60611

ROLL No. | | | | | |

QN. BOOKLET No. **019**

TEST FOR POST GRADUATE PROGRAMMES

ELECTRONIC SCIENCE

Time: 2 Hours

Maximum Marks: 450

INSTRUCTIONS TO CANDIDATES

1. You are provided with a Question Booklet and an Optical Mark Reader (OMR) Answer Sheet to mark your responses. Do not soil your OMR Sheet. Read carefully all the instructions given on the OMR Sheet.
2. Write your Roll Number in the space provided on the top of **this page.**
3. Also write your Roll Number, Test Code, Test Centre Code, Test Centre Name, Test Subject and the date and time of the examination in the columns provided for the same on the **Answer Sheet.** Darken the appropriate bubbles with HB pencil.
4. The paper consists of 150 objective type questions. All questions carry equal marks.
5. Each Question has four alternative responses marked **A, B, C** and **D** and you have to **darken** the bubble fully by **HB pencil** corresponding to the correct response as indicated in the example shown on the Answer Sheet. Also write the alphabet of your response with ball pen in the starred column against attempted questions and put an '×' mark by ball pen in the starred column against unattempted questions as given in the example in the OMR Sheet.
6. Each correct answer carries 3 marks and each wrong answer carries 1 minus mark.
7. Please do your rough work only on the space provided for it at the end of this question booklet.
8. You should return the Answer Sheet to the Invigilator before you leave the examination hall. However Question Booklet may be retained with the Candidate.
9. Every precaution has been taken to avoid errors in the Question Booklet. In the event of such unforeseen happenings, suitable remedial measures will be taken at the time of evaluation.
10. Please feel comfortable and relaxed. You can do better in this test in a tension-free disposition.

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60611

ELECTRONIC SCIENCE

1. The passive component is

(A) resistor
(B) BJT
(C) diode
(D) vacuum tube triode

2. Resistor having colour bands of brown, red and orange has a value of

(A) 2100 Ω
(B) 21000 Ω
(C) 1200 Ω
(D) 12000 Ω

3. The reactance of an inductor of 2 Henry at a frequency of zero Hz is

(A) $4\pi\ \Omega$
(B) $\infty\ \Omega$
(C) $2\ \Omega$
(D) zero Ω

4. Semiconductors have

(A) infinite temperature coefficient
(B) positive temperature coefficient
(C) zero temperature coefficient
(D) negative temperature coefficient

5. Donor type of impurity is

(A) phosphorous
(B) boron
(C) aluminium
(D) sallium

6. In intrinsic semiconductor

(A) number of electrons (n) = number of holes (p)
(B) number of electrons (n) ≠ number of holes (p)
(C) number of electrons (n) > number of holes (p)
(D) number of electrons (n) < number of holes (p)

7. Ideal diode in forward bias is characterized by

(A) infinity resistance
(B) zero resistance
(C) 10 MΩ
(D) 500 KΩ

8. At room temperature, the thermal voltage in a diode is

(A) 26 V
(B) 26 mV
(C) 2.6 V
(D) 2.6 mV

9. The knee voltage of Silicon diode is

(A) 1.0 V
(B) 0.7 V
(C) 0.7 mV
(D) 0.3 V

10. The knee voltage of GaAs diode is

(A) 1.0 V
(B) 0.7 V
(C) 1.2 V
(D) 0.3 V

11. The reverse saturation current of a Silicon diode doubles for energy

(A) 10° K rise in temperature
(B) 10° C rise in temperature
(C) 2° C rise in temperature
(D) 10° F rise in temperature

12. For low frequency operated diode, the effects of diffusion capacitance is

(A) negligible
(B) high
(C) greater than that of transition capacitance
(D) smaller than that of transition capacitance

13. Zener diode is operated in

(A) forward bias
(B) reverse bias
(C) both forward and reverse bias
(D) negative temperatures only

14. Visible light from LED extends from

(A) 100 GHz to 500 GHz
(B) 400 THz to 750 THz
(C) 100 KHz
(D) 100 MHz

15. Varactor diode acts as

(A) variable capacitor
(B) variable resistor
(C) variable voltage source
(D) variable current source

16. The depletion region in diode is

(A) a region of more free charge carriers
(B) a region of uncovered positive and negative ions
(C) a region of high current
(D) a region of high voltage

17. In bridge rectifier, PIV of each diode is

(A) $4V_m$ (B) $2V_m$

(C) V_m (D) $V_m/4$

18. The arrow on the symbol of transistor indicates

(A) the direction of emitter current
(B) the direction of collector current
(C) the direction of base current
(D) bias of the emitter junction

19. In active region of common base transistor,

(A) B-E junction is forward biased
(B) B-E junction is reverse biased
(C) C-B is forward biased
(D) both the junctions are reverse biased

20. α_{dc} of a transistor is

(A) I_C/I_B (B) I_E/I_C

(C) I_B/I_C (D) I_C/I_E

21. α_{ac} is

(A) common emitter voltage amplification factor
(B) common base voltage amplification factor
(C) common emitter current amplification factor
(D) common base current amplification factor

22. The relation between α and β is

(A) $\alpha = \frac{\beta+1}{\beta}$ (B) $\alpha = \frac{\beta}{\beta+1}$

(C) $\alpha = \frac{\beta}{\beta-1}$ (D) $\alpha = \frac{\beta-1}{\beta}$

23. Common-collector transistor configuration is used for

(A) voltage amplification (B) current amplification
(C) impedance matching (D) rectification

24. If $I_C = 4$ mA, $I_E = 4.2$ mA in C-B configuration circuit, α_{dc} is

(A) 0.95 (B) 1.05
(C) 1.0 (D) 2.05

25. If α is 0.95, β of a transistor is

(A) 19 (B) 20
(C) 0.48 (D) 50

26. Emitter follower is nothing but

(A) two stage transistor amplifier
(B) transistor amplifier common emitter configuration
(C) transistor amplifier in common base configuration
(D) transistor amplifier common collector configuration

27. In saturation region of an ideal transistor, the terminal resistance is

(A) zero (B) infinity
(C) 10 MΩ (D) 20 KΩ

28. Amplifying action of a transistor takes place by

(A) transferring current from high to low resistance circuit
(B) transferring current from low to high resistance circuit
(C) transferring a voltage from a low to a high resistance
(D) transferring a voltage from a high to a low resistance

29. Oscillator generally produces

(A) d.c. voltage waveform
(B) sinusoidal waveform
(C) pulses
(D) exponential waveform

30. The input to the oscillator circuit is

(A) zero
(B) very high
(C) sinusoidal signal
(D) triangular waveform

31. The loop gain required for sustained oscillations is

(A) 1
(B) 2
(C) zero
(D) infinite

32. Barkhausen Criterion for sustained oscillation is

(A) $|A\beta| = 1$
(B) $A\beta = 1$
(C) $|A\beta| > 1$
(D) $\angle A\beta = \pi$

33. Which of the following is used in oscillator circuit?

(A) positive feedback
(B) negative feedback
(C) zener diode
(D) photo diode

34. RC phase shift oscillator generates

(A) microwave frequency
(B) audio frequency
(C) UHF frequency
(D) VHF Frequency

35. An ideal RC network can produce a phase shift of

(A) 60°
(B) 90°
(C) 180°
(D) 360°

36. Colpitts oscillator produces

(A) radio frequency
(B) audio frequency
(C) microwave frequency
(D) UHF frequency

37. Hartley oscillator is useful for

(A) audio range
(B) RF range
(C) microwave range
(D) VLF range

38. Crystal oscillator produces frequencies of

(A) VLF
(B) LF
(C) microwave
(D) KHz – MHz

39. In crystal oscillator

(A) negative feedback exists
(B) positive feedback exists
(C) stable oscillations are present
(D) negative resistance device is present

40. Oscillator can be generated with

(A) zener diode in the circuit
(B) negative feedback in the circuit
(C) LED in the circuit
(D) tunnel diode in the circuit

41. In Wein bridge oscillator, if R_f = 1.0 MΩ, C_f = 1.0 nF, the frequency of oscillation is

(A) 1.59 KHz
(B) 159 MHz
(C) 159 Hz
(D) 159 KHz

42. The phase shift required by the transistor amplifier in RC phase shift oscillator is

(A) 360°
(B) 180°
(C) 0°
(D) 90°

43. If β is 0.05, the required open loop gain for sustained oscillation is

(A) 20
(B) 30
(C) 40
(D) 50

44. The equivalent circuit of a crystal constitutes of

(A) series RL
(B) series RLC
(C) series RC
(D) series RLC in shunt with another capacitor

45. In colpitts oscillator, if C_{1f}=1.0pF, C_{2f}=10pF, the feedback frequency

(A) reduces gain
(B) increases gain
(C) reduces stability
(D) reduces bandwidth

46. In negative feedback amplifiers

(A) $\beta = 0$
(B) $\beta = \infty$
(C) β = finite
(D) $A = 0$

47. In negative feedback amplifier the resultant gain

(A) greater than A
(B) zero
(C) less than A
(D) infinity

48. The negative feedback

(A) increases the gain
(B) produces oscillations.
(C) reduces bandwidth
(D) increases bandwidth

49. The negative feedback

(A) increases distortion
(B) decreases distortion
(C) increases gain
(D) decreases stability

50. In negative feedback, if $A\beta >> 1$, A_{nf} is

(A) $\approx \frac{1}{\beta}$
(B) infinity
(C) zero
(D) β

51. In positive feedback, if $A\beta = 1$, A_{pf} is

(A) infinity
(B) zero
(C) 1
(D) β

52. In voltage feedback amplifier, the feedback signal is proportional to

(A) output current
(B) input voltage
(C) input current
(D) output voltage

53. In voltage series feedback, A_{vf} is

(A) infinity
(B) equal to A_v
(C) greater than A_v
(D) less than A_v

54. In voltage shunt feedback amplifier, R_{mf} is

(A) greater than R_m
(B) less than R_m
(C) equal to 1
(D) zero

55. In current series feedback amplifier circuit, the signal source is

(A) Norton's
(B) Thevenin's
(C) absent
(D) voltage shunt

56. The transfer ratio without feedback in voltage shunt feedback amplifier is

(A) V_0/I_i
(B) V_0/V_i
(C) I_0/V_i
(D) I_0/I_i

57. The sensitivity of current shunt feedback amplifier is

(A) $\frac{1}{1+A_I\beta}$
(B) $\frac{1}{1+g_m\beta}$
(C) $\frac{1}{1+R_m\beta}$
(D) $\frac{1}{1+A_v\beta}$

58. The desensitivity of the voltage shunt feedback amplifier is

(A) $1+R_m\beta$
(B) $1+g_m\beta$
(C) $1+A_I\beta$
(D) $1+A_v\beta$

59. In class A power amplifier current flows for

(A) three-fourth of full cycle (B) half cycle
(C) quarter cycle (D) full cycle

60. In class B power amplifier, output current flows for

(A) full cycle (B) quarter cycle
(C) three-fourth of full cycle (D) half cycle

61. In class C power amplifier output current flows for

(A) half cycle (B) full cycle
(C) three-fourth of full cycle (D) less than half cycle of input

62. The class D power amplifier has an efficiency of

(A) 30% (B) 50%
(C) 78.5% (D) 90%

63. Class B power amplifier has an efficiency of

(A) 78.5% (B) 25%
(C) 50% (D) 90%

64. The linearity of class AB power amplifier is

(A) good (B) poor
(C) bad (D) excellent

65. The units of derating factor in power amplifier is

(A) volts / ^{0} C (B) watts / ^{0} C
(C) watts /cm^2 (D) watts

66. In class A power amplifier, if V_{cc}=20 V, R_L=10Ω, its efficiency is

(A) 25% (B) 50%
(C) 78.5% (D) 90%

67. Power gain of an amplifier is

(A) $\frac{p_o(ac)}{p_i(ac)}$ (B) $\frac{p_o(dc)}{p_i(dc)}$

(C) $\frac{p_o(ac)}{p_i(dc)}$ (D) $\frac{p_o(ac)}{p_i(ac) + p_i(dc)}$

68. If the ambient temperature raises from 25°C to 75°C and the derating factor is 2 mW/°C, the power rating to be reduced is

(A) 1.0 W (B) 0.4 W
(C) 10 W (D) 5 W

69. The transistor power dissipation is

(A) V_{CC}^2/R_L (B) V_{CE} I_C

(C) V_{CC} I_C (D) V_{CEQ} I_{CQ}

70. If the voltage gain is 100, and current gain is 50 for an amplifier, its power gain is

(A) 0.5 (B) 2
(C) 500 (D) 5000

71. If the load power is 1.0 mW and dc supplied power is 25 mW, its efficiency is

(A) 25 % (B) 50 %
(C) 4 % (D) 78.5 %

72. If the power dissipation at 25°C is 400 mW, derating factor is 3 mW/°C. When the ambient temperature is raised to 50°C, the maximum power rating at 50°C will be

(A) 397 mW (B) 325 mW
(C) 400 mW (D) 403 mW

73. JFET is

(A) voltage controlled device (B) current controlled device
(C) resistance controlled device (D) conductance controlled device

74. The relation between I_D and V_{GS} is

(A) $I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_p}\right)$ (B) $I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_p}\right)^2$

(C) $I_D = I_{DSS}\frac{V_{GS}}{V_p}$ (D) $I_D = I_{DSS}\left(1 - \frac{V_p}{V_{GSS}}\right)^2$

75. If V_{GS}=1V, $V_p = -4V$ and I_{DSS}=10mA, then I_D is

(A) 15.6 mA (B) 1.5 mA
(C) 15 A (D) 1.5 A

76. The pinch-off voltage is

(A) V_{DS} (max) of flat drain curve
(B) V_{DS} (min) of flat drain curve
(C) V_{DS} at V_{GS}=0
(D) V_{DS} at V_{GS}<0

77. If I_{DSS} = 7mA, V_{GS}(off) = −3V, V_{GS} = −1V, the drain current is

(A) 31.2 mA (B) 312 mA
(C) 3.12 mA (D) 0.312 mA

78. MOSFET is used for

(A) regulator control
(B) maintaining constant voltage
(C) automatic gain control
(D) input matching application

79. g_m of MOSFET is

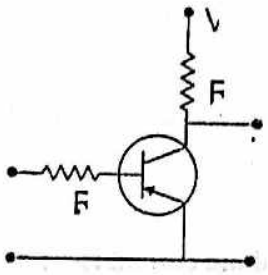
(A) $\frac{\Delta I_D}{\Delta V_{GS}}$ (B) $\frac{\Delta I_D}{\Delta V_{DS}}$

(C) $\frac{\Delta V_{DS}}{I_{DS}}$ (D) $\frac{\Delta V_{GS}}{I_D}$

80. If the peak-to-peak voltage of a sinusoidal waveform measured with CRO is 42 mV, its RMS value is

(A) 1.89 mV (B) 14.89 mV
(C) 14.9 V (D) 1.89 V

81. The advantage of using a series resistance R_s in the emitter base circuit of the amplifier shown below is



(A) bias stability increases
(B) base current can be controlled
(C) I/P resistance remains nearly constant
(D) current gain of amplifier increases

82. For an ideal difference amplifier, CMRR should be

(A) as high as possible (B) as low as possible
(C) constant (D) None of the above

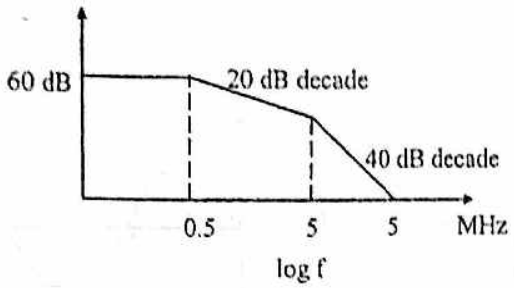
83. The cross-over distortion in Class B push pull amplifier is eliminated by

(A) operating the amplifier as Class C
(B) operating the amplifier as Class AB
(C) eliminating O/P transformer
(D) reducing the biasing of transistor

84. Which of the following is not true for complementary push-pull amplifier?

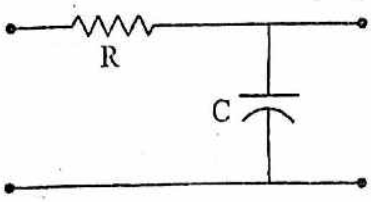
(A) its efficiency is same as that of Class B push-pull
(B) it requires one power supply
(C) it does not require any transformer
(D) it employs PNP and NPN transistor

85. The frequency response of an amplifier is given below. If the amplifier is to be stable with a phase margin of 45° the maximum permissible loop gain will be



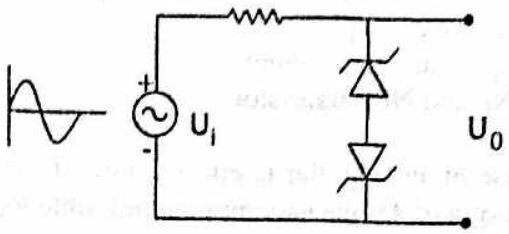
(A) 40 dB
(B) 37 dB
(C) 23 dB
(D) 20 dB

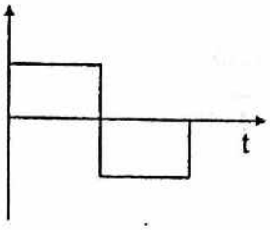
86. The circuit shown below is a

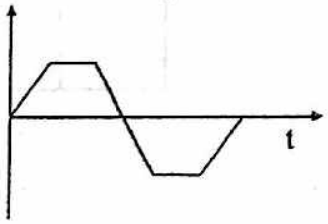


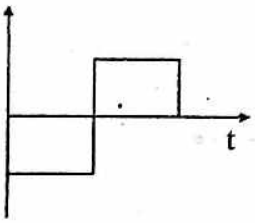
(A) differentiator
(B) low pass filter
(C) high pass filter
(D) band stop filter

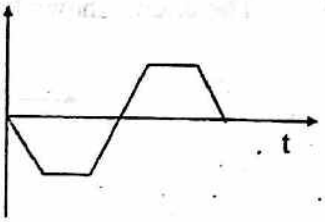
87. The output of the circuit shown below will be



(A)


(B)


(C)


(D)


88. Thyristor are basically

(A) SCRs
(B) Triacs
(C) Both SCRs and Triacs
(D) all PNPN devices

89. Which of the following PNPN devices has two gates?

(A) Triac
(B) SCS
(C) SUS
(D) Diac

90. A Blocking oscillator employs

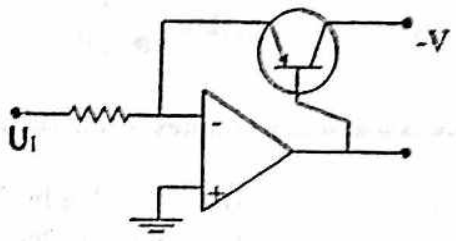
(A) degenerative feedback
(B) pulse type feedback
(C) feedback through a coupling transformer
(D) None of the above

91. The op-amp integrator circuit will act as low pass filter if the cut-off frequency is

(A) $f_c = \frac{1}{2\pi R_2 C_1}$ (B) $f_c = \frac{1}{2\pi R_1 C_1}$

(C) $f_c = \frac{R}{9\pi R_3 C_1}$ (D) None of the above

92. The circuit shown below is a



(A) log amplifier (B) antilog amplifier
(C) clipper (D) clamping circuit

93. $x(t) = 10 \sin (10\pi t + 30^\circ)$ is

(A) even signal (B) odd signal
(C) even as well as odd (D) None of the above

94. ROC of Laplace transform of $\delta(t)$ is

(A) entire left half of s-plane (B) entire s-plane
(C) entire right half of s-plane (D) $j\omega$ axis

95. The mapping $z = e^{ST}$ from s-plane to z-plane is

(A) one to one (B) many to one
(C) one to many (D) many to many

96. If $x(n) - 2x(n-1) = 4$, with $x(0) = 2$, $x(1) = ?$

(A) 0 (B) 20
(C) 8 (D) 1

97. If $x(t) = 10 \sin(5t)$, energy contained in the signal is

(A) 100 (B) 50
(C) 10 (D) 20

98. The Fourier transform of $e^{-at}u(t)$ is

(A) $\frac{1}{a-j\omega}$ (B) $\frac{1}{-a+j\omega}$
(C) $\frac{1}{a+j\omega}$ (D) $\frac{-1}{a+j\omega}$

99. A radix – 2 FFT algorithm is one which requires N, the sequence length to be

(A) multiple of 2 (B) divisible by 2
(C) a power of 2 (D) at least equal to 2

100. If three amplifier stages are cascaded and having gain n1, n2, n3 respectively. Then the overall gain is

(A) $n_1 * n_2 * n_3$ (B) $n_1 + n_2 + n_3$
(C) $n_1^2 + n_2^2 + n_3^2$ (D) $n_1^2 * n_2^2 * n_3^2$

101. The number of digits in Hexadecimal system is

(A) 15 (B) 17
(C) 16 (D) 8

102. The digit F in Hexadecimal system is equivalent to ..... in decimal system.

(A) 16 (B) 15
(C) 17 (D) 8

103. Which of the following binary numbers is equivalent to decimal 10?

(A) 1000 (B) 1100
(C) 1010 (D) 1001

104. The number FF in Hexadecimal system is equivalent to ..... in decimal system.

(A) 256
(B) 255
(C) 240
(D) 239

105. What is the output state of an OR gate if the inputs are 0 and 1?

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

106. What is the output state of an AND gate if the inputs are 0 and 1?

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

107. The output of a ..... gate is only 1 when all of its inputs are 1.

(A) NOR
(B) XOR
(C) AND
(D) NOT

108. A NAND gate is equivalent to an AND gate plus a ..... gate put together.

(A) NOR
(B) NOT
(C) XOR
(D) None of the above

109. Numbers are stored and transmitted inside a computer in

(A) binary form
(B) ASCII code form
(C) decimal form
(D) alphanumerical form

110. The decimal number 127 may be represented by

(A) $(1111\ 1111)_2$
(B) $(1000\ 0000)_2$
(C) EE_H
(D) $(0111\ 1111)_2$

111. A Kb corresponds to

(A) 1024 bits
(B) 1000 bytes
(C) 210 bytes
(D) 2048 bytes

112. A parity bit is

(A) used to indicate uppercase letters
(B) used to detect errors
(C) the first bit in a byte
(D) the last bit in a byte

113. Hexadecimal number F is equal to octal number

(A) 15 (B) 16
(C) 17 (D) 18

114. Binary number 1101 is equal to octal number

(A) 15 (B) 16
(C) 17 (D) 14

115. Octal number 12 is equal to decimal number

(A) 8 (B) 11
(C) 9 (D) None of the above

116. 1111+11111=

(A) 101111 (B) 101110
(C) 111111 (D) 011111

117. Which is non-volatile memory?

(A) RAM (B) ROM
(C) Both of the above (D) None of the above

118. The contents of which of these chips are lost when the computer is switched off?

(A) ROM chips (B) RAM chips
(C) DRAM chips (D) None of the above

119. The internal structure of PLA is similar to

(A) RAM (B) ROM
(C) both RAM and ROM (D) neither RAM nor ROM

120. An output of combinational circuit depends on

(A) present inputs
(B) previous inputs
(C) both present and previous
(D) None of the above

121. Which are sequential circuits?

(A) NAND and NOR
(B) NOT and AND
(C) X-OR and X-NOR
(D) None of the above

122. Which is the correct statement?

(A) A.A=0
(B) A+1=A
(C) A+A=A'
(D) A'.A'=0

123. For a 4096*8 EPROM, the number of address lines is

(A) 14
(B) 12
(C) 10
(D) 8

124. $(23.6)_{10} = (\ldots\ldots)_2$

(A) 11111.10011
(B) 10111.10011
(C) 00111.101
(D) 10111.1

125. In a 4 input OR gate, the total number of High outputs for the 16 input states are

(A) 16
(B) 15
(C) 13
(D) None of the above

126. Which of these are universal gates?

(A) only NOR
(B) only NAND
(C) both NOR and NAND
(D) NOT, AND, OR

127. A XOR gate has inputs A and B and output Y. Then the output equation is

(A) Y=A+B
(B) Y=AB'+A'B
(C) AB+ AB'
(D) AB'+A'B'

128. A+A.B=

(A) B
(B) A.B
(C) A
(D) A or B

129. In which function is each term known as min term?

(A) SOP
(B) POS
(C) Hybrid
(D) Both SOP and POS

130. In which function is each term known as max term?

(A) SOP
(B) POS
(C) Hybrid
(D) Both SOP and Hybrid

131. The min term designation for ABCD is

(A) m_0
(B) m_{10}
(C) m_{14}
(D) m_{15}

132. The function Y=AC+BD+EF is

(A) POS
(B) SOP
(C) Hybrid
(D) None of the above

133. AB+AB'=

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

134. In a four variable Karnaugh map eight adjacent cells give a

(A) two variable term
(B) single variable term
(C) three variable term
(D) four variable term

135. A Karnaugh map with 4 variables has

(A) 2 cells
(B) 4 cells
(C) 8 cells
(D) 16 cells

136. The term VLSI generally refers to a digital IC having

(A) more than 1000 gates
(B) more than 100 gates
(C) more than 1000 but less than 9999 gates
(D) more than 100 but less than 999 gates

137. For wired AND connection we can use

(A) TTL gates with active pull up
(B) TTL gates with open collector
(C) TTL gates without active pull up and with open collector
(D) All of the above

138. Time delay of a TTL family is about

(A) 180 ns (B) 50 ns
(C) 18 ns (D) 3 ns

139. As compared to TTL, CMOS logic has

(A) higher speed of operation (B) higher power dissipation
(C) smaller physical size (D) All of the above

140. When microprocessor processes both positive and negative numbers, the representation used is

(A) 1's complement (B) 2's complement
(C) signed binary (D) All of the above

141. In 2's complement addition, the carry generated in the last stage is

(A) added to LSB (B) neglected
(C) added to bit next to MSB (D) added to the bit next to LSB

142. A device which converts BCD to seven segments is called

(A) encoder (B) decoder
(C) multiplexer (D) None of the above

143. Which device changes parallel data to serial data?

(A) decoder (B) multiplexer
(C) demultiplexer (D) flip flop

144. A 4x1 multiplexer requires..... data select line.

(A) 1 (B) 2
(C) 3 (D) 4

145. Which device has one input and many outputs?

(A) flip flop (B) multiplexer
(C) demultiplexer (D) counter

146. A mod 4 counter will count

(A) from 0 to 4 (B) from 0 to 3
(C) from any number n to n+4 (D) None of the above

147. A counter has N flip flops. The total number of states are

(A) N (B) 2N
(C) 2^N (D) 4N

148. A decade counter skips

(A) binary states 1000 to 1111 (B) binary states 0000 to 0011
(C) binary states 1010 to 1111 (D) binary states 1111 and higher

149. The number of flip flops needed for Mod 7 counter are

(A) 7 (B) 5
(C) 3 (D) 1

150. The basic storage element in a digital system is

(A) flip flop (B) counter
(C) multiplexer (D) encoder

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