

Seat No. _____

SUB: Electronics & Communication 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.	Binary number 110011011001 is equal to decimal number _____.			
	A	2289	B	1289
	C	289	D	3289
2.	The 9's complement of $(52520)_{10}$ is _____.			
	A	99999	B	52520
	C	47479	D	None of these
3.	For a 11-bit flash ADC, the number of comparators required are			
	A	2047	B	1023
	C	2049	D	None of these
4.	The initial state of MOD-32 down counter is 00101. What will it be after 65 clock pulses?			
	A	00110	B	00100
	C	00101	D	Cannot be determined
5.	Which of the following logic family is having lowest power dissipation?			
	A	TTL	(B)	CMOS
	C	ECL	(D)	DTL
6.	Comment on following statements: Statement 1: ROM is having programmable OR gate. Statement 2: PAL is having programmable AND gate.			
	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
7.	A 8-bit DAC produces $V_{out} = 0.3$ V for a digital input of 00000001. Find the value of V_{out} for a input of 00010001.			

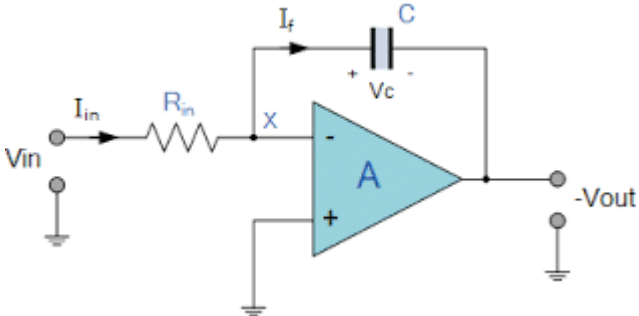
	A	3.1 V	B	10.1 V
	C	5.1 V	D	None of these
8.	A memory system of size 8 kB is required to be designed using memory chips which have 12 address lines and 4 data lines each. Number of such chips required to design the memory system will be			
	A	1	B	2
	C	4	D	8
9.	When Analog signal is to be digitized using an ADC, which circuit is used prior to digitization?			
	A	Switching circuit	B	Sample and Hold
	C	TDM circuit	D	None of these
10.	In C language, an external static variable is			
	A	Declared outside of all functions	B	Available to all the functions in that program
	C	Both declared outside of all functions and available to all the functions in that program	D	None of these
11.	In C language, the _____ operator returns the number of bytes the operand occupies.			
	A	Size	B	Byte
	C	Numbytes	D	Sizeof
12.	<p>Comment on following statements:</p> <p>Statement 1: Program Counter contains the address of the next instruction to be executed.</p> <p>Statement 2: Stack pointer keep track of the contents of the PC before jumping to the subroutine,</p>			
	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
13.	Size of stack pointer in 8051 is			
	A	8 bits	B	16 bits
	C	8 bytes	D	16 bytes
14.	In CMOS based digital circuit, if we operate same circuit at 5 times high frequency, then power dissipation of circuit			

	A	increases 10 times.	B	decreases 10 times.
	C	Increases 5 times.	D	decreases 5 times.
15.	Clocked Flip flops are used in which circuits?			
	A	Combinational circuits	B	Asynchronous sequential circuits
	C	Synchronous sequential circuits	D	both in Combinational circuits and Asynchronous sequential circuits
16.	Which of the following is not suitable for in-system programming?			
	A	both Flash and EEPROM	B	EEPROM
	C	Flash	D	EPROM
17.	8086 Microprocessor is _____			
	A	16-bit microprocessor with 20 bit address bus	B	8-bit microprocessor with 16 bit address bus
	C	24-bit microprocessor with 20 bit address bus	D	16 -bit microprocessor with 16 bit address bus
18.	In 8085, find the content of accumulator, after execution of following program: MVI A, CC H ORI CC H XRI C0H			
	A	00H	B	0CH
	C	CCH	D	C0H
19.	For AM, Find unmodulated carrier power, when $P_{out} = 80$ watt, at 100 % modulation, internal loss in modulator =10 watt.			
	A	40 W	B	60 W
	C	50 W	D	30 W
20.	For Amplitude modulated signal, bandwidth is 10khz and the highest frequency component present is 805 khz. The carrier frequency used for this AM signal is_____.			

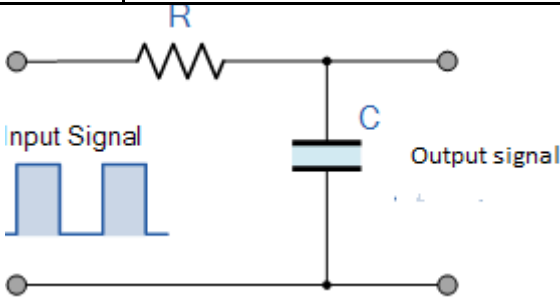
	A	795 kHz	B	800 KHz
	C	805 KHz	D	810 KHz
21.	White noise has			
	A	Non-Uniform power spectral density	B	Gaussian power spectral density
	C	triangular power spectral density	D	Uniform power spectral density
22.	How much is contributed by each bit in the code word of a PCM system under uniform and symmetric quantization to the signal to noise ratio?			
	A	3 dB	B	4 dB
	C	5 dB	D	6 dB
23.	The channel capacity under the Gaussian noise environment for a discrete memory less channel with a bandwidth of 4MHZ and SNR of 31 is			
	A	20 Mbits/s	B	32 Mbits/s
	C	4 Mbits/s	D	None of these
24.	Two sinusoidal signals of same amplitude and frequencies of 5 KHz and 5.2 KHz are added together. The combined signal is given to an ideal frequency detector. Which is the lower frequency detected?			
	A	0.2 KHz	B	10.2 KHz
	C	5 KHz	D	None of these
25.	PSK stands for			
	A	Phase Soft Keying	B	Power Shift Keying
	C	Phase Shift Keying	D	Power Soft Keying
26.	<p>Comment on following statements related to LCD.</p> <p>Statement 1: A liquid crystal display (LCD) uses much less power than LEDs.</p> <p>Statement 2: An LCD does not emit light itself but controls the intensity of reflected or transmitted light.</p>			
	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
27.	A multimode silica fiber that has a core refractive index $n_1=1.45$ and cladding refractive index $n_2=1.43$. The critical angle is =-----			
	A	85.55°	B	82.5°

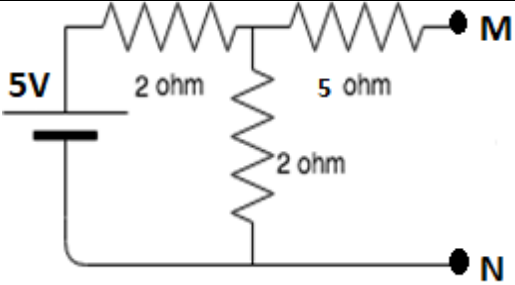
	C	80.47 °	D	81.5 °
28.	<p>Comment on following statements related to FDMA and CDMA</p> <p>Statement 1: During the period of call, other users can share the same channel in FDMA.</p> <p>Statement 2: The Code Division Multiple Access technique is not usually used because it requires very large bandwidth.</p>			
	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
29.	Which statement/s is/are true for Schottky diode?			
	A	Made by joining a doped semiconductor region with a metal	B	Used in high-speed switching circuits
	C	Also known as hot carrier diode	D	All of these
30.	N-channel MOSFETs are superior to P-channel MOSFETs, because.			
	A	They have big size.	B	They consume less power.
	C	Mobility of electrons is higher than that of holes.	D	They are easy to fabricate.
31.	Which is the false statement related to Bipolar Junction Transistors?			
	A	Base is thin in size.	B	Emitter is moderately doped.
	C	Collector is moderately doped.	D	Emitter is moderate in size.
32.	<p>An n type silicon can be formed by adding impurity of: 1. Phosphorous 2. Arsenic 3. Boron 4. Aluminum</p> <p>Which of the above are correct?</p>			
	A	1 and 2	B	2 and 3
	C	3 and 4	D	1 and 4
33.	Which of the following circuits are not useful for wave shaping?			

	A	Clipper	B	Log amplifier
	C	Sample and Hold circuit	D	Clamper
34.	<p>Comment on following statements related to Junction Diode.</p> <p>Statement 1: Charge storage capacitance is associated with Junction Diode.</p> <p>Statement 2: Channel Length Modulation is associated with Junction Diode.</p>			
	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
35.	<p>While biasing JFET, source and drain are interchanged by mistake. What will happen in this case?</p>			
	A	JFET will work normally as per expectation.	B	JFET will get damaged
	C	JFET will short circuit.	D	JFET will not work at all.
36.	<p>_____ Oscillator is characterized by a split capacitor in its tank circuits?</p>			
	A	RC phase shift Oscillator	B	Colpitts Oscillator
	C	Wein bridge Oscillator	D	None of these
37.	<p>The circuit efficiency of a class A amplifier can be increased with</p>			
	A	Transformer coupled load	B	Low dc power input
	C	Direct coupled load	D	None of these
38.	<p>Which feedback is used in Oscillators?</p>			
	A	Positive feedback	B	Negative feedback
	C	Both Negative and positive feedback	D	No feedback is used by Oscillators
39.	<p>An operational amplifier possesses</p>			
	A	Low input impedance and low output impedance	B	High input impedance and low output impedance
	C	Low input impedance and high output impedance	D	High input impedance and High output impedance

40.	<p>Following circuit works as</p> 			
	A	Op-amp as rectifier	B	Op-amp as Differentiator
	C	Inverting amplifier	D	Op-amp as an Integrator
41.	The lower threshold voltage and upper threshold voltage for IC 555 timer are respectively			
	A	1/2 VCC and 1/3 VCC	B	1/4 VCC and 2/3 VCC
	C	1/3 VCC and 2/3 VCC	D	None of these
42.	<p>Which of the following statement/s are correct?</p> <p>(1) Input impedance of a MOSFET is higher than that of a JFET.</p> <p>(2) In MOS transistor, triode region is the saturation region.</p> <p>(3) GaAsP LED produces light in visible region</p>			
	A	1 and 2	B	1 and 3
	C	2 and 3	D	1, 2 and 3
43.	A rectangular waveguide has the dimension of 1.5 cm X 2.4 cm. For the dominant mode TE10, the cut-off frequency is			
	A	2.94 GHz	B	588 GHz
	C	6.25 GHz	D	10 GHz
44.	<p>Comment on following statements:</p> <p>Statement 1: Dynamic response consists of : two parts, one steady state and the other transient state response</p> <p>Statement 2: The smallest change in a measured variable to which an instrument will respond is resolution</p>			

	A	Statement 1 is TRUE and statement 2 is FALSE.	B	Statement 1 is FALSE and statement 2 is TRUE.
	C	Both statements are FALSE.	D	Both statements are TRUE.
45.	A voltmeter having a guaranteed accuracy of 1%, reads 8 volt on a 0V to 100V range full scale reading. The percentage limiting error is			
	A	0.125%	B	1.25%
	C	12.5%	D	0.0125%
46.	What is clamp-on ammeter used for?			
	A	Low AC current	B	High AC current
	C	Low DC current	D	High DC current
47.	Pair of active transducers is			
	A	Thermocouple, Solar cell	B	Thermocouple, Thermistor
	C	Solar cell, LVDT	D	Thermistor, Solar cell
48.	The drawback/s of thermocouple is/are			
	A	They are less accurate than RTDs and thermistors	B	They need compensating leads
	C	Reference junction compensation is required in it	D	All of these
49.	Laplace transform of $\cos \omega t$ is			
	A	$S / (s^2 + \omega^2)$	B	$\omega / (s^2 + \omega^2)$
	C	$s + t$	D	None of these
50.	Three resistance of 90 ohm each are connected in delta. The resistance of equivalent star will have a value of			
	A	10 ohm	B	30 ohm
	C	90 ohm	D	15 ohm
51.	The reactances of a 10 μF capacitor at $f = 0 \text{ Hz}$ and $f = 50 \text{ Hz}$ are respectively			
	A	∞ and 318.47 Ω	B	100 Ω and 318.47 Ω
	C	∞ and 31.84 Ω	D	0.01 Ω and 31.84 Ω

52.	Mutual inductance between two magnetically coupled coils depends on the			
	A	Permeability of the core material	B	Number of turns of the coils
	C	Cross sectional area of their common core	D	All of these
53.	Due to skin effect, the current flows			
	A	Uniformly through the conductor	B	Near the surface of the conductor
	C	through central core of conductor	D	In the centre of the conductor
54.	 <p>In shown figure if square wave is applied to this circuit, What is the output wave?</p>			
	A	Sinusoidal wave	B	Square wave
	C	Triangular wave	D	None of these
55.	The Fourier transform of unit step signal is			
	A	$\pi \delta(\omega)$	B	$1/j\omega$
	C	$\pi \delta(\omega) + 1/j\omega$	D	$\pi /j\omega$
56.	The output power of filter is 100 mW, when the signal frequency is 5 kHz. When the frequency is increased to 25kHz, the output power falls to 50 mW. What is the dB change in power?			
	A	-3dB	B	-5dB
	C	-7dB	D	-2dB

57.	 <p>Calculate the Thevenin resistance across the terminal MN for the circuit shown.</p>			
	A	7 ohm	B	4 ohm
	C	3.42 ohm	D	6 ohm
58.	If r is a radius of circular orbit then the orbital period of a satellite is directly proportional to			
	A	$r^{3/2}$	B	$r^{1/2}$
	C	$r^{1/3}$	D	$r^{2/3}$
59.	A two port non reciprocal device which produces a minimum attenuation to EM wave propagation in one direction and a very high attenuation in opposite direction is generally known as			
	A	phase shifter	B	isolator
	C	Polarizer	D	circulator
60.	Klystron operation is based on			
	A	Frequency modulation	B	amplitude modulation
	C	velocity modulation	D	phase modulation
61.	In a microwave magic T, E plane and H plane are			
	A	isolated	B	In phase
	C	Out of phase	D	Either in phase or out of phase
62.	Microwave signal propagating along the curvature of the earth is known as			
	A	Faraday effect	B	Ionosphere reflection
	C	Tropospheric scatter	D	Ducting

69.	A minimum phase system with no zeros has a phase angle of -270° at gain cross over frequency. The system is			
	A	Stable	B	unstable
	C	Marginally stable	D	Conductionally stable
70.	Lead compensator and lag compensator are			
	A	Both high pass filter	B	Both low pass filter
	C	Low pass filter and High pass filter respectively	D	High pass filter and Low pass filter respectively
71.	A system with the characteristic equation $S^4+2s^3+11s^2+18s+18=0$ Will have closed-loop poles such that			
	A	All poles in the left half of the s-plane	B	all poles lie in the right half of the s-plane
	C	Two poles lie symmetrically on the imaginary axis of the s-plane	D	No pole lie on the imaginary axis of the s-plane
72.	Consider the system with $A = \begin{bmatrix} 0 & -2 \\ 0 & -3 \end{bmatrix}; \quad B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}; \quad C = [0 \quad 1]$ The system is			
	A	Controllable and observable	B	Uncontrollable and observable
	C	Controllable and unobservable	D	Uncontrollable and Unobservable
73.	If the characteristic equation of a system is $S^3+14S^2+56S+M=0$, Then it will be stable only if			
	A	$0 < M < 784$	B	$1 < M < 64$
	C	$10 > M > 660$	D	$4 < M < 784$
74.	The open loop transfer function of a unity feedback control system is $G(s) = 1/(s+2)^2$. The closed loop transfer function poles are located at			

	A	-2,-2	B	-2±j1
	C	-2, +2	D	None of these
75.	The period of a signal $x(t) = 48 + 50 \cos 60\pi t$ is			
	A	1/30 s	B	60 π s
	C	1/60 π s	D	None of these
76.	The Laplace transform of signal $t^3 u(t)$ is			
	A	3/s ⁴	B	-3/s ⁴
	C	6/s ⁴	D	-6/s ⁴
77.	The Z-transform of $u[n]$ is			
	A	1/ (1-Z ⁻¹), Z >1	B	1/ (1-Z ⁻¹), Z <1
	C	Z/ (1-Z ⁻¹), Z >1	D	Z/ (1-Z ⁻¹), Z >1
78.	The Fourier transform of signal $e^{-4 t }$ is			
	A	-8/(16+ ω^2)	B	4/(16+ ω^2)
	C	-4/(16+ ω^2)	D	8/(16+ ω^2)
79.	Quantizing noise occurs in			
	A	Pulse Width Modulation	B	Frequency Division Multiplexing
	C	Pulse Code Modulation	D	Time Division Multiplexing
80.	If the unit step response of a network is $(1 - e^{-at})$, then its unit impulse response is			
	A	$a e^{-at}$	B	$a^{-1} e^{-at}$
	C	$(1 - a^{-1}) e^{-at}$	D	$(1 - a) e^{-at}$
81.	The differential equation $x^2 y dx - (x^3 + xy^2) dy = 0$ is			
	A	in variable separable form	B	a homogeneous differential equation
	C	a linear differential equation	D	a Bernoulli's differential equation
82.	Which of the following differential equations is an exact?			
	A	$xe^x - x^2 \frac{dy}{dx} = 2xy$	B	$y \frac{dy}{dx} + 2xy = x^2 y$
	C	$\frac{dy}{dx} - y = 0$	D	$2y - x^2 \frac{dy}{dx} = x$
83.	Which of the following is a general solution of $\frac{d^2 y}{dx^2} + 10 \frac{dy}{dx} + 25y = 0$? , where A and B are arbitrary constants.			

	A	$y = Ae^{-5x} + Be^{-5x}$	B	$y = Axe^{-5x} + Be^{-5x}$
	C	$y = Ae^{5x} + Be^{5x}$	D	$y = Axe^{5x} + Be^{5x}$
84.	If y_1 and y_2 are general solutions of a second order linear differential equation then y_1 and y_2 are			
	A	linearly dependent	B	proportional
	C	linearly independent	D	inversely proportional
85.	Which of following functions is not an analytic?			
	A	$x^2 - y^2 + 2xy i$	B	$x + i y$
	C	$x + 2y i$	D	None of these
86.	$\oint_C \frac{1}{z} dz = \text{_____}$, where C is a unit circle in counter clockwise direction.			
	A	$2\pi i$	B	0
	C	$-2\pi i$	D	None of these
87.	$L\left(\frac{1}{\sqrt{t}}\right) = \text{.....}$			
	A	$\frac{\pi}{\sqrt{s}}$	B	$\frac{\sqrt{\pi}}{\sqrt{s}}$
	C	$\frac{\sqrt{\pi}}{s}$	D	None of these
88.	The convolution of t and e^t is			
	A	$e^t - (1+t)$	B	$e^t + (1+t)$
	C	$e^t - (1-t)$	D	None of these
89.	In Newton-Raphson method, we approximate the graph of a function f by suitable			
	A	Normal	B	chord
	C	tangent	D	None of these
90.	The error in the trapezoidal rule for numerical integration with a step size h is of order.....			
	A	h	B	h^4
	C	h^3	D	h^2

91.	The approximate solution of $\frac{dy}{dx} = x + y$, $y(0) = 0$ at $x = 0.4$ with step size $h = 0.2$ by Euler's method is....			
	A	0.04	B	0.4
	C	0.004	D	0.00004
92.	Consider the probability function $p(x) = \frac{6 - x - 7 }{36}$ for $x = 2, 3, 4, \dots, 12$. What is $p(6 < x < 8)$?			
	A	$\frac{5}{36}$	B	$\frac{1}{6}$
	C	$\frac{5}{18}$	D	0
93.	If a Poisson distribution is such that $\frac{3}{2}P(X = 1) = P(X = 3)$. What is $P(X \geq 1)$			
	A	0.6472	B	0.7169
	C	0	D	None of these
94.	The probability that the machine A will perform a usual function in three years' time is $\frac{1}{4}$, while the probability that the machine B will perform a usual function in three years' time is $\frac{1}{3}$. What is the probability that both machines will perform the usual function?			
	A	$\frac{7}{12}$	B	$\frac{1}{4}$
	C	$\frac{1}{2}$	D	$\frac{1}{12}$
95.	If $A = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$ then $A^5 - 3A^4 + A^3 + 4A^2$ equals to			
	A	$\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$	B	$\begin{bmatrix} 8 & -12 \\ -12 & 20 \end{bmatrix}$
	C	$\begin{bmatrix} 2 & -3 \\ -3 & 5 \end{bmatrix}$	D	None of these
96.	The local minimum value of $f(x, y) = xy + \frac{27}{x} + \frac{27}{y}$ is			
	A	55	B	54

	C	27	D	3																						
97.	The divergence of the vector function $\vec{v} = x\hat{i} + y\hat{j} + z\hat{k}$ is.....																									
	A	$\hat{i} + \hat{j} + \hat{k}$	B	\vec{r}																						
	C	1	D	3																						
98.	In usual notation, which of the following equations represents the wave equation?																									
	A	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	B	$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$																						
	C	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$	D	None of these																						
99.	The median of the following distribution is.....																									
	<table><tr><td>x</td><td>5</td><td>7</td><td>9</td><td>12</td><td>14</td><td>17</td><td>19</td><td>21</td></tr><tr><td>f</td><td>6</td><td>5</td><td>3</td><td>6</td><td>5</td><td>3</td><td>2</td><td>3</td></tr></table>								x	5	7	9	12	14	17	19	21	f	6	5	3	6	5	3	2	3
	x	5	7	9	12	14	17	19	21																	
	f	6	5	3	6	5	3	2	3																	
A	20	B	16																							
C	33	D	12																							
100.	The directional derivative of $x^2y^2z^2$ at (1, 1, -1) along the direction equally inclined with coordinate axes is																									
	A	$\frac{2}{3}$	B	$\frac{6}{\sqrt{3}}$																						
	C	$\frac{2}{\sqrt{3}}$	D	2																						