A
SET

Booklet No. :

EC - 16

Electronics & Communication Engineering

Duration of Test : 2 Hours **Max. Marks : 120**

Hall Ticket No. | | | | | | | | |

Name of the Candidate : _____

Date of Examination : _____ **OMR Answer Sheet No. :** _____

_____ _____

Signature of the Candidate **Signature of the Invigilator**

INSTRUCTIONS

1. This Question Booklet consists of **120** multiple choice objective type questions to be answered in **120** minutes.
2. Every question in this booklet has 4 choices marked (A), (B), (C) and (D) for its answer.
3. Each question carries **one** mark. There are no negative marks for wrong answers.
4. This Booklet consists of **16** pages. Any discrepancy or any defect is found, the same may be informed to the Invigilator for replacement of Booklet.
5. Answer all the questions on the OMR Answer Sheet using **Blue/Black ball point pen only.**
6. Before answering the questions on the OMR Answer Sheet, please read the instructions printed on the OMR sheet carefully.
7. OMR Answer Sheet should be handed over to the Invigilator before leaving the Examination Hall.
8. Calculators, Pagers, Mobile Phones, etc., are not allowed into the Examination Hall.
9. No part of the Booklet should be detached under any circumstances.
10. The seal of the Booklet should be opened only after signal/bell is given.

ELECTRONICS & COMMUNICATION ENGINEERING (EC)

1. The sum of the eigen values of the matrix $A=\begin{bmatrix} 1 & 1 & 3 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$ is equal to

(A) 6 (B) 8 (C) 0 (D) 1

2. If the rank of the matrix $A=\begin{bmatrix} \mu & -1 & 0 \\ 0 & 2 & -1 \\ -4 & 4 & 3 \end{bmatrix}$ is 2 then $\mu =$

(A) 1 (B) 8 (C) 0 (D) 2/5

3. The function $f(x,y)=x^2+y^2+6x+12$ has minimum value at the point

(A) (–3,0) (B) (3,0) (C) (0,1) (D) (1,1)

4. If $r=\frac{\partial^2 f}{\partial x^2}$, $s=\frac{\partial^2 f}{\partial x \partial y}$ and $t=\frac{\partial^2 f}{\partial y^2}$, then at the saddle point the function $f(x,y)$ satisfy

(A) $rt-s^2=0$ (B) $rt-s^2>0$

(C) $rt-s^2<0$ (D) $st-r^2>0$

5. If $f(z)$ is analytic within and on a closed curve C and a is any point within C then the $f(z)=\frac{1}{k}\oint\frac{f(z)}{z-a}.dz$, where k is equal to

(A) $\frac{1}{\pi}$ (B) $\frac{1}{\sqrt{2\pi}}$ (C) $\frac{1}{\sqrt{2\pi}}i$ (D) $2\pi i$

6. A random variable X has probability density function $f(x)=kxe^{-\lambda x}, x\geq 0$ then $k=$

(A) $\frac{1}{\lambda^2}$ (B) λ^2 (C) λ (D) $\frac{1}{\lambda}$

7. If the coefficient of correlation is 0.98, then the variables are

(A) Negatively correlated (B) Weak positively correlated

(C) Strong positively correlated (D) Uncorrelated

8. The order of the differential equation $\left(\frac{dy}{dx}\right)^2+5y^{\frac{1}{3}}=x$ is

(A) 1 (B) 6 (C) 2 (D) 1/3

9. An integrating factor of $xy' + y = x^3 y^6$

(A) $x^2 y^6$ (B) $e^{1/x}$ (C) $\frac{1}{x}$ (D) x

10. Which one of the following is a series method ?

(A) Picards Method (B) Euler method
(C) Milne Method (D) Runge Kutta Method

11. The impulse response of an LTI system is given by $h[n] = 2\delta[n-20]$. Determine the output $y[n]$ if the input is $x[n] = n^2$.

(A) $(n-20)^2$ (B) $2\delta[n^2-20]$ (C) $2(n-20)^2$ (D) $2\delta[(n-20)^2]$

12. The input output relationship of a system is given by $y[n] = \cos[x(n)]$. The system is

(A) linear and invertible (B) linear and non-invertible
(C) non-linear and invertible (D) non-linear and non-invertible

13. The Fourier series coefficients of a periodic signal $x(t)$ with time period T are X_k. Find the signal $y(t)$ whose Fourier series coefficients are given by $Y_k = 2X_k$ and time period is $T/5$.

(A) $y(t) = 2x(5t)$ (B) $y(t) = 2x(t/5)$
(C) $y(t) = x(10t)$ (D) $y(t) = 2x(2t/5)$

14. Choose the false statement.

(A) $n\delta(n) = 0$ (B) $u(n) = \sum_{k=-\infty}^{n} \delta(k)$
(C) $\delta(n) = \sum_{k=-\infty}^{n} u(k)$ (D) $n^2\delta(n-2) = 4\delta(n-2)$

15. The signals $x_1(t)$ and $x_2(t)$ are both band-limited to $(-\omega_1, +\omega_1)$ and $(-\omega_2, +\omega_2)$ respectively. The Nyquist sampling rate for the signal $x_1(t)x_2(t)$ will be

(A) $2\omega_1$ if $\omega_1 > \omega_2$ (B) $2\omega_2$ if $\omega_1 < \omega_2$
(C) $2(\omega_1 + \omega_2)$ (D) $\frac{\omega_1+\omega_2}{2}$

16. The response of an LTI discrete-time system to a periodic input with period N is

(A) not periodic. (B) periodic having a period N.
(C) periodic having a period $2N$. (D) periodic having a period $N/2$.

17. The step response of an LTI system whose impulse response $h(n) = u(n)$ is

(A) $(n+1)u(n)$ (B) $nu(n)$
(C) $(n-1)u(n)$ (D) $n^2u(n)$

18. If the Fourier series coefficients of a signal are periodic, then the signal must be

(A) continuous-time, periodic. (B) discrete-time, periodic.
(C) continuous-time, non-periodic. (D) discrete-time, non-periodic.

19. Let X_k represent the discrete-time Fourier series (DTFS) coefficients of the periodic sequence $x(n)$ with period N. The DTFS coefficients of the signal $(-1)^n x(n)$ in terms of X_k are

(A) X_k (B) X_{-k} (C) $X_{k+\frac{N}{2}}$ (D) $X_{k-\frac{N}{2}}$

20. The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is

(A) a constant (B) a rectangular pulse
(C) an impulse (D) a series of impulses

21. The frequency response of a system with $h(n) = \delta(n) - \delta(n-1)$ is given by

(A) $\delta(\omega) - \delta(\omega - 1)$ (B) $1 - e^{j\omega}$
(C) $u(\omega) - u(\omega - 1)$ (D) $1 - e^{-j\omega}$

22. The ROC of a causal finite-duration discrete-time signal is

(A) the entire z-plane except $z = 0$ (B) the entire z-plane except $z = \infty$
(C) the entire z-plane (D) a ring in the z-plane

23. Linear phase systems have a constant

(A) phase (B) group delay
(C) magnitude (D) phase and magnitude

24. In an N-point DFT of a finite duration signal $x(n)$ of length L, the value of N should be

(A) $N \geq L$ (B) $N = 0$ (C) $N < L$ (D) $N = L^2$

25. The algorithm used to compute any set of equally spaced samples of Fourier transform on the unit circle is

(A) DFT algorithm (B) FFT algorithm
(C) Goertzel algorithm (D) Chirp transform algorithm

26. Total number of complex multiplications required in radix -2 DIT-FFT algorithm is

(A) $\mathrm{N} \log_2 N$ (B) $\frac{\mathrm{N}}{2} \log_2 N$
(C) $\mathrm{N} \log_2 \frac{N}{2}$ (D) $\frac{\mathrm{N}}{2} \log_2 \frac{N}{2}$

27. The steady-state error of a feedback control system with an acceleration input becomes finite in a

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

28. Considering the root locus diagram for a system with $G(s) = \frac{K(s+5)}{s(s+2)(s+4)(s^2+2s+2)}$, the meeting point of the asymptotes on the real axis occurs at

(A) –1.2 (B) –0.85 (C) –1.05 (D) –0.75

29. If for a control system, the Laplace transform of error $e(t)$ is given as $\frac{8(s+3)}{s(s+10)}$ then the steady state value of the error works out as

(A) 3.6 (B) 1.8 (C) 3.2 (D) 2.4

30. The equation $2s^4 + s^3 + 3s^2 + 5s + 10 = 0$ has _____ roots in the left half of s–plane.

(A) one (B) two (C) three (D) four

31. Given a unity feedback control system with $G(s) = \frac{K}{s(s+4)}$, the value of K for a damping ratio of 0.5 is

(A) 1 (B) 16 (C) 32 (D) 64

32. The input to a controller is

(A) sensed signal (B) desired variable value

(C) error signal (D) servo-signal

33. If the Nyquist plot of the loop transfer function $G(s)H(s)$ of a closed-loop system encloses the $(-1,\ j0)$ point in the $G(s)H(s)$ plane, the gain margin of the system is

(A) zero (B) greater than zero

(C) less than zero (D) infinity

34. The transfer function of a phase-lead controller is given by

(A) $\frac{1+a\,Ts}{1+Ts}, a > 1,\ T > 0$ (B) $\frac{1+a\,Ts}{1+Ts}, a < 1,\ T > 0$

(C) $\frac{1-a\,Ts}{1+Ts}, a > 1,\ T > 0$ (D) $\frac{1-a\,Ts}{1+Ts}, a < 1,\ T > 0$

35. A system with gain margin close to unity or a phase margin close to zero is

(A) highly stable (B) oscillatory

(C) relatively stable (D) unstable

36. Peak overshoot of step-input response of an underdamped second-order system is explicitly indicative of

(A) settling time (B) rise time

(C) natural frequency (D) damping ratio

37. If the system matrix of a linear time invariant continuous system is given by $A = \begin{bmatrix} 0 & 1 \\ -3 & -5 \end{bmatrix}$, its characteristic equation is given by

(A) $s^2 + 5s + 3 = 0$ (B) $s^2 - 3s - 5 = 0$

(C) $s^2 + 3s + 5 = 0$ (D) $s^2 + 2s + 2 = 0$

38. A phase lag-lead network shifts the phase of a control signal in order that the phase of the output

(A) lags at low frequencies and leads at high frequencies relative to input
(B) leads at low frequencies and lags at high frequencies relative to input
(C) lags at all frequencies relative to input
(D) leads at all frequencies relative to input

39. The Bode plot of the transfer function $G(s) = s$ is

(A) constant magnitude and constant phase shift angle
(B) -20 dB/decade and constant phase shift angle
(C) 20 dB/decade and phase shift of $\pi/2$
(D) zero magnitude and phase shift

40. The state-variable description of a linear autonomous system is $\dot{\bar{X}} = A\bar{X}$, where X is a two-dimensional state vector and A is a matrix given by $A = \begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix}$. The poles of the system are located at

(A) –2 and +2 (B) –2j and +2j
(C) –2 and –2 (D) +2 and +2

41. 24 voice channels (4 KHz bandwidth) are sampled at 8 times the Nyquist rate and multiplexed. Each voice channel is delta modulated. 1 bit is added per frame for transmitting control information. What is the data rate of transmission ?

(A) 1.600 Mbps (B) 1.544 Mbps
(C) 2.048 Mbps (D) 1.536 Mbps

42. The characteristic of the channel resembles the filter shown in the figure 1. Find the time delay of the channel.

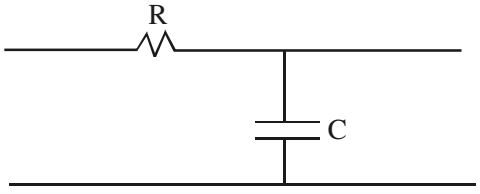


Figure 1

(A) $\frac{1}{2\pi f}\tan^{-1}\left(\frac{f}{2\pi RC}\right)$ (B) $2\pi f \tan^{-1}\left(\frac{f}{2\pi RC}\right)$

(C) $\frac{1}{2\pi f}\tan^{-1}(2\pi fRC)$ (D) $2\pi f \tan^{-1}(2\pi fRC)$

43. Let X be a continuous random variable with uniform PDF defined by $f_x(x) = \frac{1}{2\pi}$, for $0 < x < 2\pi$ and zero elsewhere. Find σ_x.

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{\sqrt{3}}$ (D) $\frac{\pi}{\sqrt{6}}$

44. The stationary process has

(A) ensemble average equal to time average

(B) all the statistical properties dependent on time

(C) all the statistical properties independent of time

(D) zero mean and zero variance

45. In a modulator, it is found that the amplitude spectrum of the signal at the output of the modulator consists of a component f_c, the carrier frequency and one component each at $f_c + f_m$ and $f_c - f_m$ where f_m is the modulating signal frequency. The modulator used is

(A) SSB (B) PAM (C) PCM (D) AM

46. A signal $X(t) = 4\cos 2\pi f_c t + 2\cos 4\pi f_c t + m(t)\cos 2\pi f_c t$ is applied to the system shown in Figure 2. What will be $Y(t)$?

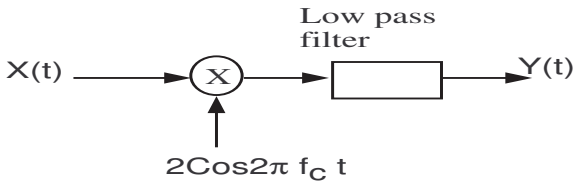


Figure 2

(A) $4m(t)\cos 4\pi f_c t$ (B) $4\cos 4\pi f_c t$

(C) $4 + m(t)$ (D) $4\,m(t)$

47. The power of an FM modulated signal with modulation index β and carrier $c(t) = A\cos 2\pi f_c t$ is

(A) $\frac{A^2}{2}$ (B) $\frac{A^2}{2}\left(1+\frac{\beta^2}{2}\right)$

(C) $\frac{A^2}{2}\left(1+\frac{\beta}{2}\right)$ (D) $A^2\left(1+\frac{\beta^2}{2}\right)$

48. If a Gaussian process $X(t)$ is applied to the stable linear filter, then the random process developed at the output of the filter will be

(A) Uniform (B) Exponential

(C) Gaussian (D) Rayleigh

49. Binary data is transmitted using PSK signaling scheme with $S_1(t) = A\cos\omega_c t$, $S_2(t) = -A\cos\omega_c t$, $0 \le t \le T_b$ where bit duration T_b is equal to 0.2 ns. The carrier frequency is $f_c = 5f_b$. The carrier amplitude at the receiver input is 1V and the power spectral density of the AWGN at the input is 10^{-11} W/Hz. The probability of error for the optimum filter will be

(A) erfc(5.5) (B) 0.5 erfc(5) (C) 0.5erfc($\sqrt{5}$) (D) erfc($\sqrt{5.5}$)

50. Which of the following is incorrect ?

(A) $H(y/x) = H(x,y) - H(x)$ (B) $I(x,y) = H(x) - H(y/x)$

(C) $H(x,y) = H(x/y) + H(y)$ (D) $I(x,y) = H(y) - H(y/x)$

51. The SSB-SC is used for the following application :

(A) Radio Broadcasting (B) Point to point communication

(C) Telegraphy and Telephony (D) TV transmitter

52. What does a logic 1 Delta Modulation (DM) bit indicate ?

(A) The message signal's amplitude is decreasing.

(B) The feedback signal's amplitude is greater than the message signal's amplitude.

(C) The feedback signal's amplitude is constant.

(D) The feedback signal's amplitude is less than the message signal's amplitude.

53. The asymptotic value of $\frac{E_b}{N_0}$ required to achieve the data rate equal to the channel capacity when the channel bandwidth tends to infinity is equal to

(A) -1.6 dB (B) -3 dB (C) 0 dB (D) infinite

54. The golden rule for encoding messages with unequal probabilities is to

(A) Encode a message with high probability by a longer code word.

(B) Encode all messages with equal length code.

(C) Encode a message with high probability by a shorter code word.

(D) Encode a message by arbitrary choosing variable length codes.

55. The output Signal to Noise Ratio, $(SNR)_o$ of matched filter depends only on

(A) ratio of input noise to output noise.

(B) ratio of output noise to power spectral density of white noise at input.

(C) ratio of signal energy to power spectral density of white noise at input.

(D) correlation of input signal to output signal.

56. In _____ multiple access is achieved by allocating different time slots for the different users.

(A) TDMA (B) CDMA (C) FDMA (D) FGMA

57. Cellular CDMA system uses what modulation method ?

(A) GFSK (B) ASK (C) QAM (D) BPSK

58. The only one signal waveform that produces zero inter symbol interference (ISI) is

(A) $\sin(2B_0t)$ (B) $\cos(2B_0t)$ (C) $\text{sinc}(2B_0t)$ (D) $\sin(B_0t)$

59. The length of antenna depends on

(A) wavelength of radiation (B) current distribution

(C) angle of radiation (D) area of cross-section

60. For a broad side linear array which of the following is not correct ?
(A) The maximum radiation occurs perpendicular to the line of the array at $\phi = 90^o$.
(B) The progressive phase shift (α) between elements is zero.
(C) Width of principal lobe is less than that of an end fire array.
(D) The maximum radiation occurs along the line of array at $\phi = 0^o$.

61. The phase velocity of waves propagating in a hollow metal waveguide is
(A) greater than the velocity of light in free space
(B) less than the velocity of light in free space
(C) equal to the velocity of light in free space
(D) equal to the group velocity

62. If the diameter of a $\lambda/2$ dipole antenna is increased from $\lambda/100$ to $\lambda/50$ then its
(A) bandwidth increases (B) bandwidth decreases
(C) gain increases (D) gain decreases

63. The directive gain cannot be stated as
(A) the ratio of the radiation intensity in that direction to the average radiated power
(B) the function of angles
(C) the directivity of an antenna when directive gain is maximum
(D) independent of angles

64. An electromagnetic wave has electric field component along Y-direction and magnetic field component along X-direction. The electromagnetic wave is propagating along
(A) Z-direction (B) X-direction
(C) Y-direction (D) XY-direction

65. The lower cut-off frequency of a rectangular wave guide with inside dimensions (3 × 4.5 cm) operating at 10 GHz is
(A) 10 GHz (B) 9 GHz (C) $\frac{10}{9}$ GHz (D) $\frac{10}{3}$ GHz

66. During night which layer does not exist?
(A) D layer (B) F_1 layer (C) F_2 layer (D) E layer

67. The dominant mode of rectangular waveguide is
(A) TE_{11} (B) TM_{11} (C) TE_{01} (D) TE_{10}

68. Vector potential is a vector
(A) whose curl is equal to the magnetic flux density
(B) whose curl is equal to the electric field intensity
(C) whose divergence is equal to the electric potential
(D) which is equal to the vector product E×H

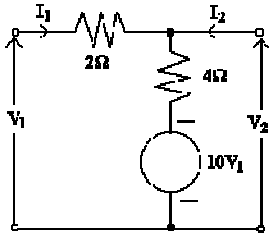
69. A uniform plane wave in air is incident normally on an infinitely thick slab. If the refractive index of the glass slab is 1.5, then the percentage of the incident power that is reflected from the air-glass interface is

(A) 0% (B) 4% (C) 20% (D) 10%

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

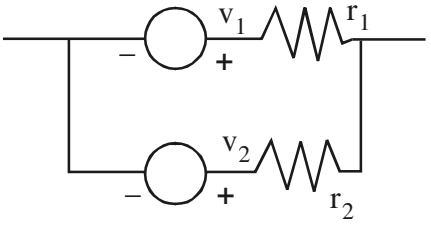
(A) a decrease in the value of reactance
(B) an increase in the value of reactance
(C) no change in the reactance value
(D) no change in the impedance value

71. The value of "Z_{22}" for the circuit shown below :



(A) 4/9 Ohms (B) 11/4 Ohms
(C) 4/11 Ohms (D) 9/4 Ohms

72. Two voltage sources, connected in parallel as shown in the below figure, must satisfy the conditions



(A) $v_1 \neq v_2$ but $r_1 = r_2$ (B) $v_1=v_2$ and $r_1 \neq r_2$
(C) $v_1=v_2$ and $r_1=r_2$ (D) $r_1 \neq 0$ or $r_2 \neq 0$ if $v_1 \neq v_2$

73. A composite voltage V = 10 sin100t + 10 cos100t is applied across a series combination of a capacitor of 1μf and resistance of 20 KΩ. The average power dissipation in the resistance is

(A) 5mW (B) 3.5mW (C) 2.5mW (D) 1.25mW

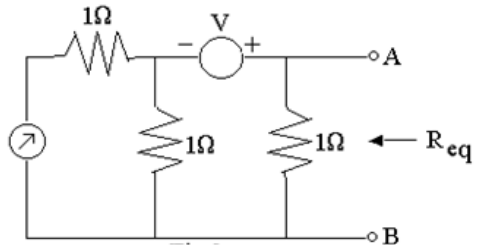
74. The driving point impedance function $Z(s) = \dfrac{s^2 + 2s + 2}{s^2 + s + 1}$ can be realized

(A) R-C Network (B) R-L Network
(C) L-C Network (D) R-L-C Network

75. A 100Ω, 1W resistor and 800Ω, 2W resistor are connected in series. The maximum DC voltage that can be applied continuously to the series circuit without exceeding the power limit of any of the resistors is

(A) 90 V (B) 50 V (C) 45 V (D) 40 V

76. The Thevenin's equivalent circuit to the left of AB in figure shown has R_{eq} is given by



(A) 1/3 Ohms (B) 3/2 Ohms (C) 1 Ohms (D) 1/2 Ohms

77. Under steady state condition

(A) Inductor acts as short and Capacitor acts as open
(B) Inductor acts as open and Capacitor acts as open
(C) Inductor acts as open and Capacitor acts as short
(D) Inductor acts as short and Capacitor acts as short

78. In the series RLC circuit, the power factor of the circuit at $f = f_L$ (Lower Frequency) and $f = f_0$ (resonance frequency)

(A) 0.707(lag), unity (B) unity, 0
(C) 0.707(lead), unity (D) 0, unity

79. Two coils are connected in series with inductance values of 16mH and 8mH.The value of mutual inductance is

(A) 12mH (B) 8mH (C) 2mH (D) 4mH

80. In parallel RLC circuit, if L=8H and C=2F then the value of critical resistance is

(A) 0.5 Ohms (B) 1 Ohm (C) 2 Ohms (D) 3 Ohms

81. The transient free condition in RL and RC circuits with AC excitation will not depend on

(A) Source frequency
(B) Initial phase of the excitation
(C) Maximum values of the excitation(*Voltage and Current*)
(D) Circuit constants(R,L, C)

82. A Unit impulse voltage is applied to one port network, which has two linear components. If the current through the network is 0 for *t<0* and decays exponentially for *t>0* then the network consists of

(A) Resistor and Inductor in series (B) Resistor and Inductor in parallel
(C) Resistor and Capacitor in parallel (D) Resistor and Capacitor in series

83. A graph of network has 4 nodes and 7 branches. The number of links(l), with respect to the chosen tree, would be

(A) 2 (B) 3 (C) 4 (D) 5

84. A network consists of a large number of ideal linear resistors (R) in series with two constant ideal sources. Power consumed by R is P1 when only the first source is active and P2 when only the second source is active. If both sources are active simultaneously, the power consumed by R is

(A) $P1 \pm P2$ (B) $\sqrt{P1} \pm \sqrt{P2}$

(C) $(\sqrt{P1} \pm \sqrt{P2})^2$ (D) $(P1 \pm P2)^2$

85. Choose the logic gate family which is having minimum propagation delay

(A) TTL (B) MOS (C) DTL (D) ECL

86. An 8085 microprocessor based system uses a 4K × 8 bit RAM with a starting address of AA00 H. The address of the last byte in this RAM is

(A) 0FFF H (B) 1000 H (C) B9FF H (D) BA00 H

87. How many memory IC's of capacity 2K × 4 are required to construct a memory capacity of 15K × 8 ?

(A) 14 (B) 15 (C) 16 (D) 18

88. The present output Q_n of an edge triggered JK flip-flop is logic 1. If k=1 then Q_{n+1}

(A) cannot be determined (B) will be logic '0'

(C) will be logic '1' (D) will be race around

89. A 12-bit (3-digit) DAC that uses the BCD input code has a full scale output of 9.99 V. The value of V_{out} for an input of 0110 1001 0101 is

(A) 4.11 V (B) 6.95 V (C) 7.38 V (D) 7.88 V

90. The starting address of below program is 0100 H

```
LXI SP, 00FF H
LXI H, 0701 H
MVI M, 20 H
MVI A, 20 H
SUB M
```

The content of accumulator when the program counter reaches 010B H is

(A) 20 H (B) 02 H (C) 00 H (D) FF H

91. A 1 micro-second pulse can be converted into a 1 milli-second pulse by using

(A) A Mono-stable multi-vibrator (B) An Astable multi-vibrator

(C) A Bi-stable multi-vibrator (D) A JK flip-flop

92. What is the maximum frequency with which a 4-bit binary ripple counter can work, if the propagation delay from CLK to Q of each flip-flop is 24 ns?
(A) 100 MHz (B) 96 MHz
(C) 10.4 MHz (D) 6.9 MHz

93. The Boolean function $f(w,x,y,z) = \sum m(5,7,9,11,13,15)$ is independent of variables
(A) w (B) x (C) y (D) z and x

94. The initial sequence of 4-bit Johnson counter is 1110, what will be the sequence after third clock pulse
(A) 1000 (B) 0001 (C) 1110 (D) 0011

95. The logic function (A+B)(A′ +B′) can be implemented by giving the inputs A and B to a two input
(A) NOR gate (B) NAND gate
(C) EX-NOR gate (D) EX-OR gate

96. The function $f(A,B,C,D) = \sum m(0,1,4,6,7,8,10,14,15)$, the number of prime implicants and essential prime implicants are
(A) 6, 1 (B) 6, 2 (C) 7, 1 (D) 7, 2

97. A 4.6 V is given as input to the counter type ADC and SAR type ADC then the digital output produced respectively
(A) 0100, 0100 (B) 0101, 0101
(C) 0100, 0101 (D) 0101, 0100

98. The current gain of a BJT drops at high frequencies because of
(A) Junction capacitances (B) Bypass capacitances
(C) Coupling capacitances (D) Parasitic capacitances

99. Which of the following fabrication is suitable for maintaining the PN junction area to the required accuracy?
(A) Grown junction type (B) Alloying
(C) Diffusion (D) Ion-implantation

100. Moore's law relates to
(A) Speed of operation of bipolar devices
(B) Speed of operation of MOS devices
(C) Power rating of MOS devices
(D) Level of integration of MOS devices

101. The value of transport factor in a BJT is effected by
(A) Doping of emitter (B) Width of collector
(C) Doping of base (D) Life time of minority carriers

102. Two 10 V identical zener diodes are connected back to back, the maximum voltage drop across the diodes when they are conducting is
(A) 20 V (B) 10 V (C) 10.6 V (D) 9.4 V

103. A PN junction exhibits a transition capacitive effect of several _____ farads in reverse bias, but may have many _____ farads of diffusion capacitance in the forward biased state.
(A) micro, pico (B) pico, micro (C) milli, milli (D) milli, micro

104. An amplifier has $R_i = 2$ KΩ and $R_0 = 40$ KΩ and $A_V = 90$. The amplifier is modified to provide 10% negative voltage feedback in series with input. The values of R_{if} and R_{of} respectively are(in ohms)
(A) 2K and 40K (B) 20K and 4K
(C) 16K and 5K (D) 0.2K and 400K

105. Class-A power amplifier delivers 10W to a load with input signal power of 200mW. The power gain is
(A) 200 (B) 10 (C) 50 (D) 20

106. Transistor has $h_{fe} = 50$, its h_{fc} =
(A) –50 (B) 50 (C) –51 (D) 51

107. A cascade amplifier has higher cut off frequency
(A) Equal to that of single stage amplifier
(B) Less than that of single stage amplifier
(C) More than that of single stage amplifier
(D) Becomes double

108. An ideal current controlled voltage source has
(A) R_i is infinity, R_0 is zero (B) R_i is zero, R_0 is infinity
(C) R_i is zero, R_0 is zero (D) R_i is infinity , R_0 is zero

109. The current density of electrons through any conductor carrying current is given by
(A) $j_0 = \frac{ne^2\tau}{m}E$ (B) $j_0 = \frac{ne\tau}{m}E$ (C) $j_0 = \frac{ne^2\tau}{mE}$ (D) $j_0 = \frac{n^2e\tau}{m}E$

110. In BJT, Sensitivity of β (common emitter current gain) with respect to α (common base current gain) is
(A) $\frac{1}{1+\beta}$ (B) $1+\beta$ (C) $\frac{1}{1+\alpha}$ (D) 1

111. A differential amplifier has a differential gain of 20000 and CMRR = 80dB. Common mode gain is
(A) 2 (B) 1 (C) 0.5 (D) 0

112. Which of the following h-parameters relations is incorrect ?

(A) $h_{ic} = h_{ie}$ (B) $h_{rc} = 1 - h_{re}$

(C) $h_{fc} = 1 + h_{fe}$ (D) $h_{oc} = h_{oe}$

113. Which of the following is true for n type semiconductor ?

(A) $n = N_d + p$ (B) $N_d + n = p$

(C) $n + p = N_d$ (D) $N_a + n = p$

114. If 10 V is the peak voltage across the secondary of the transformer in a half wave rectifier with capacitive filter, peak inverse voltage of the diode will be

(A) 20 V (B) 14.14 V (C) 10 V (D)7.8 V

115. The condition of sustained oscillation in BJT phase shift oscillator is given by

(where $K = \frac{R_c}{R}$ and R_c is collector resistance)

(A) $h_{fe} > 23 + \frac{29}{K} + 4K$ (B) $h_{fe} > 29 + \frac{23}{K} + 4K$

(C) $h_{fe} > 23 + \frac{4}{K} + 29K$ (D) $h_{fe} > 29 + \frac{4}{K} + 23K$

116. A CE amplifier has R_L =1000 Ω and R_e = 100 Ω and h_{fe}=99, h_{ie}=1000 Ω; the input resistance R_i is given approximately by

(A) 100 Ω (B) 10 KΩ (C) 1000 Ω (D) 11 K Ω

117. When an electron moves through a potential difference of 10 V, the energy acquired by it will be

(A) 10 joules (B) 16×10^{-19} eV

(C) 1.6×10^{-19} eV (D) 10 eV

118. Which of the following represents the Cascade configuration?

(A) CE – CE (B) CE – CB (C) CC – CC (D) CE – CC

119. Condition for the minimum conductivity for the semiconductor

(A) $n = \eta_i \sqrt{\frac{\mu_n}{\mu_p}}$ (B) $n = \eta_i \sqrt{\frac{\mu_p}{\mu_n}}$ (C) $n = \eta_i \frac{\mu_n}{\mu_p}$ (D) $n = \eta_i \frac{\mu_p}{\mu_n}$

120. The scaling factor of an MOS device is α using constant voltage scaling model, the gate area of the device will be scaled by

(A) 1/α (B) $1/\alpha^2$ (C) $1/\alpha^3$ (D) $1/\alpha^4$

SPACE FOR ROUGH WORK