

PGCET-2022

Seat No. _____

SUB: ELECTRONICS & COMM. ENGINEERING (EC)

Time: 1 Hour 30 minutes

Instructions:

1. Ensure that all pages are printed.
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed

1.	Energy band-gap of Germanium (Ge) is			
	A	1.42	B	1.12
	C	0.67	D	0.32
2.	An ideal current source has			
	A	Zero internal resistance	B	Infinite internal resistance
	C	A load-dependent voltage	D	A load-dependent current
3.	As per the ideal diode approximation, the cut-in voltage of a silicon diode is			
	A	0 V	B	0.7 V
	C	More than 0.7 V	D	1 V
4.	Carrier lifetime for holes and electrons in a semiconductor ranges from			
	A	Milliseconds to hundreds of nanoseconds	B	Microseconds to seconds
	C	Nanoseconds to hundreds of microseconds	D	Nanoseconds to thousands of milliseconds
5.	The Hall effect is used to determine the			
	A	Only the carrier concentration of semiconductors	B	Current flowing across a semiconductor
	C	Type of semiconductor and carrier concentration	D	None of the above
6.	If doping of p -region is more than doping of n -region in a p - n junction diode, then the depletion layer width will be			
	A	Larger in p -region compared to n -region	B	smaller in p -region compared to n -region
	C	Same in both the region	D	None of the above
7.	Which of the following is not true about the threshold voltage (V_T) in a MOSFET electronic circuit?			
	A	If V_T is less, channel forms quickly for conductivity	B	V_T can be reduced by reducing oxide layer thickness
	C	V_T can be reduced by reducing substrate doping	D	V_T is independent of ion implantation
8.	In order to act as a switch, among the following, BJT should avoid which region of conduction?			
	A	Active	B	Cut-off
	C	Saturation	D	Any of the above
9.	Tunnel diode fabrication requires which of the following type of semiconductor?			
	A	Intrinsic semiconductor	B	Extrinsic semiconductor
	C	Compound semiconductor	D	Degenerated semiconductor
10.	The formation of LED requires			

	A	Intrinsic semiconductor	B	Extrinsic semiconductor
	C	Compound semiconductor	D	Degenerated semiconductor
11.	Ripple factor of a half wave rectifier is			
	A	1.21	B	0.48
	C	1.41	D	2.0
12.	Transformer utilization factor of a center-tapped full-wave rectifier			
	A	26.8%	B	28.6%
	C	57.2%	D	55.2%
13.	Unit of slew rate of an Op-Amp is			
	A	Volt/second	B	Amp/second
	C	Unit less	D	None of the above
14.	In BJT, which region has the largest area?			
	A	Emitter	B	Base
	C	Collector	D	All are with the same area
15.	For BJT, which of the following is true according to highest-to-lowest amount of doping?			
	A	Base > Emitter > Collector	B	Collector > Emitter > Base
	C	Emitter > Base > Collector	D	Emitter > Collector > Base
16.	Which of the following is not true about an ideal op-amp?			
	A	Infinite input resistance	B	Infinite output resistance
	C	Infinite gain	D	Infinite bandwidth
17.	For building high frequency oscillators which of the following diode is preferred?			
	A	Zener diode	B	Back diode
	C	Schottky diode	D	Tunnel diode
18.	PIN diode is mainly used for which applications?			
	A	RF and microwave communication	B	Voltage regulations
	C	Optical detections	D	High frequency rectifiers
19.	Maximum efficiency of a transformer coupled class – A amplifier is			
	A	10%	B	25%
	C	40%	D	50%
20.	Which of the following is not true for the negative feedback amplifier system?			
	A	Increase the gain	B	Increase the input impedance
	C	Reduces the noise level	D	Decreases the output impedance
21.	CMRR of an ideal op-amp should be			
	A	0	B	1
	C	∞	D	None of the above
22.	Which of the following temperature transducers produces most linear output?			
	A	Thermocouple	B	RTD
	C	Thermistor	D	All of the above
23.	For high-Q inductance measurement which bridge is preferable?			
	A	Anderson bridge	B	Maxwell's
	C	Hay's bridge	D	Wein's bridge
24.	Which of the following is not true about the accuracy in measurement?			
	A	Accuracy is the closeness with the true value	B	Accuracy can be detected by single measurement
	C	Measurement can be accurate but not necessarily precise	D	Accuracy defines the reproducibility

25.	While displaying the Lissajous patterns, which of the following is the correct output for the inputs of unequal voltages of equal frequency and phase shift of 90° at X and Y plates of a CRO?			
	A	Circle	B	Ellipse
	C	Slant line	D	Figure of eight
26.	To solve a network, the number of independent equations require equals to			
	A	The number of branches	B	The number of chords
	C	Sum of number of chords and branches	D	None of the above
27.	The number of circuits required using the superposition theorem equals to			
	A	The number of sources and branches	B	The number of branches and nodes
	C	The number of sources	D	None of the above
28.	If we operate an RLC series circuit above resonant frequency then current in the circuit will			
	A	Leads the applied voltage	B	In-phase with the applied voltage
	C	Lags the applied voltage	D	None of the above
29.	Which of the following device is preferable in the mixer circuit of the front-end of a communication receiver?			
	A	PIN Diode	B	BJT
	C	MOSFET	D	Varactor diode
30.	Decimal equivalent of $(3121)_5$ is			
	A	410	B	421
	C	411	D	401
31.	$A(A + B) = ?$			
	A	AB	B	A
	C	1	D	$1 + AB$
32.	Assume that a four-bit serial in/serial out shift register which is initially clear. We wish to store the nibble 1100. What will be the four-bit pattern after the application of second clock pulse? (Enter right-most bit into shift register first.)			
	A	1100	B	0011
	C	0000	D	1111
33.	The table which shows the necessary input required at J and K to produce every possible flip-flop output transition is called			
	A	Truth table (JK)	B	State transition table (JK)
	C	Excitation table (JK)	D	None of the above
34.	Which is non-weighted code?			
	A	BCD Code	B	Excess-3 Code
	C	8 4 -2 -1 Code	D	2 4 2 1 Code
35.	A 4-bit synchronous up counter consists of flip-flops, in which each has a propagation delay from clock to Q output of 15 ns. For the counter to reach from 0000 to 1111, it takes a total of			
	A	225 ns	B	30 ns
	C	15 ns	D	240 ns
36.	For a J-K flip-flop, J and K inputs are tied to logic '1'(J = 1 and K = 1) and provided a 20 kHz clock input. Then Q output is			
	A	Constantly LOW	B	Constantly HIGH
	C	20 kHz square wave	D	10 kHz square wave

37.	Which is the best method to determine the stability and transient response of a system?			
	A	Routh-Hurwitz Criteria	B	Nyquist plot
	C	Bode-plot	D	Root locus
38.	If gain of the system is zero, then the roots			
	A	Coincide with the poles	B	Move away from the zeros
	C	Move away from the poles	D	None of these
39.	Consider a system having forward path and feedback path transfer function as $\frac{16}{s(s+0.8)}$ and $(1 + 2s)$ respectively, then the characteristic polynomial of the system will be			
	A	$s^2 + 0.8s + 16$	B	$s^2 + 2.8s + 16$
	C	$s^2 + 32.8s + 16$	D	$s^2 + 32s + 16$
40.	The impulse response of a system is given by $c(t) = \frac{1}{2}e^{-t/2}$ which of the following is it's unit-step response?			
	A	$1 - e^{-t/2}$	B	$1 - e^{-t}$
	C	$2 - e^{-t}$	D	$1 - e^{-2t}$
41.	If the gain of the open loop system is doubled, the gain margin			
	A	is not affected	B	Gets doubled
	C	Becomes half	D	Becomes one-fourth
42.	While forming Routh's array, the situation of a row of zeros indicates that the system			
	A	Has symmetrically located roots	B	Is not sensitive to variations in gain
	C	Is stable	D	Is unstable
43.	The system with open loop transfer function $G(s) = \frac{1}{s(1+s)}$ is			
	A	type-2 and order-1	B	type-1 and order-1
	C	type-0 and order-0	D	type-1 and order-2
44.	The transfer function $G(s) = \frac{15(s-8)}{s(s+10)(s+3)}$ represents			
	A	A non-minimum phase transfer function	B	A minimum phase transfer function
	C	An all-pass transfer function	D	None of these
45.	A lag compensator is basically a			
	A	High pass filter	B	Low pass filter
	C	Band pass filter	D	Band reject filter
46.	What does the signaling rate in the digital communication system imply?			
	A	Number of digital pulses transmitted per second	B	Number of digital pulses transmitted per minute
	C	Number of digital pulses received per second	D	Number of digital pulses received per minute
47.	Duality Theorem - Property of Fourier Transform states that			
	A	Shape of signal in time domain & shape of spectrum can be interchangeable	B	Shape of signal in frequency domain & shape of spectrum can be interchangeable
	C	Shape of signal in time domain & shape of spectrum can never be interchangeable	D	Shape of signal in frequency domain & shape of spectrum can never be interchangeable

48.	Which among the following assertions represents a necessary condition for the existence of Fourier Transform of discrete time signal (DTFT)?			
	A	Discrete Time Signal should be absolutely summable	B	Discrete Time Signal should be absolutely multipliable
	C	Discrete Time Signal should be absolutely integrable	D	Discrete Time Signal should be absolutely differentiable
49.	In 8085 Microprocessor, which of the following signal is used to insert wait?			
	A	ALE	B	INTR
	C	HOLD	D	READY
50.	In 8085 Microprocessor, choose correct content of accumulator (A) after the execution of the following assembly language programme MVI A, 45H MOV B, A STC CMC RAR XRA B			
	A	00 H	B	45 H
	C	67 H	D	E7 H
51.	Conditional instructions are independent of which of the following flag?			
	A	Z	B	AC
	C	P	D	CY
52.	An electric charge Q is placed in a dielectric medium. Which of the following quantities are independent of the dielectric constant ϵ of the medium?			
	A	Electric field intensity E	B	Electric flux density D
	C	Electric potential V	D	None of the above
53.	The force on a charge q moving with velocity v under the influence of electric and magnetic fields can be given by which of the following?			
	A	$q(E + B \times v)$	B	$q(E + B \times H)$
	C	$q(H + E \times v)$	D	$q(E + v \times B)$
54.	The unit of $\nabla \times H$ is			
	A	Ampere	B	Ampere/meter
	C	Ampere/meter ²	D	Ampere-meter
55.	The Maxwell's equation $\nabla \times H = J + \partial D / \partial t$ is based on			
	A	Ampere's law	B	Gauss's law
	C	Faraday's law	D	Coulomb's law
56.	For a lossless dielectric medium, the phase constant for a travelling wave, β is proportional to (ϵ_r is the relative permittivity of the medium)			
	A	ϵ_r	B	$\sqrt{\epsilon_r}$
	C	$1/\epsilon_r$	D	$1/\sqrt{\epsilon_r}$
57.	A transmission line is distortionless if			
	A	$RL = \frac{1}{GC}$	B	$RL = GC$
	C	$LG = RC$	D	$RG = LC$
58.	A $\lambda/4$ transmission line, shorted at one end, presents impedance at the other end equals to (where Z_0 is the characteristic impedance of the line)			

	A	Z_0	B	$\sqrt{2} Z_0$
	C	∞	D	0
59.	The dominant mode in a rectangular waveguide is TE ₁₀ , because this mode has			
	A	the highest cut-off wavelength	B	the highest cut-off frequency
	C	No cut-off	D	No attenuation
60.	The dominant mode in a rectangular waveguide is			
	A	TE ₀₁	B	TM ₀₁
	C	TE ₁₁	D	TM ₁₁
61.	The sequence of operations in which PCM is done is			
	A	Quantizing, encoding, sampling	B	Quantizing, sampling, encoding
	C	Encoding, quantizing, sampling	D	Sampling, quantizing, encoding
62.	In digital transmission, the modulation technique that requires minimum bandwidth is			
	A	PCM	B	DPCM
	C	Delta Modulation	D	PAM
63.	The channel capacity relationship is given by (B is the bandwidth of a channel)			
	A	$C = 2B \log_2(1+S/N)$	B	$C = B \log_2(1-S/N)$
	C	$C = B \log_2(1+2S/N)$	D	$C = B \log_2(1+S/N)$
64.	The minimum nyquist bandwidth needed for baseband transmission of R _s symbols per second is			
	A	$R_s/2$	B	$3R_s$
	C	$2R_s$	D	R_s
65.	Entropy is the measure of			
	A	Average amount of information per source output	B	Average amount of information that can be transmitted
	C	Number of error bits from total number of bits	D	None of the above
66.	Delta modulation is			
	A	1 bit DPCM	B	2 bit DPCM
	C	4 bit DPCM	D	None of the above
67.	When probability of receiving a symbol is 1 then how much information will be obtained?			
	A	1	B	0
	C	∞	D	Can not be determined
68.	In which waveform logic 1 is represented by equal amplitude alternating pulses?			
	A	Unipolar RZ	B	Bipolar RZ
	C	RZ-AMI	D	Manchester coding
69.	Which of the following is false regarding Antenna array?			
	A	Directivity increases	B	Directivity decreases
	C	Bandwidth decreases	D	Gain increases
70.	A major disadvantage of klystron amplifier is			
	A	Low power gain	B	Low bandwidth
	C	High source power	D	Design complexity
71.	In the single mode fibers, the dominant dispersion mechanism is			
	A	Intermodal dispersion	B	Frequency distribution
	C	Material dispersion	D	Intramodal dispersion
72.	In SONET, STS-1 level of electrical signaling has the data rate of			
	A	51.84 Mbps	B	155.52 Mbps
	C	622.080 Mbps	D	2488.320 Mb ps
73.	Power of carrier wave is 500 W and AM modulation index is 0.25 then its total power will be			

	A	500 W	B	416 W
	C	376 W	D	516 W
74.	In FM, if we decreases modulating frequency then the modulation index			
	A	will increase, if the modulating voltage amplitude increases	B	will decrease, if the modulating voltage amplitude increases
	C	will increase, if the modulating voltage amplitude remains constant	D	will decrease, if the modulating voltage amplitude remains constant
75.	Aliasing refers to			
	A	Sampling of signals less than at Nyquist rate	B	Sampling of signals at Nyquist rate
	C	Sampling of signals greater than at Nyquist rate	D	Unsample the original signal
76.	Effective noise at high frequencies is			
	A	Jhonson noise	B	Flicker noise
	C	Transit-time noise	D	Partition noise
77.	Which of the following devices is used to generate amplitude modulated waves?			
	A	Square-law modulator	B	Reactance modulator
	C	Reflex modulator	D	Transit modulator
78.	What is the disadvantage of FM over AM?			
	A	high modulating power is needed	B	requires high output power
	C	large bandwidth required	D	high noise is produced
79.	Envelope Detector is a/an			
	A	Coherent detector	B	Asynchronous Detector
	C	Synchronous Detector	D	Product Demodulator
80.	Which one of the following is not a useful quantity for comparing the noise performance of receivers?			
	A	Input noise voltage	B	Signal to noise ratio
	C	Noise Figure	D	Figure of merit
81.	Solution of differential equation $x \frac{dy}{dx} - 3y = x^3$ is given by			
	A	$y = x^3(x + c)$	B	$y = x(x^2 + c)$
	C	$y = x(x + c)$	D	$yx^3 = x^2 + c$
82.	Solution of differential equation $\frac{d^2y}{dx^2} - 9\frac{dy}{dx} + 20y = e^{2x}$ is given by			
	A	$y = c_1e^{5x} + c_2e^{4x} + e^{2x}$	B	$y = c_1e^{-5x} + c_2e^{-4x} + \frac{1}{6}e^{2x}$
	C	$y = c_1e^{-5x} + c_2e^{-4x} + e^{2x}$	D	$y = c_1e^{5x} + c_2e^{4x} + \frac{1}{6}e^{2x}$
83.	Laplace Transformation of t^3e^{5t} is equal to			
	A	$\frac{6}{(s-1)^4}$	B	$\frac{5}{(s-6)^4}$
	C	$\frac{1}{(s-5)^4}$	D	$\frac{6}{(s-5)^4}$

84.	Inverse Laplace Transformation of $\frac{s+2}{(s^2+4s+13)}$ is equal to			
	A	$e^{-2t} \cos t$	B	$e^{-2t} \cos 3t$
	C	$e^{-t} \cos 3t$	D	$e^t \cos 3t$
85.	$\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{\sin x} \right)$ is equal to			
	A	0	B	1
	C	$\frac{1}{2}$	D	2
86.	If $U = \tan^{-1} \left(\frac{x^4 + y^4}{x^3 + y^3} \right)$ then $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y}$ is equal to			
	A	$\frac{1}{2} \sin 3U$	B	$\frac{1}{2} \sin 2U$
	C	$\frac{1}{3} \sin 3U$	D	$\sin 2U$
87.	Vector Field $\vec{F} = 5i + 6zj + 6yk$ is			
	A	Solenoidal vector Field	B	Irrotational vector field
	C	Neither solenoidal nor irrotational	D	Solenoidal and Irrotational vector Field
88.	What is the work done when force $\vec{F} = (3x^2 + 6y)i - 14yzj + 20xz^2k$ moves particle from origin to point (1,1,1), $x = t, y = t^2, z = t^3$			
	A	5	B	$\frac{1}{5}$
	C	10	D	4
89.	Which of the following is correct for the system $x - y + z = 0, \quad x + 2y - z = 0, \quad 2x + y + 3z = 0$			
	A	Trivial solution	B	Infinitely many solutions
	C	System is inconsistent	D	None of these
90.	If $A = \begin{bmatrix} 2 & 1 & 3 \\ 0 & 4 & 0 \\ 0 & 5 & 1 \end{bmatrix}$ then an Eigen values of A^{-1} is equal to .			
	A	1, $\frac{1}{3}, \frac{1}{5}$	B	1, 2, 4
	C	1, $\frac{1}{2}, \frac{1}{4}$	D	1, 3, 5
91.	If, $A = \begin{bmatrix} 2 & 4 & 6 \\ 3 & 6 & 9 \\ 1 & 2 & 3 \end{bmatrix}$ then rank of A is equal to.			

	A	0	B	1
	C	2	D	3
92.	If $f(z) = \frac{z^4 - z^2}{(z-5)(z+1)(z-2)}$ which are the points where $f(z)$ fails to be analytic ?			
	A	-3, -2	B	-3, 5
	C	-2, -5	D	2, 5
93.	Value of $\int_c \frac{z}{(z-2)(z-3)} dz$, . (where c is $ z = 1$) is equal to			
	A	0	B	$5\pi i$
	C	πi	D	$2\pi i$
94.	Residue of $f(z) = \frac{z^2}{(z^2+1)(z^2-4)}$ at pole 2 is .			
	A	2	B	5
	C	0	D	$\frac{1}{5}$
95.	The Mean, Median and mode of 8, 10, 2, 8, 7 are.			
	A	Mean=5, Median=7, Mode= 8	B	Mean=8, Median=5, Mode= 2
	C	Mean=5, Median=8, Mode= 8	D	Mean=5, Median=8, Mode= 5
96.	In a bulb manufacturing company. It is found that there is a small chance 0.05 for any bulb to be defective. What is the Mean and Standard deviation of the binomial distribution of defective bulb in a total of 600 ?.			
	A	10, 3.54	B	30, 5.34
	C	30, 5.5	D	30, 5
97.	There are 5 yellow, 2 red and 3 white balls are in the box. Three balls are randomly selected from the box. What is the probability that the ball are 2 white and 1 red colour ?			
	A	0.025	B	0.5
	C	0.25	D	0.05

98.	Value of $\int_0^1 e^x dx$ with $h = 0.1$ by Trapezoidal rule is .			
	A	1.7197	B	2.7197
	C	3.7197	D	5.9719
99.	Using Newton- Raphson method what is the value of $\frac{1}{31}$, correct upto two decimal places. .			
	A	0.233	B	0.322
	C	0.232	D	0.032
100.	The area bounded by the curve $x^2 = y$ and $y^2 = x$ is given by			
	A	3	B	$\frac{1}{3}$
	C	$\frac{1}{2}$	D	2