University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Program: BE Electronics and Telecommunication Engineering

Curriculum Scheme: Rev-2016

Examination: TE Semester V

Course Code: ECC501 and Course Name: Microprocessor and Peripherals Interfacing

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Compared to High level language, Assembly Language requires --------.
Option A:	More memory and more execution time.
Option B:	More memory and less execution time
Option C:	Less memory and less execution time
Option D:	Same memory and same execution time.
2.	A microprocessor consists of -------.
Option A:	ALU, Register array and Control Unit
Option B:	Program memory, I/O Ports and Timers
Option C:	Data memory, I/O Ports and Timers
Option D:	ALU, Register array and UART
3.	For an 8086 microprocessor, -------- will be the value of physical address if the given segment address is 6300H and offset address is 0200H.
Option A:	06500H
Option B:	62300H
Option C:	63200H
Option D:	08300H
4.	Which of the following refer stack memory for its execution?
Option A:	CALL
Option B:	MACRO
Option C:	ENDM
Option D:	JMP *address*
5.	What is the functionality of TF bit of 8086's flag register?
Option A:	Enable single step mode for on-chip debugging
Option B:	Increment source and destination pointer during string operation
Option C:	Enable maskable interrupts
Option D:	Enable maximum mode
6.	While performing MOVSW instructions over Strings, the data is transferred to --.
Option A:	ES:DI
Option B:	DS:SI
Option C:	CS:IP
Option D:	SS:SP
7.	DIV CL instruction of 8086 microprocessor, --------.

Option A:	Store quotient of division operation in AX and remainder in DX
Option B:	Store quotient of division operation in AL and remainder in AH
Option C:	Store quotient of division operation in AH and remainder in AL
Option D:	Store quotient of division operation in DX and remainder in AX
8.	MOV AL, [BX] instruction of 8086, -------.
Option A:	Copy data from BX register to AL register
Option B:	Copy data from BL register to AL register
Option C:	Copy data from data segment location pointed by BX, to AL register
Option D:	Copy data from AL register to data segment location pointed by BX
9.	The instruction that pushes the flag register on to the stack is -------.
Option A:	PUSH
Option B:	POP
Option C:	PUSHF
Option D:	POPF
10.	How many maximum numbers of slaves can be connected in cascading of IC 8259?
Option A:	2
Option B:	4
Option C:	8
Option D:	16
11.	BSR mode of 8255 is used to ---------.
Option A:	Select mode of Port-A
Option B:	Set or Reset any one bit of Port-C
Option C:	Select IO mode of port-B
Option D:	Set or Reset a bit of Port-A
12.	How many bits are provided for Count Value In counter register of IC 8257?
Option A:	16
Option B:	32
Option C:	14
Option D:	20
13.	In square wave generator mode of 8254, Count (N) is loaded in the counter register. What is the frequency of the output signal?
Option A:	N divided by clock frequency
Option B:	Clock frequency divided by N
Option C:	65536 – N
Option D:	2^N
14.	For 8 bits of ADC, V_{REF} = 5V. If Analog voltage in 3 V, Calculate decimal equivalent of output signal.
Option A:	255
Option B:	180
Option C:	127
Option D:	153
15.	In ADC0809, ALE pin is used to ------.

Option A:	Latch analog voltage of channel.
Option B:	Latch selected channel.
Option C:	Latch clock of the ADC
Option D:	Latch output of the ADC
16.	Signal conditioners of the Data Acquisition system perform functionality like ----.
Option A:	Conversion of physical quantity to electrical signal
Option B:	Amplification and Selection of desired portion of signal
Option C:	Recording input data permanently
Option D:	Displaying all the recorded data
17.	Which of the following chips is needed to read 8 bits data from general purpose digital Input devices?
Option A:	8087
Option B:	8254
Option C:	8255
Option D:	DAC0808
18.	How many address lines a memory chip of 2K capacity will have?
Option A:	10
Option B:	8
Option C:	11
Option D:	12
19.	What is the size of data registers in 8087?
Option A:	8 bits
Option B:	16 bits
Option C:	20 bits
Option D:	80 bits
20.	Which of the following data lines are used by 8086 to read /write a byte from ODD address memory locations?
Option A:	AD0-AD7
Option B:	AD8-AD15
Option C:	AD0- AD15
Option D:	AD0-AD11

Q2	
A	**Solve any Two** **5 marks each**
i.	Explain the need of the compiler and assembler and their comparison.
ii.	Write a program to display a message "Microprocessor" on IBM PC. Use INT 21h function, AH=09 with string of message at DS:DX and terminated by "$".
iii.	Explain BSR mode of PPI-8255.
B	**Solve any One** **10 marks each**
i.	If analog voltage of 3.2V is connected to the IN3 channel of ADC 0809. Suggest hardware and write a program to convert analog voltage to its digital equivalent and store the value in the AL register. (V_{REF} = 5V)
ii.	Explain Maximum Mode of 8086 microprocessor. Draw the timing diagram for read operation in maximum mode.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Describe the importance of 8257 DMA controller.
ii.	Draw and Explain the Flag register of 8086?
iii.	Explain salient features of Programmable Interval Timer 8254.
B	**Solve any One** **10 marks each**
i.	Design an 8086 based system with 32K RAM (4 chips of 8K). Draw the memory map of the system designed.
ii.	Write an assembly language program to find the smallest number from an array of 10 numbers. Assume that all numbers are 8 bit wide.

University of Mumbai
Examination 2020

Program: Electronics and Telecommunication Engineering
Curriculum Scheme: Rev2016
Examination: Third Year Semester V
Course Code: ECC502 and Course Name: Digital Communication
Time: 1 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks** **40**
1.	The total area under the PDF curve is
Option A:	0
Option B:	Unity
Option C:	Infinite
Option D:	2π
2.	A random process is called as wide sense stationary if
Option A:	Its mean varies with shift in time origin
Option B:	Its mean does not vary with shift in time origin
Option C:	Its mean and autocorrelation vary with shift in time
Option D:	Its mean and autocorrelation do not vary with shift in time
3.	Gaussian distribution is also known as
Option A:	Uniform distribution
Option B:	Normal distribution
Option C:	Cauchy distribution
Option D:	Rayleigh distribution
4.	The total information per message sequence is known as
Option A:	Self-information
Option B:	Entropy
Option C:	Mutual information
Option D:	Information rate
5.	The source has entropy of 1.75 bits/ message and generates 40,000 messages per second its information rate is given as,
Option A:	R=50 Kbps
Option B:	R=80 Kbps
Option C:	R=70 Kbps
Option D:	R=10 Kbps
6.	The channel capacity of extremely noisy channel is
Option A:	High
Option B:	Infinite
Option C:	Zero
Option D:	Medium
7.	In a linear code, the minimum Hamming distance between any two code words is _____minimum weight of any non-zero code word.

Option A:	Less than
Option B:	Greater than
Option C:	Equal to
Option D:	Not related to
8.	The no of errors detected s and no. of errors corrected t for dmin=3
Option A:	s=2, t=1
Option B:	s=2, t=2
Option C:	s=1, t=1
Option D:	s=3, t=1
9.	The following code requires memory for encoding
Option A:	Hamming code
Option B:	Cyclic code
Option C:	BCH code
Option D:	Convolutional code
10.	A cyclic code can be generated using
Option A:	Generator polynomial
Option B:	Tree diagram
Option C:	Trellis diagram
Option D:	Coefficient matrix
11.	The term surviving path is applicable to
Option A:	Cyclic codes
Option B:	Hamming code
Option C:	R-H code
Option D:	Convolutional code
12.	Which of the following has better noise performance
Option A:	QPSK
Option B:	8-PSK
Option C:	16-PSK
Option D:	64-PSK
13.	For a specified average transmitted power, the system that gives lowest probability of error among the following is___
Option A:	Non coherent FSK system
Option B:	Coherent FSK system
Option C:	PSK system
Option D:	Coherent ASK system
14.	Bandwidth required for QPSK is _____ & BPSK is _____ respectively
Option A:	f_b, $2f_b$
Option B:	$2f_b$, f_b
Option C:	f_b, f_b
Option D:	$2f_b$, $2f_b$

15.	The modulation format in which amplitude and phase is varied is
Option A:	QPSK
Option B:	QAM
Option C:	MPSK
Option D:	BPSK
16.	The criterion used for pulse shaping to avoid ISI is
Option A:	Nyquist criterion
Option B:	Quantization
Option C:	Sample and hold
Option D:	PLL
17.	Zero forcing equalizers are used for
Option A:	Reducing ISI to zero
Option B:	Sampling
Option C:	Quantization
Option D:	Modulation
18.	The extent of eye opening in the vertical direction indicates___
Option A:	ISI
Option B:	Timing sensitivity
Option C:	Zero crossing jitter
Option D:	Noise Margin
19.	The process of obtaining the transmitted bit sequence from received signal is known as
Option A:	Channel decoding
Option B:	Source decoding
Option C:	Demodulation
Option D:	Baseband detection
20.	If input noise is white then probability of error in matched filter is
Option A:	Minimum
Option B:	Maximum
Option C:	Zero
Option D:	Infinity

<table>
<tr><td>Q2</td><td>Solve any Two Questions out of Three 10 marks each</td></tr>
<tr><td>A</td><td>Explain the following terms and give their significance
(i) Mean (ii) Central moment (iii) Variance (iv) Standard deviation</td></tr>
<tr><td>B</td><td>A discrete memoryless source has an alphabet of six symbol with their probabilities as shown:
<table>
<tr><td>Symbol</td><td>M_1</td><td>M_2</td><td>M_3</td><td>M_4</td><td>M_5</td><td>M_6</td></tr>
<tr><td>Probability</td><td>0.3</td><td>0.25</td><td>0.15</td><td>0.12</td><td>0.08</td><td>0.10</td></tr>
</table>
i) Determine the Minimum Variance Huffman codewords and average codeword length and hence find Entropy of the system.
ii) Verify the average codeword length using Shannon Fano.

Compare and comment on the results of both.</td></tr>
<tr><td>C</td><td>Discuss the problem of inter symbol interference (ISI). Explain the measures to be taken to reduce ISI. How to study ISI using eye pattern?</td></tr>
</table>

<table>
<tr><td>Q3</td><td>Solve any Two Questions out of Three 10 marks each</td></tr>
<tr><td>A</td><td>A parity check matrix of a (7,4) Hamming code is given as follows:
$H = [1\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 0 \quad 0\ 1\ 1 \quad 1\ 0\ 0 \quad 0\ 1\ 0 \quad 0\ 0\ 1\ ]$
i) Find Generator matrix using which find out the codewords of 1100 and 0101
ii) Determine the error correcting and detecting capability of system

Draw the encoder for the above block code.</td></tr>
<tr><td>B</td><td>Draw the signal space diagram for 16-PSK and 16-QAM and find their error probability. Also draw their PSD and determine bandwidth</td></tr>
<tr><td>C</td><td>Justify that the probability of error in a matched filter does not depend on the shape of the input signal. Derive relevant expression.</td></tr>
</table>

University of Mumbai

Examination 2020 under cluster 5 (Lead College APSIT)

Program: BE Electronics and Telecommunication Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: ECC503 and Course Name: Electromagnetic Engineering

Time: 2 hour Max. Marks: 80

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For the students:- All the Questions are compulsory and carry equal marks .

Q1.	The normal components of electric flux density are
Option A:	continuous across a dielectric
Option B:	discontinuous across a dielectric boundary
Option C:	zero
Option D:	infinite
Q2.	Poynting vector is given by
Option A:	E x H
Option B:	H x E
Option C:	E.H
Option D:	(E.H)^2
Q3.	If the voltage applied across a capacitor is increased, the capacitance value
Option A:	increases
Option B:	decreases
Option C:	remains constant
Option D:	becomes infinity
Q4.	Laplace’s equation has
Option A:	no solution
Option B:	only one solution
Option C:	two solutions
Option D:	infinite solutions
Q5.	An object which cannot contain an electrostatic field within it is known as
Option A:	a perfect dielectric
Option B:	a perfect conductor
Option C:	a perfect capacitor
Option D:	a charge
Q6.	Point form of Gauss law is
Option A:	Divergence of electric flux is equal to zero
Option B:	Divergence of electric flux density is equal to volume charge density
Option C:	Divergence of electric flux density is equal to zero
Option D:	Divergence of electric flux is equal to volume charge density
Q7.	Intrinsic impedance of free space is
Option A:	77 Ω
Option B:	177 Ω
Option C:	277 Ω

Option D:	377 Ω
Q8.	Which of the following is not a primary parameter of a transmission line?
Option A:	Resistance
Option B:	Capacitance
Option C:	Inductance
Option D:	Attenuation constant
Q9.	In the absence of negative charge, the electric flux lines originating from positive charge will terminate at
Option A:	infinity
Option B:	positive charge
Option C:	negative charge
Option D:	both positive and negative charge
Q10.	The force experienced per unit positive charge at a point placed in the electric field is
Option A:	Magnetic field intensity
Option B:	Electric field intensity
Option C:	Electric flux
Option D:	Magnetic flux
Q11.	In a lossless medium the intrinsic impedance η = 60π and μr = 1. The relative dielectric constant εr shall be
Option A:	1
Option B:	2
Option C:	4
Option D:	8
Q12.	The capacitance of a material in air with area 20 m^2 and distance between plates being 5m is given as
Option A:	3.536pF
Option B:	35.36pF
Option C:	0.353pF
Option D:	353.6pF
Q13.	∇.J=0 is known as
Option A:	Laplace's Equation
Option B:	Poisson's Equation
Option C:	Continuity equation for steady current
Option D:	Gauss Law
Q14.	As per Biot Savart's law, the differential magnetic field intensity produced at a point P due to differential current element is
Option A:	Inversely proportional to distance R between point P and the element.
Option B:	Directly proportional to distance R between point P and the element.
Option C:	Inversely proportional to the square of distance R between point P and the element.

Option D:	Directly proportional to the square of distance R between point P and the element.
Q15.	If the magnitude of the reflection coefficient on a transmission line for a given load is 1/3, VSWR is
Option A:	3
Option B:	2
Option C:	1
Option D:	8
Q16.	For the wave equation E = 20sin (wt-6z)a_x, the direction of wave propagation will be in
Option A:	X-direction
Option B:	Y-direction
Option C:	Z-direction
Option D:	XZ-direction
Q17.	The Smith chart consists of
Option A:	Constant R and variable X circles
Option B:	Variable R and constant X circles
Option C:	Constant R and constant X circles
Option D:	Variable R and variable X circles
Q18.	Magnetic flux density emerging out of a closed surface is
Option A:	one
Option B:	zero
Option C:	dependent on magnetic movements inside the closed surface.
Option D:	dependent on magnetic movements outside the closed surface.
Q19.	An infinite sheet has a charge density of 150 μC/m. The flux density in μC/m^2 is
Option A:	25
Option B:	50
Option C:	75
Option D:	100
Q20.	The direction of induced emf can be found by
Option A:	Laplace's equation
Option B:	Flemming's right hand rule
Option C:	Lenz's law
Option D:	Biot-Savart's law

Q2.	**Solve any Two Questions** **(10 Marks each):**
i.	In free space, V= $6xy^2z + 8$. Find electric field intensity **E** and volume charge density ρ_V at point P (1, 2,-5)

ii.	Evaluate both sides of the divergence theorem for the field $\mathbf{D}= 2xy\ \mathbf{a_x} + x^2\ \mathbf{a_y}$ (C/m^2) and a rectangular parallelepiped formed by the planes x=0 to 1, y= 0 to 2, z= 0 to 3.
iii.	Define reflection coefficient, transmission coefficient and standing wave ratio. For normal incidence, determine the amplitudes of reflected and transmitted electric and magnetic fields **E** and **H** at interface of two regions at z=0. Given: Incident Ei= 1.5 x 10^{-3} V/m. $\varepsilon_{r1} = 8.5$, $\mu_{r1} = 1$, $\sigma_1 = 0$. Second region is free space.

Q3.	**Solve any Two Questions (10 Marks each):**
i.	Derive expression to find magnetic field intensity due to infinite long straight conductor on z-axis by Biot- Savart law
ii.	State Poynting theorem. Derive mathematical expression for the Poynting theorem and explain the meaning of each term.
iii.	Explain the concept of electrostatic discharge and magnetic levitation using principles of electromagnetics

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: ECC-504 and Course Name: Discrete Time Signal Processing

Time: 2 hour Max. Marks: 80

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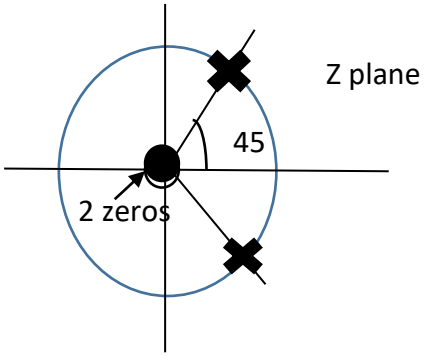
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In bilinear transformation, the left-half s-plane is mapped to which of the following in the z-domain?
Option A:	Partially outside the unit circle |z|=1
Option B:	Entirely outside the unit circle |z|=1
Option C:	Entirely inside the unit circle |z|=1
Option D:	Partially inside the unit circle |z|=1
2.	Twiddle factor W_4^3=
Option A:	j
Option B:	1
Option C:	-1
Option D:	-j
3.	$H_1[Z] = 1 + 0.25z^{-1}$ behaves like a _____filter and $H_2[Z] = 1 - 0.25z^{-1}$ behaves like a _____filter
Option A:	Low pass, High pass
Option B:	High pass, Low pass
Option C:	Band Pass, All pass
Option D:	All pass, Band pass
4.	In impulse invariant transformation method for H(s)=$\frac{1}{s-P}$ digital transformation is given as
Option A:	H(z)=$\frac{1}{1-e^{pT}\ z^{-1}}$
Option B:	H(z)=$\frac{1}{1-e^{-pT}\ z^{-1}}$
Option C:	H(z)=$\frac{1}{1+e^{-pT}\ z^{-1}}$
Option D:	H(z)=$\frac{10}{1+e^{pT}\ z^{-1}}$
5.	The Quantisation error in Analog to digital conversion (ADC) of a signal is said to be _____ error and this error is assumed to have a _____ probability distribution function (pdf)
Option A:	Truncation, Uniform
Option B:	Truncation, Gaussian
Option C:	Rounding, Uniform

Option D:	Rounding, Gaussian
6.	In the DTMF signal tone number 1 press generates _____ and _____ tones
Option A:	697 Hz and 1209 Hz
Option B:	770 Hz and 1336 Hz
Option C:	852 Hz and 1336 Hz
Option D:	941 Hz and 1209 Hz
7.	An FIR filter which has the following property $\lvert\angle H(0) - \angle H(\pi)\rvert = \pi$ behaves like an
Option A:	Minimum phase system
Option B:	Maximum phase system
Option C:	Mixed phase system
Option D:	Zero phase system
8.	The simultaneous fetch of code as data is done in _____ architecture
Option A:	Harvard architecture
Option B:	Von-Neumann architecture
Option C:	Very large instruction word architecture
Option D:	Modified Harvard architecture
9.	The relation between analog and digital frequency is nonlinear in case of
Option A:	Impulse invariant transformation.
Option B:	Bilinear transformation.
Option C:	Frequency sampling.
Option D:	chebyshev sampling..
10.	Range of Round off error for two's complement binary number representation with B number of bits is given as -------
Option A:	$-\left(\frac{2^{-B}}{2}\right) \leq \epsilon_R \leq \left(\frac{2^{-B}}{2}\right)$
Option B:	$-(2^{-B}) \leq \epsilon_R \leq 0$
Option C:	$-(2^{-B}) \leq \epsilon_R \leq (2^{-B})$
Option D:	$-(2^{+B}) \leq \epsilon_R \leq 0$
11.	In ECG signal the heart rate is computed using _____ interval
Option A:	R-R interval
Option B:	S-S interval
Option C:	T-T interval
Option D:	Q-Q interval
12.	The normalized transition width of a Rectangular window of length N is written as
Option A:	$\frac{3.1}{N}$
Option B:	$\frac{3.3}{N}$
Option C:	$\frac{5.5}{N}$
Option D:	$\frac{0.9}{N}$
13.	If an input signal x[n] having a range 10V is passed through a 6-bit quantizer then the quantization step size

Option A:	0.15625
Option B:	0.015625
Option C:	0.00244
Option D:	0.0244
14.	The DIT FFT algorithm divides the sequence into
Option A:	Positive and negative values
Option B:	Even and Odd samples
Option C:	Upper higher and lower spectrum
Option D:	Small and large samples
15.	The architecture that employs instruction level parallelism is
Option A:	Von-Neumann architecture
Option B:	Harvard architecture
Option C:	Modified Harvard architecture
Option D:	VLIW architecture
16.	The normalized transfer function of lowpass filter is transformed to highpass filter with cutoff frequency, Ωc by the transformation
Option A:	$S_n \rightarrow s^{\star}\ \Omega c$
Option B:	$S_n \rightarrow s/\ \Omega c$
Option C:	$S_n \rightarrow\ \Omega c/s$
Option D:	$S_n \rightarrow s\text{^}2^{\star}\ \Omega c$
17.	The sign magnitude and twos complement representation of the decimal number (-10) is given as --------- and ----------respectively
Option A:	01010, 10101
Option B:	11010, 10110
Option C:	1010, 0110
Option D:	-1010, -0101
18.	If DFT {x(n)}= X(k), then DFT {x(n+m) } is
Option A:	$X(k)\ e^{\frac{-j2\pi km}{N}}$
Option B:	$X(k)\ e^{\frac{j2\pi km}{N}}$
Option C:	$X(k)\ e^{\frac{j2\pi k}{mN}}$
Option D:	$X(k)\ e^{\frac{-j2\pi k}{mN}}$
19.	The location of compulsory zero in a Type II linear phase FIR filter is at_____ and in Type IV is at _____
Option A:	$z\ =\ -1,\ \ z = +1$
Option B:	$z = +1,\ \ z = -1$
Option C:	$z = \pm 1$, No compulsory zeros
Option D:	No compulsory zeros, $z = \pm 1$
20.	If an N-point sequence, If N=16, the total number of complex additions and multiplications using Direct Computation of DFT are,
Option A:	240,256
Option B:	256,240

Option C:	256,256
Option D:	240,300

Q2	
A	**Solve any Two** **5 marks each**
i.	Identify the type of filter if the pole-zero plot is given as shown. Also draw its frequency response and find its transfer function 
ii.	A digital filter with a 3 dB bandwidth of 0.4π is to be designed from the analog filter whose system response is: $H(s)=\frac{\Omega c}{s+\Omega c}$ Use the bilinear transformation and obtain H(z).
iii.	Explain with block diagram application of DSP in RADAR signal processing
B	**Solve any One** **10 marks each**
i.	Design a linear phase FIR Band pass filter to pass frequencies in the range 0.4π to 0.65π rad/sample by taking N = 7 and using a Hanning window
ii.	Compute DFT of sequence x(n)={ 2,2,2,2,1,1,1,1 } using DIF-FFT algorithm

Q3.	
A	**Solve any Two** **5 marks each**
i.	Find DFT of x[n]={1,2,3,2] and using these results find DFT of x1[n]={1+j1,2+j2,3+j3,2+j2}
ii.	Explain Multiply and accumulate (MAC) unit
iii.	Specify the characteristics and location of compulsory zeros in Type I, Type II, Type III and Type IV FIR filters
B	**Solve any One** **10 marks each**
i.	Design a linear phase FIR low pass filter with cut off frequency of 0.75π rad/sec and order N = 5 using frequency sampling method
ii.	A second order filter $H(z) = \frac{1}{1-0.95z^{-1}+0.225\,z^{-2}}$. If the register length is 4 bits with MSB as sign bit. Find the effect of Quantization (**rounding off**) on the pole locations if the filter is realized using Direct Form II and cascading structures. In which case shift from the actual pole location due to quantization is less? Also, draw the noise model for a cascaded structure realization.

University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: EXTC

Curriculum Scheme: Rev2016.

Examination: TE Semester V

Course Code: ECCDLO5011 and Course Name: MICROELECTRONICS.

Time: 2 hour Max. Marks: 80

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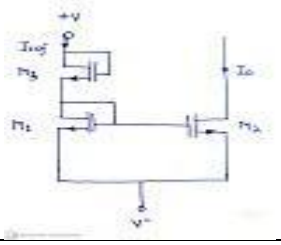
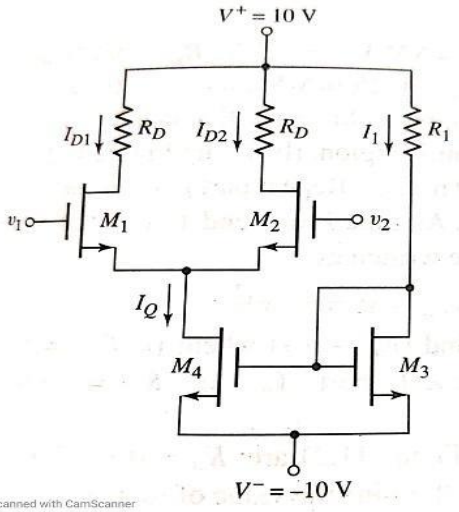
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks (2 Marks each)**
1.	For N Channel MOSFET the term $\mu_n C_{OX}$ is known as
Option A:	Process Transconductance
Option B:	Device Transconductance
Option C:	Device Conductance
Option D:	Process Conductance
2.	Condition for MOSFET to work in the deep triode region is____ .
Option A:	$V_{DS}=V_{GS}$
Option B:	$V_{DS}<V_{GS}$
Option C:	$V_{DS} \geq (V_{GS}-V_{TN})$
Option D:	$V_{DS} \geq 2(V_{GS}-V_{TN})$
3.	MOSFET Offers finite output resistance because of
Option A:	Punch through effect
Option B:	Channel length Modulation Effect
Option C:	Body Effect
Option D:	Hot electron effect
4.	MOSFET works as linear resistor in
Option A:	Saturation region
Option B:	Triode region
Option C:	Deep Triode region
Option D:	Breakdown region
5.	In case of full scaling, if Scaling factor S=2 and let P is the power dissipation of MOSFET before scaling then after scaling Power dissipation is
Option A:	P
Option B:	P/2
Option C:	P/4
Option D:	P/8
6.	Polysilicon is used for gate in MOSFET because
Option A:	It is semi metal
Option B:	It has lattice matching with silicon
Option C:	It is easy to fabricate

Option D:	Its cost is less.
7.	As per λ based design rule the minimum spacing between two adjacent contact cut is
Option A:	1λ
Option B:	2λ
Option C:	3λ
Option D:	4λ
8.	In Cascode current source the output resistance is approximately given as
Option A:	$g_m r_o$
Option B:	$g_m^2 r_o$
Option C:	r_o^2
Option D:	$g_m r_o^2$
9.	In Current Mirror circuit if 2 (W/L)o/p=(W/L)ref,then
Option A:	Io=Iref/2
Option B:	Iref=2Io
Option C:	Io=2Iref
Option D:	Io=3Iref
10.	For a MOSFET VGS=2V,VTN=1V,ID=1Milliampere and λ=0.01v^-1,then its Intrinsic gain is
Option A:	200
Option B:	100
Option C:	50
Option D:	300
11.	In a CS Amplifier with Passive load for MOSFET Process Transconductance is $0.1ma/v^2$,(W/L)=20,Overdrive voltage is 1V, λ=0 and RL=10K,then its voltage gain is.
Option A:	10
Option B	20
Option C:	30
Option D:	40
12.	MOSFET works as an Amplifier in _____Region.
Option A:	Cut-off
Option B:	Breakdown
Option C:	Triode
Option D:	Saturation
13.	The voltage gain of double Cascode Amplifier is.
Option A:	$g_m r_o$
Option B:	$(g_m r_o)^2$
Option C:	$(g_m r_o)^3$
Option D:	$(g_m r_o)^4$
14.	For a Dual input Balanced output differential amplifier, differential mode voltage gain is given as_____ .
Option A:	$-g_m Z_L$
Option B:	$-g_m Z_L/2$

Option C:	$-g_m^2 Z_L$
Option D:	$-g_m^2 Z_L/2$
15.	Dual power supply biasing is used in differential amplifier for ____
Option A:	To improve voltage gain.
Option B:	To improve Bandwidth
Option C:	To improve input impedance
Option D:	To avoid coupling capacitors.
16.	For a differential amplifier A_d=100, A_{CM}=10, then CMRR in Decibel is__.
Option A:	10
Option B:	20
Option C:	30
Option D:	40
17.	In class D power amplifier the MOS transistor operates
Option A:	Triode region
Option B:	Saturation Region
Option C:	Acts as switch
Option D:	Breakdown region
18.	In power amplifier circuit the use of RFC is
Option A:	Impedance matching
Option B:	Providing isolation between DC & AC
Option C:	Boosting of power gain
Option D:	Reducing the voltage swing
19.	A reverse bias P-N junction behaves like a
Option A:	Variable Inductor
Option B:	Variable capacitor
Option C:	Rectifier
Option D:	Clipper
20.	To fabricate Inductor inside the IC we use
Option A:	Plastic spiral wire
Option B:	Polysilicon spiral wire
Option C:	Silicon spiral wire
Option D:	Metal spiral wire

Q2 (20 Marks)	**Solve any Two Questions out of Three 10 marks each**
A	What do you mean by Short Channel MOSFET, explain various Short channel effects in MOSFET.

B	For the circuit shown V^+=10V.Transistors parameters are V_{TN} =2V, $\mu_n C_{OX}$=40μA/$V^2$and λ=0. Design the circuit such that I_{REF}=0.5Ma,I_O=0.2Ma and M_2 remains biased in saturation region for $V_{DS} \geq 1V$. 
C	Draw the circuit diagram of a common source amplifier with NMOS diode connected load. Derive the expression for voltage gain and output voltage swing.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	 In the given circuit for the MOSFET M_1 and M_2 V_{TN}=1V,K_N=0.1Ma/V^2,λ=0.For M_3 and M_4 V_{TN}=1V,K_N=0.3Ma/V^2,λ=0.01V^{-1}. Determine value of I_Q,A_d,A_{CM},and CMRR.If R_D=25KΩ,R_1=30KΩ.
B	Draw and Explain the working of Class B Power amplifiers using MOSFET and derive the expression for power efficiency.
C	Write the short notes on 1) Fabrication of Inductor 2) Fabrication of capacitor.

University of Mumbai

Examination 2020 under cluster __(Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Electronics & Telecommunication Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester: V

Course Code: ECCDLO5012 and Course Name: TV & Video Engineering

Time: 2-hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following blocks convert all the picture information into an equivalent electrical signal?
Option A:	RF tuner
Option B:	Common IF amplifier
Option C:	Television camera
Option D:	Video detector
2.	In the Television system, which of the following is not a complementary colour?
Option A:	Cyan
Option B:	Magenta
Option C:	Green
Option D:	Magenta
3.	If there are 625 lines per TV picture, then lines per field are____.
Option A:	1250
Option B:	625
Option C:	312.5
Option D:	2500
4.	Which of the following is not true about the colour circle?
Option A:	A primary and its complement can be considered as opposite to each other and hence the colour difference signals turn out to be of opposite polarities.
Option B:	The 3 primary colours R, G and B are represented by three radial vectors that are 120 degree phase shifted with respect to each other.
Option C:	The degree of saturation of a colour increases as we move along its vector from the center to the circumference of the colour wheel.
Option D:	Hue of a colour is represented by the length of the phasor
5.	Steps of Video compression based on Motion Compensation are in the following order:
Option A:	Motion Compensation based prediction, derivation of prediction error and Motion Estimation
Option B:	Motion Estimation, Motion Compensation based prediction and derivation of prediction error
Option C:	Motion Compensation based prediction, Motion Estimation and derivation of prediction error

Option D:	Derivation of prediction error, Motion Compensation based prediction and Motion Estimation
6.	Chromecast devices do not have _____connectivity option.
Option A:	HDMI
Option B:	Wi-Fi
Option C:	Ethernet
Option D:	RCA
7.	In DVB standard, the word DVB Stands for____
Option A:	Direct Video Broadcasting
Option B:	Digital Video Broadcasting
Option C:	Digital Via Broadcasting
Option D:	Direct Via Broadcasting
8.	Select the correct value of scanning frequency for luminance and for chrominance signal in MAC encoding.
Option A:	24 MHz for luminance and 13.5 MHz for chrominance
Option B:	13.5 MHz for luminance and 6.75MHz for chrominance
Option C:	12.5 MHz for luminance and 24.5 MHz for chrominance
Option D:	6.75 MHz for luminance and 4.7 MHz for chrominance
9.	What is the value of the Colour Subcarrier frequency of NTSC TV system?
Option A:	3.58 MHz
Option B:	4.43 MHz
Option C:	5.5 MHz
Option D:	2.45 MHz
10.	How much is the active scan line period in TV?
Option A:	52 µsec
Option B:	32 µsec
Option C:	64 µsec
Option D:	16 µsec
11.	Interlace scanning is used in televisions to avoid problem of ____.
Option A:	Ghost image
Option B:	Flicker
Option C:	Multipath interference
Option D:	Propagation delay
12.	Which of the following is a technological convergence of computers, television sets and set-top boxes?
Option A:	LED TV
Option B:	HDTV
Option C:	Smart TV
Option D:	LCD TV

13.	The amount of light intensity as perceived by the eye regardless of the colour is termed as___.
Option A:	Hue
Option B:	Colour burst
Option C:	Saturation
Option D:	Luminance
14.	Which of the following is not a characteristic of the PAL television system?
Option A:	The weighted ($B - Y$) and ($R - Y$) signals are modulated without being given a phase shift of 33°.
Option B:	On modulation both the colour difference quadrature signals are allowed the same bandwidth of about 1.3 MHz
Option C:	PAL television systems are susceptible to differential phase error.
Option D:	phase of the subcarrier to one of the modulators is reversed from + 90° to – 90° at the line frequency.
15.	DVB-S standard only specifies physical link characteristics and framing but _____is used as the transport stream for it.
Option A:	MPEG – 4
Option B:	MPEG – 3
Option C:	MPEG – 2
Option D:	MPEG – 1
16.	In the 1250 line HDTV standard, the number of active lines are____.
Option A:	1152
Option B:	1035
Option C:	1250
Option D:	1050
17.	Which of the following statements is not correct with respect to IPTV?
Option A:	It can support live television, time shifted TV, video on demand.
Option B:	IPTV can offer more channels than conventional TV systems.
Option C:	It reduces the bandwidth of the system.
Option D:	IPTV services can use wireless home networking technology.
18.	Which of the following DVB systems sends data in physical layer pipes?
Option A:	DVB-T
Option B:	DVB-T2
Option C:	DVB –H
Option D:	DVB-S
19.	Which of the following standards is also called as MPEG-part10 Advance Video Coding?
Option A:	H.264
Option B:	H.265
Option C:	H.262
Option D:	H.263
20.	With reference to digital video, which of the following statements is incorrect?

Option A:	Line rate is simply the frame rate multiplied by the number of lines per total frame.
Option B:	Refresh rate is generally engineered into a system. Once chosen, it cannot easily be changed.
Option C:	In a bright environment such as an office, a refresh rate above 70 Hz might be required.
Option D:	In a dim viewing environment typical of television viewing, such as a living room, a flash rate of 200 Hz is sufficient.

Option 3

Q2 (20 Marks)	
A	**Solve any Two** **5 marks each**
i.	Explain the terms Hue, Saturation and Luminance related to colour TV system.
ii.	What is MAC signal? What are its advantages?
iii.	Write a short note on Chromecast.
B	**Solve any One** **10 marks each**
i.	Draw composite video signal for 3 scanning line sequence and explain various components in it.
ii.	With the help of neat diagram explain MPEG-2 principle for image compression. Also state its features and applications.

Q3. (20 Marks)	
A	**Solve any Two** **5 marks each**
i.	Compare NTSC and PAL television systems.(At least 5 points of comparison)
ii.	Draw the block diagram of monochrome TV transmitter and explain its working.
iii.	Explain the following terms related to digital video: 1) Pixel Array 2) Frame Rate and Refresh Rate
B	**Solve any One** **10 marks each**
i.	Explain satellite television with respect to block diagram, basic operation, frequency allocation, advantages and limitations.
ii.	Explain IPTV with respect to architecture, internet protocols used, advantages and limitations.

University of Mumbai

Examination 2020 under cluster __(Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev 2016

Examination: TE, Semester: V

Course Code: ECCDLO 5013 and Course Name: Elective I: Finite Automata Theory

Time: 2 hour Max. Marks: 80

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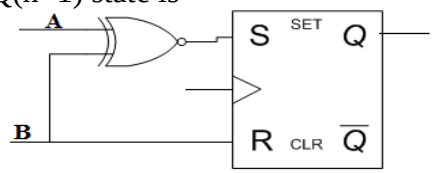
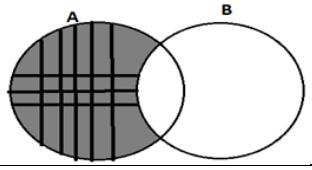
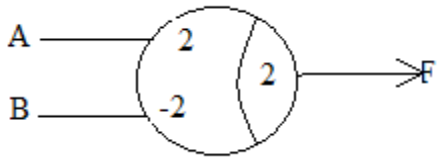
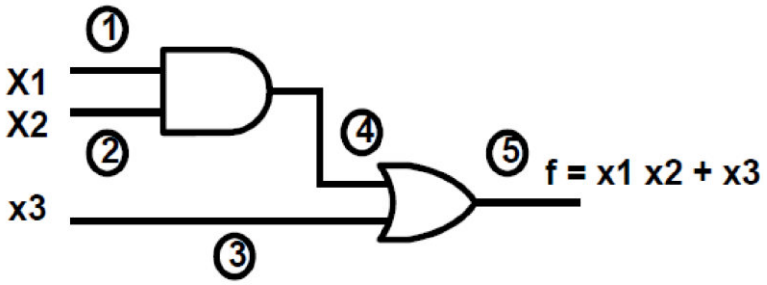
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A switching function *F* can be decomposed into two threshold elements F_1 and F_2. The function F can be implemented using_____
Option A:	2 threshold elements interconnected to perform AND operation
Option B:	2 threshold elements interconnected to perform NAND operation
Option C:	2 threshold elements interconnected to perform OR operation
Option D:	2 threshold elements interconnected to perform NOR operation
2.	How many flip-flops will be complemented in a 10-bit binary ripple counter to reach the next count after the count 1001100111
Option A:	4
Option B:	5
Option C:	6
Option D:	9
3.	The race in which stable state depends on order is called
Option A:	Critical race
Option B:	Identical race
Option C:	Non critical race
Option D:	Defined race
4.	The table having one state in each row is called
Option A:	Transition table
Option B:	State table
Option C:	Flow table
Option D:	Primitive flow table
5.	Conditional box has a shape of
Option A:	Square
Option B:	Rectangle
Option C:	Oval
Option D:	Pentagon

6.	How many number of prime implicants are there in the expression F(x, y, z) = y'z' + xy + x'z.
Option A:	7
Option B:	19
Option C:	3
Option D:	53
7.	In digital circuits permanent faults may arises due to
Option A:	Noise
Option B:	Non ideal transient behaviour of components
Option C:	Failure of component
Option D:	Propagation time
8.	A threshold function
Option A:	May be a unate function
Option B:	is not a unate function
Option C:	Is always a unate function
Option D:	may or may not be unate function
9.	An AB flip-flop is constructed from an SR flip-flop. The expression for next Q(n+1) state is 
Option A:	$\overline{A}\overline{B} + AQ$
Option B:	$\overline{A}\overline{B} + \overline{B}Q$
Option C:	Both A and B
Option D:	A+B
10.	Race condition is present in
Option A:	synchronous logic circuit
Option B:	asynchronous logic circuit
Option C:	ideal logic circuit
Option D:	Combinational logic circuit
11.	An implicant that is not a proper subset of any other implicant i.e. it is not completely covered by any single implicant, is called
Option A:	Intersection set
Option B:	Essential prime implicant
Option C:	Prime implicant
Option D:	Union set
12.	The shaded area of the figure is best described by? 

Option A:	A‘ (Complement of A)
Option B:	A U B -B
Option C:	A ∩ B
Option D:	B’(complement of B)
13.	The T-gate shown below represents F= 
Option A:	$\overline{A}B$
Option B:	$A\overline{B}$
Option C:	AB
Option D:	$\overline{A}\overline{B}$
14.	The binary relation {(1,1), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2)} on the set {1, 2, is _____
Option A:	reflective, symmetric and transitive
Option B:	irreflexive, symmetric and transitive
Option C:	neither reflective, nor irreflexive but transitive
Option D:	irreflexive and antisymmetric
15.	Suppose a relation R = {(3, 3), (5, 5), (5, 3), (5, 5), (6, 6)} on S = {3, 5, 6}. Here R is known as _____
Option A:	equivalence relation
Option B:	reflexive relation
Option C:	symmetric relation
Option D:	transitive relation
16.	In system engineering which of the following methods bridges the gap between the two ends of system development?
Option A:	ASM method
Option B:	VSM method
Option C:	Factor method
Option D:	FSM method
17.	According to Moore circuit, the output of synchronous sequential circuit depend/s on _____ of flip flop
Option A:	Past state
Option B:	Present state
Option C:	Nest state
Option D:	External inputs
18.	How many binary relations are there on a set S with 9 distinct elements?
Option A:	2^{90}
Option B:	2^{100}
Option C:	2^{81}
Option D:	2^{60}

19.	Simplify the expression using K-maps: F(A,B,C) = π(0,2,4,5,7).
Option A:	(x+y)(y+z)(x+z)(x'+z')
Option B:	(x+z')(y+z)(x+y)
Option C:	(x+y'+z)(x+z')
Option D:	(y'+z')(x'+y)(z+y')
20.	In dynamic hazards multiple output transition can occur if
Option A:	Circuit have single path with different delay
Option B:	Circuit have multiple path with different delay
Option C:	Circuit have multiple path with single delay
Option D:	Circuit have single path with single delay

Q2.	**Solve any Two Questions out of Three** **10 marks each**
A	Design a 3 bit counter which counts in the following sequence using T flip flop. 0—1—3—4—5—7—0-……etc.
B	Find the fault table for all stuck-at faults of the following circuit. And prepare test generation using exclusive or method 
C	The set {a,b,c,d,e,f,g,h,i,j,k} has the partitions $\pi_1 = \{\underline{a,b,c}\,;\underline{d,e};\underline{f};\ \underline{g,h,i};\underline{j,k}\}$ $\pi_2 = \{\underline{a,b}\,;\underline{c,g,h};\underline{d,e,f};\underline{i,j,k}\}$ $\pi_3 = \{\underline{a,b,c,f};\underline{d,e,g,h,i,j,k}\}$ i) Find $\pi_1 + \pi_2$ and $\pi_1.\pi_2$ ii) Find $\pi_1 + \pi_3$ and $\pi_1.\pi_3$ iii) Find a partition that is greater than π_1 and smaller than π_3.

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	Explain distinguishing and synchronizing sequence techniques.
B	Find the homing sequence and synchronizing sequence for the following machine.

Present State	**Next State, Z**	
	X=0	**X=1**
A	B,0	D,0
B	A,0	B,0
C	D,1	A,0
D	D,1	C,0

C	Realize the Boolean function using Threshold gate $f(w,x,y,z) = \sum m(0,1,4,5,8,9,11,13)$

University of Mumbai

Examination 2020

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **BE ELECTRONICS & TELECOMMUNICATION ENGINEERING**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ECCDLO5014 and Course Name: DATA COMPRESSION & ENCRYPTION

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	AES has_____ different configurations.
Option A:	Two
Option B:	Three
Option C:	Four
Option D:	Five
2.	SHA-1 produces a hash value of
Option A:	256 bits
Option B:	160 bits
Option C:	180 bits
Option D:	128 bits
3.	Use Caesar's Cipher to decipher the following: HQFUBSWHG WHAW
Option A:	ABANDONED TEXT
Option B:	ENCRYPTED LOCK
Option C:	ABANDONED LOCK
Option D:	ENCRYPTED TEXT
4.	Moving Picture Experts Group (MPEG-2), was designed for high-quality DVD with a data rate of _____ .
Option A:	3 to 6 Mbps
Option B:	4 to 6 Mbps
Option C:	5 to 6 Mbps
Option D:	6 to 8 Mbps
5.	Steps in jpeg are in following order
Option A:	DCT, quantization , data compression
Option B:	DCT, data compression, quantization
Option C:	quantization, DCT, data compression
Option D:	data compression ,DCT, quantization
6.	In Huffman coding, data in a tree always occurs?
Option A:	Roots
Option B:	Leaves
Option C:	Outside the tree
Option D:	right sub tree

7.	SET stands for ___
Option A:	Secure email transaction
Option B:	Secure electronic transmission
Option C:	Safe email transaction
Option D:	Secure electronic transaction
8.	Which protocol is used to convey SSL related alerts to the peer entity?
Option A:	Alert Protocol
Option B:	Handshake Protocol
Option C:	Upper-Layer Protocol
Option D:	Change Cipher Spec Protocol
9.	What is the key size allowed in PGP?
Option A:	1024-1056
Option B:	1024-4056
Option C:	1024-4096
Option D:	1024-2048
10.	Prob a1= 0.2, prob a2=0.2 , prob a3=0.25 , prob a4=0.05 , prob a5=0.15, prob a6=0.15. Find entropy.
Option A:	3
Option B:	3.25
Option C:	2
Option D:	2.25
11.	Compression ratio is……..
Option A:	Uncompressed size /compressed size
Option B:	compressed size/ Uncompressed size
Option C:	compression gain/compression factor
Option D:	compression factor/ compression gain
12.	_____ encoding is based on the science of psychoacoustics, which is the study of how people perceive sound.
Option A:	Predictive
Option B:	Perceptual
Option C:	Huffman coding
Option D:	Arithmetic coding
13.	An asymmetric-key ciphers uses
Option A:	1 key
Option B:	2 key
Option C:	3 key
Option D:	4 key
14.	_____ audio/video refers to on-demand requests for compressed audio/video files.
Option A:	Streaming live
Option B:	Streaming stored
Option C:	Interactive

Option D:	Streaming stored and Interactive
15.	A video consists of a sequence of
Option A:	Slots
Option B:	Signals
Option C:	Packets
Option D:	Frames
16.	The basic processing unit of H.261 design is called a
Option A:	Block
Option B:	Megablock
Option C:	Macroblock
Option D:	Microblock
17.	There are ____ types of redundancies in an audio file.
Option A:	5
Option B:	4
Option C:	3
Option D:	2
18.	Human ears can hear sound waves when the frequency lies between
Option A:	2Hz to 20kHz
Option B:	20Hz to 2MHz
Option C:	20Hz to 20KHz
Option D:	0.2Hz to 2KHz
19.	SHA has _____ rounds.
Option A:	18
Option B:	14
Option C:	20
Option D:	22
20.	Choosing a discrete value that is near but not exactly at the analog signal level leads to
Option A:	PCM error
Option B:	Quantization error
Option C:	PAM error
Option D:	PWM error

Q2	
A	**Attempt any 2** **05 marks each**
i	Explain JPEG- LS standard.
ii	Explain in brief a network based intrusion detection system.
iii	Write a short note on secure/multiple internet mail extension
B	**Attempt Any 1** **10 marks each**

i	Encrypt the plain text 15 using the RSA algorithm which uses prime numbers p=7 and q=11. The public key e =13. Verify that the decrypted text is the same as plain text.
ii	Explain the working of Data Encryption Standard with the help of a block diagram.

Q3	
A	**Attempt any 2** **05 marks each**
i	Explain the different security goals.
ii	Illustrate the worst case scenario in LZ-77 dictionary compression technique.
iii	Explain Fermat's Little theorem and Euler theorem with an example.
B	**Attempt any 1** **10 marks each**
i	A source A = {a, b,c,d} has probabilities (0.7, 0.15,0.1, 0.05} respectively. Generate a tag for the sequence {abcda} using arithmetic code.
ii	Explain LZ-77 approach of data compression with an example and explain the problem with LZ77 technique.