University of Mumbai

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **BE Electronics Engineering**

Curriculum Scheme: Rev 2019 'C' Scheme

Examination: SE Semester III

Course Code: **ELC301** and Course Name: **Engineering Mathematics III**

Time: 2 hour Max. Marks: 80

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Note: All Questions are compulsory.

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks. 2 marks each**
1.	Laplace Transform of $\{t\ sin3t\}$ is
Option A:	$-\frac{6s}{(s^2+9)^2}$
Option B:	$-\frac{3}{(s^2+9)^2}$
Option C:	$\frac{6s}{(s^2+9)^2}$
Option D:	$-\frac{6}{(s^2+9)^2}$
2.	Laplace Transform of $\{sin2t\ sin3t\}$ is
Option A:	$\frac{1}{2}\left[\frac{s}{s^2+1}-\frac{s}{s^2+25}\right]$
Option B:	$\frac{1}{2}\left[\frac{s}{s^2+1}+\frac{s}{s^2+25}\right]$
Option C:	$\frac{1}{2}\left[\frac{s}{s^2+25}-\frac{s}{s^2+1}\right]$
Option D:	$\left[\frac{s}{s^2+1}-\frac{s}{s^2+25}\right]$
3.	Laplace Transform of $\{e^{2t}(1+sint)\}$ is
Option A:	$\frac{1}{(s+2)}+\frac{1}{(s+2)^2+1}$
Option B:	$\frac{1}{(s-2)}+\frac{s}{(s-2)^2+1}$
Option C:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2+1}$
Option D:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2-1}$

4.	If $L\{f(t)\} = \frac{1}{s\sqrt{s+1}}$, then $L\{f(2t)\}$ is
Option A:	$\frac{1}{2s}\sqrt{\frac{2}{(s+2)}}$
Option B:	$\frac{1}{s}\sqrt{\frac{2}{(s+2)}}$
Option C:	$\frac{1}{2}\sqrt{\frac{s}{(s+2)}}$
Option D:	$\sqrt{\frac{2}{(s+2)}}$
5.	Inverse Laplace Transform of $\frac{1}{s^4}$ is
Option A:	$\frac{1}{3!}\,t^4$
Option B:	$\frac{1}{2!}\,t^4$
Option C:	$\frac{1}{3!}\,t^3$
Option D:	$\frac{1}{4!}\,t^4$
6.	Inverse Laplace Transform of $\frac{1}{s} + \frac{1}{(s+2)^2}$ is
Option A:	$1 - te^{-2t}$
Option B:	$1 + te^{2t}$
Option C:	$1 + e^{-2t}$
Option D:	$1 + te^{-2t}$
7.	Inverse Laplace Transform of $\frac{1}{(s-2)^2-1}$ is
Option A:	$e^{-2t}sinht$
Option B:	$e^{2t}sint$
Option C:	$e^{2t}sinht$
Option D:	$e^{2t}cosht$
8.	Find Fourier coefficient a_0 for the function $f(x) = 2x - 3x^2\,, 0 \le x \le 2\pi$?
Option A:	$1 - 2\pi$

Option B:	$\pi(1-2\pi)$
Option C:	0
Option D:	$2\pi(1-2\pi)$
9.	Find Fourier coefficient b_1 in half range sine series for the function $f(x) = sinx,\ 0 < x < \pi$?
Option A:	$\frac{\pi}{2}$
Option B:	0
Option C:	1
Option D:	-1
10.	Find Fourier coefficient a_0 for the function $f(x) = 1 - x^2$, $-1 \leq x \leq 1$
Option A:	$\frac{2}{3}$
Option B:	$\frac{1}{3}$
Option C:	0
Option D:	$-\frac{2}{3}$
11.	Which of the following is related to Cauchy-Riemann equations?
Option A:	$u_x = v_y\,, u_y = v_x$
Option B:	$u_x = -v_y\,, u_y = v_x$
Option C:	$u_x = v_y\,, u_y = -v_x$
Option D:	$u_x = u_y\,, v_y = v_x$
12.	If the eigenvalues of a 4x4 matrix A are given as 2 ,-3,-13 and 7,then determinant of A is
Option A:	19
Option B:	45
Option C:	546
Option D:	25
13.	What is the divergence of the vector field $\vec{f} = 3x^2\hat{\imath} + 5xy^2\hat{\jmath} + xyz^3\hat{k}$ at the point (1, 2, 3)?
Option A:	89
Option B:	80
Option C:	124
Option D:	100

14.	The Eigen values of the following matrix are $A = \begin{bmatrix} -2 & 5 & 4 \\ 0 & 7 & 5 \\ 0 & 0 & 2 \end{bmatrix}$
Option A:	-3 , 12, -6
Option B:	2,4 , 5
Option C:	1, 2 ,3
Option D:	-2,2,7
15.	If $u = 2x + kx^3 + 3xy^2$ is harmonic then the value of the constant k is
Option A:	3
Option B:	-1
Option C:	2
Option D:	0
16.	A vector field which has a vanishing divergence is called as _____
Option A:	Solenoidal field
Option B:	Rotational field
Option C:	Hemispheroidal field
Option D:	Irrotational field
17.	If all Eigen values are distinct then the matrix is
Option A:	Non-diagonalizable
Option B:	Diagonalizable
Option C:	Symmetric
Option D:	Singular
18.	If $f(z) = ze^z$ then it's real part u is given by
Option A:	$e^x \{ x\, siny + y\, cosy \}$
Option B:	$e^x \{ y\, siny + x\, cosy \}$
Option C:	$e^x \{ x\, cosy - y\, siny \}$
Option D:	$e^x \{ y\, siny - x\, cosy \}$
19.	If the Eigenvalues of a matrix A are 1,-2,-1 then the Eigenvalues of $A^2 - A - 2I$ are
Option A:	-4,4,0
Option B:	2,4,1
Option C:	2,4,0
Option D:	-2,4,0
20.	Determine the constants a, b, c if $\bar{F}$ is irrotational where $\bar{F} = (axy + bz^3)i + (3x^2 - cz)j$
Option A:	-6,0,1
Option B:	6,0,0
Option C:	0,6,0
Option D:	6,6,1

Q2. (20 Marks)	**Solve any Four out of Six.** **5 marks each**
A	Find L$[(t + sint)^2]$
B	Find $L^{-1}\left[\frac{4s+12}{s^2+8s+12}\right]$
C	Obtain the Fourier series for $f(x) = x$ in (0,2π).
D	Find the analytic function f(z) *in terms of* z whose real part is $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$.
E	Find the Eigenvalues of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{bmatrix}$ and Show that matrix satisfies the characteristic equation .
F	Show that $\bar{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both irrotational and solenoidal.

Q3. (20 Marks)	**Solve any Four out of Six.** **5 marks each**
A	Evaluate $\int_0^t \frac{\sin u}{u}\, du$
B	Find $L^{-1}\left[\frac{1}{s(s^2+9)}\right]$
C	Obtain half range Fourier sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$.
D	Find the constants a, b, c, d, e if $f(z) = (ax^3 + bxy^2 + 3x^2 + cy^2 + x) + i(dx^2y - 2y^3 + exy + y)$ is analytic.
E	Find Eigenvalues & Eigenvectors for the matrix $A = \begin{bmatrix} 3 & -4 \\ 2 & -3 \end{bmatrix}$
F	Evaluate by using Green's theorem $\int_C (x^2 - y)dx + (2y^2 + x)dy$, where C is the closed region bounded *by* $y = 4$ and $y = x^2$.

University of Mumbai

Examination 2021 under Cluster 06

(Lead College: Vidyavardhini's College of Engg Tech)

Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC302 and Course Name: Electronic Devices and Circuits I

Time: 2 hour Max. Marks: 80

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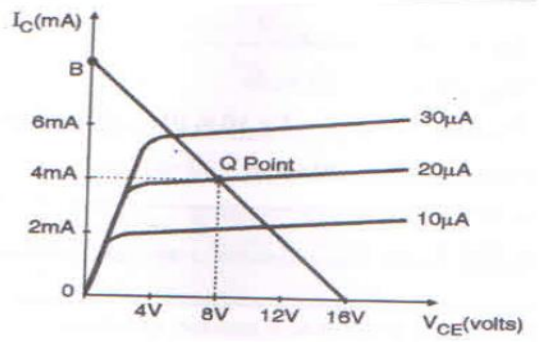
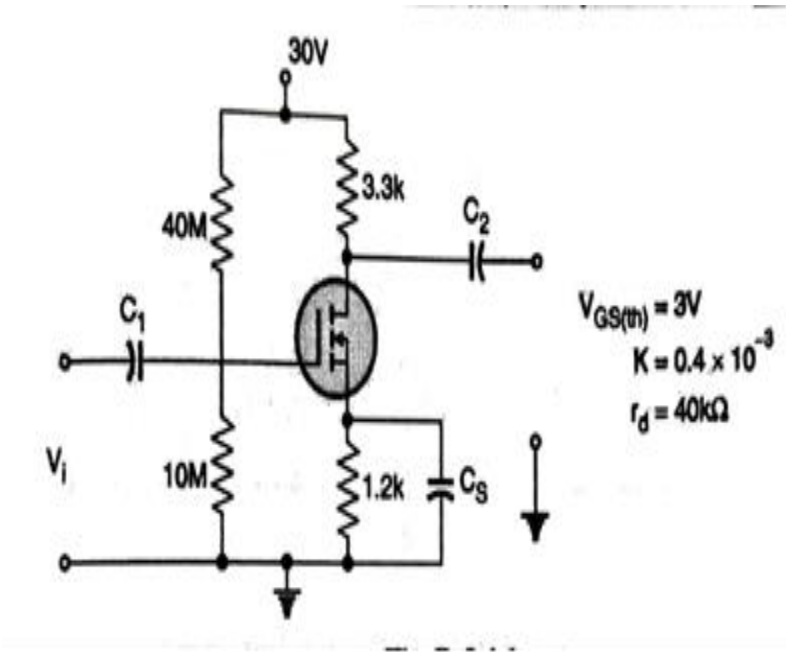
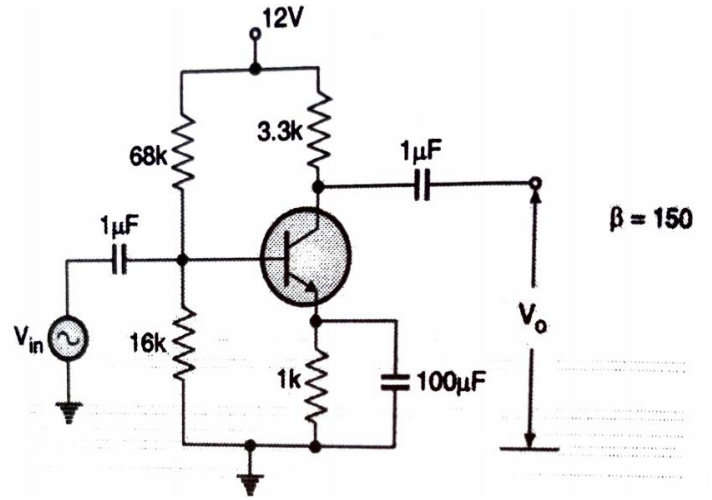
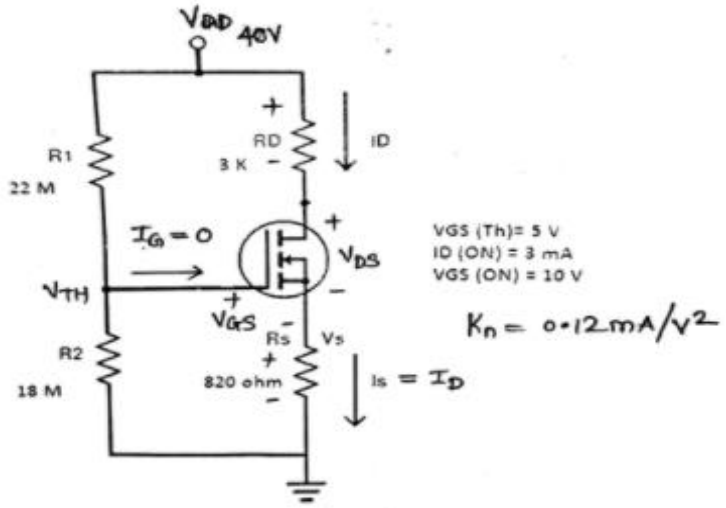
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The *PN* junction allows current flow when
Option A:	*p*-type is more positive than the *n*-type
Option B:	*n*-type is more positive than the *p*-type
Option C:	both the *n*-type and *p*-type have the same positive potential
Option D:	both the *n*-type and *p*-type have the same negative potential
2.	In a PN junction the potential barrier is due to the charges on either side of the junction, these charges are
Option A:	Majority carriers
Option B:	Minority carriers
Option C:	Majority and minority carriers
Option D:	Fixed donor and acceptor ions
3.	Which of the following statement is incorrect?
Option A:	Output of CE amplifier is out of phase with respect to its input
Option B:	CC amplifier is a voltage buffer
Option C:	CB amplifier is a voltage buffer
Option D:	CE amplifier is used as an audio (low frequency) amplifier
4.	The Hybrid-parameters analysis gives correct results for _____
Option A:	large signals only
Option B:	small signals only
Option C:	both large and small signals
Option D:	Not large nor small signals
5.	How many h-parameters are there for a transistor?
Option A:	Two
Option B:	Three
Option C:	Four
Option D:	Five
6.	The hfe parameter is called _____ in CE arrangement with output short circuited.
Option A:	Voltage Gain
Option B:	Current gain

Option C:	Input impedance
Option D:	Output impedance
7.	How many h-parameters of a transistor are dimensionless?
Option A:	Four
Option B:	Two
Option C:	Three
Option D:	One
8.	In bipolar junction transistor (BJT) the Early effect is due to :-
Option A:	Decrease in width of the emitter due to reverse bias of collector-to-base junction
Option B:	Decrease in width of the base due to reverse bias of collector-to-base junction
Option C:	Decrease in width of collector due to reverse bias of collector-to-base junction
Option D:	Temperature variations resulting in thermally generated minority carriers
9.	In PNP bipolar junction transistor (BJT), stream of current in active region is due to :-
Option A:	Drift of holes
Option B:	Drift of electrons
Option C:	Diffusion of holes
Option D:	Diffusion of electrons
10.	In a bipolar junction transistor (BJT) if $\beta = 100$ & collector current (IC) is 30 mA then what is the value of base current (IB) ?
Option A:	0.3mA
Option B:	0.03 mA
Option C:	30µA
Option D:	0.3µA
11.	In bipolar junction transistor (BJT) which mode of operation is not commonly used in real life applications?
Option A:	The inverse / reverse mode of operation
Option B:	The cut-off mode of operation
Option C:	The saturation mode of operation
Option D:	The forward active / linear mode of operation
12.	The MOSFET is almost ideal as switching device because
Option A:	It has longer life
Option B:	It works progressively
Option C:	It consumes low power
Option D:	It has linear characteristics
13.	MOSFET turn on when
Option A:	VGS>VT
Option B:	VGS<VT
Option C:	VGS=0
Option D:	VDS=VT
14.	The small signal output resistance of r_o of MOSFET is

Option A:	$[\lambda I_{DQ}]^{-2}$
Option B:	$[\lambda I_{DQ}]^{-1}$
Option C:	$[\lambda I_{DQ}]^{-3}$
Option D:	$[\lambda I_{DQ}]^{+1}$
15.	Which of the following device has the highest input impedance?
Option A:	JFET
Option B:	MOSFET
Option C:	Crystal Diode
Option D:	BJT
16.	What is the equation of VG for n-channel E-MOSFET in Voltage divider bias configuration?
Option A:	VG = [R2/(R1+R2)]VDS
Option B:	VG = [R1/(R1+R2)]VDD
Option C:	VG = [R1R2/(R1+R2)]VDS
Option D:	VG =[R2/(R1+R2)]VDD
17.	Biasing used in E- MOSFET
Option A:	Fixed bias, self-bias, collector to Base bias, voltage divider bias
Option B:	Fixed bias, collector to Base bias, voltage divider bias
Option C:	Feedback bias ,voltage divider bias
Option D:	Self-bias , collector to Base bias, voltage divider bias
18.	In MOSFET, which terminal is electrically isolated from the entire device structure?
Option A:	Source (S)
Option B:	Drain (D)
Option C:	Gate (G)
Option D:	Bulk or Body or Substrate (SS)
19.	Which is the most suitable biasing circuit for CE Amplifier design?
Option A:	Fixed Bias
Option B:	Fixed bias with R_E
Option C:	Collector to base bias
Option D:	Voltage divider bias
20.	In design of filters, which of these has the lowest value of ripple factor (γ) ?
Option A:	Capacitor (C) Filter
Option B:	Inductor (L) Filter
Option C:	Inductor & Capacitor (L-C) Filter
Option D:	C-L-C or 'π' Filter

Q2 **(20 Marks)**	
Q.2 A)	**Solve any two out of three (5 marks each)**
1.	Describe the V-I characteristic of P-N Junction diode with neat labeled diagram.
2.	The DC load line of fixed bias is shown in fig below Determine the required value of VCC, RC and RB for the fixed Bias circuit.  Fig. 1
3.	Explain Bias compensation for BJT(bipolar Junction Transistor).
Q.2 B)	**Solve any one question out of two (10 marks each)**
1	Design single stage CE amplifier for the following specification AV≥100, Vo= 2.5 V f_L=20Hz, stability factor S=10 , use transistor BC147A.hfe=220, hie=2.7KΩ and $V_{CE(SAT)}$=0.25V
2.	For the circuit shown below in Fig. 2, calculate Av, Ri, Ro.  Fig 2.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	For the given BJT circuit in fig 3.a, find Voltage Gain, Input Resistance and output resistance.  Fig 3.a
B	For the voltage divider bias circuit using N-channel E-MOSFET shown in Fig. 3.b, calculate Q – point where Q = [V_{DSQ}, I_{DQ}].  Fig 3.b
C	Design a single stage CE amplifier with FL=10 Hz, Voltage gain AV is 80 output voltage Vo=4.5 V and stability factor S=8. Use BC147A having hfe=220, hie=2.7KΩ and $V_{CE(SAT)}$=0.25V.

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Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)
Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC303 and Course Name: Digital Logic Circuits

Time: 2 hours Max. Marks: 80

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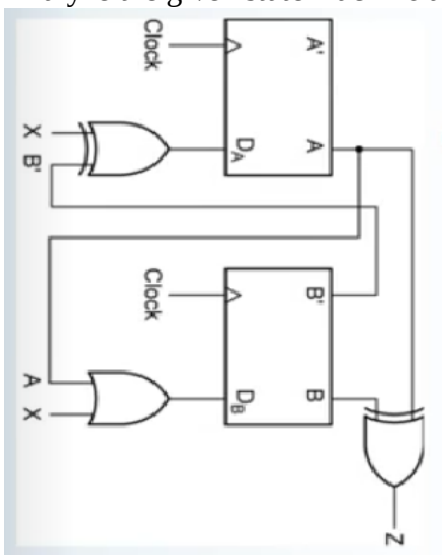
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Convert Decimal $(105)_{10}$ to Binary.
Option A:	$(101001)_2$
Option B:	$(1101001)_2$
Option C:	$(1110101)_2$
Option D:	$(1001011)_2$
2.	In Hamming code this expression will help you to find out number of parity bits.
Option A:	$2^P>=P+M+1$
Option B:	$2^P<=P+M+1$
Option C:	$2^P=P+M-1$
Option D:	$2^P<=P+M-1$
3.	Convert$(125)_8$ octal to binary
Option A:	$(1010101)_2$
Option B:	$(101010)_2$
Option C:	$(1010111)_2$
Option D:	$(11010101)_2$
4.	A multiplexer with 3 select lines is a
Option A:	4:1 multiplexer
Option B:	8:1 multiplexer
Option C:	16:1 multiplexer
Option D:	32:1 multiplexer
5.	IC 74138 is a
Option A:	3:8 line decoder
Option B:	1:8 line decoder
Option C:	4:8 line decoder
Option D:	any lines to 8 line decoder
6.	The IC 74151 can function as a
Option A:	4:1 multiplexer
Option B:	8:1 multiplexer
Option C:	16:1 multiplexer
Option D:	32:1 multiplexer

7.	IC 7485 is a
Option A:	4 bit magnitude comparator
Option B:	4 bit adder
Option C:	4 bit subtractor
Option D:	decoder
8.	Machine whose output depends on present state and external input is :
Option A:	Mealy
Option B:	Sequential asynchronous
Option C:	Asynchronous
Option D:	Moore
9.	Which one of the following is a method of state minimization?
Option A:	Truth table
Option B:	K-map
Option C:	Quine Mcclusky method
Option D:	Implication chart
10.	IC 7492 is a
Option A:	MOD 12 Asynchronous counter
Option B:	MOD 12 Synchronous counter
Option C:	MOD 16 Asynchronous counter
Option D:	MOD 16 Synchronous counter
11.	In IC 74194 when control inputs s1 and s0 are one, it gives _____ operation.
Option A:	Shift right
Option B:	Shift left
Option C:	Hold
Option D:	Load
12.	IC 7490 consist of
Option A:	MOD 6, MOD 2 counter
Option B:	MOD 5, MOD 2 counter
Option C:	MOD 8, MOD 2 counter
Option D:	MOD 5, MOD 3 counter
13.	Condition: IC74163 , CLR=ENP=ENT=1 , LD=0, ABCD=0011, What is the output at pin QD, QC,QB,QA
Option A:	1100
Option B:	0011
Option C:	0101
Option D:	0010
14.	Which of the Logic family dissipate minimum power
Option A:	TTL
Option B:	CMOS
Option C:	DTL
Option D:	ECL

15.	Figure of merit of IC family is
Option A:	Gate propagation delay
Option B:	Gate power Dissipation
Option C:	Speed power product
Option D:	fan out
16.	The number of similar gates which can be driven by a gate is called as_____
Option A:	Power dissipation
Option B:	Noise margin
Option C:	Fan-out
Option D:	Speed
17.	FPGA stands for
Option A:	Field Programmable Gate Application
Option B:	Field Programmable Gate Array
Option C:	Field Programming Gate Array
Option D:	FET Programmable Gate Array
18.	In procedural assignment _____ data type is used.
Option A:	reg
Option B:	wire
Option C:	wor
Option D:	tri
19.	Operator symbol <<< is a
Option A:	Arithmetic shift left
Option B:	Arithmetic shift right
Option C:	Logical shift left
Option D:	Logical shift right
20.	_____ is a net data type used in Verilog.
Option A:	reg
Option B:	integer
Option C:	real
Option D:	wire

Q2 **(20 Marks)**	
Q2.A	**Solve any Two 5 marks each**
i.	Write short note on Hamming code.
ii.	Compare Melay and Moore Machine.
iii.	Write a program using Verilog HDL for implementing a 4:1 multiplexer using data flow modeling.
Q2.B	**Solve any One 10 marks each**
i.	Implement the function $s = \sum m(1,2,4,7)$ and $c = \sum m(3,5,6,7)$ using a 3:8 decoder IC 74138.
ii.	Explain universal shift register. Design and implement a twisted ring counter using IC 74194.

Q3 **(20 Marks)**	
Q3.A	**Solve any Two 5 marks each**
i.	Explain with diagram working of IC 7483.
ii.	Write short note on CPLD Architecture.
iii.	Write a program to implement half adder using Verilog HDL.
Q3.B	**Solve any One 10 marks each**
i.	Design MOD-6 counter using IC7490.
ii.	Analyze the given state machine and draw the state diagram. 

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Examination 2021 under Cluster 06

(Lead College: Vidyavardhini's College of Engg Tech)

Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC304 and Course Name: Electrical Network Analysis and Synthesis

Time: 2 hour Max. Marks: 80

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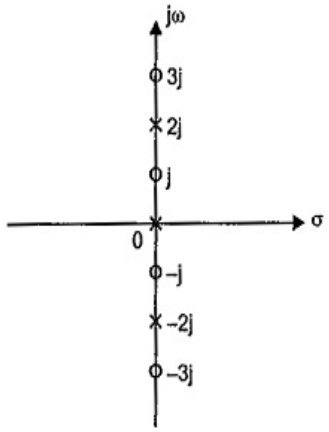
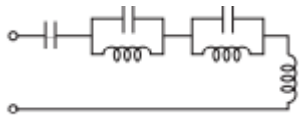
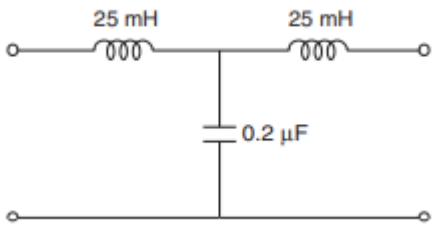
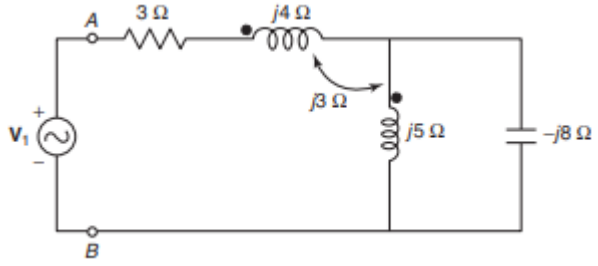
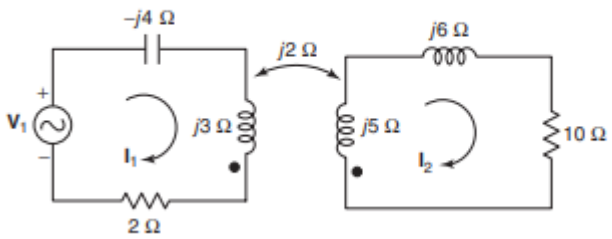
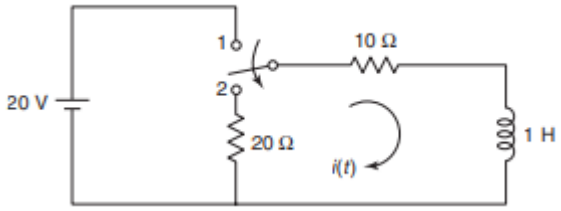
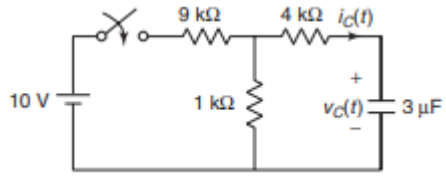
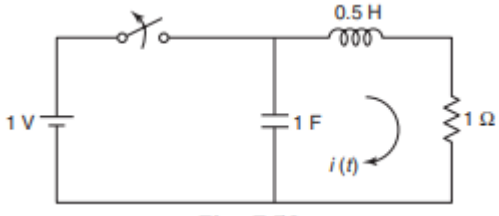
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	----------between coils is defined as fraction of magnetic flux produced by the current in one coil that links the other
Option A:	Coefficient of Coupling
Option B:	Self Inductance
Option C:	Mutual Inductance
Option D:	Self Coupling
2.	The combined inductance of two coils connected in series is 0.6 H or 0.1 H depending on relative directions of currents in the two coils. If one of the coils has a self-inductance of 0.2 H, find (a) mutual inductance, and (b) coefficient of coupling.
Option A:	(a)M=0.105H , (b) K= 0.62
Option B:	(a)M=0.125H , (b) K= 0.72
Option C:	(a)M=0.115H , (b) K= 0.72
Option D:	(a)M=0.125H , (b) K= 0.62
3.	Which notation of instant implies that the unchanged condition of network is about to change?
Option A:	$t\ (0)^{+}$
Option B:	$t(0)^{-}$
Option C:	t^{*}
Option D:	$t\hat{}$
4.	What does 'σ' indicate in the equation of complex frequency variable s = σ + jω while defining the Laplace transform?
Option A:	Attenuation constant
Option B:	Damping factor
Option C:	Propagation constant
Option D:	Phase constant

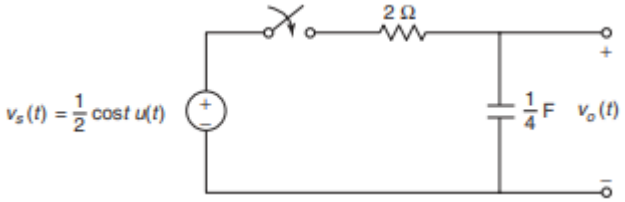
5.	Consider a function f(t) that satisfies the differential equation given below. What equation will be generated by taking Laplace transform and replacing the terms $f(0^-)$ & $f'(0^-)$ by zero? $[d^2 f(t) / dt^2] + 5 [df(t) / dt] + 6 f(t) = 10$
Option A:	$[S^2 F(s) + 5s F(s)+6 F(s)] = 10/s$
Option B:	$[S^2 F(s) + 5s F(s) – 6 F(s)] = 10/s$
Option C:	$[S^2 F(s) – 5s F(s) + 6 F(s)] = 10/s$
Option D:	$[S^2 F(s) – 5s F(s) – 6 F(s)] = 10/s$
6.	What is an ideal value of network function at poles?
Option A:	Zero
Option B:	Nonzero
Option C:	Infinity
Option D:	Unity
7.	The realization of driving point immitance functions of networks can be done by any of the forms which are not used from following
Option A:	Foster I
Option B:	Foster II
Option C:	Cauer I
Option D:	Curier II
8.	Which among the following represents the precise condition of reciprocity for transmission parameters?
Option A:	AD-BC=0
Option B:	AC-BD=1
Option C:	AD-BC=1
Option D:	BC-AD=1
9.	The relation between Z_{OT}, Z_{oc}, Z_{sc} is?
Option A:	$Z_{OT}=\sqrt{Z_{oc}Z_{sc}}$
Option B:	$Z_{oc}=\sqrt{(Z_{OT}\ Z_{sc})}$
Option C:	$Z_{sc}=\sqrt{(Z_{OT}\ Z_{oc})}$
Option D:	$Z_{oc}=\sqrt{(Z_{OT}\ Z_{oc})}$
10.	In determining Hybrid parameters, among V_1, V_2, I_1, I_2, which of the following are dependent variables?
Option A:	V_1 and V_2
Option B:	I_1 and I_2
Option C:	V_1 and I_2
Option D:	I_1 and V_2
11.	The Laplace transform of a unit-ramp function starting at t = a is

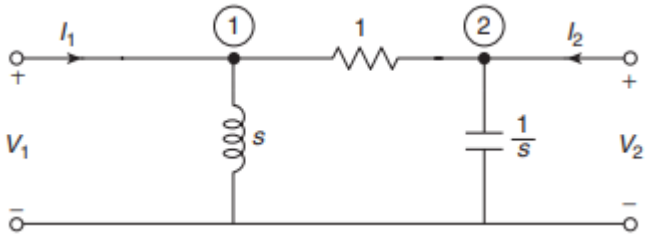
Option A:	$\frac{1}{(s+a)^2}$
Option B:	$\frac{e^{-as}}{(s+a)^2}$
Option C:	$\frac{e^{-as}}{s^2}$
Option D:	$\frac{a}{s^2}$
12.	 **Fig. 7.4** Above pole zero diagram indicates which function
Option A:	RC
Option B:	LC
Option C:	RL
Option D:	RLC
13.	A system is represented by the transfer function 10 / (S+2)(s+1), The dc gain of this system is
Option A:	1
Option B:	5
Option C:	10
Option D:	2
14.	The transfer function of a low-pass RC network is
Option A:	$(RCs)\,(1+RCs)$
Option B:	$\frac{RCs}{1+RCs}$
Option C:	$\frac{1}{1+RCs}$
Option D:	$\frac{s}{1+RCs}$
15.	The input ports of two networks are connected in series and the output ports are

	connected in parallel ,then resultant h-parameter matrix is the ---------- of h-parameter matrices of each individual two-port network
Option A:	Substraction
Option B:	Division
Option C:	Multiplication
Option D:	Sum
16.	For a two-port network to be reciprocal
Option A:	z11 = z22
Option B:	y21 = y12
Option C:	h21 = h12
Option D:	AD - BC = 0
17.	The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the right half of s-plane is
Option A:	Zero
Option B:	One
Option C:	Two
Option D:	Three
18.	The circuit shown in Fig. is 
Option A:	Cauer I form
Option B:	Cauer II form
Option C:	Foster I form
Option D:	Foster II form
19.	From below functions which is positive real function
Option A:	$F(s) = \frac{s^3 + 5s}{s^4 + 2s^2 + 1}$
Option B:	$F(s) = \frac{s^2 + s + 6}{s^2 + s + 1}$
Option C:	$F(s) = \frac{s^2 + 4}{s^3 + 3s^2 + 3s + 1}$
Option D:	$F(s) = \frac{s^3 + 6s^2 + 7s + 3}{s^2 + 2s + 1}$
20.	Find the nominal impedance, cut-off frequency for the network shown in fig. 
Option A:	nominal impedance=500, cut-off frequency=3.18Khz

Option B:	nominal impedance=600, cut-off frequency=3.18Khz
Option C:	nominal impedance=500, cut-off frequency=2.16Khz
Option D:	nominal impedance=600, cut-off frequency=2.16Khz

Q2 (20 Marks)	**Solve any Four out of Six (5 marks each)**
A	For the coupled circuit shown in Figure, find input impedance at terminals A and B. 
B	*Find the conductively coupled equivalent circuit for the network shown in Fig.* 
C	In the network shown in Figure, the switch is changed from the position 1 to the position 2 at t = 0, steady condition having reached before switching. Find the values of I, di/dt, d^2i/dt^2 at t=0+ 
D	In the network shown in Figure, the switch closes at t = 0. The capacitor is initially uncharged. Find v_c (t) and i_c (t) 
E	In the network shown in Figure, the switch is opened at t = 0. Steady-state condition is achieved before t = 0. Find i(t) 

F	For the network shown in Figure, find the response vo (t). 

Q3 (20 Marks)	
Q.3 A	**Solve any Two (5 marks each)**
i.	Write short note on Different types of filter
ii.	Determine the transmission parameters for the network shown in Fig. 
iii.	Write derivation for Condition for Reciprocity
Q.3 B	**Solve any One (10 marks each)**
i.	a) Prove that polynomial $P(s) = s^4 + s^3 + 2s^2 + 3s + 2$ is not Hurwitz. b) Test whether the polynomial P(s) = $s^8 + 5s^6 + 2s^4 + 3s^2 + 1$ is Hurwitz by Routh array
ii.	Realise Foster I & Cauer I forms of the following RC impedance function $Z(s) = \frac{s+4}{(s+2)(s+6)}$

University of Mumbai

Examination 2021 under Cluster 06

(Lead College: Vidyavardhini's College of Engg Tech)

Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC305 and Course Name: Electronic Instruments and Measurements

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.	The sensitivity of a voltmeter using 0-5 mA meter movement is
Option A:	50 Ω/V
Option B:	200 Ω/V
Option C:	100 Ω/V
Option D:	500 Ω/V
2.	The error determined as algebraic numerical difference between true value of the quantity and the value recorded by the measuring instrument at any instant is
Option A:	random error
Option B:	lag
Option C:	dynamic error
Option D:	fidelity
3.	Kelvin's double bridge is used to measure low resistances because
Option A:	it has high sensitivity
Option B:	there is no thermoelectric emf
Option C:	resistance variation due to temperature
Option D:	effect of contact and lead resistances is eliminated
4.	In an Anderson bridge the unknown inductance is measured in terms of
Option A:	known inductance and resistance
Option B:	known inductance
Option C:	known capacitance and resistance
Option D:	known capacitance
5.	Which of the following errors can arise, as a result of mistake in reading, parallax improper instrument location and inadequate lighting?
Option A:	construction errors
Option B:	transmission errors
Option C:	observation errors
Option D:	translation errors

6.	Q meter works on the principle of
Option A:	series resonance
Option B:	barkhausen criterion
Option C:	piezoelectric effect
Option D:	parallel resonance
7.	Electronics voltmeters which use rectifier employ negative feedback. This is done
Option A:	to increase the overall gain.
Option B:	to improve stability.
Option C:	to improve linearity of diodes.
Option D:	to improve nonlinearity of diodes.
8.	In digital meter construction, the Schmitt trigger is used for
Option A:	sinusoidal waveforms into rectangular pulses.
Option B:	rectangular pulses into Sinusoidal waveforms.
Option C:	scaling of sinusoidal waveforms.
Option D:	providing time base.
9.	Current is converted to voltage
Option A:	through a voltmeter
Option B:	through a resistance
Option C:	through an ammeter
Option D:	through a galvanometer
10.	Basic building blocks of digital multimeter are
Option A:	oscillator, amplifier
Option B:	diode, op amp
Option C:	rectifier, Schmitt trigger
Option D:	ADC, attenuator, counter
11.	Any instrument can be used as a standard to calibrate another instrument, provided that its accuracy is ____ times better than instrument to be calibrated.
Option A:	three
Option B:	five
Option C:	four
Option D:	seven
12.	The set of precision series connected resistors for use in potentiometer calibration of ammeters is called as
Option A:	shunt box
Option B:	series box
Option C:	decade box
Option D:	series - Shunt box
13.	True rms responding voltmeter uses
Option A:	Thermistors
Option B:	Thermocouple
Option C:	LVDTs
Option D:	RTDs

14.	To measure dielectric loss, We would use
Option A:	Anderson bridge
Option B:	Kelvin bridge
Option C:	Schering bridge
Option D:	Maxwell's bridge
15.	What is the effect of IC chips on DVM?
Option A:	increase in cost
Option B:	increase in power
Option C:	reduction in cost
Option D:	increase in size
16.	An instrument whose output is a sinusoidal voltage that varies over a complete frequency band slowly and continuously is known as
Option A:	Function generator
Option B:	Random noise generator
Option C:	Signal generator
Option D:	Sweep generator
17.	Value of Femto is
Option A:	10 raised to –9
Option B:	10 raised to –15
Option C:	10 raised to –12
Option D:	10 raised to –18
18.	The unique quality of every quantity which distinguishes it from all is called as
Option A:	dimension
Option B:	unit
Option C:	standards
Option D:	precision
19.	An instrument's reliability means
Option A:	the extent to which the characteristics remain non - linear
Option B:	the life of the instrument
Option C:	the extent to which the characteristics remain linear
Option D:	the degree to which the repeatability continues to remain within specific limits
20.	Damping in an instrument provides
Option A:	counter torque to deflection torque
Option B:	good accuracy
Option C:	braking action on a meter pointer
Option D:	starting torque on the meter pointer

Q2 (20 Marks)	
Q.2 A	**Solve any Two (5 marks each)**
i.	Explain the operation of spectrum analyzer.
ii.	Explain need of calibration with suitable example.
iii.	The set of 10 voltage measurements were recorded as 98, 102, 101, 97, 100, 103, 98, 106, 107 and 99. Find the precision at fourth measurement.
Q.2 B	**Solve any One (10 marks each)**
i.	Explain the operation of Kelvin double bridge with mathematical analysis.
ii.	Explain the operation of dual slope and successive approximation type dc voltmeters.

Q3 (20 Marks)	
Q.3 A	**Solve any Two (5 marks each)**
i.	Explain how potentiometer can be used for calibration of voltmeter.
ii.	Explain the operation of peak responding AC voltmeter.
iii.	Explain the operation of Wheatstone bridge.
Q.3 B	**Solve any One (10 marks each)**
i.	Explain operation of function generator with the help of block diagram.
ii.	Explain static and dynamic characteristics of an instrument