

# PGCET-2023

Seat No. \_\_\_\_\_

SUB: Electronics & Communication Engineering

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.	In a network with twelve circuit elements and five nodes, what is the minimum number of mesh equations?			
	A	24	B	12
	C	10	D	18
2.	A network consists of Linear resistors and ideal voltage source. If the value of the resistors are halved, then voltage across each resistor is			
	A	halved	B	doubled
	C	Increased four times	D	Not changed
3.	In a travelling electromagnetic wave, E and H vector fields are			
	A	perpendicular in space .	B	parallel in space.
	C	E is in the direction of wave travel.	D	H is in the direction of wave travel
4.	For power calculation, following theorem is used.			
	A	Norton's theorem	B	Superposition theorem
	C	Thevenin's theorem	D	Reciprocity theorem
5.	Q-factor of a series R-L-C circuit possessing resonant frequency of 10 Hz and bandwidth of 5 Hz is			
	A	0.5	B	4
	C	2	D	50
6.	Poles and zeros of a driving point function of a network are simple and interlace on the $j\omega$ axis. The network consists of elements.			
	A	R and C	B	R and L
	C	L and C	D	R, L and C
7.	As a low level detector, following diode can be used.			
	A	Schottky barrier	B	Tunnel
	C	PN Junction	D	Gunn
8.	For the varactor diode the following is incorrect statement.			
	A	Has a variable capacitance.	B	Utilizes transition capacitance of a junction
	C	Has always a uniform doping profile	D	Is often used in an automatic frequency control device.

9.	In a bipolar transistor at room temperature , if the emitter current is doubled the voltabe across its base-emitter junction			
	A	Doubles.	B	No change
	C	Halves.	D	Four times
10.	Consider the following circuit configurations.1. common emitter 2.common base 3.Emitter follower. 4. Emitter follower using Darlington pair. The correct sequence in increasing order of the input resistances of these configurations is			
	A	2,1,3,4	B	1,2,4,3
	C	1,2,3,4	D	2,1,4,3
11.	The pinch-off voltage $V_p=+6V$ for a P-channel JFET. If $V_{gs}=+2V$ ,What is the value of $V_{ds}$ at which it will enter into saturation region?			
	A	+4V	B	+8V
	C	+12V	D	-8V
12.	The lower turn off time of MOSFET when compared to BJT can be attributed to which one of the following?			
	A	Absence of Minority carriers.	B	Presence of Minority Carriers.
	C	Absence of Majority carriers.	D	Presence of Majority Carriers.
13.	When a junction diode is used in switching applications, the forward recovery time is			
	A	Of the order of the reverse time.	B	Negligible in comparison to the reverse recovery time.
	C	Greater than the reverse recovery time.	D	Equal to the mean carrier life time T for the excess minority carriers.
14.	Which of the following transistor is most vulnerable against ESD (Elecrostatic discharge)			
	A	JFET	B	MOSFET
	C	NPN transistor	D	PNP transistor
15.	A Ohmmeter is basically:			
	A	Voltage meter	B	Power meter
	C	Multi meter	D	Current meter
16.	An Amplifier is assumed to have a single pole high frequency transfer function.The rise time of its output response to a step function input is 35 nsec.The upper -3dB frequency(in MHz)for the amplifier to a sinusoical input is approximately at			
	A	10	B	20
	C	30	D	40
17.	In a single stage RC coupled common emitter amplifier, the phase shift at the lower 3 dB frequency is			
	A	90 degree	B	180 degree
	C	135 degree	D	0 degree
18.	If Q of a signle stage single tuned amplifier is doubled, then its bandwidth will			
	A	Become half	B	Become double
	C	Become four times.	D	Remains same.

19.	In a half wave rectifier, if an ac supply is 60Hz, then what is the ac ripple at output?			
	A	30 Hz	B	15Hz
	C	60 Hz	D	120 Hz
20.	A transistor is operated as a non-saturated switch to eliminate			
	A	Turn-off time.	B	Delay time.
	C	Storage time	D	Turn-on time.
21.	With zero volt on both inputs, an op-amp ideally should have an output voltage equal to the			
	A	CMRR	B	zero
	C	+15V	D	-15V
22.	An op-amp has a common mode gain of 0.01 and a differential mode gain of $10^5$ . Its CMRR would be			
	A	$10^{-7}$	B	$10^7$
	C	$10^3$	D	$10^{-3}$
23.	A first order low pass filter is given with $R=50\Omega$ and $C=5\mu F$ . What is the frequency at which the gain of the voltage transfer function of the filter is 0.25?			
	A	246 KHz	B	0.49KHz
	C	2.46KHz	D	24.6KHz
24.	A thyristor controlled reactor is used to get			
	A	Variable resistance	B	Variable capacitance
	C	Improved reactive power factor.	D	Variable inductance
25.	When two identical SCRs are placed back to back in series with a load and if each is fired at 90Degree, the voltage across the load will be			
	A	Zero	B	One
	C	Infinite	D	$1/\pi \times$ Peak voltage
26.	Which of the following is the dual form of the Boolean identity $AB + \bar{A}C = (A+C)(\bar{A}+B)$ ?			
	A	$AB + \bar{A}C = AC + \bar{A}B$	B	$(A+B) + (\bar{A}+C) = (A+C)(\bar{A}+B)$
	C	$(A+B) + (\bar{A}+C) = AC + \bar{A}B$	D	$AB + \bar{A}C = AB + \bar{A}C + BC$
27.	The minimum number of NAND gates required to implement $A + A\bar{B} + A\bar{B}C$ is equal to			
	A	1	B	0
	C	2	D	4
28.	To add two four bit numbers with high speed, minimum circuits needed are			
	A	1 full adder	B	2 full adder
	C	3 full adder	D	3 full adder and 1 half adder
29.	Which one of the following operation cannot be performed by flip-flop?			
	A	counting	B	Data storage
	C	Data transfer	D	Adder

30	To relies a mod-5 counter , The number of T flip-flops required is			
	A	5	B	3
	C	2	D	6
31	Unit of relative permeability is			
	A	Henry	B	Henry/meter
	C	It is dimensionless	D	Henry/Hz
32	VSWR is a measure of			
	A	Power transferred	B	Current transferred
	C	Voltage transferred	D	Impedance transferred
33	A hollow rectangular waveguide acts as a			
	A	LOW pass filter	B	High pass filter
	C	Band pass filter	D	Band stop filter
34	Divergence theorem is applicable for			
	A	static field only	B	both static and time varying fields
	C	time varying fields only	D	electric fields only
35	The directive gain cannot be stated as			
	A	the ratio of the radiation intensity in that direction to the average radiated power.	B	independent of angles.
	C	the directivity of an antenna when directive gain is maximum.	D	the function of angles
36	The dominant mode of rectangular wave guide is			
	A	TE <sub>11</sub>	B	TE <sub>01</sub>
	C	TM <sub>11</sub>	D	TE <sub>10</sub>
37	The system characterized by the equation $y(t) = ax(t) + b$ is			
	A	Non-linear	B	Linear if $b < 0$
	C	Linear if $b > 0$	D	Linear for any value of b
38	Inverse Fourier transform of $u(\omega)$ is			
	A	$\delta(t) + 1/(2\pi t)$	B	$0.5 \delta(t) + 1/(2\pi t)$
	C	$0.5 \delta(t) + 1/(\pi t)$	D	$\delta(t) + 1/(\pi t)$
39	A band pass signal extends from 1 KHz to 2 KHz. The minimum sampling frequency needed to retain all information in the sampled signal is			
	A	2KHz	B	4 KHz
	C	1KHz	D	3KHz
40	The ROC of z-transform must be			
	A	A discontinuous region	B	Entire z-plane
	C	A connected Region	D	Unit circle

41	A system has 12 poles and 2 zeros. Its high frequency asymptote in its magnitude plot has a slope of			
	A	-280 dB/decade	B	-240 dB/decade
	C	-200 dB/decade	D	-320 dB/decade
42	The transconductance $g_m$ of a JFET is of the order of			
	A	1 S	B	1 mS
	C	1 $\mu$ S	D	1nS
43	Which of the following instruction can be used to select register bank3 in 8051 microcontroller?			
	A	CLR PSW.4 SETB PSW.3	B	SETB PSW.4 SETB PSW.3
	C	CLR PSW.3 CLR PSW.4	D	SETB PSW.3 CLR PSW.4
44	In 8051, the instruction – JNB P2.5, HERE, assumes that bit P2.5 is an _____.			
	A	Input	B	Output
	C	Input or output	D	Neither input nor output
45	The following can be used as microwave oscillator			
	A	PN Junction Diode	B	Gunn Diode
	C	JFET	D	MOSFET
46	The capacitance microphone is used for the detection of			
	A	Heart sound	B	Blood flow
	C	Heart rate	D	Foot pressure
47	(41.6875) <sub>10</sub> = _____			
	A	(101000.1011) <sub>2</sub>	B	(111000.1011) <sub>2</sub>
	C	(101001.1011) <sub>2</sub>	D	(101001.1010) <sub>2</sub>
48	ROM memory address map of DS89C420 with 16 KB of ROM is			
	A	0000 to 1FFFFH	B	0000 to 2FFFFH
	C	0000 to 3FFFFH	D	0000 to 4FFFFH

49	The reverse saturation current in germanium diode varies as (where T is the temperature in deg K)			
	A	T	B	$T^{1.5}$
	C	$T^2$	D	$1/T$
50	In 8085, _____address lines are multiplexed with data lines.			
	A	Lower-order four address lines	B	Lower-order eight address lines
	C	Higher-order four address lines	D	Higher-order eight address lines
51	If the peak transmitted power in radar system is increased by factor of 16,the maximum range will be increased by factor.			
	A	4	B	2
	C	8	D	16
52	A solution to 'blind speed' problem is			
	A	to use monopulse	B	to use MTI
	C	to change doppler frequency	D	to vary PRF
53	The term single mode and multimode are best describes as			
	A	number of wavelengths each fiber can support	B	the index number
	C	the number of fibers placed into fiber-optic cable	D	number of voice channels each fiber can support
54	PCM( Pils Code Modulation) system is			
	A	Inherently most power-resistance	B	Inherently most frequency-resistance
	C	inherently most noise-resistance	D	Inherently most code-resistance
55	In cellular communication the channel capacity increases means			
	A	The radius of cell reduces	B	the cluster size is reduced
	C	the co-channel interference reduced	D	frequency reuse distance increased
56	In cellular communication, cell splitting is done to			
	A	accommodate more traffic	B	accommodate more area
	C	save the power	D	increase the frequency use

57	The cluster size of the frequency reuse pattern of a hexagonal cellular system can only take on particular values. Namely			
	A	3, 7, 12, 19....	B	3, 7, 9, 12...
	C	4, 7, 9, 16, 25...	D	3, 4, 10, 15...
58	In a 100% amplitude modulated signal, if the total transmitted power is P, then the carrier power will be			
	A	$\frac{2}{3}P$	B	$\frac{1}{4}P$
	C	$\frac{1}{3}P$	D	$\frac{2}{5}P$
59	In FM, if the frequency of the modulating voltage is double, the maximum frequency deviation			
	A	become four times	B	become half
	C	Doubles	D	Remains Unchanged
60	Which of the following is the synchronous detector			
	A	diode detector	B	ratio detector
	C	coherent detector	D	envelope detector
61	Resonant antenna is			
	A	Travelling wave	B	Rhombic
	C	Aperiodic	D	periodic
62	Basic transmission loss between two antennas depends on			
	A	frequency and distance	B	gain
	C	frequency	D	distance
63	Wave unaffected by night or day is			
	A	space wave	B	tropospheric wave
	C	ground wave	D	sky wave
64	the ionospheric layer does not exist during day time is			
	A	D	B	F2
	C	F	D	F1

65	Which of the following is a digital transducer?			
	A	Encoder	B	Straining Gauge
	C	LVDT	D	Thermistor
66	Thermal noise is independent of ...			
	A	Bandwidth	B	Center frequency
	C	Temperature	D	Power
67	The root locus branches			
	A	Start from open loop poles and terminate at zeros	B	Start from open loop zeros and terminate at poles
	C	May start from pole or zero and terminate at another pole or zero	D	None of the above
68	Which one out of following offers high spectrum efficiency with constant amplitude ?			
	A	QPSK	B	BPSK
	C	MSK	D	GMSK
69	The control system which is Very stable and sluggish means			
	A	High Gain and High Phase Margin	B	High Gain and Low Phase Margin
	C	Low Gain and High Phase Margin	D	Low Gain and Low Phase Margin
70	If modulating frequency is 20 KHz and peak frequency deviation is 50 KHz. Bandwidth of FM signal as per Carson's rule is ....			
	A	20KHz	B	50KHz
	C	140KHz	D	120KHz
71	Rayleigh fading channel model characteristics is not applicable to ...			
	A	Distinct line of sight path	B	No Direct line of sight path
	C	Multiple indirect path between transmitter and receiver	D	None of above
72	The higher the index number			
	A	has no effect on the speed of light	B	shorter the wavelength propagation
	C	higher the speed of light	D	lower the speed of light



73	To radiate unmodulated signal of 1KHz we need antenna size of			
	A	3m	B	3km
	C	3cm	D	3mm
74	For the signum function $\text{sgn}(t)$ , $F(j\omega)=$			
	A	$1/j\omega$	B	$2 j\omega$
	C	$2/ j\omega$	D	$j\omega$
75	When multistage amplifier the coupling method which is capable of providing highest gain is			
	A	Transformer coupling	B	Direct coupling
	C	RC coupling	D	Impedance coupling
76	“Qualitative results” refer to:			
	A	Results that require numerical data.	B	Results that are difficult to observe during an experiment.
	C	Results that can be observed during an experiment.	D	None of these is correct.
77	In a PNP transistor operating in the active region, the concentration of minority carrier holes in the n-region at collector junction $J_C$ is			
	A	same as junction $J_E$	B	zero
	C	thermal equilibrium value $p_{no}$ of emitter	D	thermal equilibrium concentration of holes in collector region
78	AM transmitter employing low power use,			
	A	emitter modulator	B	base modulator
	C	collector modulator	D	none of above
79	Antenna aperture efficiency is			
	A	$D/A_{eff}$	B	$g_p/g_d$
	C	$A_{em}/A$	D	$A/D$
80	The following is interference limited system			
	A	TDMA	B	FDMA
	C	CDMA	D	None

81.	Which of the following conditions holds true for a symmetric matrix?			
	A	$A = A'$	B	$A = -A'$
	C	$A = IA$	D	$A =  A $
82.	If $\lambda$ is an Eigen value of a non-singular matrix $A$ then Eigen values of a matrix $A^{-1}$			
	A	$-\lambda$	B	$\frac{1}{\lambda}$
	C	0	D	$-\frac{1}{\lambda}$
83.	The trace of the matrix $\begin{pmatrix} 3 & 6 & 9 \\ 4 & 7 & 5 \\ 5 & 8 & 2 \end{pmatrix}$ is			
	A	12	B	15
	C	11	D	9
84.	If $u = x^2 + 2xy + y^2$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$ _____			
	A	0	B	$2u$
	C	u	D	$3u$
85.	The divergence of gradient of a scalar function is			
	A	Curl operation	B	Laplace operation
	C	Double Gradient operation	D	Null Vector
86.	The Curl of a gradient of a scalar function is			
	A	Zero Vector	B	Unity
	C	Zero	D	Three
87.	Which of the following theorem convert line integral to surface integral?			
	A	Stoke's and Green's theorem	B	Green's theorem only
	C	Stoke's theorem only	D	Gauss divergence and Stoke's theorem
88.	What is order and degree of differential equation $1 + \left(\frac{dy}{dx}\right)^5 = \exp(y)$			
	A	1,5	B	1,1
	C	5,1	D	5,5
89.	The number of arbitrary constants in the general solution of differential equation of second order is _____.			
	A	1	B	4
	C	2	D	3

90.	The particular integral of $(D^2 + 1)y = e^{2x}$			
	A	$e^{2x}$	B	$\frac{1}{7}e^{2x}$
	C	$\frac{1}{5}e^{2x}$	D	zero
91.	The Laplace transform of 1 is			
	A	$\frac{1}{s}$	B	s
	C	0	D	Not defined
92.	The Inverse Laplace transform of $\frac{1}{s+1}$ is			
	A	0	B	$e^t$
	C	$e^{-t}$	D	e
93.	The equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ is known as the _____			
	A	One dimensional heat equation	B	Laplace Equation
	C	One dimensional wave equation	D	Poisson Equation
94.	A function which is analytic everywhere in a complex plane is known as			
	A	Harmonic function	B	differentiable function
	C	entire function	D	regular function
95.	The value of the integral $\int_C \frac{z^2}{z-2} dz$ , where C is the circle $ z  = 3$ is			
	A	$2\pi i$	B	$8\pi i$
	C	$-2\pi i$	D	$\pi i$
96.	A Maclaurin series is a Taylor series with centre			
	A	$z_0 = 0$	B	$z_0 = 1$
	C	$z_0 = 2$	D	$z_0 = 4$
97.	Normal distribution is symmetric around _____			
	A	Mean	B	Variance
	C	Standard deviation	D	covariance
98.	Rate of convergence of the Newton-Raphson method is generally _____			
	A	Linear	B	Super-linear
	C	Quadratic	D	Cubic
99.	The second-order Runge-Kutta method uses _____ as a predictor.			
	A	backward order method	B	midpoint rule
	C	forward Euler method	D	multipoint method
100.	_____ is not a measure of central tendency			
	A	Mean	B	Mode
	C	Median	D	Range