series and ensure there are no blank pages in the question booklet. **In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.**
3. Answer **all** questions. **All** questions carry equal marks.
4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
5. An answer sheet will be supplied to you, separately by the Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.
7. Each question comprises *four* responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet there are **four** circles Ⓐ, Ⓑ, Ⓒ and Ⓓ against each question. To answer the questions you are to mark with Blue or Black ink Ball point pen ONLY ONE circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, Ⓑ is the correct answer, you have to mark as follows :

Ⓐ ● Ⓒ Ⓓ

9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the time of examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
10. The sheet before the last page of the Question Booklet can be used for Rough Work.
11. Do not tick-mark or mark the answers in the Question Booklet.
12. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
13. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL

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1. Shannon's channel capacity formula is applicable to the AWGN channel and is given by

(A) $C = B\log_2\left(1+\frac{S}{N}\right)$ (B) $C = B\log_{10}\left(1+\frac{S}{N}\right)$

(C) $C = B\log_8\left(1+\frac{S}{N}\right)$ (D) $C = B\log_{16}\left(1+\frac{S}{N}\right)$

2. As the data packet moves from the lower to the upper layers, headers are

(A) Modified (B) Removed

(C) Added (D) Rearranged

3. The basic rate of SONET is

(A) 2.048 Mbps (B) 51.84 Mbps

(C) 1.544 Mbps (D) 155 Mbps

4. Obtain the 16's complement of ABAB

(A) 5455 (B) 5554

(C) 5557 (D) 5655

5. Name the circuit that generates the following three outputs : $X = Y, X > Y, X < Y$

(A) Parity generator circuit (B) Parity checker circuit

(C) Data selector circuit (D) Magnitude comparator circuit

6. If a register has shift and parallel load capabilities then it is called as

(A) Bi-directional shift register (B) Uni-directional shift register

(C) Parallel in parallel out register (D) Universal shift register

7. In charge free region, the Poisson equation becomes

(A) Maxwell equation (B) Ampere equation

(C) Laplace equation (D) Steady state equation

8. _____ Flag is used only internally for BCD operation and is not available for the programmer to change the sequence of the program.

(A) Zero flag (B) Parity flag

(C) Carry flag (D) Auxillary flag

9. Sampling theorem denoted as

(A) $\frac{1}{\Delta T} > 2\mu_{max}$ (B) $\frac{1}{T} > 2\mu_{max}$

(C) $\frac{1}{\Delta T} < 2\mu_{max}$ (D) $\frac{1}{\Delta T} > 1\mu_{max}$

10. _____ is the process of moving a filter mask over the image and computing the sum of products.

(A) Correlation (B) Convolution

(C) Interpolation (D) Extrapolation

11. If we reverse the direction of all branch transmittances and interchange the input and output of the flow graph remain unchanged. What will be the form?

(A) Cascade-form (B) Transposed form

(C) Parallel form (D) Direct form

12. Find the natural response of the system described by difference equation $y(n) - 4y(n-1) + 4y(n-2) = x(n) - x(n-1)$ when the initial conditions are $y(-1) = y(-2) = 1$.

(A) $y(n) = 2n(2^n)u(n)$ (B) $y(n) = -2n(2^n)u(n)$

(C) $y(n) = 2n^2(2^n)u(n)$ (D) $y(n) = 2n(2^n)u(n^2)$

13. How many complex multiplications are required for a 15-point prime factor FFT if we do not count multiplications by ± 1?

(A) 80 (B) 90

(C) 70 (D) 60

14. The positions of the poles for the butterworth filter lie on _____ and the positions of the poles for the Chebyshev filter lie on

(A) Ellipse, circle (B) Circle, Ellipse

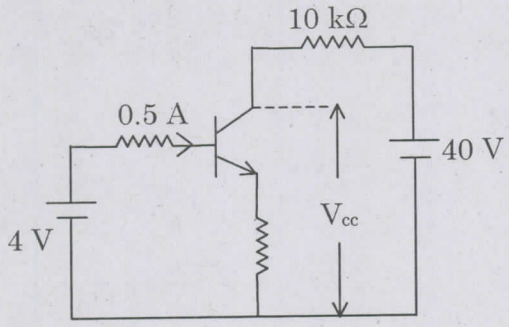
(C) Circle, Line (D) Ellipse, Line

15. A sampling rate conversion by the rational sampling factor L/M is accomplished by cascading

(A) an interpolator with a decimator (B) a decimator with an interpolator

(C) two decimators (D) two interpolators

16. In the circuit, current gain of the ideal transistor is 10. The operating point of the transistor (V_{CC}, I_C) is



(A) 40 V, 4 A
(B) 40 V, 5 A
(C) 0 V, 4 A
(D) 15 V, 4 A

17. The cascade amplifier has the combination of
(A) CE – CC (Common Emitter – Common Collector)
(B) CE – CB (Common Emitter – Common Base)
(C) CB – CC (Common Base – Common Collector)
(D) CB – CB (Common Base – Common Base)

18. The positive feedback reduces
(A) Instability
(B) Distortion
(C) Noise
(D) Bandwidth

19. Colpitts and Hartley oscillators belong to a general class of oscillation that ———— feedback.
(A) Voltage – series
(B) Current – Series
(C) Voltage – Shunt
(D) Current – Shunt

20. Half power gain is the maximum gain minus
(A) 6 dB
(B) 12 dB
(C) 3 dB
(D) 2 dB

21. If differential amplifier has a differential gain of 20,000. $CMRR = 80\,dB$, then common mode gain is
(A) 2
(B) 1
(C) $\frac{1}{2}$
(D) 0

22. Voltage shunt feedback

(A) Increases input and output resistance

(B) Increases input resistance and decrease output resistance

(C) Decreases input resistance and increases output resistance

(D) Decreases input and output resistance

23. In a common Emitter amplifier, the un by passed Emitter resistance provides

(A) Voltage shunt feed back

(B) Current series feed back

(C) Negative voltage feed back

(D) Positive current feed back

24. The output of an ideal differential amplifier, when same input signals are applied at the inputs, is

(A) Dependent on its CMRR

(B) Dependent on its voltage gain

(C) Determined by its symmetry

(D) Zero

25. The RMS value of load current in a half-wave rectifier is

(A) $I_m/\sqrt{2}$

(B) $I_m/2$

(C) $2\frac{I_m}{\pi}$

(D) $\frac{I_m}{\pi}$

26. The feedback factor β for a voltage shunt feedback amplifier is given by

(A) $\beta = \frac{V_f}{V_o}$

(B) $\beta = \frac{I_f}{I_o}$

(C) $\beta = I_f / V_o$

(D) $\beta = \frac{V_f}{I_o}$

27. The percentage regulation of Half-wave rectifier is

(A) $\frac{V_{no\,load} - V_{load}}{V_{no\,load}} \times 100\%$

(B) $\frac{V_{load} - V_{no\,load}}{V_{load}} \times 100\%$

(C) $\frac{V_{no\,load} - V_{load}}{V_{load}} \times 100\%$

(D) $\frac{V_{load} - V_{no\,load}}{V_{no\,load}} \times 100\%$

28. The output DC voltage of a full-wave rectifier is

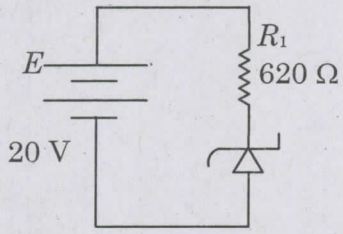
(A) $V_{dc} = \frac{2V_m}{\pi} - I_{dc}R_f$

(B) $V_{dc} = \frac{V_m}{\pi} - I_{dc}R_f$

(C) $V_{dc} = 2V_m - I_{dc}R_f$

(D) $V_{dc} = V_m - I_{dc}R_f$

29. For the zener diode circuit in figure, E = 20V and $R_1 = 620\ \Omega$. The zener diode is 1N755. The diode current is given by V_z of 1N755 is 7.5V



(A) 12.5 mA

(B) 20.16 mA

(C) 7.5 mA

(D) 151 mA

30. Major part of the current in an intrinsic conductor is due to

(A) Conduction – band electrons

(B) Valence – band electrons

(C) Holes in the valence band

(D) Thermally – generated electrons

31. In Boolean Algebra $A \cdot \overline{A}$ is equal to

(A) 1

(B) A

(C) A^2

(D) 0

32. The major distinction between a Field Effect Transistor (FET) and a BJT is

(A) FET is unipolar

(B) FET is more noisy

(C) FET has lower input resistance

(D) FET has very large gain bandwidth product

33. LEDs fabricated from GaAs and GaAsP emits radiation in the

(A) Ultraviolet region and Infrared region respectively

(B) Infrared region and Visible region respectively

(C) Visible region and Infrared region respectively

(D) Infrared region and Ultraviolet region respectively

34. If V_m is the peak voltage across the secondary of the transformer in a half wave rectifier (without any filter), then the maximum voltage on the reverse - biased diode is

(A) V_m (B) $2V_m$

(C) $\frac{1}{2} V_m$ (D) $4V_m$

35. For the circuit shown in Figure 1, the V_O and I_D will be

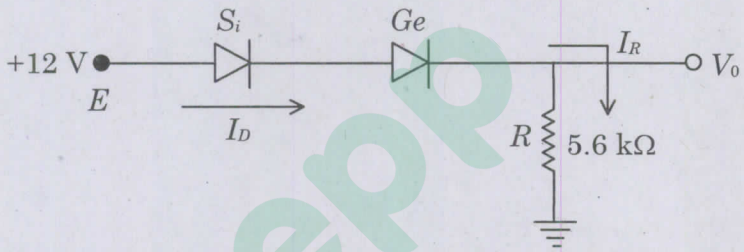


Figure 1

(A) $V_O = 12$ V and $I_D = 2.1$ mA (B) $V_O = 11.3$ V and $I_D = 2.0$ mA

(C) $V_O = 11$ V and $I_D = 1.96$ mA (D) $V_O = 11.7$ V and $I_D = 2.1$ mA

36. Diodes are used to clip voltages in circuits because they act as

(A) Dependent current sources whose current is clipped by the load resistor value

(B) Inductors that can remove current spikes

(C) Current sources under certain bias conditions

(D) Voltage sources under certain bias conditions

37. In the saturation region, the JFET transfer characteristic are

(A) Exponential (B) Parabolic

(C) Linear (D) Hyperbolic

38. Radio spectrum licenses for Personal Communications Services (PCS) is _____ frequency bands.

(A) 900 – 1000 MHz
(B) 1800 – 2000 MHz
(C) 1500 – 200 MHz
(D) 1200 – 1700 MHz

39. A laser diode has a relative spectral width of 2×10^{-3} and 1's emitting a mean wavelength of 1 μm. What is its spectral half-width?

(A) 1 μm
(B) 0.2 μm
(C) 20 nm
(D) 2 nm

40. The geometry of hexagon is such that the number of cells per cluster 'N' can only have values which satisfy equations

(A) $N = i + i^2 j^2 + j$
(B) $N = i + ij + j$
(C) $N = i^2 + ij + j^2$
(D) $N = i^3 + ij + j^3$

41. If there are five routers and six networks in an internetwork using link state routing. How many routing tables are there?

(A) 2
(B) 5
(C) 7
(D) 11

42. Adaptive transform codes is a frequency domain technique that has been successfully used to encode speech at bit rates in the range

(A) 9.6 Kbps – 20 Kbps
(B) 8.5 Kbps – 30 Kbps
(C) 10 Kbps – 25 Kbps
(D) 40 Kbps – 50 Kbps

43. Capacity of each channel in FDMA is given by

(A) $C = W \cdot \log_2(1 + S/N)$
(B) $C = M \cdot \log_2(1 + S/N)$
(C) $C = (W/M) \log_2 (1 + S/N)$
(D) $C = \log_2(1 + S/N)$

44. TWT uses a helix

(A) To reduce the axial velocity of RF field
(B) To ensure broadband operation
(C) To increase the efficiency
(D) To reduce noise

45. A LED is emitting a mean wavelength of $\lambda = 0.90\mu m$ and its spectral half-width $\Delta\lambda = 18nm$. What is its relative spectral width?

(A) 0.02 (B) 0.05

(C) 0.90 (D) 18

46. The number of multiply operations in LMS Gradient DFE algorithm is

(A) 3N+1 (B) 2N+1

(C) 6N+1 (D) 7N+1

47. Cellular Digital Packet data uses of what channel bandwidth

(A) 35 KHz (B) 40 KHz

(C) 30 KHz (D) 50 KHz

48. The _____ function gives a quantitative measure of the closeners or similarity between samples of a speech signal as a function of their time separation.

(A) Probability density (B) Power spectral density

(C) Auto correlation (D) All the above

49. Block codes are _____ codes that enable a limited number of errors to be detected and corrected without retransmission.

(A) Forward error check (B) Forward error correction

(C) Forward error detection (D) None of the above

50. In QPSK the average probability of bit error in AWGN channel is obtained as

(A) $P_{e\ QPSK} = Q\left(\sqrt{\frac{2E_b}{N_o}}\right)$ (B) $P_{e\ QPSK} = Q^2\left(\sqrt{\frac{2E_b}{N_o}}\right)$

(C) $P_{e\ QPSK} = Q\left(\sqrt{\frac{E_b}{N_o}}\right)$ (D) $P_{e\ QPSK} = Q\left(\frac{1}{2}\sqrt{\frac{2E_b}{N_o}}\right)$

51. The open loop transfer function of a unity feedback system is given by $\frac{K}{S(S+1)}$. If the value of K is such that the system in critically lamped, the closed loop poles will lie at

(A) $0.5 \pm j\,0.5$ (B) $\pm j\,0.5$

(C) 0 and -1 (D) -0.5

52. The transfer function of a first-order process is given by

$$\frac{Y(S)}{R(S)} = G(S) = \frac{K}{\tau S + 1}$$

Then the impulse response to an impulse strength of 5 is

(A) $y(t) = \frac{KA}{\tau} e^{-5t/\tau}$ (B) $y(t) = \frac{5K}{\tau} e^{-5t/\tau}$

(C) $y(t) = \frac{5K}{\tau} e^{-t/\tau}$ (D) $y(t) = \frac{KA}{\tau} e^{-t/\tau}$

53. The first two rows of Routh's tabulation of a third order equation are as follows

S^3	2	2
S^2	4	4

This means there are

(A) two roots at $S = \pm j$ and one root in right half of S-plane

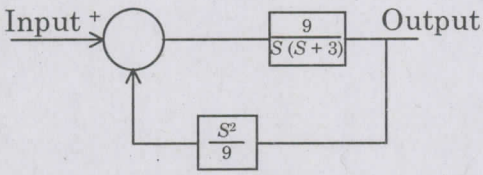
(B) two roots at $S = \pm j^2$ and one root in left half of S-plane

(C) two roots at $S = \pm j^2$ and one root in the right half of S-plane

(D) two roots at $S = \pm j$ and one root in the left half of S-plane

54. Consider the control system shown in fig and statements given below the figure.

1. The system is of second order
2. Basically the system is having negative feedback
3. The system is of type 1
4. The dimension of the output is not same as input of these statements



(A) 2 and 4 correct (B) 1 and 2 correct

(C) 2, 3 and 4 correct (D) 1, 2 and 3 correct

55. Consider the following statements

(i) Many systems are designed for peak overshoot is the range 5 – 25%

(ii) Desired dominant closed – loop poles are usually complex – conjugate pair

(A) All the statements are false

(B) Statement (i) is true, but statement (ii) is false

(C) Statement (ii) is true, but statement (i) is false

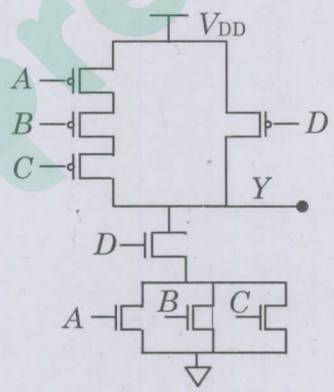
(D) Both statements are true

56. Match the following pair of 8085 instructions :

(a)	DAA	1.	Program control instruction
(b)	LXI	2.	Data movement instruction
(c)	RST	3.	Interrupt instruction
(d)	JMP	4.	Arithmetic instruction

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

57. For the circuit in figure, identify the boolean function implemented



(A) $y = \overline{(A + B + C)\, D}$

(B) $y = \overline{A \cdot B \cdot C + D}$

(C) $y = ABC + D$

(D) $y = (A + B + C), D$

58. A mouse interface could be connected to a microprocessor based system through

(A) Serial interface

(B) PS/2 interface

(C) USB interface

(D) (A), (B) and (C)

59. In CMOS inverter when the output is at logic 1, ———— transistor conducts and ———— transistor is in off state.

(A) n mos, p mos
(B) p mos, n mos
(C) n mos, n mos
(D) p mos, p mos

60. Which of the following is a 2 byte instruction?

(A) ORA A
(B) XRA A
(C) CMA
(D) XRI 80 H

61. In 8051 family instructions, which one of the following option is true?

(A) An opcode is one byte long for each instruction
(B) An opcode has variable number of bits in instruction
(C) An opcode must have operands specified in each instruction
(D) An opcode cannot coexist with the PC bits

62. 32 bit ARM processors operate in ———— for 32 bits operations.

(A) Jessle mode
(B) ARM mode
(C) Thumb mode
(D) JTAG mode

63. CAN bus serial line is at logic 1 during its

(A) Active State
(B) Wait State
(C) Ready State
(D) Recessive State

64. Define the type of instruction with its addressing mode. (8086 ALP) IN AX, 04H

(A) Arithmetic, indexed addressing
(B) Data transfer, port addressing
(C) Logical, based indexed addressing
(D) Branching, register indirect addressing

65. The bandwidth required for an FM signal with a modulating frequency of 2 KHz and maximum deviation of 10 KHz as given by Carson's rule is

(A) 10 KHz
(B) 20 KHz
(C) 12 KHz
(D) 24 KHz

66. In a PCM system the maximum audio input frequency is 6 KHz. The minimum sampling rate required is

(A) 6 KHz
(B) 9 KHz
(C) 12 KHz
(D) 18 KHz

67. As far as jamming resistance is concerned

(A) both FH and DS, (spread spectrum techniques) are equally good

(B) FH has better jamming resistance than DS

(C) DS has better jamming resistance than FH

(D) Slow frequency hopping has better jamming resistance than DS

68. A carrier signal $A_C \cos \omega_C t$ and a modulating signal $\cos \omega_m t$ are applied in series to a diode switching modulator. For 85% modulation, Ac, amplitude of carrier is

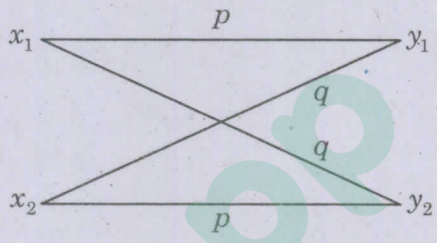
(A) 1 volts

(B) 1.498 volts

(C) 1.948 volts

(D) 1.248 volts

69. Channel capacity of Binary symmetric channel illustrated below is



(A) $1 + p\log_2 p + q\log_2 q$

(B) $1 + p\log_2 q + q\log_2 p$

(C) 0

(D) 0.5

70. For the same energy per bit E_b, probability of Bit error P_e, (comparing coherent BPSK, coherent BFSK, DPSK and Noncoherent BFSK)

(A) is least for DPSK

(B) is least for coherent BFSK

(C) is least for coherent BPSK

(D) is least for noncoherent BFSK

71. The power of an angle modulated wave (PM or FM) with amplitude A is

(A) A^2

(B) Decided by the time varying message signal

(C) Depends on the value of k_p and k_f

(D) $A^2/2$

72. Simplified function of the following Boolean expression is $xy + x'z + yz =$

(A) $x + z + y$ (B) $x + z$

(C) $xy + x'z$ (D) xyz

73. In 2's complement negative number system ———— padded for left shift and ———— for right shift. In 1's complement negative number system ———— padded to left shift and ———— for right shift.

(A) Zeros, sign extension, zeros, ones

(B) Zeros, ones, zeros, ones

(C) Zeros, ones, ones, sign extension

(D) Zeros, sign extension, ones, sign extension

74.

Present state		Input	Next state		Output
A	B	X	A	B	Y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	1	0
0	1	1	1	0	0
1	0	0	1	0	0
1	0	1	1	1	0
1	1	0	1	1	1
1	1	1	0	0	1

The state equations and output equation of the given state table for sequential circuits with T flip – flops are

(A) $T_A = Bx, T_B = B_{\oplus x}, y = AB$ (B) $T_A = Ax, T_B = x, y = AB$

(C) $T_A = x, T_B = x, y = AB'$ (D) $T_A = x, T_B = Ax\ , y = AB'$

75. A prime implicant occupying ———— block of 1's in a karnaugh map would have lower cost than a prime implicant occupying ———— block of 1's because the ———— will result in fewer variables than the

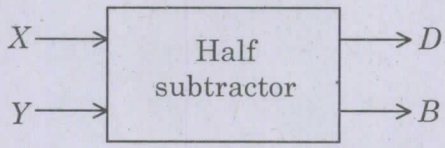
(A) smaller, larger, latter, former (B) larger, smaller, former, latter

(C) smaller, larger, former, latter (D) larger, smaller, latter, former

76. In PLAs (Programmable Logic Arrays), the number of inputs equal to

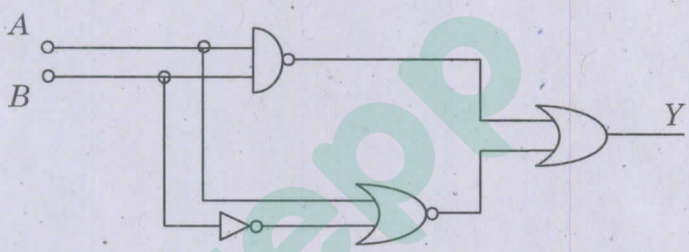
(A) Number of AND gates
(B) Number of OR gates
(C) Number of product terms
(D) Number of Buffer inverter gates

77. Find out the equation for D and B



(A) $D = \overline{X}Y + X\overline{Y}, B = \overline{X}Y$
(B) $D = X\overline{Y} + X\overline{Y}, B = X\overline{Y}$
(C) $D = XY + \overline{X}Y, B = \overline{X}Y$
(D) $D = XY + \overline{X}Y, B = X\overline{Y}$

78. The output Y is



(A) $Y = \overline{AB}$
(B) $Y = \overline{A}B$
(C) $Y = AB$
(D) $Y = A\overline{B}$

79. To determine the sequences required for execution of operations, the opcode of the instruction get transferred to,

(A) Instruction register
(B) Status register
(C) Accumulator register
(D) Temporary register

80. For an n bit binary counter having 'n' number of flip flops, specify the maximum possible range of bit count

(A) 0 to 2^n
(B) 0 to 2^{n-1}
(C) 0 to 2^{n+1}
(D) 0 to $2^{\frac{n+1}{2}}$

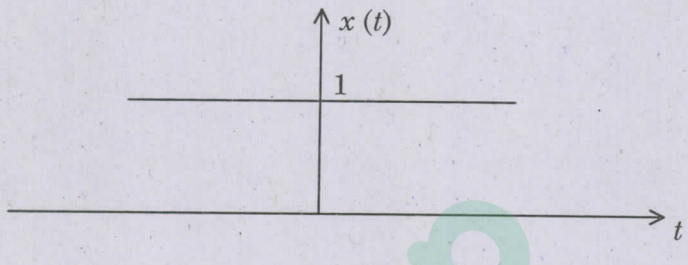
81. In the following state table, the equivalent states are

Present state	Next state $x=0$	Next state $x=1$	Output $x=0$	Output $x=1$
a	c	b	0	1
b	d	a	0	1
c	a	d	1	0
d	b	d	1	0

(A) $(a,d)\ (b,\ c)$ (B) $(a,c)\ (b,d)$

(C) $(a,\ b)\ (c,d)$ (D) (a,c)

82. Fourier Transform of a DC signal $x(t)$ shown below is,



(A) 2π (B) $\delta(\Omega)$

(C) $2\pi\ \delta(\Omega)$ (D) $\pi\,\delta(\Omega)$

83. $x(t) * \delta\ (t-t_o) =$ where $*$ represents the convolution operation.

(A) $\delta(t-t_0)$ (B) $x(t)$

(C) $x(t-t_0)$ (D) $\delta(t)$

84. Given the $z-$ transform of a sequence $x(n)$ as $x(z) = 2z^2 + 3z + 1 + 2z^{-1}$. The ROC of $x(z)$ is

(A) Entire z-plane (B) Entire z-plane except $z=0$

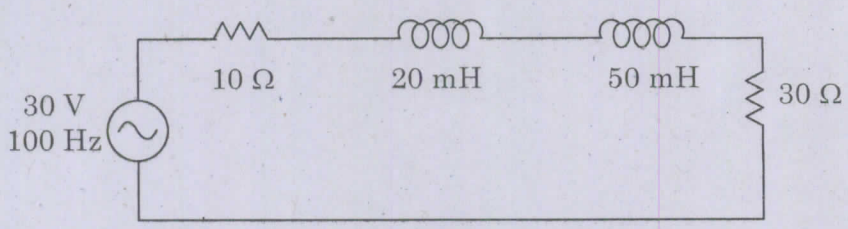
(C) Entire z-plane except $z=\infty$ (D) Entire z -plane except $z=0$ and $z=\infty$

85. Given $x(t) = 2\sin 100\pi t - 3\cos 50\pi t$. What is the Nyquist rate for this signal?

(A) 100π (B) 50π

(C) 200π (D) 400π

86. The total impedance of the circuit shown is



(A) $40 + j\,43.98\,\Omega$ (B) $40 - j\,43.98\,\Omega$

(C) $40 + j\,48.98\,\Omega$ (D) $40 - j\,48.98\,\Omega$

87. Fourier transform of the unit impulse function $\delta[n]$ is

(A) 2π (B) 1

(C) π (D) 0

88. Identify which of the following is a non-recursive system

(i) $y(n) = 3y(n-1) + 3y(n-2) + x(n)$

(ii) $y(n) = 0.5\,y(n-1) + 2y(n-2) + x(n-1)$

(iii) $y(n) = 0.5\,x(n) + 2x(n-1) + 3x(n-2)$

(iv) $y(n) = 3\,y(n-1) + 0.5\,y(n-2) + x(n-2)$

(A) (i) (B) (ii)

(C) (iii) (D) (iv)

89. Choose the incorrect answer related to mutual inductance

(A) Mutual inductance is measured in Henry

(B) Mutual inductance may appear either as positive or negative quantity

(C) The current in a coil generates magnetic flux in the same coil and nearby coil, inducing a voltage in second coil

(D) $M_{12} = M_{21}$

90. Choose the wrong statement. In the nodal analysis, the choice of a reference node does not

(A) affect the voltages of various nodes

(B) affect the operation of the circuit

(C) change the voltage across any element

(D) alter the potential difference between any pair of nodes

91. The impulse response $h(t) = 1/3\,e^{-4t}u(t)$. Find the frequency response $H(j\Omega)$ of the system

(A) $\dfrac{1/3}{4 + j\Omega}$ (B) $\dfrac{1}{4 + j\Omega}$

(C) $\dfrac{1}{4 - j\Omega}$ (D) $\dfrac{1/3}{4 - j\Omega}$

92. A field is solenoidal,

(A) if it obeys divergence theorem (B) if its gradient is zero

(C) if its curl is zero (D) if its divergence is zero

93. The basic principle of impedance matching in a transmission line is

(A) Maximum power transfer theorem (B) Norton Theorem

(C) Superposition Principle (D) Thevinin's Theorem

94. The radiation resistance at the terminals of an antenna is given by

(A) $R_r = \dfrac{120\pi}{I_o^{\,2}} \int_s |H|^2\, dS$ (B) $R_r = \dfrac{120\pi}{I_o^{\,2}} \int_s |E|^2\, dS$

(C) $R_r = \dfrac{120}{I_o^{\,2}} \int_s |Z_o|^2\, dS$ (D) $R_r = \dfrac{120}{I_o^{\,2}} \int |H|^2\, dS$

95. A dielectric medium has a relative permittivity $\varepsilon_r = 6$. Find the index of refraction and the phase velocity for a wave in an unbounded medium of this dielectric

(A) 2.45, 1.22 $Mm\,S^{-1}$ (B) 2.45, 0.122 $Mm\,S^{-1}$

(C) 2.45, 12.2 $Mm\,S^{-1}$ (D) 2.45, 122 $Mm\,S^{-1}$

96. Find the reflection co-efficient of the wave with SWR of 3.5.

(A) 0.55 (B) 0.23

(C) 0.48 (D) 0.68

97. If all the physical dimensions are reduced by the factor of two and wavelength is increased by the factor of two then the performance of the antenna will remain

(A) Unchanged (B) Changed

(C) Doubled (D) Reduced by half

98. In broadside array, the maximum radiation can be achieved, when all the elements in the array should have similar

(A) Wavelength (B) Amplitude

(C) Phase (D) (B) and (C)

99. According to Biot-Savart law, the magnetic field intensity is

(A) Proportional to the distance

(B) Proportional to square of the distance

(C) Inversely proportional to the distance

(D) Inversely proportional to square of the distance

100. Amplitude shift keying is not widely used, because

(A) it is too complex

(B) is more vulnerable to noise as it does not have constant envelope

(C) it requires higher bandwidth

(D) it requires more transmitted power for same P_e, compared to other modulation schemes

101. $y(t) = m(t)c(t)$, (where $m(t)$ is message signal and $c(t)$ is the spreading signal) represents the signal of

(A) FH spread spectrum

(B) TH spread spectrum

(C) DS spread spectrum

(D) PN sequence

102. The power saving in a DSB-SC system with 100% modulation is

(A) 50%

(B) 66%

(C) 75%

(D) 100%

103. The auto correlation function of white noise is

(A) A delta function

(B) a constant

(C) guassian

(D) $\exp(-|t|)$ with usual notation

104. Compute the hamming distance between two valid codewords 101101 and 001100

(A) 3

(B) 1

(C) 4

(D) 2

105. The bandwidth of the spectrum over which the hopping occurs is called

(A) Total hopping bandwidth

(B) Instantaneous bandwidth

(C) Both (A) and (B)

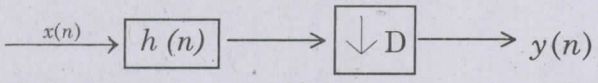
(D) None of the above

106. Which one of the following difference equation will not exhibit limit cycle behaviour?

(A) $y(n) = x(n) + 0.5x(n-1)$ (B) $y(n) = 3y(n-1) + x(n) + x(n-1)$

(C) $y(n) = x(n) - 0.5y(n-1)$ (D) $y(n) = 2y(n-1) + 3x(n)$

107. Consider the following system



$h(n)$ is a filter with frequency response, then

(A) $H(e^{jw}) = \begin{cases} 1, & |w| \le \pi/D \\ 0 & \text{otherwise} \end{cases}$ (B) $H(e^{jw}) = \begin{cases} T_S, & |w| \le \pi/D \\ 0, & \text{otherwise} \end{cases}$

(C) $H(e^{jw}) = \begin{cases} 1/T_S, & |w| \le \pi/D \\ 0, & \text{otherwise} \end{cases}$ (D) $H(e^{jw}) = \begin{cases} e^{-j3w}, & |w| \le \pi/D \\ 0 & \text{otherwise} \end{cases}$

108. What is the magnitude square function of a normalized butterworth filter to 1 rad/sec cut-off frequency as

(A) $1/1 + (\Omega)^{2N}$ (B) $1/[1 + (\Omega/\Omega_C)^{2N}]$

(C) $1/\sqrt{1 + (\Omega/\Omega_C)^{2N}}$ (D) $\sqrt{1 + (\Omega/\Omega_C)^{2N}}$

109. If $x(k)$ is the N-point DFT of a sequence $x(n)$, Then what is the DFT of $x^*(n)$?

(A) $x^*(K)$ (B) $x(N-K)$

(C) $x^*(K-N)$ (D) $x^*(N-K)$

110. If a discrete time signal $x[n]$ is filtered by an ideal low pass filter with cut-off frequency _____ then the output of the filter can be down sampled by a factor of 'M' (is an integer) without aliasing.

(A) π/M (B) $\pi/M + 1$

(C) $\pi/M - 1$ (D) π/M^2

111. Multiplying two 16-bit fixed point numbers will produce a product with up to _____ bits of precision, and the product need to be quantized back to _____ bits.

(A) 31, 16 (B) 18, 16

(C) 31, 8 (D) 20, 16

112. How many complex multiplications are required for a 12-point prime factor FFT with $N_1 = 4 \& N_3 = 3$ if we do not count multiplications by ± 1 and $\pm j$?

(A) 22 (B) 26

(C) 28 (D) 24

113. State which of the following statements are TRUE

(i) An analog high pass filter cannot be mapped to a digital high pass filter using Impulse invariant transformation

(ii) A stable analog filter gets mapped to a stable digital filter using Bilinear transformation

(A) (i) – TRUE (ii) – FALSE (B) (ii) – TRUE (i) – FALSE

(C) (i) and (ii) – FALSE (D) (i) and (ii) – TRUE

114. The Butterworth filter of order n is described by the magnitude squared of its frequency response given by $|H_n(j\Omega)|^2 = 1/[1+(\Omega/\Omega_C)^{2n}]$. The value of $20 \log|H_n(j\Omega)|$ at $\Omega = \Omega_C$ is

(A) –2 dB (B) –3.01 dB

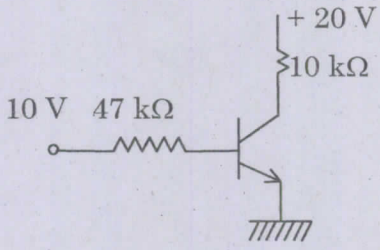
(C) –3 dB (D) – 3.5 dB

115. Given $x(n) = \{1,2,3,4,2\}$ the upsampled signal with an upsampling factor of $L = 2$ is $y[n] = x\left[\frac{n}{L}\right] =$

(A) $\{1,0,0,2,0,0,3,0,0,4,0,0,2\}$ (B) $\{1,0, 2,0, 3,0, 4, 0,2\}$

(C) $\{1,3,2\}$ (D) $\{1,4\}$

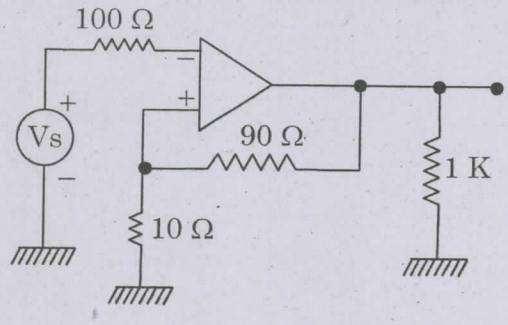
116. In the circuit given, collector to ground voltage is +20V. Which of the following is the probable error?



(A) Collector – Emitter terminals shorted (B) Emitter to ground connection open

(C) Base resistor open (D) Collector base terminal shorted

117. What is the feed back factor of the circuit



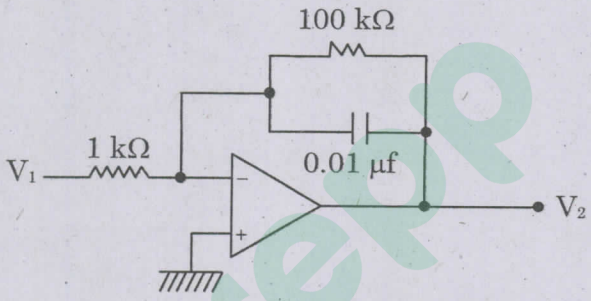
(A) $\frac{9}{100}$

(B) $\frac{9}{10}$

(C) $\frac{1}{9}$

(D) $\frac{1}{100}$

118. The low frequency gain of LPF shown is



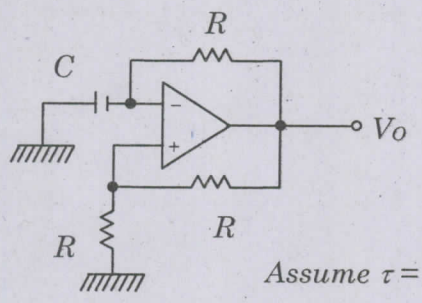
(A) 10 dB

(B) 20 dB

(C) 30 dB

(D) 40 dB

119. For the oscillator circuit given, expression for the time period of oscillator can be given by



Assume $\tau = RC$

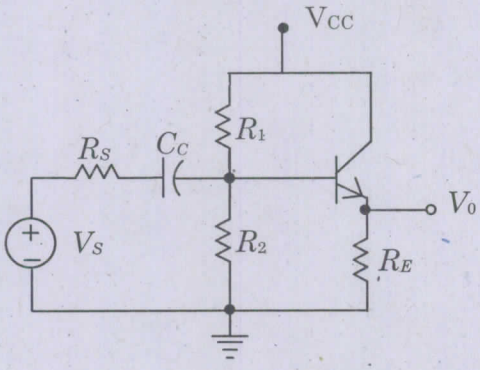
(A) $\tau \ln 3$

(B) $2\tau \ln 3$

(C) $\tau \ln 2$

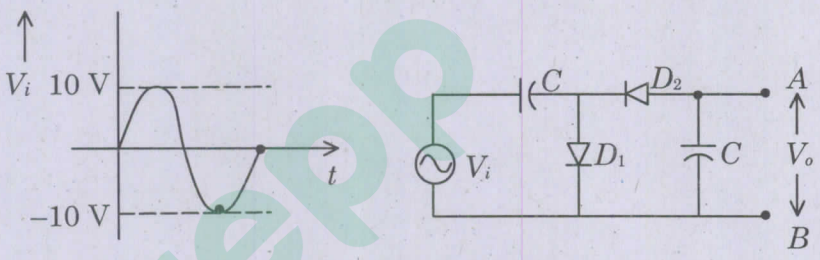
(D) $2\tau \ln 2$

120. The current gain and voltage gain of the Emitter follower circuit given in figure are (Assume that $R_S = 500\ \Omega$, $R_1 = R_2 = 50\,K\Omega, R_L = 2\,K\Omega, h_{fe} = 100$ and $h_{ie} = 1.1\,K\Omega$)



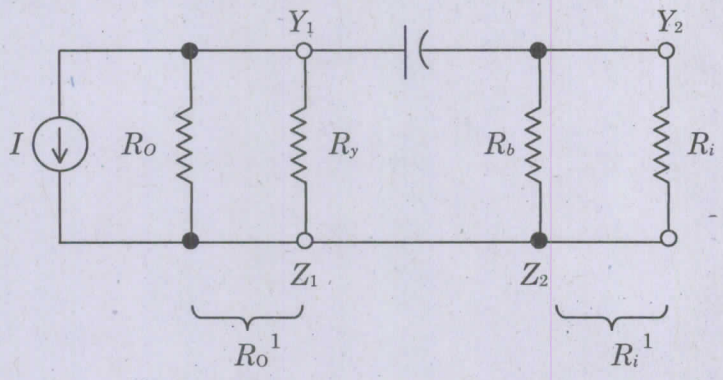
(A) 101, 0.1146
(B) 0.9946, 101
(C) 101, 0.9946
(D) 0.9946, 105

121. When the input waveform and circuit of a Clamper is given as shown in figure and a dc volt meter indicating the voltage across the output A and B (Grounded) – will show



(A) +10 V
(B) –10 V
(C) +20 V
(D) – 20 V

122. The following circuit represents the low frequency model of



(A) RC coupled amplifier
(B) Phase shift oscillator
(C) Darlington circuit
(D) Single stage common emitter amplifier

123. The main purpose of the metalization process is

(A) To supply a bonding surface for mounting the chip

(B) To protect the chip from oxidation

(C) To act as a heat sink

(D) To interconnect the various circuit elements

124. What is the conductivity when Hall effect coefficient is 5 and mobility is 5 cm^2/S?

(A) 100 S/m

(B) 10 S/m

(C) 0.0001 S/m

(D) 0.01 S/m

125. Heavy doping is tunnel diode results is

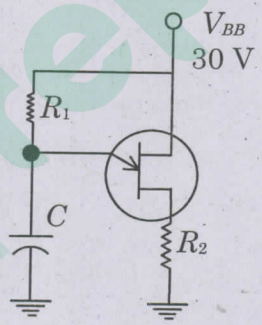
(A) an indefinite depletion region

(B) an extremely narrow depletion region

(C) avoiding the formation of depletion region

(D) slow growth of depletion region

126. The characteristic of UJT shown in Figure exhibits $\eta = 0.5$, $V_V = 1V$, $I_V = 10mA$, $I_P = 20\mu A$ and $V_P = 14V$. The value of R_1 that will ensure proper turn on and turn off must be



(A) $800\ K\Omega > R_1 > 2.9\ K\Omega$

(B) $2.9\ K\Omega > R_1 > 800\ \Omega$

(C) $2.9\ K\Omega > R_1 > 2\ K\Omega$

(D) $800\ \Omega > R_1 > 200\ \Omega$

127. The equivalent dc output voltage of a half wave rectifier is _____ the equivalent dc output voltage of a full wave rectifier.

(A) equal to

(B) half

(C) double

(D) not related to

128. What happens to a tunnel diode when the reverse bias effect goes beyond the valley point P?

(A) It behaves as a normal diode

(B) It attains increased negative slope effects

(C) Reverse saturation current increases

(D) Becomes independent of temperature

129. The mean-square shot-noise current in any device is given by

(A) $I_n^2 = 2q I_{dc} B$

(B) $I_n^2 = q I_{dc} B$

(C) $I_n^2 = 2q^2 I_{dc} B$

(D) $I_n^2 = 2q I_{dc} B^2$

130. The diffusion capacitance for a silicon diode with a 10 mA forward current when the charge carrier transit time of 70 ns is

(A) 1 nF

(B) 1 pF

(C) 1 μF

(D) 1 F

131. The number of minority carriers crossing the junction of a diode depends primarily on the

(A) Concentration of doping impurities

(B) Magnitude of the potential barrier

(C) Magnitude of the forward bias voltage

(D) Rate of thermal generation of electron hole pairs

132. The drift current velocity for electrons and for holes in a 1 mm length of silicon at 27°C when the terminal voltage = 10 V is

(A) $V_n = -1500$ m/s and $V_p = 500$ m/s

(B) $V_n = -500$ m/s and $V_p = 1500$ m/s

(C) $V_n = 1500$ m/s and $V_p = -500$ m/s

(D) $V_n = 500$ m/s and $V_p = -1500$ m/s

133. A UJT has $R_{BB(min)} = 4K\Omega$, $P_D = 360$ mW at 25°C and a power derating factor D = 2.4 mW/°C. The maximum voltage V_{B1B2} that should be used at a temperature of 100°C is

(A) 26.0 V

(B) 26.2 V

(C) 26.8 V

(D) 26.6 V

134. In the SONET, from the Synchronous Transport Signal (STS), Optical Carrier (OC) is obtained

(A) after scrambling and optical to electrical conversion

(B) after electrical to optical conversion

(C) after optical to electrical conversion

(D) after scrambling and electrical to optical conversion

135. Normal practice in satellite communications is to have transponders to narrow bandwidth because

(A) Customers demand only voice service

(B) Customers in large number want to share a satellite's bandwidth

(C) Excessive intermodulation problems can be avoided

(D) EIRP will be improved

136. At critical radius of curvature, in multimode fibers

(A) large deformation will happen to the fiber jacket

(B) no deformation happens to fiber jacket

(C) large bending losses occur

(D) no loss occurs

137. AM signal is represented as

(A) $S_{AM}(t) = A_c[1 + M(t)]\cos(2\pi f_c t)$

(B) $S_{AM}(t) = A_c[1 + M(t)]\sin(2\pi f_c t)$

(C) $S_{AM}(t) = A_c[M(t)]\cos(2\pi f_c t)$

(D) $S_{AM}(t) = A_c[M(t)]\sin(2\pi f_c t)$

138. Choose the incorrect answer related to CDMA

(A) CDMA can use microscopic spatial diversity for soft handoff

(B) CDMA possesses frequency diversity

(C) CDMA requires power control

(D) The CDMA has very high capacity since it is not affected by interference

139. The data link layer imposes a _____ mechanism to prevent overwhelming the receiver.

(A) Access control

(B) Flow control

(C) Error control

(D) None of the above

140. A system has transfer function

$$\frac{C(s)}{R(s)} = \frac{s+3}{s[s^2+2s+2]}$$

It is a _____ order system and poles are located at _____ and zero is located at _____.

(A) $2, [0, -1 \pm j], -3$

(B) $3, [0, -1 \pm j], -3$

(C) $2, [0, -1 \pm j], 3$

(D) $3, [0, -1 \pm j], 3$

141. If any of the coefficients of the characteristic equation _____ in the presence of at least one positive coefficient then the system is unstable.

(A) is zero

(B) is negative

(C) are zero or negative

(D) is real

142. Consider a feed back control system with open loop transfer function

$$G(S)\,H(S) = \frac{(1+0.5s)}{s(1+s)(1+0.2s)}$$

The type of the open loop system is

(A) zero

(B) one

(C) two

(D) three

143. Gain cross over frequency is the frequency at which gain is

(A) unity

(B) 0

(C) ∞

(D) 2

144. The expression for determining the peak overshoot of a second order – system

(A) $M_P = e^{-\pi\varsigma/\sqrt{1-\varsigma^2}}$

(B) $M_P = e^{\pi\varsigma/\sqrt{1-\varsigma^2}}$

(C) $M_P = 1 - e^{\pi\varsigma/\sqrt{1-\varsigma^2}}$

(D) $M_P = 1 - e^{-\left(\pi\varsigma/\sqrt{1-\varsigma^2}\right)}$

145. The characteristic equation of a feedback control system is $S^3 + KS^2 + 5S + 10 = 0$. For the system to be critically stable, the value of K should be

(A) 4

(B) 3

(C) 2

(D) 1

146. Systems having a finite non-zero steady-state error when the reference input is a step input are labelled as

(A) Type – 1 system
(B) Type – 2 system
(C) Type – 3 system
(D) Type – 0 system

147. The phase margin of a system with the open loop transfer function $G(S)H(S) = \frac{(1-S)}{(1+S)(2+S)}$ is

(A) 0°
(B) 63.4°
(C) 90°
(D) ∞

148. Given the damping ratio $\varepsilon = 0.4$ and undamped natural frequency $w_n = 5$ rad/sec of a second order system. The transfer function of the system is

(A) $\frac{C(s)}{R(s)} = \frac{25}{s^2 + 4s + 25}$
(B) $\frac{C(s)}{R(s)} = \frac{5}{s^2 + 4s + 5}$
(C) $\frac{C(s)}{R(s)} = \frac{25}{s^2 + s + 25}$
(D) $\frac{C(s)}{R(s)} = \frac{25}{s^2 + 25s + 25}$

149. In bode plot, _____ is used frequency and _____ is used for magnitude and _____ for phase.

(A) Linear scale, log scale, log scale
(B) Log scale, linear scale, linear scale
(C) Log scale, log scale, linear scale
(D) Linear scale, linear scale, log scale

150. Feed back control systems are

(A) insensitive to both forward and feedback path parameter changes
(B) less sensitive to feedback path parameter changes than to forward – path parameter changes
(C) less sensitive to forward – path parameter changes than to feedback path parameter changes
(D) equally sensitive to forward and feedback path parameter changes

151. For the equation $S^3 - 4S^2 + S + 6 = 0$ the number of roots in the left half of the s-plane will be

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

152. The common range of step size in stepper motor which are interfaced with micro processor based systems is

(A) 0° to 10°
(B) 10° to 29°
(C) 0.9° to 30°
(D) 0.3° to 45°

153. The assembler directive in 8086 called EQU

(A) in forms the assembler which logical segment contains data
(B) is used to assign names to variables
(C) is used to assign names to constants
(D) is used to explicitly assign a name to an address

154. The number of memory chips needed to design 8 K Byte memory using the memory chip size of 1024 × 1 is

(A) 8
(B) 16
(C) 32
(D) 64

155. The address lines required to interface 8 K Byte memory chip with 8085 microprocessor is

(A) 16
(B) 13
(C) 10
(D) 7

156. Is there any error found in the given instruction? If yes, find the right alternate. (8086 ALP)
MOV ES, DS

(A) NO error
(B) MOV CH, BH
(C) MOV CH, BL
(D) Both (B) and (C)

157. What is the content of accumulator (8085) after execution of the following program

MVI A, FF H
ADI 01 H

(A) 11 H
(B) 00 H
(C) 10 H
(D) 01 H

158. Description of LAHF instruction in 8086 processor

(A) Store A register to segment register
(B) Load A register to segment register
(C) Store A register from flags
(D) Load A register from flags

159. In a PAM system, four signals each band limited to 5 KHz are sampled at twice the Nyquist rate. The resulting PAM samples are transmitted over a single channel after time division multiplexing. What is the minimum transmissions bandwidth of the channel?

(A) 5 KHz
(B) 20 KHz
(C) 40 KHz
(D) 80 KHz

160. A 400 W carrier is amplitude modulated to a depth of 100%. How much power saving is achieved for SSB – SC compared to AM DSB – FC and AM DSB – SC respectively?

(A) 600 W and 100 W respectively
(B) 500 W and 100 W respectively
(C) 100 W and 500 W respectively
(D) 100 W and 600 W respectively

161. If an angle – modulated signal is given by $f_a(t) = \cos(2\times10^8\pi t + 75\sin 2\times10^8\pi t)$ then peak frequency deviation of the carrier is

(A) 1000 Hz
(B) 7500 Hz
(C) 75000 Hz
(D) 100 μHz

162. The bit rate of T1 system used in the us (for time division multiplexing) is,

(A) 2.048 Mb/s
(B) 1.544 Mb/s
(C) 640 Kbps
(D) 1280 Kbps

163. A PAM signal may be demodulated using

(A) a low pass filter
(B) a differentiator followed by a LPF
(C) an integrator
(D) a LPF followed by an equalizer

164. A 200 W carrier is modulated to a depth of 60%. The total power in the modulated wave is

(A) 200 W
(B) 236 W
(C) 36 W
(D) 72 W

165. This technique is involving frequency translation. Identify it

(A) Amplification
(B) Clamping
(C) Modulation
(D) Filtering

166. Choose the incorrect answer connected to Delta modulation

(A) Delta modulation is 1 bit DPCM

(B) Delta modulation transmits the derivative of $m(t)$

(C) Delta modulation uses a first order predictor which is nothing but time delay T_S

(D) Delta modulation is unsuitable for television signals

167. If the minimum possible length and average length of a coding scheme are 2.418 and 2.45 bits respectively. Then its code efficiency and redundancy are

(A) 1.01 and 0.013

(B) 0.986 and 0.024

(C) 0.976 and 0.024

(D) 0.986 and 0.014

168. If a block code is to have a t-error correction capability then the minimum distance $d_{\min}$ of the code should be such that

(A) $d_{\min} \geq 2t$

(B) $d_{\min} \geq t$

(C) $d_{\min} \geq 2t+1$

(D) $d_{\min} > 2t-1$

169. A carrier of 10 KW is amplitude modulated to a depth of 100% by a sinusoid. Then the power of the transmitted AM wave is

(A) 10 KW

(B) 5 KW

(C) 15 KW

(D) 11 KW

170. An FM wave represented by the voltage equation $v = 12\sin(6\times10^8 t + 6\cos 1250\, t)$. The modulating signal frequency and frequency deviation are

(A) 1250 Hz and 1194 Hz

(B) 199 Hz and 1194 Hz

(C) 95.5 Hz and 995 Hz

(D) 199 Hz and 995 Hz

171. The midband frequency of IF section and IF bandwidth of AM and FM radio are _____, _____, _____ and _____ respectively.

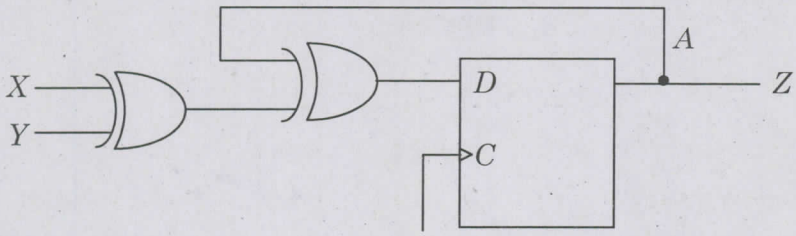
(A) 10.7 MHz, 0.455 MHz, 10 KHz and 200 KHz

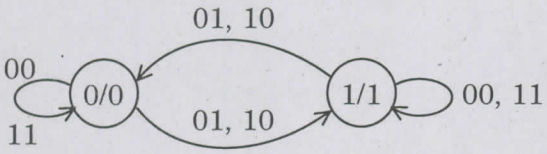
(B) 10.7 MHz, 0.455 MHz, 200 KHz and 10 KHz

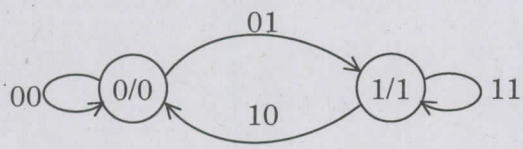
(C) 0.455 MHz, 10.7 MHz, 10 KHz and 200 KHz

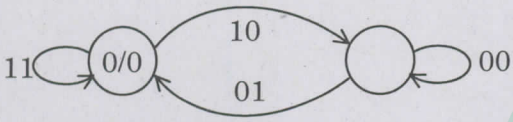
(D) 0.455 MHz, 10.7 MHz, 200 KHz and 10 KHz

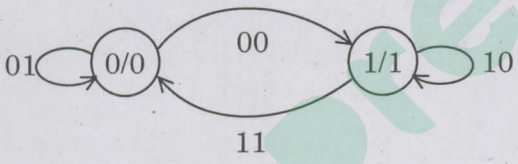
172. The state diagram of the following state machine is



(A)


(B)


(C)


(D)


173. A 4 bit synchronous counter uses flip-flops with propagation delay time of 25 ns each. The maximum possible time required for change of state will be

(A) 25 ns
(B) 50 ns
(C) 75 ns
(D) 100 ns

174. A computer employs RAM chips of 256×8 and ROM chips of 1024×8. The system needs 2K Bytes of RAM and 4KB of ROM and four interface units. How many ROM and RAM chips are needed?

(A) ROM = 4 chips ; RAM = 8 chips
(B) ROM = 8 chips ; RAM = 4 chips
(C) ROM = 4 chips ; RAM = 4 chips
(D) ROM = 8 chips ; RAM = 8 chips

175. Name the memory elements used in clocked and asynchronous sequential circuits

(A) Time delay devices and registers
(B) Time delay devices and flip flops
(C) Time delay devices and counters
(D) Time delay devices and latches

176. The propagation delay of each flip flop is the highly limiting factor in the design of

(A) Ring counter
(B) Ripple counter
(C) Mod n counter
(D) Up/down counter

177. Tick the True statement

(A) OR and NOT gates are necessary and sufficient for realization of any logic function
(B) AND and NOT gates are necessary and sufficient for realization of any logic function
(C) NOR gates are sufficient to realize any logic function
(D) NAND gates are not sufficient to realize any function

178. Find the faulty even parity code

(i) 100110010
(ii) 011101010
(iii) 10111111010001010

(A) only (ii)
(B) only (iii)
(C) both (ii) and (iii)
(D) both (i) and (iii)

179. Subtractors are designed using ———— ICS.

(A) digital
(B) analog
(C) subtractor
(D) adder

180. Which DMA technique employs cycle stealing in true sense?

(A) Transparent DMA
(B) Multiplexed DMA
(C) Inter leaved DMA
(D) Daisy Chain DMA

181. An encoder that responds to the highest number when two or more number are applied simultaneously is called

(A) Binary to BCD encoder
(B) Binary to ASCII encoder
(C) Priority encoder
(D) BCD to Binary encoder

182. In $Y-\Delta$ transformation of resistance, one aim of Δ, has _____ value of resistance.

(A) $R_{ab} = R_a + R_b + \frac{R_a R_b}{R_c}$ (B) $R_{ab} = \frac{R_a R_c + R_b R_c}{R_c}$

(C) $R_{ab} = \frac{R_a R_b + R_a R_c + R_b R_c}{R_a + R_b + R_c}$ (D) $R_{ab} = \frac{R_b R_c + R_{ac}}{R_a + R_b + R_c}$

183. Minimum no. of resistors required to form a series-parallel circuit is

(A) Two (B) Three

(C) Four (D) One

184. The value of R_L for resonance in the network shown in Figure 1.

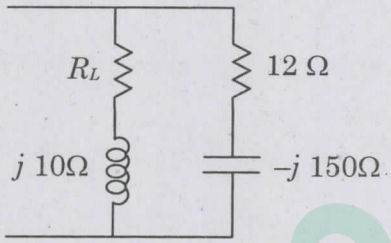
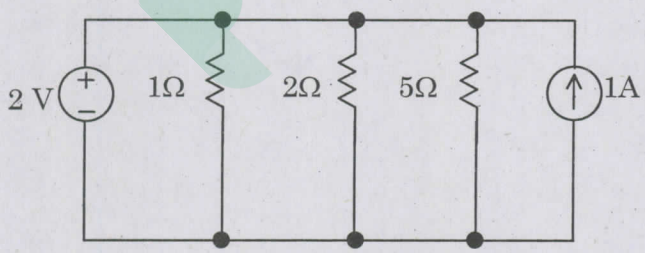


Figure 1

(A) $R_L = 30\ \Omega$ (B) $R_L = 21\ \Omega$

(C) $R_L = 38\ \Omega$ (D) $R_L = 29\ \Omega$

185. What is the power absorbed in the 5 Ω resistor?



(A) 0.8 W (B) 0.6 W

(C) 0.5 W (D) 0.4 W

186. Two coils connected in series have an equivalent inductance of 0.4 H when connected in aiding and equivalent inductance 0.2 H when connected in opposing. Find the mutual inductance of the coil.

(A) 0.15 H (B) 0.65 H

(C) 0.75 H (D) 0.8 H

187. If $ZL = 200\Omega$ and ———— $Z_i = 50\,\Omega$, then the quarter wave transformer should have a characteristic impedance of

(A) 40 Ω
(B) 100 Ω
(C) 4 Ω
(D) 75 Ω

188. A rectangular wave guide in dominant TE_{10} mode has dimension $1.07\ cm \times 0.43\ cm$. What is the cut off frequency?

(A) 9.72 GHz
(B) 15.08 GHz
(C) 19.44 GHz
(D) 24.19 GHz

189. Which one of these equation is not Maxwell's equation for a static electromagnetic field in a linear homogeneous medium state?

(A) $\nabla \cdot B = 0$
(B) $\nabla \times D = 0$
(C) $\oint D \cdot ds = Q$
(D) $\nabla^2 A = \mu_0 J$

190. The concept of displacement current was a major contribution attributed to

(A) Faraday
(B) Lenz
(C) Maxwell
(D) Lorentz

191. Which of these modes does not exist in a rectangular resonant cavity?

(A) TE_{110}
(B) TE_{011}
(C) TM_{110}
(D) TM_{111}

192. Find the radiation resistance of an infinitesimal dipole whose overall length 1's p/50

(A) 0.316 Ω
(B) 0.10 Ω
(C) 5.026 Ω
(D) 1.06 Ω

193. HTTP is

(A) Session layer protocol
(B) Application layer protocol
(C) Data link layer protocol
(D) Network layer protocol

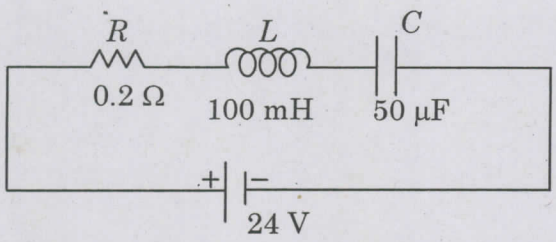
194. Fourier series representation of the signal $x(t) = 1 + \cos\frac{\pi}{2}t$ is

(A) $x(t) = 1 + \frac{1}{2}e^{j\pi/2^t} + \frac{1}{2}e^{-j\pi/2^t}$
(B) $x(t) = 1 + \frac{1}{2j}e^{j\pi/2^t} - \frac{1}{2j}e^{-j\pi/2^t}$
(C) $x(t) = 1 + \frac{1}{2}e^{j\pi/2^t} - \frac{1}{2}e^{-j\pi/2^t}$
(D) $x(t) = 1 + \frac{1}{2j}e^{j\pi/2^t} + \frac{1}{2j}e^{-j\pi/2^t}$

195. For each element of x in a Boolean algebra $x + x = x$ and $xx = x$ by

(A) Involution law
(B) Absorption law
(C) Idempotent law
(D) Commutative law

196. For the circuit given, find the current I at resonance condition.

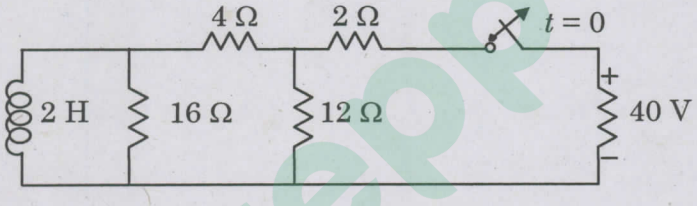


(A) 120 A
(B) 128 A
(C) 132 A
(D) 134 A

197. When a dc voltage of 100 V is applied to a circuit having $R = 10\,\Omega$ and $L = 10\,H$ connected in series, the current after 0.1 sec after switching on and the time taken to reach half of its final values are

(A) 0.95 A and 0.693 sec.
(B) 2 A and 1.786 sec.
(C) 0.5 A and 0.693 sec.
(D) 0.95 A and 1.786 sec.

198. In the network the switch has been in closed position for a long time. At $t = 0$ the switch is opened. The current through the induction is,



(A) $6e^{-4t}\,V$
(B) $6\,(1 - e^{-4t})V$
(C) $6\,(1 + e^{-4t})V$
(D) $6\,V$

199. The inductance and energy stored in joules in the magnetic field of the solenoid having length 30 cm and diameter 3 m and wound with 1000 turns of wire when carrying a current of 10 Amp.

(A) 0.003 mH and 0.15 joules
(B) 3 mH and 0.15 joules
(C) 8 mH and 0.15 joules
(D) 0.003 H and 0.015 joules

200. If $x[n] = -x[-n]$, then

(A) $\sum_{n=-\infty}^{\infty} x[n] = 1$
(B) $\sum_{n=-\infty}^{\infty} x[n] = 0$
(C) $\sum_{n=0}^{\infty} x[n] = 1$
(D) $\sum_{n=0}^{\infty} x[n] = 0$