Examination: **M.Tech Electronics and Communication Engineering**

SECTION 1 - SECTION 1

Question No.1

When a voltmeter is placed across a forward biased diode, it will read a voltage approximately equal to

- The total circuit voltage
- 0 V
- The diode barrier potential
- The bias battery voltage

Question No.2

If A is 3x3 matrix with |A|=3, then |adj(adj(A))| is

- 9
- 81
- 243
- 27

Question No.3

In general, ROM contains the Decoder (k) and OR Gate (n). what is the relationship of 'k' & 'n'

- 2_k - n
- $2_n \times k$
- $2_k \times n$
- 2_k + n

Question No.4

The condition for symmetry of network

- $Z_{12}=Z_{21}$
- $-h_{12}=h_{21}$
- AD-BC=1
- $h_{11}h_{22}-h_{12}h_{21}=1$

Question No.5

Given the values of R=3 Ω, L=3mH, C=100μf of an RLC circuit. The response i(t) of the circuit is

- Under damped
- Critically damped
- Over damped
- Lossless

Question No.6

$\iint x^2\, y+x\, y^2\, dxdy$ over the area between $y=x^2$ and y=x

- 1/28
- 3/28
- 3/56
- 1/14

Question No.7

What is the clock frequency? If the asynchronous counter having period of the waveform of 24 micro seconds

and 8 clock cycles.

- 426 KHz
- 333 KHz
- 322 KHz
- 326 KHz

Question No.8

Source encoding in a data communication system is done in order to_____

- conserve the transmitted frequency
- reduce the transmission errors
- Conserve the transmitted power
- Enhance the information transmission rate

Question No.9

A rectangular horn antenna operating at 4GHz has the wavelength of 0.075m and gain of about 13dBi. What will be its required capture area?

- 0.0149 m^2
- 0.0475 m^2
- 0.9732 m^2
- 0.5521 m^2

Question No.10

Find C of Lagrange's mean value theorem for $f(x)=7x^2+4x$ in the interval [-1,4]

- 1.5
- -2.5
- -1.5
- 2.5

Question No.11

In a PCM system with uniform quantization, increasing the number of bits from 8 to 9 will reduce the quantization noise power by a factor of

- 8
- 9
- 4
- 2

Question No.12

An Anti fuse programming technology is predominantly associated with _____.

- CPFGs
- CPLDs
- SPLDs
- FPGAs

Question No.13

A communication channel with additive white Gaussian noise, has a bandwidth of 4 KHz&signal to noise ratio of 15. Its channel capacity is_____

- 1.6kbps
- 256kbps
- 16kbps
- 32kbps

Question No.14

For a hexagonal geometry, co-channel reuse ratio for a cluster size of N=7 is

- 4.58
- 6.24
- 3
- 6

Question No.15

The number of branches in a graph is 8. The number of sub-graphs in network is

- 256
- 128
- 254
- 126

Question No.16

The auto correlation function of power spectral density for white noise

- $R_w(\tau) = 2N_0\,\delta(\tau)$
- $\delta(\tau) = \frac{N_0}{2} R_w(\tau)$
- $\delta(\tau) = 2N_0 R_w(\tau)$
- $R_w(\tau) = \frac{N_0}{2}\,\delta(\tau)$

Question No.17

The differential gain of a differential amplifier is 1,000. The common mode gain if CMRR=60 dB is

- 10000
- 1
- 0.001
- 1000

Question No.18

A random variable x takes values $0, 1, 2, \ldots$ with probability proportional to $(x+1)\left(\frac{1}{5}\right)^x$
The probability that x <= 5 is

- 0.9997
- 0.6997
- 0.7997
- 0.8997

Question No.19

Quantizing noise can be reduced by increasing

- sampling rate
- amplitude
- Bandwidth
- Number of standard quantizing levels

Question No.20

The response of an FIR filter with impulse response h(n)= {1,2,4} to the input sequence x(n)={1,2}is

- {1,2,8,8}
- {1,4,8,8}
- {1,4,6,8}
- {1,4,6,6}

Question No.21

The solution of $\frac{d^2x}{dy^2} - 4\frac{dy}{dx} + 4y = e^{2x}\sin 2x$ for y(0)=1/4,y'(0)=1 is

- $0.25e^{2x}(1+\sin 2x)$
- $(0.25+x)e^{2x} + e^{2x}(\sin 2x)/4$
- $0.25e^{2x} - e^{2x}(\sin 2x)/4$
- $(0.25+x)e^{2x} - e^{2x}(\sin 2x)/4$

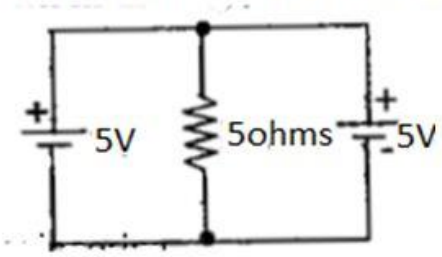
Question No.22

Which of the following is a closed loop system?

- Auto-Pilot for an Aircraft
- Car Starter
- DC Generator
- Electric Switch

Question No.23

The current flowing across the 5 ohms resistor is



- 1.5A
- 2A
- 0.5A
- 1A

Question No.24

In a clamping circuit, the forward resistance of the diode is 250 ohms and its reverse resistance is 100Kohms. The value of the resistance across the diode is

- 12KΩ
- 25KΩ
- 60.125KΩ
- 5KΩ

Question No.25

By placing an inverter between both input of an SR Filp Flop, it becomes

- T- Flip Flop
- D- Flip Flop
- Master slave JK Flip Flop
-

JK Flip Flop

Question No.26

Brewster angle is represented as θ_B =

- $tan^{-1}\sqrt{\frac{\omega_1}{\omega_2}}$
- $tan^{-1}\sqrt{\frac{\omega_2}{\omega_1}}$
- $tan^{-1}\sqrt{\frac{\epsilon_1}{\epsilon_2}}$
- $tan^{-1}\sqrt{\frac{\epsilon_2}{\epsilon_1}}$

Question No.27

Which multivibrator is used as a master oscillator_____?

- Monostable
- Bistable
- Astable
- Schmitt trigger

Question No.28

Strapping is used in cavity magnetrons to_____

- Ensure bunching
- Improve bandwidth
- prevent cathode back heating
- prevent mode jumping

Question No.29

Residue of the function $(17\text{-}e^{-2z})/z^3$ at its poles

- -4
- 2
- -2
- 4

Question No.30

A _____ cavity resonator is most commonly used and _____ mode permits the widest tuning range.

- Cylindrical TE_{111}
- Rectangular, TE_{110}
- Rectangular, TM_{110}
- Cylindrical, TM_{110}

Question No.31

The frequency at which the gain of the operational amplifier is zero dB is known as

- zero db frequency
- Beat frequency
- unity gain cross over frequency

- Cross over frequency

Question No.32

The total number of multiplication in 4 point DFT and 16 point FFT respectively are

- 16, 16
- 32, 32
- 16, 32
- 32, 64

Question No.33

A 1.0 KHz signal is flat top sampled at the rate of 1800 samples/sec and the samples are applied to an ideal rectangular LPF with cut-off frequency of 1100 Hz, then the output of the filter contains

- 800 Hz and 900 Hz components
- 800 Hz, 900 Hz and 100 Hz components
- 800 Hz and 1000 Hz components
- only 800 Hz component

Question No.34

In an operational amplifier at higher frequencies___

- Output voltage tends to be 180 degrees out of phase with the input voltage
- Output voltage leads with respect to input voltage
- Output voltage lags with respect to input voltage
- Output voltage tends to be in phase with the input voltage

Question No.35

The Fourier transform of a signal h(t) is $H(\omega) = \frac{2\cos(\omega)\sin(2\omega)}{\omega}$. The value of h(0) is

- 1/4
- 2
- 1
- 1/2

Question No.36

A system has transfer function G(s)=1/(s+12). Its settling time and rise time respectively are

- 0.33, 0.183
- 0.183, 0.33
- 0.077, 0.33
- 0.33, 0.077

Question No.37

A unity feedback system has the following forward transfer function: $G(s)=\frac{10(s+20)(s+30)}{s(s+25)(s+35)}$. The steady state error when the input is 15tu(t) is

- 2.1875
- 0.4
- 0
- Infinity

Question No.38

When the emitters of two identical transistors are coupled, we get

- coupled clipper
- clamper
- single ended clipper
- double ended clipper

Question No.39

In floor planning, placement and routing are _____ tools.

- Back end
- open
- middle
- Front end

Question No.40

The electric field of electromagnetic wave propagation in the positive direction is given by

$$E = \sin(\omega t - \beta z)\,\hat{a}_x + \sin\left(\omega t - \beta z + \frac{\pi}{2}\right)\hat{a}_y$$

The wave is

- Right-hand Circularly polarized
- Left-hand Circularly polarized
- Elliptically polarized
- Linearly polarized in z-direction

Question No.41

In TDMA, the frequency reuse of Bandwidth cell is 6 GHz and Bandwidth channel is 2 GHz. then the required number of cell is

- 12
- 8
- 3
- 4

Question No.42

The Fourier transform of the signal x(t)= $\frac{2}{t^2+1}$ is

- $\pi e^{|\omega|}$
- $2\pi e^{|\omega|}$
- $\pi e^{-|\omega|}$
- $2\pi e^{-|\omega|}$

Question No.43

The skin depth and surface resistance for copper at f =10 GHz are _____

- 6.6 X10 $^{-4}$ mm, 0.26 ohms per square
- 5.6 X10 $^{-4}$ mm, 0.026 ohms per square
- 5.6 X10 $^{-4}$ mm, 0.26 ohms per square
- 6.6 X10 $^{-4}$ mm, 0.026 ohms per square

Question No.44

Which digital system translates coded characters into a more useful form?

- encoder
- decoder
- counter
- display

Question No.45

Thermal runway is not possible in FET because as the temperature of FET increases___

- Drain current increases
- The mobility decreases
- The transconductance increases
- Source current increases

Question No.46

Minimum number of satellites needed for estimation of position is____

- 4
- 7
- 6
- 5

Question No.47

The return loss of a device is found to be 20 dB. The VSWR and magnitude of reflection coefficient are respectively

- 1.22 and 0.1
- -1.22 and 0.1
- 2.44 and 0.2
- 0.81 and 0.1

Question No.48

A (75 - j 2) ohm load is connected to a co-axial line of 75 *ohm* impedance at 5 MHz. The Perfect matching can be obtained by employing

- A capacitance at a distance from load
- A short circuit stub at load
- 4. An inductance at the source
- An inductance at the load

Question No.49

The computational procedure for Radix-2 Decimation in frequency algorithm takes

- $\log_2 2N$
- $\log_2 N$
- $2\log_2 N$
- $\log_2 N/2$

Question No.50

A mod-2 counter followed by a mod-5 counter is

- Same as a mod-5 counter followed by a mod-2 counter
- A decade counter
- mod-6 counter

- A mod-7 counter

Question No.51

A carrier voltage of unmodulated carrier power 1kW on being amplitude modulated by an audio sinusoidal voltage to a depth of 100% has total modulated carrier power of

- 4kW
- 1.5kW
- 1.25kW
- 2kW

Question No.52

The negative resistance in Gunn Diode is due to _____

- High reverse bias
- Tunneling across the junction
- electron transfer to a less mobile energy level
- Electron domain formation at the junction

Question No.53

The PLA has _____

- Programmable AND array and Fixed OR array
- Programmable AND array and Programmable OR array
- Fixed AND array and Fixed OR array
- Fixed AND array and Programmable OR array

Question No.54

Out of four devices mentioned below, the fastest switching device is_____

- Diode
- BJT
- MOSFET
- JFET

Question No.55

At a cellular frequency of 800 MHz and a vehicle velocity of 15 mi/h, the level crossing rate is

- 30 per second
- 15 per second
- 25 per second
- 20 per second

Question No.56

A small increase in the collector reverse bias will cause

- A large decrease in collector current
- A large increase in collector current
- Very little change in collector reverse saturation current
- A large increase in emitter current

Question No.57

A signal has frequency components from 300 Hz to 1.8 KHz. The minimum possible rate at which the signal has to be sampled is

- 2400 samples/sec
- 5600 samples/sec

- 4800 samples/sec
- 3600 samples/sec

Question No.58

In JFET assume the saturation current is $I_{DSS} = 2$ mA, and the pinch-off voltage is V_p= -3.5 V. Calculate i_D and $V_{DS}(sat)$ for $V_{GS} = 0$ and $\frac{V_p}{2}$.

- i_D=3, 1.5 mA and $V_{DS}(sat)$ = 2.5 , 2.75 V
- i_D=2, 0.5 mA and $V_{DS}(sat)$ = 2.5 , 2.75 V
- i_D=2, 0.5 mA and $V_{DS}(sat)$ = 3.5 , 1.75 V
- i_D=3, 1.5 mA and $V_{DS}(sat)$ = 3.5 , 1.75 V

Question No.59

In a digital communication system, transmissions of successive bits through a noisy channel are assumed to be independent events with error probability p. The probability of at most one error in the transmission of an 8-bit sequence is

- $(1-p)^8 + 8P(1-p)^7$
- $(1-p)^8 + p(1-p)^7$
- $7(1-p) + p/8$
- $(1-p)^8 + (1-p)^7$

Question No.60

The inverse z-transform of $X(z)=\log(1+2z^{-1})$, $|z|>|2|$ is

- $\frac{-(2^n)u(n-1)}{n}$
- $\frac{-(-2^n)u(-n-1)}{n}$
- $\frac{-(2^n)u(-n-1)}{n}$
- $\frac{-(-2^n)u(n-1)}{n}$

Question No.61

The system of linear equations

$$(4b-1)x+y+z=0$$
$$-y+z=0$$
$$(4b-2)z=0$$

has a non-trivial solution, if b equals

- 1/8
- 4
- 2
- 1/4

Question No.62

The power spectral density of a deterministic signal is given by $\left[\frac{\sin(f)}{f}\right]^2$, where '$f$' is frequency. The autocorrelation function of this signal in the time domain is

- a cos pulse
- a rectangular pulse
- a triangular pulse
- a sine pulse

Question No.63

The Nyquist sampling interval, for the signal sin$c$ (700 t) + sin$c$ (500 t) is

- $\frac{1}{350}\ sec$
- $\frac{1}{700}\ sec$
- $\frac{\pi}{700}\ sec$
- $\frac{\pi}{350}\ sec$

Question No.64

Bistatic Radar

- has two antennas at different locations
- has no antennas
- has a single antenna
- has two antennas at the same place

Question No.65

The transfer function of a system is $\frac{100(1+0.25s)}{1+0.5s}$, The phase shift at $\omega = 0$ and $\omega = \infty$ are

- 0^o and -90^o
- 90^o and -90^o
- 90^o and 180^o
- 0^o and 180^o

Question No.66

A loss less transmission line with a characteristic impedance of 75 ohms is terminated by a load impedance of 130 ohms . The magnitude of the incident wave is 15V. Find the maximum and minimum values of voltage on the line.

- 19V,11V
- 15V, 15V
- 33V, 17V
- 25V, 13V

Question No.67

The gain for a standard horn is 14 dB at f= 10 GHz. The horn is connected to a receiver circuit to measure power from a source operating at 10 GHz. An antenna with unknown gain is substituted for the horn. An attenuation of 12.5 dB must be added in the receiver circuit for the indicated output to be the same as for the horn. What is the G of the antenna?

- 12.5 Db
- 1.5 dB

- 14 dB
- 26.5 dB

Question No.68

The process of transferring a mobile station from one base station to another is

- Handoff
- Reuse
- Roamer
- Blockage

Question No.69

Five identical resistors of 1 ohm are connected between the pair of nodes (1,3),(3,4),(1,4),(2,4) and (3,2). The equivalent resistance across the nodes 1 and 2 will be

- 2
- 5/3
- 1/3
- 1

Question No.70

Which of the following instruments will have the same calibration on both AC &DC ?

- Electrodynamometer type
- Moving coil type
- Induction type
- Moving iron type

Question No.71

The high pass circuit acts as a differentiator if the time constant of the circuit is

- very small
- very large
- Infinite
- equal to T

Question No.72

In Common emitter amplifier, the unbypassed emitter resistance provides_____

- Voltage shunt feedback
- current series feedback
- negative feedback
- positive feedback

Question No.73

In 8086 the overflow flag is set when

- The sum is more than 16 bits
- Carry and sign flags are reset
- Signed numbers go out of their range after an arithmetic operation
- Carry and sign flags are set

Question No.74

The Nyquist Sampling rate for the signal $g(t)=10\cos(50\pi t)\cos^2(150\pi t)$ where 't' is in seconds, is

- 200 samples per second

- 300 samples per second
- 350 samples per second
- 150 samples per second

Question No.75

The bandwidth of an RF tuned amplifier is dependent on _____

- Q-factor of the tuned output circuit
- Q-factor of the Input & output circuit as well as quiescent operating point
- Quiescent operating point
- Q-factor of the tuned input circuit

Question No.76

The decoder is represented as n to m line decoder where

- $m < 2^n$
- $m \leq 2^n$
- $m > 2^n$
- $m \geq 2^n$

Question No.77

The bridge suitable for the measurement of an unknown inductance in terms of a known capacitance would include

- Maxwell & Hay
- Kelvin
- Maxwell & Schering
- Hay & Schering

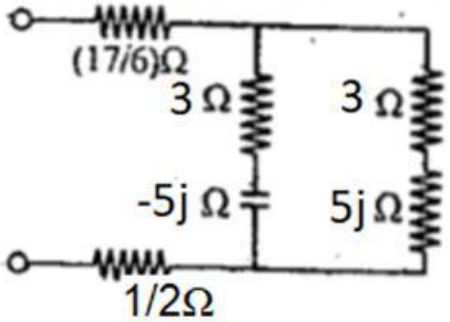
Question No.78

CW Radar gives_____

- color of target
- Range of the target
- Radial velocity of target
- size of target

Question No.79

The total impedance of the circuit given is



- 9
- 7
- 5
- 3

Question No.80

In a baseband communication link, frequencies upto 4500 Hz are used for signaling. Using a raised cosine pulse with 85% excess bandwidth and for no inter symbol interference, the maximum possible signaling rate is symbols per sec is

- 4760
- 4860
- 4865
- 4763

Question No.81

The wavelength of microwaves at 100 GHz will be _____

- 0.3cm
- 0.3m
- 3cm
- 0.03cm

Question No.82

A multimode step index fiber has a core radius “a” of 40 μm and clad radius “b” of 50 μm. The refractive index of core is 1.4 and Δ = 10%. What is the light gathering power ?

- 0.62
- 0.44
- 0.38
- 1

Question No.83

The radiation resistance of λ/2 dipole is

- 36.5Ω
- 63.5Ω
- 73Ω
- 75Ω

Question No.84

For the zero modulated signal, the quadrature null effect takes place when ∅=

- $\pm\pi$
- $\pm 2\pi$
- $\pm\frac{\pi}{4}$
- $\pm\frac{\pi}{2}$

Question No.85

A source produces 4 symbols with probability $\frac{1}{4}, \frac{1}{8}, \frac{1}{2}$ *and* $\frac{1}{2}$. For this source, a practical coding scheme has an average code word length of 2 bits/symbols. The efficiency the code is

- $\frac{17}{14}$
- $\frac{16}{17}$
-

- $\frac{17}{21}$
- $\frac{17}{16}$

Question No.86

The settling time of a second order system whose transfer function has exactly 2 poles at $-3\sqrt{3}$ is

- 0.66
- 0.55
- 0.88
- 0.77

Question No.87

The Open-loop transfer function of a unity feedback control system is given by $G(s) = \frac{K}{s(s+1)}$
If the gain is increased to infinity, then the damping ratio will tend to become

- $\frac{1}{\sqrt{2}}$
- 1
- 0
- ∞

Question No.88

A helical antenna is used for satellite tracking because of _____

- gain
- bandwidth
- circular polarization
- Maneuverability

Question No.89

For a CC amplifier RE = 100 Ω, $r_{e'}$=10 Ω and β_{ac} = 150. The ac input resistance at the base is

- 16.5 KΩ
- 27 Ω
- 13KΩ
- 33 Ω

Question No.90

A continuous random variable X follows rectangular distribution with its distribution over [110,120]. The values of variance of X and P(112≤ x ≤115) respectively are

- 25/12, 0.3
- 115, 0.4
- 2, 0.4
- 25/3, 0.3

Question No.91

What is the resolution of 9-bit D/A converter in percentage? If the full scale output voltage of this converter is +5V, what is the resolution in volts?

- 0.5% and 10 mV
- 0.5 % and 5 mV
- 0.2% and 5 mV

- 0.2% and 10 mV

Question No.92

In VLSI design, which process deals with the determination of resistance & capacitance of interconnections?

- Testing
- Extraction
- Floor planning
- Placement & Routing

Question No.93

In a micro processor, the register which holds the address of the next instruction to be fetched is_____

- Instruction register
- stack pointer
- Accumulator
- Program counter

Question No.94

What is the z-transform of the signal defined as x(n)=u(n)-u(n-11)?

- $\frac{1-z^{-11}}{1-z^{-1}}$
- $\frac{1+z^{11}}{1+z^{-1}}$
- $\frac{1+z^{10}}{1+z^{-1}}$
- $\frac{1-z^{10}}{1-z^{-1}}$

Question No.95

GEO stationary satellites are placed in equatorial orbits at a height of approximately

- 3600km
- 3, 60,000km
- 360km
- 36,000km

Question No.96

The unit step response of a system starting from rest is given by $y(t)=1-e^{-2t}$ for $t \geq 0$. The transfer function of the system is

- $\frac{2}{2+s}$
- $\frac{1}{1+2s}$
- $\frac{1}{2+s}$
- $\frac{2s}{1+2s}$

Question No.97

For a shorted section of 75 ohm transmission line, l= λ/4, the input impedance is _____ (assume α =0)

- 100 ohms
- Infinity

- -75 ohms
- 0

Question No.98

Consider a single input single output discrete-time system with x(n) as input and y(n) as output, where the two are related as

$$y(n) = \begin{cases} n|x(n)|; & 0 \le n \le 10 \\ x(n) - x(n-1); & otherwise \end{cases}$$

Which one of the following statements is true about the system?

- It is not causal but stable
- It is neither causal and stable
- It is causal but not stable
- It is causal and stable

Question No.99

For 8085 microprocessor, the following program is executed.

```
MVI A, 05H;
MVI B, 05H;
PTR: ADD B;
DCR B;
JNZ PTR;
ADI 03H;
HLT;
```

At the end of program, accumulator contains

- 17H
- 20H
- 23H
- 05H

Question No.100

Matched filter is used to _____

- Filters RF signals
- Removes AF signals
- Optimizes signal to noise ratio
- is used as amplifier