## Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2023

## CSS

## ELECTRONICS WITH SPECIALIZATION IN OPTO ELECTRONICS/ELECTRONICS WITH SPECIALIZATION IN ARTIFICAL INTELLIGENCE <br> $\qquad$

## General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be $(\checkmark)$ 'tick marked' only in the "Response Sheet" provided.
3. Negative marking : $\mathbf{0 . 2 5}$ marks will be deducted for each wrong answer .

Time : 2 Hours

To be filled in by the Candidate

| Register <br> Number | in Figures |  |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  | in words |  |  |  |  |  |  |  |  |

Choose appropriate answer from the options in the questions.

$$
\text { (100 } \times 1=100 \text { marks) }
$$

1. Which of the following is not a valid rule of Boolean algebra
a) $(A+B)(A+C)=A+B C$
b) $A+A B=A$
c) $A+\bar{A} B=B$
d) $A+1=1$

2. Generally, a multiplexer has
a) One data input and one data output
b) Several data inputs and several data outputs
c) Several data inputs and one data output
d) One data input and several data outputs
3. Which of the following flip-flop has only one input
a) S-R flip-flop
b) J-K flip-flop
c) D flip-flop
d) None of these
4. Which of the following equation does not satisfy De Morgan's theorem
a) $\overline{A B}=\bar{A}+\bar{B}$
b) $\overline{A+B+C}=\bar{A} \bar{B} \bar{C}$
c) $\overline{A+B C}=\bar{A}(\bar{B}+\bar{C})$
d) None of these
5. The counter which is characterized by ten states is
a) Ripple counter
b) Modulus counter
c) Decade counter
d) Multiple clock counter
6. Flip-flops belongs to $\qquad$ category of logic circuit.
a) Monostable multivibrator
b) One shots
c) Astable multivibrator
d) Bistable multivibrator
7. A 4-MOD-ripple counter has $\qquad$ number of states.
a) 10
b) 4
c) 16
d) 8
8. The bus used by a microprocessor to communicate with external devices is
a) Control bus
b) Data bus
c) Address bus
d) None of these
9. A form of computer program language in which statements expressed in mnemonics is
a) C language
b) Java language
c) Assembly language
d) All of these
10. The storage capacity of a register consisting of 8 flip-flops is
a) 2 bits
b) 4 bits
c) 16 bits
d) 8 bits
11. Which of the following belongs to basic element of a microprocessor
a) Arithmetic logic unit
b) Register
c) Control unit
d) All of these
12. Which of the following boolean expression corresponds to $\bar{A}+B+A$
a) $\bar{B} A+B$
b) $A \bar{B}+B A$
c) $B$
d) 1
13. How does a synchronous counter differ from an asynchronous counter
a) In the method of clocking
b) In the value of modulus
c) In the type of flip flop used
d) In the number of states in its sequence
14. An operational amplifier is $\qquad$ coupled high-gain amplifier.
a) RC coupled
b) Transformer coupled
c) Direct coupled
d) None of these
15. Which of the following is not an ideal characteristics of an opamp
a) Infinite voltage gain
b) Zero output resistance
c) Infinite bandwidth
d) Zero common mode rejection ratio
16. The relation between the closed loop voltage gain $\left(A_{F}\right)$, open loop voltage gain $(A)$, and the feedback circuit gain $(B)$ of a voltage-series feedback operational amplifier is
a) $\quad A_{F}=\frac{A K}{1+A B}$
b) $\quad A_{F}=\frac{A B}{1+A}$
c) $\quad A_{F}=\frac{A}{1+A B}$
d) None of these
17. Which of the following sentence is not true for an operational amplifier as an integrator
a) Square wave input signal will be converted into cosine wave
b) Square wave input signal will be converted into sine wave
c) Sine wave input signal will be converted into cosine wave
d) None of these
18. Which of the following sentence is correct about Butterworth filter
a) It has a flat passband and stopband
b) It has ripple passband and ripple stopband
c) It has ripple passband and flat stopband
d) It has flat passband and ripple stopband
19. How the quality factor $Q$ of a band filter depends on the central $\left(f_{c}\right)$, lower cutoff $\left(f_{L}\right)$, and higher cutoff $\left(f_{H}\right)$ frequencies
a) $Q=\frac{f_{L}}{f_{C}-f_{H}}$
b) $Q=\frac{f_{C}}{f_{L}-f_{H}}$
c) $Q=\frac{f_{C}}{f_{H}-f_{L}}$
d) None of these
20. Which of the following is the characteristics of a comparator
a) Speed of operation
b) Accuracy
c) Compatibility of output
d) All of these
21. The resolution of an 8-bit digital to analog converter is
a) $1 / 4$
b) $1 / 8$
c) $1 / 64$
d) $1 / 256$
22. Which of the following represent a type of analog to digital converter
a) Single-ramp integrating
b) Single counter
c) Successive approximation
d) All of these
23. A rectangle of cross sectional area $A$ is placed in an uniform electric field $\vec{E}$. If normal to the area of the coil makes an angle of $90^{\circ}$ with the electric field, then the electric field through the rectangle is
a) $\vec{E}$
b) $\vec{A} \cdot \vec{E}$
c) $\frac{\vec{A} \cdot \vec{E}}{n}$
d) Zero
24. The energy of an electromagnetic wave in vacuum is
a) $\frac{E^{2}}{2 \epsilon_{0}}+\frac{B^{2}}{2 \mu_{0}^{2}}$
b) $\frac{1}{2} \epsilon_{0} E^{2}+\frac{1}{2} \mu_{0} B^{2}$
c) $E^{2}+B^{2}$
d) $\frac{1}{2} \epsilon_{0} E^{2}+\frac{B^{2}}{2 \mu_{0}}$
25. The Lorentz gauge condition is given by
a) $\vec{\nabla} \cdot \vec{A}-\mu \in \frac{\partial \phi}{\partial t}=0$
b) $\vec{\nabla} \cdot \vec{A}+\mu \in \frac{\partial \phi}{\partial t}=0$
c) $-\vec{\nabla} \cdot \vec{A}+\mu \in \frac{\partial \phi}{\partial t}=0$
d) $\vec{\nabla} \cdot \vec{A}-\frac{\in}{\mu} \frac{\partial \phi}{\partial t}=0$
26. The packing fraction of a body centered cubical lattice with lattice constant $a=5 A^{\circ}$ is
a) $60 \%$
b) $72 \%$
c) $68 \%$
d) $58 \%$
27. The Miller indices of plane parallel to $Y-Z$ plane with $X$ intercept $=1$ in the form of $(h, k, l)$ is
a) $(\infty, \infty, 0)$
b) $(0,0,1)$
c) $(1, \infty, \infty)$
d) $(1,0,0)$
28. The density of silicon with lattice constant $a=5.43 A^{\circ}$ and atomic weight 28.1.is
a) $25.8 \mathrm{gm} / \mathrm{cm}^{2}$
b) $3.8 \mathrm{gm} / \mathrm{cm}^{2}$
c) $2.33 \mathrm{gm} / \mathrm{cm}^{2}$
d) $8.4 \mathrm{gm} / \mathrm{cm}^{2}$
29. The drift velocity of a carriers in a semiconductor per applied electric field is known as
a) Displacement current
b) Mobility
c) Permeability
d) Polarizability
30. The luminescence occurs due to the recombination of holes in the valence and electrons in the conduction band is known as
a) Photo-luminescence
b) Electro-luminescence
c) Fluorescence
d) Cathodo-luminescence
31. The voltage developed across a semiconductor when it is subjected to mutually perpendicular electric voltage V and magnetic field $B$ is known as
a) Zener voltage
b) Stopping potential
c) Knee voltage
d) Hall voltage
32. The phenomenon of releasing large amount of electrons when a strong electric field is applied across a heavily doped PN diode is known as
a) Avalanche breakdown
b) Impact ionization
c) Zener breakdown
d) None of these
33. Which of the following experiment does not use Bragg's Law as basic principle to determine crystal structure
a) Laue method
b) Rotating crystal method
c) Hull method
d) Quincke's method
34. Determine the speed of neutrons, if the Bragg's angle is $30^{\circ}$ and interatomic spacing $d=3.84 A^{\circ}$ for order $n=1$
a) $1.2 \times 10^{5} \mathrm{~cm} / \mathrm{s}$
b) $2.8 \times 10^{5} \mathrm{~cm} / \mathrm{s}$
c) $1.83 \times 10^{5} \mathrm{~cm} / \mathrm{s}$
d) $5.2 \times 10^{5} \mathrm{~cm} / \mathrm{s}$
35. If the potential energy of a system is $\phi(r)=\frac{-\alpha}{r^{6}}+\frac{\beta}{r^{12}}$, then determine the inter molecular seperation $r_{0}$ for which potential energy is minimum
a) $\left(\frac{2 \beta}{\alpha}\right)^{1 / 6}$
b) $\left(\frac{\beta}{\alpha}\right)^{1 / 6}$
c) $\left(\frac{2 \alpha}{\beta}\right)^{1 / 6}$
d) $\left(\frac{2 \beta}{\alpha}\right)^{1 / 3}$
36. Which of the following expression represents Debye temperature, if $v_{D}$ represents debye frequency
a) $\frac{k v_{D}}{h}$
b) $\frac{h v_{D}}{k}$
c) $\frac{v_{D}}{k h}$
d) $k h v_{D}$
37. The Einstein's temperature for Einstein's frequency $9 \times 10^{11} \mathrm{~Hz}$ is
a) 20 K
b) 43 K
c) 56 K
d) 60 K
38. Which model says that the potential energy of an electron while moving in an one dimentional crystal lattice is in the form of rectangular waves
a) Bohr model
b) Debye model
c) Kronig-Penny model
d) Schrodinger model
39. The electronic polarizability $\alpha_{e}$ of a mono-atomic gas atom is
a) $4 \pi \epsilon_{0}$
b) $4 \pi \in_{0} R$
c) $4 \pi \in_{0} R^{2}$
d) $4 \pi \in_{0} R^{3}$
40. The potential energy of a system of 2 particles is given by $V=\frac{-m}{r^{2}}+\frac{m}{r^{8}}$ where $r$ is the distance between the particle and $m$ and $n$ are positive constants. The expression for $r$ in terms of $m$ and $n$ where potential energy is minimum is
a) $r_{0}^{3}=2 \sqrt{\frac{n}{m}}$
b) $r_{0}^{3}=2 \frac{n}{m}$
c) $\quad r_{0}^{2}=8 \frac{n}{m}$
d) $\quad r_{0}^{2}=4 \frac{n}{m}$
41. The work done on a charge by EM force is equal to the decrese in energy stored in the field, less the energy which flowed out through the surface is the statement of
a) Gauss's theorem
b) Stoke's theorem
c) Poyenting theorem
d) Divergence theorem
42. If the vector potential $\vec{A}_{(x, y, z)}=-y \hat{i}+2 x \hat{j}$, then the corresponding magnetic field associated with it is
a) $\hat{i}+\hat{k}$
b) $3 \hat{k}$
c) $-\hat{i}+2 \hat{j}$
d) $-\hat{i}+\hat{j}+\hat{k}$
43. The frequency $(\omega)$ dependence of power radiated by an electric dipole is
a) $\omega$
b) $\omega^{2}$
c) $\omega^{3}$
d) $\omega^{4}$
44. Which of the following Maxwell's equation is independent of nature of medium
a) $\vec{\nabla} \cdot \vec{B}=0$
b) $\vec{\nabla} \cdot \vec{E}=\frac{\rho}{\epsilon_{0}}$
c) $\vec{\nabla} \times \vec{E}=\frac{\partial \vec{B}}{\partial t}$
d) $\vec{\nabla} \times \vec{B}=\mu_{0} \vec{J}+\mu_{0} \epsilon_{0} \frac{\partial \vec{E}}{\partial t}$
45. The polarizability of a conducting sphere placed in uniform electric field is __ the product of permitivity in free space and the volume of the sphere.
a) Twice
b) Thrice
c) Four times
d) None of these
46. If $\epsilon_{0}, \epsilon_{r}$ and $\alpha$ are the permitivity of free space, relative permitivity, and the polarizability respectively, then $\frac{\epsilon_{r}-1}{\epsilon_{r}+1}=\frac{N \alpha}{3 \epsilon_{0}}$ is known as $\qquad$ relation.
a) Lorentz
b) Clausius-Mossotti
c) Einstein
d) Coulomb
47. Which of the following relation is true, if an electromagnetic wave is described by an electric field $\vec{E}=\vec{E}_{0} \sin (k x-\omega t)$ and magnetic field $\vec{B}=\vec{B}_{0} \sin (k x-\omega t)$
a) $E_{0} k=B_{0} \omega$
b) $E_{0} B_{0}=\omega k$
c) $E_{0} \omega=B_{0} k$
d) None of these
48. The polariability of a dielectric $\alpha_{e}$ is
a) Increases with temperature
b) Decreases with temperature
c) Independent of temperature
d) None of these
49. What is the magnetic field inside a hollow cylinder with radius ' $a$ ' along the parallel axis, if the current flowing along the surface of the cylinder is I
a) $\frac{\mu_{0} I}{2 \pi a}$
b) $\frac{1}{a}$
c) zero
d) $\frac{1}{\pi a^{2}}$
50. If current $I$ is flowing through an infinitely along straight wire, then magnetic field induced at a distance $d$ is given by
a) $\frac{\mu_{0}}{4 \pi} \hat{k}$
b) $\frac{\mu_{0}}{4 \pi} \frac{2 l}{d} \hat{k}$
c) $\frac{\mu_{0}}{4 \pi} \frac{l}{d}$
d) None of these
51. Which of the following function of complex variable $z=x+i y$ is analytic
a) $|z|$
b) $\operatorname{Re}(z)$
c) $\log z$
d) $z^{-1}$
52. The residue of function $\frac{z}{(z-a)(z-b)}$ at infinity is
a) $\frac{a}{b}$
b) $\frac{-b}{a}$
c) -1
d) 1
53. What is the value of ' $a$ ', if the vectors $2 \hat{i}-\hat{j}+\hat{k}, \hat{i}+2 \hat{j}-3 \hat{k}$ and $3 \hat{i}+a \hat{j}+5 \hat{k}$ are coplanar
a) -4
b) 4
c) 2
d) -2
54. The solution of the differential equation $\frac{d^{2} y}{d x^{3}}+6 \frac{d^{2} y}{d x^{2}}+11 \frac{d y}{d x}+6 y=0$ are
a) $e^{x}, e^{2 x}$ and $e^{3 x}$
b) $e^{-x}, e^{-2 x}$ and $e^{-3 x}$
c) $\frac{1}{x}, x^{2}$ and $x^{3}$
d) $\sin x, \cos 2 x$ and $\cos 3 x$
55. If the laplace transform of function $f(t)=\sin \pi t$ is $F(s)=\frac{\pi}{s^{2}+\pi^{2}}, S>0$ then laplace transform of $t \sin \pi t$ is
a) $\frac{\pi}{s^{2}\left(s^{2}+\pi^{2}\right)}$
b) $\frac{2 \pi}{s^{2}\left(s^{2}+\pi^{2}\right)^{2}}$
c) $\frac{2 \pi s}{\left(s^{2}+\pi^{2}\right)^{2}}$
d) $\frac{2 \pi}{\left(s^{2}+\pi^{2}\right)^{2}}$
56. The laplace transform of $t \sin a t$ is
a) $\frac{2 a s}{\left(s^{2}+a^{2}\right)^{2}}$
b) $\frac{2 a}{\left(s^{2}+a^{2}\right)^{2}}$
c) $\frac{2 s}{\left(s^{2}+a^{2}\right)^{2}}$
d) $\frac{a}{\left(s^{2}+a^{2}\right)^{2}}$
57. Which of the following represents the Fourier transform of function $f(a t)$
a) $a F(\omega)$
b) $\frac{2}{a} F(\omega)$
c) $\frac{1}{a} F\left(\frac{\omega}{a}\right)$
d) None of these
58. Let $P_{n}(x)$ is the Legendre polynomial of order $n$, then $3 x^{2}+3 x+1$ can be expressed as
a) $2 P_{2}+3 P_{1}$
b) $4 P_{2}+2 P_{1}+P_{0}$
c) $3 P_{2}+3 P_{1}+P_{0}$
d) $2 P_{2}+3 P_{1}+2 P_{0}$
59. What is the period of the signal $x(t)=8 \sin \left(0.8 \pi t+\frac{\pi}{4}\right)$
a) $0.4 \pi \mathrm{~s}$
b) $0.8 \pi s$
c) $1.25 \pi \mathrm{~s}$
d) 2.5 s
60. The Fourier transform of the Kronecker $\delta$ function is proportional to
a) 0
b) 1
c) $\sin k$
d) ik
61. The eigen value of matrix $A=\left[\begin{array}{ccc}0 & 2 i & 3 i \\ -2 i & 0 & 6 i \\ -3 i & -6 i & 0\end{array}\right]$ are
a) $-5,-2,7$
b) $-7,0,7$
c) $-4 i, 2 i, 2 i$
d) $2,3,6$
62. The number of photons released from a laser beam of power 1 mW and wavelength $6328 A^{\circ}$ is
a) $4.5 \times 10^{15}$
b) $3.18 \times 10^{15}$
c) $2.3 \times 10^{15}$
d) $1.68 \times 10^{10}$
63. The minimum number of $\mathrm{Cr}^{3+}$ ions in a ruby laser with wavelength 694 nm and emits 1 J pulses of light is
a) $5.59 \times 10^{18}$
b) $3.49 \times 10^{18}$
c) $1.39 \times 10^{15}$
d) $1.18 \times 10^{18}$
64. What will be the equilibrium ratio of population of upper and lower energy levels of a 3-level laser with wavelength $5500 A^{\circ}$ at 300 K in the absence of pumping.
a) $2.24 \times 10^{-38}$
b) $1.32 \times 10^{-38}$
c) $4.92 \times 10^{-38}$
d) $1.68 \times 10^{-38}$
65. Which of the following represents the energy band gap of a semiconductor laser whose peak emission wavelength is $1.25 \mu \mathrm{~m}$
a) 3 eV
b) 2 eV
c) 1 eV
d) 6 eV
66. What is the time required for the current to attain $75 \%$ of its value, if an e.m.f. 10 V is applied to a circuit having resistance $20 \Omega$ and inductance 1 H .
a) 0.87 s
b) 0.0893 s
c) 0.0693 s
d) 0.19 s
67. The expression for the transient power when a current is flowing in an LR circuit is
a) $I_{0}^{2} R\left(1-e^{-\frac{R t}{L}}\right)$
b) $\quad I_{0}^{2} R\left(1-e^{-\frac{L t}{R}}\right)$
c) Zero
d) $I_{0}^{2} R\left(1-e^{-\frac{R}{L t}}\right)$
68. What is the maximum value of resistance for a circuit with inductance $L=0.5 \mathrm{H}$ and capacitance $C=0.002 \mu F$ to be oscillatory
a) $2.8 \times 10^{4} \Omega$
b) $6.5 \times 10^{4} \Omega$
c) $7.8 \times 10^{4} \Omega$
d) $3.162 \times 10^{4} \Omega$
69. The oscillation frequency of electromagnetic waves in an LC circuit is
a) $\sqrt{2 \pi L C}$
b) $\frac{1}{\sqrt{2 \pi L C}}$
c) $2 \pi \sqrt{L C}$
d) $\frac{1}{2 \pi \sqrt{L C}}$
70. The time constant of a resistor-capacitor circuit is defined as the time taken by the charge to fall from maximum to $\qquad$ of its value.
a) 0.693
b) 0.707
c) 0.368
d) 0.623
71. $\qquad$ is used to represent arithmetic operations in flow chart.
a) Diamond boxes
b) Rectangles
c) Parallelograms
d) Rectangles with rounded corners
72. Scanf( ) is a predefined function in $\qquad$ header file in C language.
a) stdlib.h
b) stdio.h
c) math.h
d) none of these
73. Which of the following is an example of iteration in C language.
a) For Loop
b) While Loop
c) Do-while Loop
d) All of these
74. Which of the following represents the process of creating an integrated circuit
a) MSI
b) VSLI
c) SLSI
d) All of these
75. If the input signal voltage of a common emitter transistor increases in the positive direction, then the output voltage is
a) increase in the positive direction
b) decrease in the positive direction
c) increase in the negative direction
d) decrease in the negative direction
76. On the basis of what transistors are classified into class $A$, class $B$ and class $C$ amplifiers
a) According to the usage
b) According to the frequency
c) According to the coupling
d) According to the mode of operation
77. The range of frequency over which the gain is equal to or greater than
$\qquad$ of the maximum gain is known as bandwidth of a transistor.
a) $69.3 \%$
b) $70.7 \%$
c) $65.8 \%$
d) $80.2 \%$
78. Which of the following sentence is not true for designing a perfect power transistor amplifier
a) RC coupling is used
b) Size of the power transistor is made large
c) Transformer coupling is used
d) Base current amplification factor is low
79. The base current of a common base connection transistor with $\alpha=0.95$ is
$\qquad$ if the voltage drop across the resistor $2 \mathrm{k} \Omega$ which is connected across collector is 2 V .
a) 0.8 mA
b) $\quad 0.19 \mathrm{~mA}$
c) 0.6 mA
d) 0.05 mA
80. Consider a transistor which uses potential divider method of biasing with $R_{1}=50 \Omega, R_{2}=10 \Omega$ and $R_{E}=1 \mathrm{k} \Omega$. The value of collector current is
$\qquad$ if $V_{C C}=12 \mathrm{~V}$ and $V_{B E}=0.1 \mathrm{~V}$
a) 2.9 mA
b) 3.8 mA
c) 1.9 mA
d) 0.6 mA
81. The gain of multistage amplifier is equal to $\qquad$ of gains of individual stages.
a) sum
b) difference
c) product
d) half
82. The frequency of Colpitt's oscillator is
a) $\frac{1}{2 \pi \sqrt{L C_{1} C_{2} /\left(C_{1}+C_{2}\right)}}$
b) $\frac{1}{2 \pi \sqrt{L\left(C_{1}+C_{2}\right) /\left(C_{1} C_{2}\right)}}$
c) $\frac{1}{2 \pi \sqrt{L\left(C_{1}+C_{2}\right)}}$
d) $\frac{1}{2 \pi \sqrt{L C_{1} / C_{2}\left(C_{1}+C_{2}\right)}}$
83. Which of the following is the most frequently used audio oscillator
a) Hartley oscillator
b) Phase shift oscillator
c) Wein Bridge oscillator
d) Colpitt's oscillator
84. The overall gain of a multistage amplifier is 140 . If the gain is reduced to 17.5 when negative voltage feed back is applied, then the fraction of output that is fed back to the input is
a) 0.01
b) 0.05
c) 0.1
d) 0.08
85. $\qquad$ is a semiconductor device in which output current is controlled by applied electric field.
a) JFET
b) MOSFET
c) None of these
d) Both of these
86. Which of the following sentence is not true for JFET
a) It has very high input impedance
b) It has low power gain
c) It has a smaller size
d) None of these
87. Which of the following sentence is true in the case of a Silicon Controlled Rectifier (SCR)
a) It is used in switching dc and ac
b) It acts as a rectifier
c) It is also known as thyristor
d) All of these
88. The minimum forward voltage at which a Silicon Controlled Rectifier conducts heavily without gate voltage is
a) Avalanche breakdown
b) Peak reverse voltage
c) Breakover voltage
d) None of these
89. The 8085 is an $\qquad$ bit general purpose microprocessor.
a) 2
b) 4
c) 6
d) 8
90. Perform the subtraction $64.25-32.5$ in the binary number system.
a) 000111.10
b) 011111.11
c) 0011111.11
d) 000001.11
91. Convert $72_{8}$ into binary
a) $11111_{2}$
b) $111010_{2}$
c) $00111_{2}$
d) $1111100_{2}$
92. Convert 0.1011 binary number to its equivalent decimal number
a) $\left(\frac{11}{16}\right)_{10}$
b) $\quad 25_{10}$
c) $\left(\frac{16}{11}\right)_{10}$
d) $\left(\frac{14}{16}\right)_{10}$
93. Which of the following logic gate has two low input signals and only one high output signal
a) NAND
b) NOR
c) AND
d) $O R$
94. The relation between the base current amplification factor $(\beta)$ and emitter carried amplification factor $(\alpha)$ of a transistor is
a) $\beta=\frac{1}{(1-\alpha)}$
b) $\beta=\frac{\alpha}{(1-\alpha)}$
c) $\beta=\frac{(1-\alpha)}{(\alpha)}$
d) None of these
95. The rate of change of collector current $I_{C}$ with respect to the collector leakage current $I_{\text {CBO }}$ at constant $\beta$ and $I_{B}$ is known as
a) Current amplification factor
b) Stability factor
c) Weight factor
d) Lande g factor
96. Which of the following does not represent Barkhausen's Criterian for oscillation
a) The Loop gain must be unity
b) The loop gain must be greater than unity
c) The feedback signal feeding back at the input must be phase-shifted by $360^{\circ}$
d) The feedback signal feeding back at the input must be phase-shifted by $180^{\circ}$
97. $\qquad$ states that the any linear active network without terminals can be replaced by a single voltage source in series with a single impedance.
a) Kirchhoff's circuit laws
b) Norton's theorem
c) Thevenin's theorem
d) Tellegen's theorem
98. Kronecker Delta function is
a) mixed tensor of the second rank
b) covarient tensor
c) contravarient tensor
d) mixed tensor of the rank one
99. The solution of the differential equation $\frac{d y}{d x}+2 x y=2 e^{-x^{2}}$ is
a) $y=2 x+C e^{-x^{2}}$
b) $\quad y=(2 x+C) e^{-x^{2}}$
c) $y=x+C e^{-x^{2}}$
d) $y=C e^{-x^{2}}$
100. A linear vector space $V$ is a set over field $F$, such that elements of $V_{n}$ obey certain mathematical operations like
a) Addition
b) Multiplication
c) Both (a) and (b)
d) None of these

## ANSWER SHEET

|  | A | B | C | D | E | 26 | A |  | B | C D |  | E |  | A | A B | C | D |  |  |  | 6 | A B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | A | B | C | D | E | 27 | A | A ${ }^{\text {B }}$ | B | C D | D | E | 52 | A | A B | C | D |  | E | 77 | A | A B | C | D | E |
| 3 | A | B | C | D | E | 8 | A | A | B | C D | D | E | 53 | A | A B | C | D |  | E | 78 | A | A B | C | D | E |
| 4 | A | B | C | D | E | 9 | A |  | B | C D | D | E | 4 | A | A B | C | D | D | E |  | A | A B | C | D | D |
| 5 | A | B | C | D | E | 30 | A |  | B | C D | D | E | 5 | A | A B | C | D |  | E |  | A | A B | C | D | E |
| 6 | A | B | C | D | E | 31 | A | A | B $C$ | C D | D | E | , | A | A B | C | D | D | E | 81 | A | A B | C | D | E |
| 7 | A | B | C | D | E | 32 | A | A | B $C$ | C D | D | E |  | A | B | C | D | D |  |  | 2 | A B | C | D | E |
| 8 | A | B | C | D | E | 3 | A | A | B | C D | D | E |  | A | B | C | D | D |  |  | A | A | C | D | E |
| $9$ | A | B | C | D | E | 34 | A | B | B | C D |  | E |  | A | B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C D | D | E | 35 | A |  | B $C$ | C D | D | E |  | A | A B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C | D | E | 36 | A | B | B $C$ | C D | D | E |  | A | A B | C | D |  |  |  | A | A B | C | D | D |
|  | A | B | C | D | E | 37 | A | A | B | C D |  | E | 62 | A | A B | C | D |  |  |  | A | A B | C | D | E |
|  | A | B | C | D | E | 38 | A | B | B ${ }^{\text {C }}$ | C D |  | E | 63 | A | A B | C | D |  |  | 88 | A | A B | C | D | E |
|  | A | B | C | D | E | 39 | A | B | B | C D |  | E | 64 | A | A B | C | D | D | E | 89 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | $B$ | C D |  | E |  | A | A B | C | D | D |  | 90 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B | C D |  | E |  | A | A B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B C | C D |  | E |  | A | A B | C | D | - | E | 92 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A B | C | D | D | E | 93 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A B | C | D |  | E |  |  | A B | C | D | E |
|  | A | B | C | D | E |  |  |  | B C | C D |  | E |  | A | A $\mathrm{B}^{\prime}$ | C | D |  |  | 95 |  | A B | C | D | E |
|  | A | B | C | D | E | 46 |  |  | B C | C D |  | E |  | A | A B | C | D |  |  | 96 |  | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B | C D |  | E |  | A | A B | C | D |  |  | 97 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A $\mathrm{B}^{\prime}$ | C | D |  |  | 98 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B C | C D |  | E |  | A | A B | C | D |  |  | 99 | A | A B | C | D | E |
|  | A | B | C | D | E |  |  |  | B C | C D |  | E |  |  | A ${ }^{\text {B }}$ | C | D |  |  |  | 0 | A B | C | D | E |

