K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai - 400022
NAAC Accredited Institute with 'A' Grade
NBA Accredited 3 Programs (Computer Engineering, Electronics & Telecommunication Engineering and Electronics Engineering) Permanently Affiliated to University of Mumbai

EXAMINATION TIME TABLE (JUNE 2021)

PROGRAMME - T.E. (Electronics)(REV. -2016) (Choice Based)

SEMESTER - V

Days and Dates	Time	Course Code	Paper
Wednesday, June 16, 2021	11.30 a.m to 1.30 p.m	ELX501	Micro-controllers & Applications
Friday, June 18, 2021	11.30 a.m to 1.30 p.m	ELX502	Digital Communication
Monday, June 21, 2021	11.30 a.m to 1.30 p.m	ELX503	Engineering Electromagnetics
Wednesday, June 23, 2021	11.30 a.m to 1.30 p.m	ELX504	Design with Linear Integrated Circuts
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	ELXDLO5011	Elective I: Data Base & Management System
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	ELXDLO5012	Elective I: Digital Control System
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	ELXDLO5013	Elective I: ASIC Verification
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	ELXDLO5014	Elective I: Biomedical Instrumention

Important Note: ● **Change if any, in the time table shall be communicated on the college web site.**

PRINCIPAL

Mumbai
20th May, 2021

University of Mumbai
Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)

Examinations Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELX501 and Course Name: Microcontroller and Applications

Time: 2 Hours Max. Marks: 80

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Q1. [40 Marks]	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks [2 Marks each]**
1.	In 8051 serial communication Mode 2_____ bits are transmitted or received
Option A:	8
Option B:	9
Option C:	10
Option D:	11
2.	In 8051, the alternate use of _____ is to serve as higher order address bus for external memory.
Option A:	Port 0
Option B:	Port 1
Option C:	Port 2
Option D:	Port 3
3.	_____ timer register of 8051 is bit addressable
Option A:	TCON
Option B:	TMOD
Option C:	TH0
Option D:	TH1
4.	What is internal ROM capacity of 8051.
Option A	4 kB
Option B:	8 kB
Option C:	16 kB
Option D:	64 kB
5.	A Common Cathode SSD is suitably interfaced to port 1 of the 8051. It is desired to display the digit 5 on the SSD. The Hex code _____ must be output to port 1 [assume segments a to h are connected from LSB to MSB of port 1 and h is permanently 0]
Option A:	7F H
Option B:	5B H
Option C:	6D H
Option D:	66 H

6.	In Cortex M3 processor, the interrupt latency can be as low as _____.
Option A:	4 cycles
Option B:	12 cycles
Option C:	8 cycles
Option D:	24 cycles
7.	LM35 is a _____ Sensor
Option A:	Pressure
Option B:	Humidity
Option C:	Temperature
Option D:	Gas
8.	In ARM Cortex M3, Software in a Privileged Access Level can switch the program into the User Access Level using the _____
Option A:	Control Register
Option B:	xPSR
Option C:	Link Register
Option D:	Interrupt Mask Registers
9.	DAA command adds 6 to the nibble if .
Option A:	CY and AC are necessarily 1
Option B:	Either CY or AC is 1
Option C:	There is no relation with CY or AC
Option D:	CY is 1
10.	The 8051 assembler identifies Immediate Addressing mode by symbol.
Option A:	#
Option B:	%
Option C:	@
Option D:	&
11.	In 8051, identify which Register is not SFR?
Option A:	PC
Option B:	DPTR
Option C:	SP
Option D:	IP
12.	The ARM Cortex M3 core has general purpose registers.
Option A:	13
Option B:	14
Option C:	12
Option D:	16
13.	Which instructions have effect on the flags of PSW?
Option A:	MOV A, R0
Option B:	ACALL
Option C:	JMP
Option D:	DIV AB

14.	0808 is _____
Option A:	Only DAC
Option B:	Only ADC
Option C:	Could be DAC or ADC
Option D:	Counter
15.	To set contrast of the 16 x 2 LCD, pin ____ is used.
Option A:	1
Option B:	2
Option C:	3
Option D:	4
16.	In 8051 Timer/Counter, _____ Mode supports Automatic Reload Operation
Option A:	Mode 2
Option B:	Mode 1
Option C:	Mode 0
Option D:	Mode 3
17.	instructions have decision making capability
Option A:	Data Transfer
Option B:	Logical
Option C:	Boolean
Option D:	Program Branching
18.	In 8051, the EA bit of the IE SFR Enables/Disables
Option A:	Only Timer Interrupts
Option B:	Only External Interrupts
Option C:	All Maskable Interrupts
Option D:	Only Serial Interrupts
19.	On Reset, what is the default address of Stack pointer in 8051?
Option A	09 H
Option B:	07 H
Option C:	F4 H
Option D:	A5 H
20.	In ARM Cortex M3, Register PUSH and POP operations are always
Option A:	Byte Aligned
Option B:	Word Aligned
Option C:	Half Word Aligned
Option D:	Double Word Aligned

Q2 (20 Marks)	**Solve any Four Questions out of Six [5 marks each]**
A	Write a short note on Assembler Directives in 8051.
B	Draw and explain the IP SFR of 8051.
C	Differentiate between RISC and CISC processors.
D	Explain Interfacing of ADC to 8051with neat figure.
E	Show the interfacing of a single Seven Segment Display Module to the 8051 Microcontroller. Explain in brief.
F	Write a short note on NVIC in Cortex M3.

Q3. (20 Marks)	**Solve any Two Questions out of Three [10 marks each]**
A	Explain with neat figure the Interfacing of DAC 0808 to the 8051. Write a program to generate Sawtooth waveform at DAC output.
B	Assume that the stack pointer points to memory location 4AH and the contents of the memory location 30H and 31H are 00 and FF respectively. Illustrate the stack contents and contents of Memory Location 30H and 31H after the execution of each of the following instructions. PUSH 30H PUSH 31H POP 30H POP 31H What is the address in the stack pointer after execution of the last instruction in the program segment above?
C	Explain interrupt structure of 8051 with suitable diagram. Hence explain all SFRs associated with interrupts.

University of Mumbai
Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)

Examination Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELX501 and Course Name: Microcontroller and Applications

Time: 2 Hours Max. Marks: 80

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Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	C
Q3.	A
Q4	A
Q5	C
Q6	B
Q7	C
Q8.	A
Q9.	B
Q10.	A
Q11.	A
Q12.	A
Q13.	D
Q14.	C
Q15.	C
Q16.	A
Q17.	D
Q18.	C
Q19.	B
Q20.	B

Important steps and final answer for the questions involving numerical example

Q3(B):

1. **Before Execution**

SP	4A
30H	00
31H	FF
4C	XX
4B	XX
4A	XX

2. **After execution of PUSH 30H**

SP	4B
4C	XX
4B	00
4A	XX

30H	00
31H	FF

3. **After execution of PUSH 31H**

SP	4C

30H	00
31H	FF
4C	FF
4B	00
4A	XX

4. **After execution of POP 30H**

30H	FF
31H	FF
4C	FF
4B	00
4A	XX

SP	4B

5. **After execution of POP 31H**

4C	FF
4B	00
4A	XX

30H	FF
31H	00

SP	4A

This is the address in SP after execution of last instruction

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Examinations Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination : TE Semester V

Course Code: ELX502 and Course Name: DIGITAL COMMUNICATION

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.	For M equally likely messages, M>>1, if the rate of information R > C, the probability of error is
Option A:	Arbitrarily small
Option B:	Close to unity
Option C:	Not predictable
Option D:	Unknown
2.	We can divide channel coding schemes in to two broad categories: ---------- and ---------- coding.
Option A:	Block; Linear
Option B:	Linear; Nonlinear
Option C:	Block, Convolution
Option D:	Huffman, Shannonfano
3.	Hamming distance between 1000 and 0001 is ----------
Option A:	3
Option B:	1
Option C:	4
Option D:	2
4.	The inner portion of the fiber cable is called
Option A:	Cladding
Option B:	Coating
Option C:	Inner conductor
Option D:	Core
5.	Tick the correct sentence
Option A:	Noise immunity of 16 QAM is better than 16 PSK and QPSK
Option B:	Noise immunity of 16 QAM is better than 16 PSK but poorer than QPSK
Option C:	Noise immunity of 16 QAM is poorer than 16 PSK but better than QPSK
Option D:	Noise immunity of 16 QAM is poorer than both 16 PSK and QPSK.
6.	The value of the probability density function of random variable is
Option A:	Positive function
Option B:	Negative function
Option C:	Zero

Option D:	One
7.	In linear block code, for the received code-word Y ,syndrome(S) is calculated by:
Option A:	Y/ H^T
Option B:	$Y*H^2$
Option C:	Y*H
Option D:	$Y*H^T$
8.	If each pulse of the sequence to be detected is in _____ shape, the pulse can be detected without ISI.
Option A:	Sine
Option B:	Cosine
Option C:	Sinc
Option D:	Square
9.	Bandwidth of Mary FSK is
Option A:	2^N fb/2N
Option B:	$2^{(N+1)}$ fb/N
Option C:	2^N fs/N
Option D:	$2^{(N+1)}$ fs/N
10.	In the structure of fiber, the light is guided through the core due to total internal
Option A:	reflection
Option B:	refraction
Option C:	diffraction
Option D:	dispersion
11.	A satellite signal transmitted from a satellite transponder to earth's station
Option A:	Uplink
Option B:	Downlink
Option C:	Terrestrial
Option D:	Earthbound
12.	In binary data transmission DPSK is preferred to PSK because
Option A:	coherent carrier is not required to be generated at the receiver
Option B:	For a given energy per bit, the probability of error is less
Option C:	The 180 degree phase shifts of the carrier are unimportant
Option D:	More protection is provided against impulse noise
13.	Zero forced equalizers are used for
Option A:	Reducing ISI to zero
Option B:	Sampling
Option C:	Quantization
Option D:	Error control
14.	Why are VHF, UHF, and microwave signals used in satellite communication?
Option A:	More bandwidth
Option B:	More spectrum space
Option C:	Are not diffracted by the ionosphere

Option D:	Economically viable
15.	For a bit-rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are
Option A:	16 KHz and 20 KHz
Option B:	20 KHz and 32 KHz
Option C:	20 KHz and 40 KHz
Option D:	32 KHz and 40 KHz
16.	The maximum synchronizing capability in coding techniques is present in
Option A:	Manchester format
Option B:	Polar NRZ
Option C:	Polar RZ
Option D:	Polar quaternary NRZ
17.	The sequence of operations in which PCM is done is
Option A:	Sampling, quantizing, encoding
Option B:	Quantizing, encoding, sampling
Option C:	Quantizing, sampling, encoding
Option D:	Sampling, encoding, quantizing
18.	The method using which the error propagation in duo-binary signalling can be avoided is
Option A:	Filtering
Option B:	Precoding
Option C:	Postcoding
Option D:	Sampling
19.	In Manchester and differential Manchester encoding, the transition at the middle of the bit is used for
Option A:	bit transfer
Option B:	synchronization
Option C:	baud transfer
Option D:	Error detection
20.	The bit steam 01001 is differentially encoded using ‘Delay and Ex OR’ scheme for DPSK transmission. Assuming the reference bit as a ‘1’ and assigning phases of ‘0’ and ‘π’ for 1’s and 0’s respectively, in the encoded sequence, the transmitted phase sequence becomes
Option A:	π 0 π π 0
Option B:	0 π π 0 0
Option C:	0 π π π 0
Option D:	π π 0 π π

<table>
<tr><td>Q2.</td><td></td></tr>
<tr><td>A</td><td>Solve any Two 5 marks each</td></tr>
<tr><td>i.</td><td>Why MSK is called shaped QPSK.Explain</td></tr>
<tr><td>ii.</td><td>In the presence of White Gaussian noise, with a constant signal power the channel capacity reaches its upper limit with the increase in the bandwidth B. Prove that this upper limit of C is given by $C_{\infty}=1.44(S/N_0)$.</td></tr>
<tr><td>iii.</td><td>Write short note on Optimum receiver.</td></tr>
<tr><td>B</td><td>Solve any One 10marks each</td></tr>
<tr><td>i.</td><td>Discuss the problem of IntersymbolInterference(ISI).Explain the measures to be taken to reduce ISI.How to study ISI using Eye pattern</td></tr>
<tr><td>ii.</td><td>A (8,4) cyclic code is generated by using generator polynomial $g(x)=x^4 + x^2 +1$. Draw the encoder and find the code word generated for message bits 1110(LSB) by tracing the path through encoder .Verify the result by using division method</td></tr>
<tr><td>Q3. A</td><td>Solve any Two 5 marks each</td></tr>
<tr><td>i.</td><td>Write a short note on Optical communication system</td></tr>
<tr><td>ii.</td><td>For a convolutional encoder with code rate 1/3 and constraint length 3 and generating Vectors g1=(1 1 1) , g2= (1 0 1) , g3= (1 1 0).
(i) Draw the encoder and find the codeword for input sequence 11010 by code tree method.</td></tr>
<tr><td>iii.</td><td>Differentiate between offset and nonoffset QPSK</td></tr>
<tr><td>B</td><td>Solve any One 10marks each</td></tr>
<tr><td>i.</td><td>Draw the signal constellation of 16 PSK and 16 QASK. Determine Euclidean distance and expression for symbol energy in both the systems. Compare them and comment about noise immunity</td></tr>
<tr><td>ii.</td><td>A DMS X(Discrete memoryless source) has following 5 symbols with probabilities
<table>
<tr><td>Symbol</td><td>X1</td><td>X2</td><td>X3</td><td>X4</td><td>X5</td></tr>
<tr><td>Probability</td><td>0.4</td><td>0.1</td><td>0.19</td><td>0.15</td><td>0.16</td></tr>
</table>
i.ConstructShanon Fano code for X and calculate the efficiency of code
ii.Repeat for Huffman code and compare the result</td></tr>
</table>

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Examination Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: ELX 502 and Course Name: Digital communication

Time: 2 hour Max. Marks: 80

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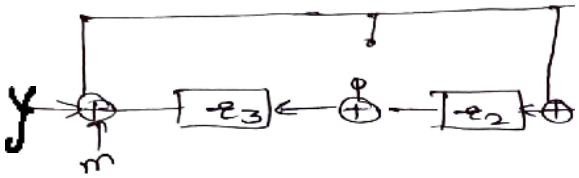
Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	D
Q4	D
Q5	B
Q6	A
Q7	D
Q8.	C
Q9.	B
Q10.	A
Q11.	B
Q12.	A
Q13.	A
Q14.	C
Q15.	D
Q16.	A
Q17.	A
Q18.	B
Q19.	B
Q20.	C

Q 2. (B) ii)

encoder design for



After tracing path
content of shift reg
$e_3\ e_2\ e_1\ e_0 = 1$
MSB

Division method

$$\frac{x^{n+k}\ m(x)}{g(x)} = \frac{x^4}{2}$$

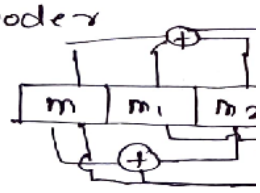
After binary divis

$x^3+1 = x^3+0$

∴ result is ve

Q 3. (B) (A) encoder

ii)



codeword for I/P se

111, 010, 011, 001, 1

(by

9 3(B)

ii> codewords for Shanon-Fa

	Shanon Fano	Hu
0.4	00	
0.19	01	c
0.16	10	0
0.15	110	0
0.1	111	0

efficiency.

Huffman coding = 97.7 %

Shanon fano = 95.6 %

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Examination Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: **ELX 503** and Course Name**: Engineering Electromagnetics**

Time: 2 hour Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following represents correct divergence operation?
Option A:	$\vec{E} = -\nabla V$
Option B:	$\vec{\nabla} \bullet \overline{D} = \rho_v$
Option C:	$\vec{\nabla} \times \overline{H} = \overline{J}_c$
Option D:	$\nabla^2 V = 0$
2.	The electric field lines are
Option A:	originating from a positive charge and terminate at a positive charge
Option B:	originating from a positive charge and terminate at a negative charge
Option C:	originating from a negative charge and terminate at a negative charge
Option D:	originating from a negative charge and terminate at a positive charge
3.	Gauss law for electric fields is given by
Option A:	$Div\, \vec{D} = \rho_v$
Option B:	$Div\, \vec{B} = 0$
Option C:	$Div\, \vec{H} = 0$
Option D:	$Div\, \vec{E} = 0$
4.	Which of the following Maxwell's equations is correct?
Option A:	$\vec{\nabla} \bullet \overline{D} = J_D$
Option B:	$\vec{\nabla} \times \overline{H} = 0$
Option C:	$\vec{\nabla} \times \overline{E} = J_c$
Option D:	$\vec{\nabla} \bullet \overline{B} = 0$
5.	Which of the following is called as Laplace's equation?

Option A:	$\nabla^2 V = -\frac{\varrho_S}{\epsilon}$
Option B:	$\nabla^2 V = 0$
Option C:	$\nabla \times V = 0$
Option D:	$\nabla^2 \times V = -\frac{\varrho_S}{\epsilon}$
6.	For a dielectric-to-dielectric medium, tangential components of electric and magnetic fields will be
Option A:	Discontinuous, Continuous across the boundary
Option B:	Discontinuous, Discontinuous across the boundary
Option C:	Continuous, Discontinuous across the boundary
Option D:	Continuous, Continuous across the boundary
7.	A quarter-wave monopole antenna operating in air at frequency 3 MHz must have an overall length of _____m.
Option A:	300
Option B:	150
Option C:	75
Option D:	25
8.	For an electromagnetic wave propagating in free space having $\overline{E} = 60\,cos(10^6 t - 0.2z)\,\vec{a}_y$ V/m find the direction of propagation.
Option A:	X direction
Option B:	Y direction
Option C:	Z direction
Option D:	XY direction
9.	For an electromagnetic wave propagating in z-direction, electric field E_y leads E_x by 90° and $E_x \neq E_y$. The wave polarization is _____.
Option A:	Left hand elliptically polarized
Option B:	Left hand circularly polarized
Option C:	Right hand elliptically polarized
Option D:	Right hand circularly polarized
10.	A medium can be classified as a good dielectric if _____.
Option A:	$\sigma/\omega\varepsilon = 0$
Option B:	$\sigma/\omega\varepsilon \ll 1$
Option C:	$\sigma/\omega\varepsilon = 1$
Option D:	$\sigma/\omega\varepsilon \gg 1$
11.	For an electromagnetic wave in air, the incident electric field, incident energy E is 40 V/m. If the reflection coefficient is 0.18, the reflected electric field is ____.
Option A:	7.2 V
Option B:	222.22 V
Option C:	0.40 V
Option D:	138.88 mV

12.	Method of moments is used to solve
Option A:	Laplace's equation
Option B:	Differential equations
Option C:	Linear equations
Option D:	Integral equations
13.	For a non-conducting medium, the ratio $\frac{E}{H} =$ is _____.
Option A:	$\eta = \frac{\varepsilon}{\mu}$
Option B:	$\eta = \frac{\mu}{\varepsilon}$
Option C:	$\eta = \sqrt{\frac{\mu}{\epsilon}}$
Option D:	$\eta = \sqrt{\frac{\epsilon}{\mu}}$
14.	The relation between average radiation intensity and the radiated power is _____.
Option A:	$U_{avg} = \frac{P_{rad}}{4\pi}$
Option B:	$U_{avg} = \frac{4\pi}{P_{rad}}$
Option C:	$U_{avg} = P_{rad}$
Option D:	$U_{avg} = P_{rad} * 4\pi$
15.	An electromagnetic wave travelling in air is normally incident on a dielectric having transmission coefficient Γ_T = 1.32. What is value of the reflection coefficient Γ_R?
Option A:	0.32
Option B:	1.32
Option C:	2.32
Option D:	0.68
16.	The troposphere is the:
Option A:	highest layer of the atmosphere
Option B:	the most ionized layer of the atmosphere
Option C:	lowest layer of the atmosphere
Option D:	middle layer of the atmosphere
17.	The radiation resistance of a short diploe is _____.
Option A:	$R_r = 10\pi^2\left(\frac{dl}{\lambda}\right)^2$

Option B:	$R_r = 20\pi^2\left(\frac{dl}{\lambda}\right)^2$
Option C:	$R_r = 70\pi^2\left(\frac{dl}{\lambda}\right)^2$
Option D:	$R_r = 80\pi^2\left(\frac{dl}{\lambda}\right)^2$
18.	The reflection coefficient of a transmission line is 0.25. The SWR is of the transmission line will be _____ .
Option A:	0.67
Option B:	1.67
Option C:	2.5
Option D:	3.5
19.	The expression for the characteristic impedance of a transmission line is
Option A:	$Z_0 = \sqrt{(R + j\omega L)\times(G + j\omega C)}$
Option B:	$Z_0 = \sqrt{(R + j\omega L)/(G + j\omega C)}$
Option C:	$Z_0 = \frac{(R+j\omega L)}{(G+j\omega C)}$
Option D:	$Z_0 = (R + j\omega L)\times(G + j\omega C)$
20.	The lower half area of the Smith chart is representing _____ effect of the normalized impedance?
Option A:	Inductive
Option B:	Resistive
Option C:	Capacitive
Option D:	Null

Q2.	**Solve the following** **(20 Marks)**
A	**Solve any Two 5 marks each**
i.	Compare different methods used in computational electromagnetics.
ii.	Define skin depth; calculate its value if the given conductor is having conductivity of $3*10^6$ S/m, $\mu=\mu_o$ at operating frequency of 300 KHz.
iii.	Enlist Maxwell's equations in point form and integral form for static field.
B	**Solve any One 10 mark each**
i.	Derive the reflection and transmission coefficient for a wave with normal incidence having reflected from a perfect dielectric.

ii.	A medium has $\mu_{r=10,}$ $\varepsilon_r = 2.5$ and conductivity is 10^{-4} mho/m, Determine Phase constant, attenuation, propagation constant, Phase velocity and wavelength if wave is having frequency of 1GHz.

Q3.	**Solve the following** **(20 Marks)**
A	**Solve any Two 5 marks each**
i.	Write a note on Smith chart and explain the steps to calculate SWR from the chat.
ii.	Find the directive gain and directivity if $U(\theta, \phi) = 10\sin\theta\sin2\phi$, $0<\theta<\pi$, $0<\varphi<2\pi$; (Assume max efficiency k=1)
iii.	Explain various modes of radio wave propagation.
B	**Solve any One 10 mark each**
i.	Derive an expression for radiation resistance of an infinitesimal dipole.
ii.	A lossy transmission line characteristics impedance is $Z_o = \sqrt{\frac{0.1+j200}{0.005+j0.003}}$ Ω. Calculate reflection coefficient and SWR if load impedance connected is $Z_L = 60 + j20\ \Omega$.

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Examination Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: **ELX 503** and Course Name**: Engineering Electromagnetics**

Time: 2 hour Max. Marks: 80

Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	B
Q3.	A
Q4	D
Q5	B
Q6	D
Q7	D
Q8.	C
Q9.	A
Q10.	B
Q11.	A
Q12.	D
Q13.	C
Q14.	C
Q15.	A
Q16.	C
Q17.	D
Q18.	B
Q19.	B
Q20.	C

Important steps and final answer for the questions involving numerical example

Q2(A)(ii):

Given $\sigma = 3*10^6$S/m, $\mu=\mu_o$, f =300KHz

Skin Depth $\delta = \frac{1}{\sqrt{\pi f \mu \sigma}} = 530.5\ \mu m$

Q2(B)(ii): Given $\mu_{r=10}$, $\varepsilon_r = 2.5$, $\sigma = 10^{-4}$mho/m, f = 1GHz.

Propagation constant $\gamma = \sqrt{j\omega\mu(\sigma + j\omega\varepsilon)}$

$= 0.0366 + j\ 104.8$

But $\gamma = \alpha + j\beta$

Attenuation $\alpha = 0.0366\ Neper/m$

Phase constant $\beta = 104.8\ rad/m$

Wavelenth $\lambda = \frac{2\Pi}{\beta} = 0.06\ meter$

Phase Velocity $v_p = \frac{\omega}{\beta} = 56.9 \times 10^6\ m/s$

Q3(A)(ii): From given $U(\theta,\varphi)$, $U_{Max} = 10$

Directivity $D_o = \frac{4\pi U_{Max}}{P_{rad}}$

Where

$$P_{rad} = \iint_{\theta=0,\phi=0}^{\theta=\pi,\phi=2\pi} [U_{\theta,\phi}] sin\theta d\theta d\phi = 5\pi$$

Hence $D_0 = \mathbf{8}$ & Directive gain [G] = kD = **8** (k =1)

Q3(B)(ii): Given Z_L and Z_0 for the line.

Reflection coefficient

$$\Gamma_0 = \frac{Z_L - Z_0}{Z_L + Z_0} = 0.00047 - j0.220 = 0.22 <- 90^o$$

& SWR $S = \frac{1+|\Gamma|}{1-|\Gamma|} = 1.57$

University of Mumbai
Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)

Examinations Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELX 504 and Course Name: Design with Linear Integrated Circuits

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.	Operational amplifier amplifies the following signals
Option A:	AC signals
Option B:	DC Signals
Option C:	Both AC and DC signals
Option D:	Noise
2.	The values of input impedance and output impedance for an ideal op-amp are
Option A:	Zero and Zero
Option B:	Infinity and Infinity
Option C:	Zero and Infinity
Option D:	Infinity and Zero
3.	An inverting summing amplifier with gain 1 has three different input voltage: 1.2 V, 2.2 V and 3.2 V. Find the output voltage?
Option A:	6.6 V
Option B:	3.2 V
Option C:	1.2 V
Option D:	-6.6 V
4.	Why a resistor is shunted across the feedback capacitor in the practical integrator?
Option A:	To reduce error voltage
Option B:	To enhance low frequency gain
Option C:	To enhance error voltage
Option D:	To reduce operating frequency
5.	If an instrumentation amplifier is designed using a transducer bridge, then which device measure the change in physical energy?
Option A:	Resistive transducer
Option B:	Indicating meter
Option C:	Capacitive transducer
Option D:	Inductor circuit

6.	Voltage-to-current converter with floating load is also called as
Option A:	Current series positive feedback
Option B:	Voltage series negative feedback
Option C:	Voltage series positive feedback
Option D:	Current series negative feedback
7.	In a first order low-pass filter what value of R is required if the filter has a cut-off frequency of 1 kHz and C=0.01 microF
Option A:	15.9 kΩ
Option B:	20 kΩ
Option C:	16.9 kΩ
Option D:	17.9 kΩ
8.	Which of the following filter is also called as a notch filter?
Option A:	Wide band-reject filter
Option B:	Narrow band-pass filter
Option C:	Wide band-pass filter
Option D:	Narrow band-reject filter
9.	Frequency of oscillation in Wein bridge oscillator is given as
Option A:	159/RC
Option B:	0.159/RC
Option C:	1/RC
Option D:	2/RC
10.	The anti-log amplifier has following component in series with input.
Option A:	Diode
Option B:	Resistor
Option C:	Capacitor
Option D:	Inductor
11.	A precision rectifier is designed by placing ---- in the feedback loop of an op-am circuit.
Option A:	Capacitor
Option B:	Resistor
Option C:	Diode
Option D:	Transistor
12.	What is the resolution of a digital-to-analog converter (DAC)?
Option A:	It is the comparison between the actual output of the converter and its expected output
Option B:	It is the deviation between the ideal straight-line output and the actual output of the converter
Option C:	It is the smallest analog output change that can occur as a result of an increment in the digital input.

Option D:	It is its ability to resolve between forward and reverse steps when sequenced over its entire range.
13.	Which of the following is a binary weighted DAC?
Option A:	R-2R ladder DAC
Option B:	PWM DAC
Option C:	Switched resistor DAC
Option D:	Sampling DAC
14.	The quantization error in an analog-to-digital converter can be reduced by:
Option A:	increasing the number of bits in the counter and decreasing the number of bits in the DAC
Option B:	decreasing the number of bits in the counter and DAC
Option C:	decreasing the number of bits in the counter and increasing the number of bits in the DAC
Option D:	increasing the number of bits in the counter and DAC
15.	What is the role of the comparators in the IC 555 circuit?
Option A:	to compare the output voltages to the internal voltage divider
Option B:	to compare the input voltages to the internal voltage divider
Option C:	to compare the output voltages to the external voltage divider
Option D:	to compare the input voltages to the external voltage divider
16.	The time period of a monostable 555 multivibrator is given by
Option A:	T = 0.33RC
Option B:	T = 2RC
Option C:	T = 1.1RC
Option D:	T = RC
17.	At which state the phase-locked loop tracks any change in input frequency?
Option A:	Free running state
Option B:	Phase locked state
Option C:	Capture state
Option D:	Minor state
18.	What is the typical dropout voltage for the 7805 fixed positive voltage regulator?
Option A:	1 V
Option B:	1.5 V
Option C:	1.2 V
Option D:	2 V
19.	What is the range of the voltage level of the LM317 adjusted voltage regulator?
Option A:	0 to 5 V
Option B:	1.2 to 37 V

Option C:	-12 to 12 V
Option D:	-5 to 5 V
20.	In high voltage high current IC723 configuration, which element is used to boost the current source capacity?
Option A:	Resistor
Option B:	Capacitor
Option C:	Transistor
Option D:	Inductor

Q2 **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	Draw the circuit diagram and explain the operation of differentiator. What are the limitations of ideal differentiator?
B	Design a low-pass filter at a cutoff frequency of 1 kHz with a passband gain of 2.
C	Draw the circuit diagram and explain the operation of zero crossing detector.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	Draw neat circuit diagram and explain the operation of successive approximation type analog to digital converter.
B	Draw neat circuit diagram and explain the operation of monostable multivibrator using IC555.
C	Write a note on : Functional block diagram and working of IC 723

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Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELX 504 and Course Name: Design with Linear Integrated Circuits

Time: 2 hour Max. Marks: 80

==========

Q1:

Question Number	Correct Option
Q1.	C
Q2.	D
Q3.	D
Q4	A
Q5	A
Q6	D
Q7	A
Q8.	D
Q9.	B
Q10.	A
Q11.	C
Q12.	C
Q13.	A
Q14.	D
Q15.	B
Q16.	C
Q17.	B
Q18.	D
Q19.	B
Q20.	C

Q.2 (B)

Given Fh=1 kHz

(1) Let C=0.01 μF
(2) R=1/2π (Fh*C) = 15.9 kΩ
(3) Since the passband gain is 2, R1 and Rf must be equal. So R1=Rf=10 kΩ

Draw the circuit diagram with all the designed values.

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Examinations Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester: V

Course Code: ELXDLO5011 and Course Name: Database & Management System

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.	Duplication of data at several places is called as _____
Option A:	Data Isolation
Option B:	Atomicity Problem
Option C:	Data Inconsistency
Option D:	Data Redundancy
2.	(Select course id from section where semester = 'Fall' and year= 2009) except (select course id from section where semester = 'Spring' and year= 2010); This query will display:
Option A:	Only tuples from second part
Option B:	Tuples from both the parts
Option C:	Tuples from first part which do not have second part
Option D:	Only tuples from the first part which has the tuples from second part
3.	Subset of Super keys is known as
Option A:	Candidate key
Option B:	Non Key Attribute
Option C:	Non Primary Attribute
Option D:	Foreign key
4.	Which one of the following is conflict operation?
Option A:	Reads and writes from the same transaction
Option B:	Reads and writes from different transaction
Option C:	Reads and writes from different transactions on different data items
Option D:	Reads and writes from different transaction on same data
5.	What is the purpose of physical data independence?
Option A:	The user of the logical level does not need to be aware of the complexity of physical level.
Option B:	The user of the logical level must know about physical level.

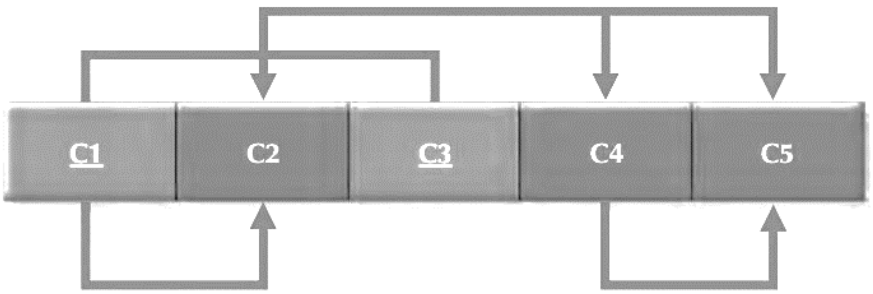
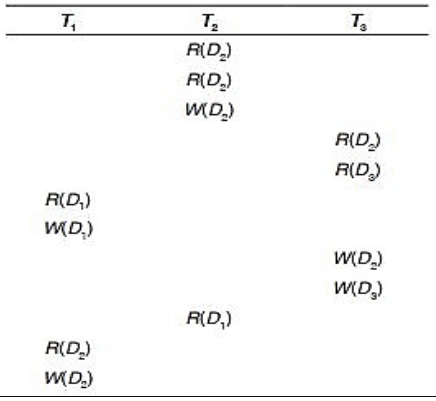
Option C:	Complexity issue at logical level is not known.
Option D:	The interdependence of logical and data.
6.	The three basic techniques to control deadlocks are: deadlock ____, deadlock detection, and deadlock avoidance.
Option A:	Prevention
Option B:	Protection
Option C:	Commit
Option D:	Recovery
7.	The result which operation contains all pairs of tuples from the two relations, regardless of whether their attribute values match
Option A:	Join
Option B:	Cartesian product
Option C:	Intersection
Option D:	Set difference
8.	Which of the following scenarios may lead to an irrecoverable error in a database system?
Option A:	A transaction writes a data item after it is read by an uncommitted transaction
Option B:	A transaction reads a data item after it is read by an uncommitted transaction
Option C:	A transaction reads a data item after it is written by a committed transaction
Option D:	A transaction reads a data item after it is written by an uncommitted transaction
9.	In E-R model, the details of the entities are hidden from the user. This process is called
Option A:	Categorization
Option B:	Abstraction
Option C:	Generalization
Option D:	Specialization
10.	Which of the following is a correlated subquery?
Option A:	Uses the result of an outer query to determine the processing of an inner query
Option B:	Uses the result of an inner query to determine the processing of an outer query
Option C:	Uses the result of an inner query to determine the processing of an inner query
Option D:	Uses the result of an outer query to determine the processing of an outer query
11.	'___%' matches any string of
Option A:	At least three characters
Option B:	At most three characters
Option C:	Exactly three characters
Option D:	Exactly three characters ending with %
12.	Relation *dept year(dept name, total inst 2007, total inst 2008, total inst 2009)*. Here the only functional dependencies are from dept name to the other attributes. The highest form of normalization for the above information is:
Option A:	1NF
Option B:	2NF
Option C:	BCNF
Option D:	3NF

13.	An association of several entities in an Entity-Relation Model is called
Option A:	Tuple
Option B:	Relation
Option C:	Relationship
Option D:	Field
14.	A transaction that completes its execution successfully is said to be
Option A:	Committed
Option B:	rolled over
Option C:	Complete
Option D:	rolled back
15.	If ABCDE are the attributes of a table and ABCD is a super key and ABC is also super key then
Option A:	A B C must be candidate key
Option B:	A B C cannot be super key
Option C:	A B C cannot be candidate key
Option D:	A B C may be candidate key
16.	The correct order of SQL expression is
Option A:	Select, group by, where, having
Option B:	Select, where, group by, having
Option C:	Select, group by, having, where
Option D:	Select, having, where, group by
17.	A table is in 3NF if it is in 2NF and if it has no:
Option A:	functional dependencies
Option B:	transitive dependencies
Option C:	trivial functional dependency
Option D:	multivalued dependencies
18.	In a one-to-many relationship, the entity that is on the many side of the relationship is called a(n) entity
Option A:	parent
Option B:	Child
Option C:	Instance
Option D:	Subtype
19.	Consider the following relation Cinema (theater, address, capacity) Which of the following options will be needed at the end of the SQL query? SELECT P1.address FROM Cinema P1 such that it always finds the addresses of theaters with maximum capacity?
Option A:	WHERE P1.capacity >= All (select P2.capacity from Cinema P2)
Option B:	WHERE P1.capacity >= Any (select P2.capacity from Cinema P2)

Option C:	WHERE P1.capacity > All (select max(P2.capacity) from Cinema P2)
Option D:	WHERE P1.capacity > Any (select max(P2.capacity) from Cinema P2)
20.	Consider the following transaction involving two bank accounts x and y. read(x); x: = x – 100; write(x); read(y); y: = y + 0; write(y) The constraint that the sum of the accounts x and y should remain constant is that of
Option A:	Atomicity
Option B:	Consistency
Option C:	Isolation
Option D:	Durability

Q2	**Solve any Two Questions out of Three 10 marks each**
A	Discuss different types of database architectures with the help of a neat diagram of each type. Explain one application of each type of architecture
B	Design a database for a worldwide package delivery company (e.g., DHL or FedEx). The database must be able to keep track of customers who ship items and customers who receive items; some customers may do both. Each package must be identifiable and trackable, so the database must be able to store the location of the package and its history of locations. Locations include trucks, planes, airports, and warehouses Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.
C	Consider the following relational schema Product(Maker, model, type) PC(Model, speed, ram, harddrive, screen, price) Laptops(model, speed, ram, harddrive, screen, price) Printer(model, color, type, price) Write the queries for the following using relational algebra 1. Find the make and model of all the pcs that are less that $1000 but greater than $800 dollars? 2. What are the models of pcs that are not made by a company that also makes laptops? 3. Find those manufacturers (i.e., makers) who produce Laptops but not PC's. 4. Find the model and price of all products made by manufacturer B (i.e., maker='B') 5. List the price of all the PC, laptop, and printer.

Q3	**Solve any Two Questions out of Three 10 marks each**
A	Consider the schema of World War II capital ships

	Classes(class, type, country, numGuns, bore, displacement) Ships(name, class, launched) Battles(name, date) Outcomes(ship, battle, result) Ships are built in "classes" from the same design, and the class is usually named for the first ship of that class. The relation Classes records the name of the class, the type ('bb' for battleship or 'bc' for battlecruiser), the country that build the ship, the number of main guns, the bore (diameter of the gun), and the displacement (weight, in tons). Relation Ships records the name of the ship, the name of its class, and the year in which the ship was launched. Relation Battles gives the name and date of battles involving these ships, and relation Outcomes gives the result (sunk, damaged, or ok) for each in each battle. Write SQL queries for the following 1. Find the ships heavier than 35,000 tons 2. Find those battles with at least three ships of the same country 3. Find the countries whose ships had the largest number of guns. 4. Find the classes of ships, at least one of which was sunk in a battle 5. Find for each class the year in which the first ship of that class was launched
B	Consider the following dependency diagram of a database. The primary keys are underlined  a. Identify and discuss each of the indicated dependencies b. Convert the above database in 3NF. Explain your solution
C	Consider the three data items D1, D2 and D3 and the following execution of schedules of transactions T1, T2 and T3: 

	a. Find whether above schedule is conflict serializable or not b. Find whether the schedule has deadlock or not

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Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester: V

Course Code: ELXDLO5011 and Course Name: Database Management System

Time: 2-hour Max. Marks: 80

Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	C
Q3.	A
Q4	D
Q5	A
Q6	A
Q7	B
Q8.	D
Q9.	B
Q10.	B
Q11.	A
Q12.	C
Q13.	C
Q14.	A
Q15.	D
Q16.	B
Q17.	B
Q18.	B
Q19.	A
Q20.	B

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Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELXDLO5012 Course Name: Digital Control Systems

Time: 2 hour Max. Marks: 80

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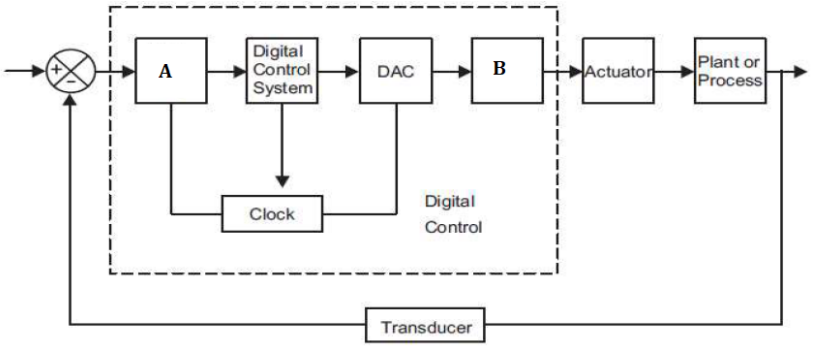
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Transfer function of Zero Order Hold is
Option A:	$\frac{1-e^{st}}{s}$
Option B:	$\frac{1-e^{-st}}{s}$
Option C:	$\frac{1+e^{-st}}{s}$
Option D:	$\frac{1+e^{st}}{s}$
2.	The spectrum of the sampled signal may be obtained without overlapping only if (f_s is sampling frequency, f_m is maximum frequency in the signal)
Option A:	$f_s > 2f_m$
Option B:	$f_s < 2f_m$
Option C:	$f_s > f_m$
Option D:	$f_s < f_m$
3.	Which of the following relationship is true for the pulse transfer function
Option A:	G(z)H(z) = GH(z)
Option B:	G(z)H(z) ≠ GH(z)
Option C:	G(z)H(z) >= GH(z)
Option D:	G(z)H(z) <= GH(z)
4.	Which of the following can be a state transition matrix for digital system?
Option A:	A^t
Option B:	e^{At}
Option C:	A^k

Option D:	e^{-At}
5.	The characteristic equation: $P(z) = z^3 - 1.3z^2 - 0.08z + 0.24 = 0$ Where $a_0 = 1$, $a_1 = -1.3$, $a_2 = -0.08$, $a_3 = 0.24$. According to Jury's stability condition, find which of the following statement is true?
Option A:	Stable because all 4 conditions are satisfied
Option B:	Unstable
Option C:	Stable as 3 out of 4 conditions are satisfied
Option D:	Stability cannot be found
6.	Which of the following is correct for bilinear transformation?
Option A:	All points in the LHP of s are mapped outside the unit circle in the z-plane
Option B:	All points in the RHP of s are mapped inside the unit circle in the z-plane
Option C:	All points in the LHP & RHP of s are mapped inside & outside the unit circle in the z-plane
Option D:	All points in the LHP & RHP of s are mapped outside & inside the unit circle in the z-plane
7.	Identify the block A & B in given block diagram of Digital control system 
Option A:	**A:** Filter circuit, **B:** Hold Circuit
Option B:	**A:** S/H circuit and ADC, **B:** Filter circuit
Option C:	**A:** S/H circuit and ADC, **B:** Sensor
Option D:	**A:** Integrator, **B:** Hold Circuit
8.	Which of the following methods is not used for realization of pulse transfer function of digital controllers
Option A:	Direct programming
Option B:	Standard programming

Option C:	Series programming
Option D:	Finite programming
9.	Which of the following is not a type of state-space representation of discrete-time system?
Option A:	Controllable canonical form
Option B:	Diagonal canonical form
Option C:	Ladder canonical form
Option D:	Jordan canonical form
10.	Z- transform of $f(k)=2\times1(k)+4\times\delta(k)$ is
Option A:	$\frac{4z-6}{z-1}$
Option B:	$\frac{4z+6}{z-1}$
Option C:	$\frac{6z-4}{z-1}$
Option D:	$\frac{6z+4}{z-1}$
11.	If it is possible compute the states of the system from measured output then the system is said to be
Option A:	Observable
Option B:	Controllable
Option C:	Cannot be determined
Option D:	Both Controllable and observable
12.	Which of the following is true for the stability of digital systems?
Option A:	All the eigenvalues must lie in the left half of z-plane.
Option B:	All the eigenvalues must lie in the right half of z-palne
Option C:	All the eigenvalues must lie outside of unit circle of z-palne
Option D:	All the eigenvalues must lie within the unit circle of z-palne
13.	If the root locus of a digital system intersects unit circle at gain K=10 then which of the following is true?
Option A:	When gain is equal to 10 the system is unstable
Option B:	When gain is equal to 10 the system is marginally stable

Option C:	When gain is equal to 10 the system is stable
Option D:	It gives no information about stability of the system
14.	Jury's test is used to determine which property of digital systems?
Option A:	Observability
Option B:	Controllability
Option C:	Stability
Option D:	Detectability
15.	What are the eigenvalues of $\begin{bmatrix} 0 & 1 \\ -0.21 & -1 \end{bmatrix}$?
Option A:	0.4 and 0.5
Option B:	-0.4 and -0.5
Option C:	-0.3 and -0.7
Option D:	0.3 and 0.7
16.	The Z-Transform X(z) of a discrete time signal x(n) is given by
Option A:	$\sum_{n=-\infty}^{\infty} x(n)z^{n}$
Option B:	$\sum_{n=-\infty}^{\infty} x(n)z^{-n}$
Option C:	$\sum_{n=0}^{\infty} x(n)z^{n}$
Option D:	$1+\sum_{n=0}^{\infty} x(n)z^{n}$
17.	Which of the following remains invariant under similarity transform?
Option A:	Eigenvalues of the system
Option B:	Transfer function of the system
Option C:	Zeros of the system
Option D:	All of the mentioned
18.	Digital data refers to the information that is
Option A:	Continuous in time
Option B:	Discrete in time
Option C:	Discrete in time and also quantized

Option D:	Continuous in time and also quantized
19.	Which of the following is not a method to compute solution of discrete-time control system?
Option A:	Caley-Hamilton theorem
Option B:	Z-transform method
Option C:	Diagonalization
Option D:	La'Hospital's rule
20.	The state variable equations of a system are $\dot{x}1 = -3x1 - x2 - u$ $\dot{x}2 = 2x1$
Option A:	System is not controllable
Option B:	System is controllable
Option C:	Data insufficient for finding controllability
Option D:	Cannot be found as matrix **A** and **B** are not given

Q2	**Solve any Two Questions out of three** **10 marks each**
A	Consider a discrete-time system described by the following difference equation $y(k) = a_1T\ y(k-1) + b_0u(k)$. Make a rough sketch of region of stability on a_1-T plane.
B	Describe bilinear transformation approach for discretization of continuous-time systems in detail. Also, comment on the mapping between s-plane and z-plane under such discretization.
C	Discuss ZOH as low-pass filter using clear diagrams of its frequency response characteristics.

Q3	**Solve any Two Questions out of three** **10 marks each**
A	Design a deadbeat controller for a discrete-time system which is described by following open-loop pulse transfer function. Assume loop to be closed by negative unity feedback. $G(z) = \frac{2(z+0.5)}{(z-1)(z-0.61)}$
B	Write a short note on Nyquist sampling theorem.
C	Discretize the continuous time state-space equation $\dot{x} = Ax + Bu$ and obtain the discrete-time state-space representation.

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Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELXDLO5012 and Course Name: Digital Control Systems

Time: 2 hour Max. Marks: 80

==========

Q1:

Question Number	Correct Option
Q1.	A
Q2.	B
Q3.	B
Q4	C
Q5	B
Q6	C
Q7	B
Q8.	D
Q9.	C
Q10.	C

Question Number	Correct Option
Q11.	A
Q12.	D
Q13.	B
Q14.	C
Q15.	C
Q16.	B
Q17.	D
Q18.	C
Q19.	D
Q20.	B

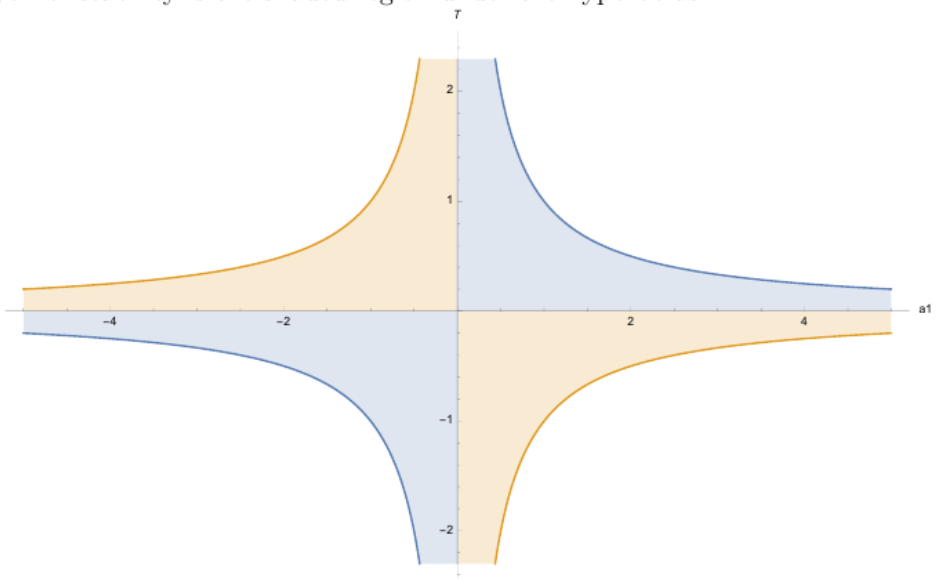
Important steps and final answer for the questions involving numerical example

A2(A)

Taking the $\mathcal{Z}$-transform of the difference equation and computing the transfer function,

$$Y(z) = a_1 T z^{-1} Y(z) + b_0 U(z)$$
$$\frac{Y(z)}{U(z)} = \frac{b_0}{1 - a_1 T z^{-1}}$$
$$\frac{Y(z)}{U(z)} = \frac{b_0 z}{z - a_1 T}$$

The condition for stability dictates the poles must be within unit circle. Thus, $|a_1 T| < 1$ implies stability of given difference equation. The equation $|a_1 T| = 1$ is a pair of hyperbolas and the region of stability is the shaded region under the hyperbolas.

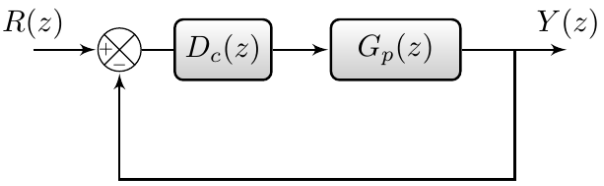


A5(A):

The open-loop plant transfer function is given by,

$$G_p(z) = \frac{2(z+0.5)}{(z-1)(z-0.61)} = \frac{2z^{-1}(1+0.5z^{-1})}{(1-z^{-1})(1-0.61z^{-1})}$$

The system block diagram is as shown below with $D_c(z)$ as deadbeat controller and negative unity feedback. Assume the closed-loop transfer function is $M(z)$ then,



$$\begin{aligned} M(z) &= \frac{C(z)}{R(z)} \\ &= \frac{D_c(z)G_p(z)}{1+D_c(z)G_p(z)} \end{aligned}$$

Rearranging for $D_c(z)$ gives,

$$D_c(z) = \frac{M(z)}{G_p(z)(1-M(z))} \tag{1}$$

For the deadbeat responce the closed loop transfer function $M(z) = C(z)/R(z)$ should be a polynomial in z^{-1}. Thus, by replacing some the desired $M(z)$ the deadbeat controller can be computed if $G_p(z)$ has all stable poles and zeros. However, in this case plant has one pole at unity it cannot be cancelled in the controller but it can be cancelled in $M(z)$ as shown below.

Rewrite the plant transfer function as,

$$G_p(z) = \frac{z^{-1}}{1-z^{-1}} \frac{2(1+0.5z^{-1})}{1-0.61z^{-1}} = \frac{z^{-1}}{1-z^{-1}} B(z)$$

Now replacing above in (1) we get,

$$D_c(z) = \frac{1-z^{-1}}{z^{-1}} \frac{M(z)}{B(z)(1-M(z))}$$

Now selecting $M(z) = z^{-1}$ satisfies all the requirements for deadbeat controller and the resulting controller is

$$D_c(z) = \frac{1}{B(z)} = \frac{z-0.61}{2(z+0.5)}$$

University of Mumbai
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Examinations Commencing from 15th June 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELXDLO5013 and Course Name: ASIC Verification

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.	Default value of register datatype is
Option A:	0
Option B:	X
Option C:	Z
Option D:	U
2.	…..is used to returns a real number with the complete time value including fractions.
Option A:	$time
Option B:	$realtime
Option C:	$constanttime
Option D:	$variabletime
3.	State the unpacked array for the following
Option A:	bit [7:0] my_array[3:0];
Option B:	bit [7:0] [3:0] my_array;
Option C:	bit [7:0] my_array;
Option D:	bit [7] my_array;
4.	In Verilog continuous assignment, LHS must be
Option A:	Scalar Net
Option B:	Vector Net
Option C:	Vector Reg
Option D:	Scalar as well as Vector Net
5.	For inter process communication, what is used to get a new semaphore without blocking it.
Option A:	New
Option B:	Get
Option C:	Try_get
Option D:	Create
6.	In Verilog `h1234 is a
Option A:	16 bit hexadecimal number
Option B:	32 bit hexadecimal number
Option C:	4 bit hexadecimal number

Option D:	It is invalid notation
7.	Verification ensure that RTL performance__?
Option A:	Correct function
Option B:	Correct task
Option C:	Correct work
Option D:	Correct value
8.	RTL stands for ?
Option A:	Register top level
Option B:	Register threshold level
Option C:	Register transfer level
Option D:	Register trail level
9.	Which of the following data types is new in system Verilog?
Option A:	Integer
Option B:	Logic
Option C:	Time
Option D:	Try
10.	In System Verilog, ….is called intelligent bundle of signals.
Option A:	Modport
Option B:	Class
Option C:	Event
Option D:	Interface
11.	Abbreviate FPGA
Option A:	Field programmable gate accumulator
Option B:	Field programmable array
Option C:	Field paired gate array
Option D:	Field programmable gate array logic
12.	In Verilog, a output port must always connected externally to
Option A:	net only
Option B:	a reg only
Option C:	either net or reg
Option D:	None of the mentioned
13.	DUT instance is created in
Option A:	Agent
Option B:	Environment
Option C:	Test
Option D:	Testbench top
14.	Which level of abstraction level is available in Verilog but not in VHDL?
Option A:	Behavioral level
Option B:	Dataflow level
Option C:	Switch level
Option D:	Gate level

15.	What does R and C stand for
Option A:	Random constraint
Option B:	Random Custom
Option C:	Random Cyclic
Option D:	Random Call

16.	Initial value of x=1 and y=2, then what will be final value if
	always @ (posedge clock)
	x<=y;
	always @ (posedge clock)
	y<=x;

Option A:	X=2, Y=1
Option B:	X=1, Y=2
Option C:	Both will have value equal to 1
Option D:	Both will have value equal to 1=2
17.	How many flops will be synthesized by the given code? always @ (posedge clock) begin Q1<=d; Q2<=q1; Q3<=q2; end
Option A:	1
Option B:	2
Option C:	3
Option D:	4
18.	Which is not a correct method of specifying time scale in Verilog?
Option A:	1ns/1ps
Option B:	10ns/1ps
Option C:	100ns/100ps
Option D:	100ns/110ps
19.	Steps of verification process
Option A:	Plan , work , test
Option B:	Test , plan
Option C:	Specification , create plan , create test
Option D:	Plan , test
20.	What is the output? module test; Bit [31:0] abc[*]; Initial begin abc[500]=40; $display(“size of abc = %d”,abc.num()); End
Option A:	Size of abc=500
Option B:	Size of abc=40
Option C:	Size of abc=501

Option D:	Size of abc=1

Q2 .	**Solve any Two Questions out of Three 10 marks each**
A	Draw the layered test bench and explain the working of each of the blocks.
B	Differentiate between Blocking and Non - blocking assignments in Verilog with proper example. Also describes various datatypes used in System Verilog.
C	List out types of coverage in System Verilog. Explain in detail Functional and Code coverage.

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	Explain the concept of an interface along with clocking block and modport using suitable example and why it is used?
B	What is difference between bounded and unbounded mailboxes? Explain with example how can we create unbounded mailboxes?
C	Explain various Fork Join statements supported in System Verilog with proper examples.

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Course Code: ELXDLO5013 and Course Name: ASIC Verification

Time: 2 hour Max. Marks: 80

==========

Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	B
Q3.	A
Q4	D
Q5	C
Q6	A
Q7	A
Q8.	C
Q9.	B
Q10.	D
Q11.	D
Q12.	A
Q13.	D
Q14.	C
Q15.	C
Q16.	A
Q17.	C
Q18.	D
Q19.	C
Q20.	A

Important steps and final answer for the questions involving numerical example

Q2 and Q3 are theory questions.

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Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELXDLO5014 and Course Name: Biomedical Instrumentation

Time: 2 hours 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.	Metal and micropipet are the types of
Option A:	The pH Electrode
Option B:	Microelectrodes
Option C:	Floating Electrode
Option D:	Needle Electrode
2.	The principal ion that is not involved with the phenomena of generation of bio-potentials is
Option A:	Sodium
Option B:	potassium
Option C:	chlorine
Option D:	hydrogen
3.	Resting potential of a cell generally varies from
Option A:	-40mV to -400 mV
Option B:	-60mV to -120mV
Option C:	-6 mV to -100 mV
Option D:	-60mV to -100 mV
4.	The interconnection betweens between neurons are called
Option A:	glial cells
Option B:	gray matter
Option C:	white matter
Option D:	synapses
5.	Lead I is the potential difference between
Option A:	Right Arm (RA) electrode and Left Arm (LA) electrode:
Option B:	Left Arm (LA) electrode and Right Leg (RL) electrode:
Option C:	Right Leg (RL) electrode and Right Arm (RA) electrode:
Option D:	RA+RL+LA

6.	Out of the following, which one requires a high frequency response?
Option A:	ECG
Option B:	ERG
Option C:	EMG
Option D:	EEG
7.	Which of the following is the correct formula for cardiac output?
Option A:	Heart Rate * BP
Option B:	stroke volume* BP
Option C:	heart rate / resistance
Option D:	Stroke Volume * heart rate
8.	Which type of filter is employed to reduce the hum noise generated by the power supply in the ECG circuit?
Option A:	band pass filters
Option B:	high pass filters
Option C:	notch filters
Option D:	low pass filters
9.	According to the international 10/20 system to measure EEG, even number denotes which side of the brain?
Option A:	Left
Option B:	Top
Option C:	Bottom
Option D:	Right
10.	This technique is used to obtain blood samples from the heart for oxygen content analysis and to detect the location of abnormal blood flow pathways.
Option A:	Implantation of a transducer in a vessel
Option B:	Percutaneous insertion
Option C:	Palpatory
Option D:	Catheterization
11.	The driving current of Impedance plethysmography is AC and it's frequency is
Option A:	Less than 5 kHz
Option B:	10 kHz or higher
Option C:	Between 5 kHz to 10 kHz
Option D:	Between 1 kHz to 5 kHz
12.	Swan-Ganz catheter contains four separate lumens. Out of the following, which one is not present in it?
Option A:	Lumen for wires
Option B:	Lumen for capacity measurement
Option C:	Lumen for balloon inflation
Option D:	Lumen for pressure measurement

13.	Colorimeter is used for measuring _____ of solutions.
Option A:	Transmittance and absorbance
Option B:	Only transmittance
Option C:	Only absorbance
Option D:	Inductance and transmittance
14.	A Coulter Counter is able to
Option A:	Count Complete Blood Count
Option B:	Only RBC
Option C:	Only WBC
Option D:	Only platelets
15.	By giving external electrical stimulation impulses to the heart muscle, it is possible to regulate the heart rate. These impulses are given by an electronic instrument called a
Option A:	Pacemaker
Option B:	Defibrillator
Option C:	Heart Lung Machine
Option D:	Ventilator
16.	In CT machine, what is the range of thickness of the tissues represented in each image slice?
Option A:	1 – 10 mm
Option B:	10-100 mm
Option C:	1-100 mm
Option D:	100 – 200 mm
17.	The cooling agent for the MRI magnet is
Option A:	Helium
Option B:	Neon
Option C:	Argon
Option D:	Xenon
18.	Out of the following which one is not a mode of sonography?
Option A:	A-mode
Option B:	3D-mode
Option C:	B-mode
Option D:	M-mode
19.	In micro shock hazards, which current flows through insulation, Dust, Moisture?
Option A:	Leakage current

Option B:	Capacitive leakage current
Option C:	Resistive leakage current
Option D:	Resistive current
20.	Heart-lung machine does not consist of this functional unit.
Option A:	The pump
Option B:	The oxygenator
Option C:	Heat exchanger
Option D:	Controller

Q2	**Solve any four questions out of the given six. (5 marks each)**
A	Explain Block diagram of EEG machine.
B	Explain the Coulter's counter with suitable diagram
C	Write a short note on heart sound measurement.
D	Explain the types of bio-potential electrodes.
E	Write a short note on baby incubator.
F	Explain the scanning system of CT scan.

Q3	**Solve any two questions out of the given three. (10 marks each)**
A	Illustrate the techniques used for cardiac output measurement
B	Draw a block diagram of ECG and explain each block in detail. Draw the ECG waveform and write a note on each wave component.
C	Explain the pacemaker with its different types and pacing modes.

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Q1:

Question Number	Correct Option
Q1.	B
Q2.	D
Q3.	D
Q4	D
Q5	A
Q6	C
Q7	D
Q8.	C
Q9.	D
Q10.	C
Q11.	B
Q12.	B
Q13.	A
Q14.	A
Q15.	A
Q16.	B
Q17.	A
Q18.	B
Q19.	C
Q20.	D