University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 15th June 2021 to 24th June 2021

Program: BE (Electronics)

Curriculum Scheme: Rev 2016 (CBCGS)

Examination: SE Semester III

Course Code: ELX301 and Course Name: Applied Mathematics III

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.	Find Laplace Transform of $e^{3t}H(t-2)$.
Option A:	$e^{2(s+3)}.\frac{1}{s+3}$
Option B:	$e^{-2(s-3)}.\frac{1}{s-3}$
Option C:	$e^{2(s-3)}.\frac{1}{s-3}$
Option D:	$e^{-2(s+3)}.\frac{1}{s+3}$
2.	The Laplace transform of $e^{-3t}\,\mathrm{erf}\sqrt{t}$ is
Option A:	$\frac{1}{(s-4)\sqrt{s-3}}$
Option B:	$\frac{1}{(s-3)\sqrt{s-4}}$
Option C:	$\frac{1}{(s+4)\sqrt{s+3}}$
Option D:	$\frac{1}{(s+3)\sqrt{s+4}}$
3.	The value of the integral $\int_0^\infty e^{-t}\sinh 2t \sin 3t\,dt$ is
Option A:	$\frac{1}{5}$
Option B:	$\frac{1}{15}$
Option C:	$\frac{1}{25}$
Option D:	$\frac{1}{35}$
4.	The inverse Laplace transform of $tan^{-1}(s)$ is
Option A:	$\frac{-\sin t}{t}$
Option B:	$-\frac{e^{-4t}\cosh t}{t}$
Option C:	$\frac{e^{-4t}\,sint}{t}$

Option D:	$\frac{\sin t}{t}$
5.	The inverse Laplace transform of $\left[\frac{e^{-\pi s}}{s^2-2s+2}\right]$ is
Option A:	$e^{-(t+\pi)}\sin(t-\pi)H(t-\pi)$
Option B:	$e^{(t+\pi)}\sin(t+\pi)H(t+\pi)$
Option C:	$e^{(t-\pi)}\sin(t-\pi)H(t-\pi)$
Option D:	$e^{(t-\pi)}\sin(t+\pi)H(t+\pi)$
6.	The inverse Laplace transform of $\frac{1}{s\sqrt{s+4}}$ is
Option A:	$\frac{1}{2}\text{erf}_c(2\sqrt{t})$
Option B:	$\frac{1}{2}\text{erf}(2\sqrt{2t})$
Option C:	$\frac{1}{2}\text{erf}(4\sqrt{t})$
Option D:	$\frac{1}{2}\text{erf}(2\sqrt{t})$
7.	If $f(x)=x^2, -\pi<x<\pi$, then the value of $\sum_{n=1}^{\infty}\frac{1}{n^2}$ is
Option A:	$\frac{\pi^2}{8}$
Option B:	$\frac{\pi^2}{6}$
Option C:	$\frac{\pi^2}{12}$
Option D:	$\frac{\pi^4}{6}$
8.	The Fourier series expansion of $f(x)=\begin{cases}-c, -1<x<0\\ c, \ 0<x<1\end{cases}$ is
Option A:	$\frac{c}{4\pi}\left[\sin\pi x+\frac{1}{3}\sin 3\pi x+\frac{1}{5}\sin 5\pi x+\cdots\cdot\right]$
Option B:	$\frac{4c}{\pi}\left[\cos\pi x+\frac{1}{3}\cos 3\pi x+\frac{1}{5}\cos 5\pi x+\cdots\cdot\right]$
Option C:	$\frac{4c}{\pi}\left[\sin\pi x-\frac{1}{3}\sin 3\pi x+\frac{1}{5}\sin 5\pi x-\cdots\cdot\right]$
Option D:	$\frac{4c}{\pi}\left[\sin\pi x+\frac{1}{3}\sin 3\pi x+\frac{1}{5}\sin 5\pi x+\cdots\cdot\right]$
9.	The complex form of Fourier series for f(x)=2x in $[0, 2\pi]$ is
Option A:	$2\pi+2i\sum_{n=-\infty}^{\infty}\frac{e^{nix}}{n}, \quad for\ n\neq 0$
Option B:	$2\pi+2i\sum_{n=-\infty}^{\infty}\frac{e^{-nix}}{n}, \quad for\ n\neq 0$

Option C:	$2\pi + 2i \sum_{n=-\infty}^{\infty} \frac{e^{nix}}{4n}, \quad for\ n \neq 0$
Option D:	$2\pi + 2i \sum_{n=-\infty}^{\infty} \frac{e^{-nix}}{8n}, \quad for\ n \neq 0$
10.	The half range sine series of f(x)=x(π − x) in (0, π) is
Option A:	$\frac{8}{\pi}\left[\frac{1}{1^4}\sin\pi x - \frac{1}{3^4}\sin 3\pi x + \frac{1}{5^4}\sin 5\pi x - \cdots\right]$
Option B:	$\frac{8}{\pi}\left[\frac{1}{1^3}\sin\pi x + \frac{1}{3^3}\cos 3\pi x + \frac{1}{5^3}\sin 5\pi x + \cdots\right]$
Option C:	$\frac{8}{\pi}\left[\frac{1}{1^3}\sin\pi x + \frac{1}{3^3}\sin 3\pi x + \frac{1}{5^3}\sin 5\pi x + \cdots\right]$
Option D:	$\frac{8}{\pi}\left[\frac{1}{1^3}\cos\pi x + \frac{1}{3^3}\cos 3\pi x + \frac{1}{5^3}\cos 5\pi x + \cdots\right]$
11.	The value of $\left[\bar{b}\times\bar{c} \quad \bar{a}\times\bar{c} \quad \bar{a}\times\bar{b}\right]$ is
Option A:	$-\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]^2$
Option B:	$\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]^2$
Option C:	$\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]^3$
Option D:	$\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]^4$
12.	The unit normal vector to the surface $xy^3z^2 = 4, at\ (-1,-1,2)\ is$
Option A:	$\frac{-(i+3j-k)}{\sqrt{11}}$
Option B:	$\frac{(i+3j-k)}{\sqrt{11}}$
Option C:	$\frac{-(i+3j+k)}{\sqrt{11}}$
Option D:	$\frac{-(i-3j-k)}{\sqrt{11}}$
13.	If $\bar{F} = (axy + bz^3)i + (3x^2 - cz)j + (3xz^2 - y)k$ is irrotational, then the value of a, b, c is
Option A:	$a = 6, b = 1, c = 6$
Option B:	$a = 1, b = 6, c = 1$
Option C:	$a = 1, b = 1, c = 6$
Option D:	$a = 6, b = 1, c = 1$
14.	Using Green's theorem, the value of $\int_C (P\,dx + Q\,dy)$ is
Option A:	$\iint_R \left(\frac{\partial Q}{\partial x} + \frac{\partial P}{\partial y}\right) dx\,dy$
Option B:	$\iint_R \left(\frac{\partial P}{\partial x} - \frac{\partial Q}{\partial y}\right) dx\,dy$

Option C:	$\iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dx\, dy$
Option D:	$-\iint_R \left(\frac{\partial Q}{\partial x} + \frac{\partial P}{\partial y}\right) dx\, dy$
15.	For any closed surface S, the value of $\iint_S (\nabla\phi \times \nabla\psi) \cdot d\bar{S}$ is
Option A:	0
Option B:	1
Option C:	-1
Option D:	∞
16.	Using Stokes's theorem, the value of $\int_c (x^2 i + xyj) \cdot d\bar{r}$ where c is boundary of the rectangle $x = 0, y = 0, x = 2, y = 3$
Option A:	3
Option B:	6
Option C:	9
Option D:	18
17.	If the imaginary part of analytic function is $\tan^{-1}\left(\frac{y}{x}\right)$, then the analytic function must be
Option A:	$-\log z + c$
Option B:	$\log\sqrt{z} + c$
Option C:	$\tan(\log z) + c$
Option D:	$\log z + c$
18.	Which one of the following functions is Harmonic Function?
Option A:	$u = y^3 + 3x^2y$
Option B:	$u = y^3 - 3x^2y$
Option C:	$u = y^3 - x^2y$
Option D:	$u = y^3 - 3x^2$
19.	Find the fixed points of the bilinear transformation of $w = \frac{2z+6}{z+7}$
Option A:	1, -6
Option B:	-1, 6
Option C:	-1, -2
Option D:	1, -2
20.	The value of $J_n(x)$ is
Option A:	$\sum_{m=0}^{\infty} \frac{(-1)^m (x/2)^{2m+n}}{m!\lvert\overline{n+m-1}}$
Option B:	$\sum_{m=0}^{\infty} \frac{(-1)^m (x/2)^{2m-n}}{m!\lvert\overline{n+m+1}}$

Option C:	$\sum_{m=0}^{\infty} \frac{(-1)^m (x/2)^{2m+n}}{m!\lvert\overline{n+m+1}}$
Option D:	$\sum_{m=0}^{\infty} \frac{(-1)^m (x/2)^{2m+n}}{m!\lvert\overline{n-m+1}}$

Q2	**Solve any Four out of Six** **5 marks each**
A	Find the Laplace transform of: $\cosh t \int_0^t e^u \cosh u \, du$
B	Using convolution theorem, find inverse Laplace transforms of $\frac{1}{(s-2)(s+2)^2}$
C	Find complex form of Fourier Series for f(x)=e^{-x} in the interval (-1,1)
D	Find f(r), so that the vector f(r)$\bar{r}$ is both solenoidal and irrotational
E	Using stoke's theorem evaluate $\int_C \bar{F} \cdot d\bar{r}$ where $\bar{F} = yi + zj + xk$ and C is the boundary of the surface $x^2 + y^2 = 1 - z, \quad z > 0$
F	Find the Bilinear Transformation which maps the points z = ∞, i, 0 onto the points w = 0, i, ∞.

Q3	**Solve any Four out of Six** **5 marks each**
A	Prove that $\int_0^{\infty} e^{-\sqrt{2}t} \{\frac{\sin t \sinh t}{t}\} dt = \frac{\pi}{8}$
B	Find inverse Laplace transform of $\frac{1}{(s+3)(s^2+2s+2)}$
C	Find the Fourier series expansion of $f(x) = \begin{cases} 2, -2 < x < 0 \\ x, \ 0 < x < 2 \end{cases}$
D	Find the angle between the surfaces $x \log z + 1 - y^2 = 0$, $x^2 y + z = 2$ at $(1, 1, 1)$
E	Using Gauss Divergence theorem, prove that $\iint (y^2 z^2 i + z^2 x^2 j + y^2 z^2 k) \cdot \bar{N} \, dS = \frac{\pi}{12}$ where S is the part of the sphere $x^2 + y^2 + z^2 = 1$ above the XY plane
F	Prove that $J_{5/2}(x) = \sqrt{\frac{2}{\pi x}} \cdot \left\{\frac{3-x^2}{x^2} \sin x - \frac{3}{x} \cos x\right\}$

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: SE Semester III

Course Code: ELX302 and Course Name: Electronic Devices and Circuits-I

Time: 2 hour Max. Marks: 80

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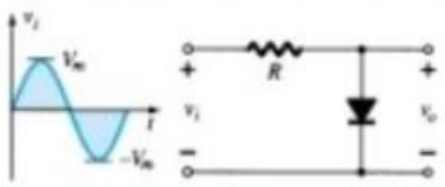
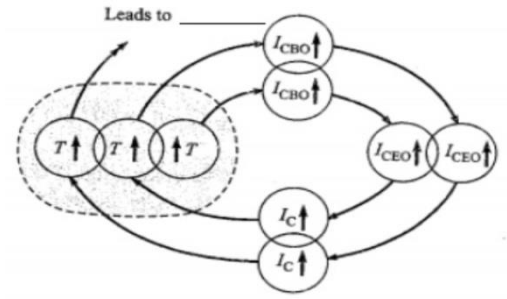
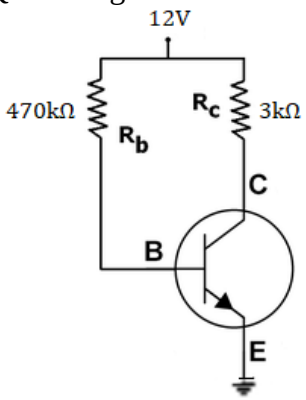
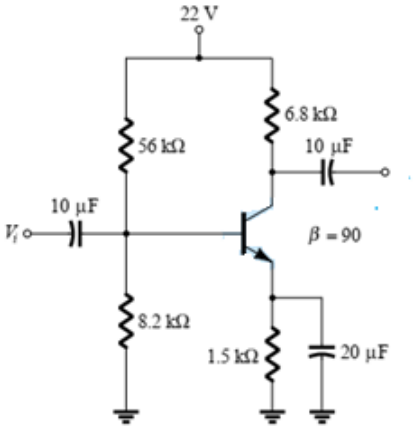
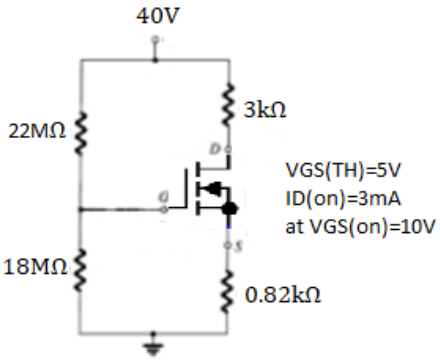
Q1. 40 Marks	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Name the current produced due to motion of charge carriers from a region of higher concentration to a region of lower concentration?
Option A:	drift current
Option B:	diffusion current
Option C:	electron current
Option D:	hole current
2.	Why is the silicon mostly chosen when compared to germanium?
Option A:	low power consumption
Option B:	high efficiency
Option C:	greater working temperature
Option D:	large I_{CBO}
3.	If the temperature of a crystal diode increases, then leakage current----------
Option A:	remains the same
Option B:	decreases
Option C:	increases
Option D:	becomes zero
4.	Assume the diode is ideal. What will be the peak value of the output waveform for the given circuit. 
Option A:	Vm
Option B:	-Vm
Option C:	+(Vm-Vd)
Option D:	-(Vm-Vd)
5.	If the input junction and the output junction is forward biased, then the transistor is said to be in _____ region
Option A:	Active Region
Option B:	Cut off Region

Option C:	Breakdown Region
Option D:	Saturation Region
6.	For a Voltage divider circuit having RC=R1=R2=RE=1KΩ, if VCC=20V, find IC when Vce = Vcc.
Option A:	0
Option B:	2mA
Option C:	20mA
Option D:	1mA
7.	Input impedance Zin for a voltage divider CE Amplifier is given as----------
Option A:	Zin=R1||R2||re
Option B:	Zin=R1||R2
Option C:	Zin=R1||R2||rπ
Option D:	Zin=R1||rπ
8.	For a Voltage divider bias circuit, having R1=R2=10KΩ, RC = 4.7 kΩ, RE=1 KΩ, What is the value of collector current at saturation if V_{CC}=10V?
Option A:	1A
Option B:	10mA
Option C:	1.75mA
Option D:	1mA
9.	Name this cumulative process of rise in temperature in BJT. 
Option A:	Stabilization
Option B:	Thermal Runaway
Option C:	Early effect
Option D:	Base width modulation
10.	The capacitive reactance, XC, of the bypass capacitor should be at least _____ times smaller than RE at the minimum frequency for which the amplifier must operate.
Option A:	10
Option B:	100
Option C:	50
Option D:	500
11.	MOSFET is a _____ device
Option A:	Voltage Controlled
Option B:	Current Controlled
Option C:	Impedance Controlled

Option D:	Admittance Controlled
12.	What will be the current flowing through the gate terminal of an FET?
Option A:	IDSS
Option B:	IDSS/2
Option C:	IDSS/4
Option D:	zero
13.	The _____ can be operated in two modes: Depletion mode and enhancement mode.
Option A:	BJT
Option B:	JFET
Option C:	D-MOSFET
Option D:	Diode
14.	For levels of VGS > VT, the drain current is related to the applied gate-to-source voltage by the following nonlinear relationship: _____
Option A:	ID= k (VGS - VT)^2
Option B:	ID= k (VGS - VT)
Option C:	ID= (VGS - VT)^2
Option D:	ID= k (VGS - VT^2)
15.	If a MOSFET is to be used as an amplifier then it must work in _____
Option A:	Cut-off region
Option B:	Triode region
Option C:	Saturation region
Option D:	Both cut-off and triode region can be used
16.	_____ is a semiconductor formed by a junction of semiconductor with a metal.
Option A:	Schottky Diode
Option B:	Photo diode
Option C:	Tunnel diode
Option D:	Gunn diode
17.	Name the component placed in a counter system that helps in counting the objects as they are passing on a conveyor
Option A:	Solar Cell
Option B:	Schottky diode
Option C:	Photo diode
Option D:	LED
18.	Efficiency of center tapped full wave rectifier is _____
Option A:	81.2%
Option B:	50%
Option C:	40.6%
Option D:	45.3%
19.	What is the peak inverse voltage across diode for a center tapped full wave

	rectifier?
Option A:	Vm
Option B:	2Vm
Option C:	Vm/2
Option D:	Vm/1.44
20.	The value of inductance in LC filter at which the load current does not fall to zero is called ---------
Option A:	Peak inductance
Option B:	Critical inductance
Option C:	Cut in inductance
Option D:	Damping inductance

Q2 **(20 Marks)**	
A	**Solve any Two 5 marks each**
i.	Explain the construction and working of JFET with neat diagrams.
ii.	Explain the operation of BJT as an amplifier.
iii.	Find IBQ, ICQ and VCEQ for the given bias circuit. Given β=100 
B	**Solve any One 10 marks each**
i.	Find Zi, Zo, Av and Ai for the following circuit 
ii.	Determine *IDQ*, *VGSQ*, and *VDS* for the network given

Q3 **(20 Marks)**	
A	**Solve any Two 5 marks each**
i.	Explain the VI characteristics of PN junction diode.
ii.	Compare HWR, Centre tapped FWR and Bridge Rectifier
iii.	Explain the construction, working and characteristics of Photodiode.
B	**Solve any One 10 marks each**
i.	Design a single stage CE Amplifier to give a voltage gain Av≥ 80 with stability factor S≤11 and output voltage of, Vo rms=3V. Assume Vcc=18V and VBE=0.7V. Use npn transistor with specifications: hfe (min)=115, hfe(typ)=180, hie=4.5kΩ, and frequency FL≤ 300Hz.
ii.	Perform ac analysis on a bypassed CS D-MOSFET amplifier with voltage divider bias circuit with neat diagrams to obtain the expression for input impedance (Zi), output impedance (Zo) input and voltage gain (Av).

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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: SE Semester III

Course Code: ELX303 and Course Name: Digital Circuit Design

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.	Decimal number of binary number 10111 is
Option A:	21
Option B:	22
Option C:	23
Option D:	24
2.	Binary codes of octal no. $(645)_8$ is
Option A:	110 100 110
Option B:	110 101 100
Option C:	110 101 100
Option D:	110 100 101
3.	$(D8A)_{16}$ - $(426)_{16}$ is
Option A:	965
Option B:	964
Option C:	963
Option D:	962
4.	Binary representation of gray no. 10110 is
Option A:	11011
Option B:	11001
Option C:	11010
Option D:	10110
5.	In BCD invalid codes are
Option A:	8 to 15
Option B:	7 to 14
Option C:	10 to 15
Option D:	11 to 15
6.	In Boolean algebra what is value of A+AB=?
Option A:	A+B
Option B:	A-B
Option C:	B
Option D:	A

7.	Which of the following expressions is in the sum-of-products form?
Option A:	(A + B)(C + D)
Option B:	(A. B)(C .D)
Option C:	A.B .(CD)
Option D:	AB + CD
8.	Don't care conditions can be used for simplifying Boolean expressions in _____
Option A:	Registers
Option B:	Terms
Option C:	K-maps
Option D:	Latches
9.	What is a multiplexer?
Option A:	It is a type of decoder which decodes several inputs and gives one output
Option B:	A multiplexer is a device which converts many signals into one
Option C:	It takes one input and results into many output
Option D:	It is a type of encoder which
10.	In a multiplexer, the selection of a particular input line is controlled by _____
Option A:	Data controller
Option B:	Selected lines
Option C:	Logic gates
Option D:	Both data controller and selected lines
11.	Which flip-flop is called as Delay Filp-Flop
Option A:	S—R FLIP FLOP
Option B:	J-KFLIP FLOP
Option C:	D FLIP FLOP
Option D:	T FLIP FLOP
12.	The word de-multiplexer means _____
Option A:	one in to many
Option B:	Many into one
Option C:	Distributor
Option D:	converter
13.	The full form of SR is _____
Option A:	System rated
Option B:	Set reset
Option C:	Set ready
Option D:	Set Rated
14.	The characteristic equation of S-R latch is _____
Option A:	Q(n+1) = S + Q(n)R'
Option B:	Q(n+1) = SR + Q(n)R
Option C:	Q(n+1) = S'R + Q(n)R

Option D:	Q(n+1) = S'R + Q'(n)R
15.	How is a J-K flip-flop made to toggle?
Option A:	J = 0, K = 0
Option B:	J = 1, K = 0
Option C:	J = 0, K = 1
Option D:	J = 1, K = 1
16.	BCD counter is also known as _____
Option A:	Parallel counter
Option B:	Decade counter
Option C:	Synchronous counter
Option D:	VLSI counter
17.	CMOS gates are commercially available as which of the following series?
Option A:	1000
Option B:	2000
Option C:	3000
Option D:	4000
18.	Which of the following is the most widely employed logic family?
Option A:	Emitter-coupled logic
Option B:	Transistor-transistor logic
Option C:	CMOS logic family
Option D:	NMOS logic
19.	The full form of SIPO is _____
Option A:	Serial-in Parallel-out
Option B:	Parallel-in Serial-out
Option C:	Serial-in Serial-out
Option D:	Serial-In Peripheral-Out
20.	What is the difference between a shift-right register and a shift-left register?
Option A:	There is no difference
Option B:	The direction of the shift
Option C:	Propagation delay
Option D:	The clock input

Q2 (20 Marks)	
A	**Solve any Two 5 marks each**
i.	Convert D flip flop to T flip flop.
ii.	Design FULL ADDER 3 lines to 8 lines decoder .
iii.	What is the difference between asynchronous counter and synchronous counter
B	**Solve any One 10 marks each**
i.	Design 2 bit synchronous counter using J-K flip-flop
ii.	Implement the expression using K-Map for the function F(A,B,C,D) =

	∑m(2,3,6,7,8,9,13,14)

Q3. (20 Marks)	
A	**Solve any Two 5 marks each**
i.	Draw and explain the circuit diagram of 2-input TTL NAND gate.
ii.	State and explain with examples DeMorgon's Law
iii.	Design 2 bit Grey Code Counter using T Flip-Flop
B	**Solve any One 10 marks each**
i.	Simplify 4 variable Boolean function using Quine-McClusky technique F(A,B,C,D) = ∑m(0,1,2,3,8,9,10,11,12,13)
ii.	Explain Lock-Out condition in counters with examples.

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: **SE Semester III**

Course Code: **ELX304** and Course Name: **Electrical Network Analysis and Synthesis**

Time: 2-hour Max. Marks: 80

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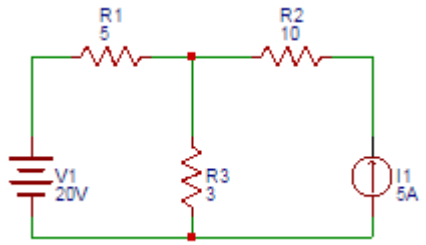
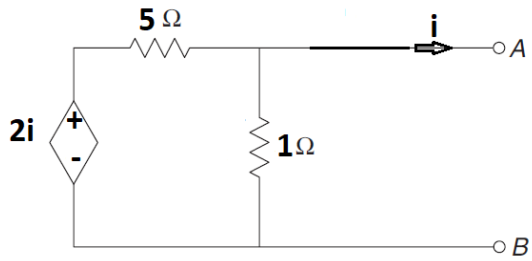
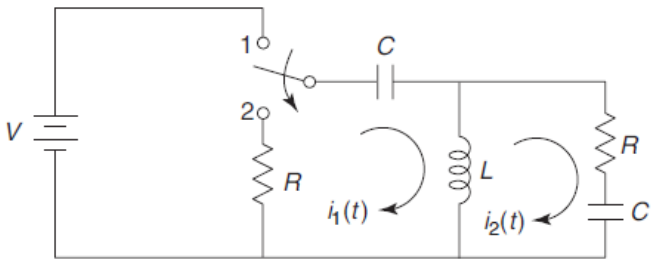
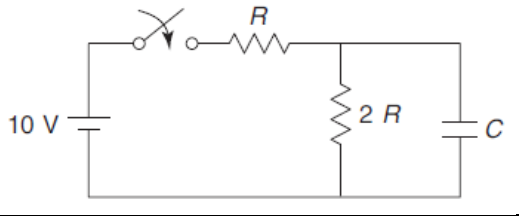
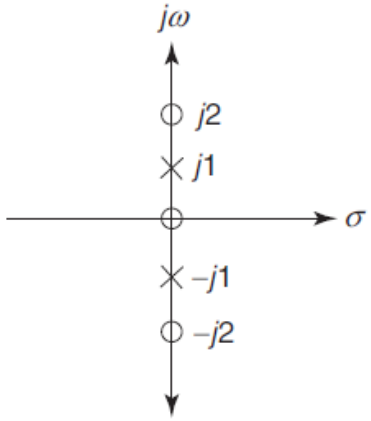
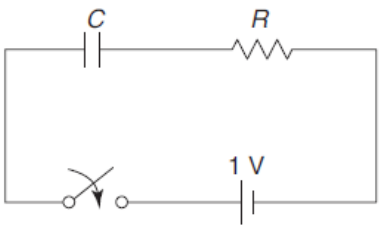
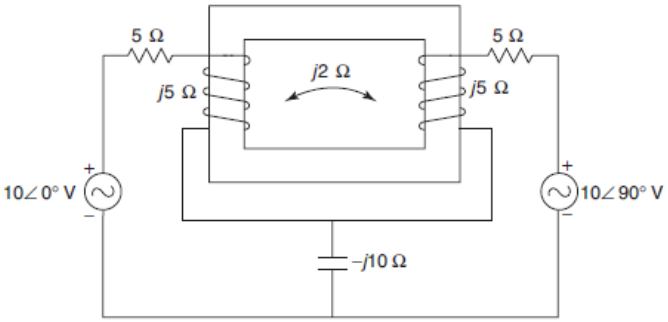
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In Superposition theorem, while considering a source, all other voltage sources are?
Option A:	open circuited
Option B:	short circuited
Option C:	change its position
Option D:	removed from the circuit
2.	The maximum possible mutual inductance of two inductively coupled coils with self-inductances L1 = 25 mH & L2 = 100mH is given by
Option A:	125 mH
Option B:	75 mH
Option C:	50 mH
Option D:	20 mH
3.	For transfer of maximum power, the relation between load resistance R and internal resistance r of the voltage source is
Option A:	R = 2r
Option B:	R = 1.5r
Option C:	R = r
Option D:	R = 0.5r
4.	In the circuit shown, find the current through 3Ω resistor using Superposition theorem. 
Option A:	6
Option B:	5
Option C:	5.6
Option D:	6.5

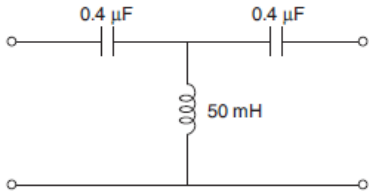
5.	For transfer of maximum power, the relation between load resistance R and internal resistance r of the voltage source is
Option A:	R = 2r
Option B:	R = 1.5r
Option C:	R = r
Option D:	R = 0.5r
6.	Norton's current in the following figure is _____ 
Option A:	2i/5 Amp
Option B:	Zero
Option C:	Infinite
Option D:	2i/6 Amp
7.	Superposition theorem states that the response in any element is the _____ of the responses that can be expected to flow if each source acts independently of other sources.
Option A:	Algebraic sum
Option B:	Vector sum
Option C:	Multiplication
Option D:	Subtraction
8.	At t = 0^- No saturation condition has been reached. At t = 0 Switching action for application of DC source to capacitive circuit. At t = 0^+ What will be the status of inductor?
Option A:	As it is
Option B:	Open Circuit
Option C:	Short Circuit
Option D:	Current Source
9.	At t = 0^+ the current i_1 in figure is 
Option A:	– V / 2R
Option B:	– V / R
Option C:	– V / 4R

Option D:	Zero
10.	The time constant of the network shown in figure is 
Option A:	2RC
Option B:	3RC
Option C:	RC (1 / 2)
Option D:	RC (2 / 3)
11.	In series RC circuit the time constant 'T' is given by –
Option A:	CR
Option B:	R / C
Option C:	C / R
Option D:	R+ C
12.	If excitation and response are measured at the same ports, the network function is known as
Option A:	RL network only
Option B:	RC network only
Option C:	LC network only
Option D:	RL as well as RC network
13.	The condition for reciprocity of Y parameters –
Option A:	$Y_{12} = Y_{21}$
Option B:	$Y_{11} = Y_{22}$
Option C:	$Y_{12} . Y_{21} = 1$
Option D:	$Y_{11} . Y_{22} = 1$
14.	The condition for symmetry of Z parameters –
Option A:	$Z_{12} = Z_{21}$
Option B:	$Z_{11} = Z_{22}$
Option C:	$Z_{12} . Z_{21} = 1$
Option D:	$Z_{11} . Z_{22} = 1$
15.	The necessary and sufficient condition for a rational function F(s) to be the driving-point impedance of an RC network is that all poles and zeros should be
Option A:	simple and lie on the negative real axis in the s-plane
Option B:	complex and lie in the left half of s-plane
Option C:	complex and lie in the right-half of s-plane
Option D:	simple and lie on the positive real axis of the s-plane
16.	The number of roots of $S^3 + 5S^2 + 7S + 3 = 0$ in the left half of s-plane is
Option A:	Zero
Option B:	One
Option C:	Two

Option D:	Three
17.	The pole-zero pattern of a particular network is shown in Figure. It is that of an 
Option A:	LC Network
Option B:	RC Network
Option C:	RL Network
Option D:	Only Resistive Network
18.	Filter have the -
Option A:	Characteristic impedance is resistive in stop band
Option B:	Characteristic impedance is reactive in pass band
Option C:	Characteristic impedance is resistive in pass band
Option D:	Characteristic impedance is infinite in stop band
19.	If f_1 and f_2 are the lower and upper cut off frequencies of the band pass filter, the series impedance Z_1 is
Option A:	Capacitive at f_1
Option B:	inductive at f_1
Option C:	resistive at f_2
Option D:	zero at f_2
20.	The phase constant β of the filter during stop band is
Option A:	Zero radian
Option B:	2
Option C:	Π
Option D:	2 π

Q2	**Solve any Two Questions out of Three 10 marks each**
A	Define transient period and transient response. The series RC circuit shown in figure, the voltage across C starts increasing when the DC source is switched ON. The rate of increase of voltage across C at the instant just after the switch is closed i.e., at $t = 0^+$ will be –

	
B	State the steps for solving the example based on Thevenin's theorem. Prove that, at maximum power condition the efficiency is ---%
C	Obtain the doted equivalent circuit for the coupled circuit shown in fig. below and find mesh currents. Also find the voltage across the capacitor. 

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	Currents I1 and I2 entering at port 1 &port 2 respectively of a two-port network are given by following equations: $I_1 = 0.5\ V_1 - 0.2V_2$ $I_2 = -\ 0.2\ V_1 + V_2$ Find Y, Z and ABCD parameters for the network.
B	Test whet her the polynomial **$P(s) = S^7 + 2S^6 + 2S^5 + S^4 + 4S^3 + 8S^2 + 8S + 4$** is Hurwitz
C	What is filter? Find the characteristic impedance, cut-off frequency and pass band for the network shown below. 

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: SE Semester III

Course Code: ELX305 and Course Name: Electronic Instruments and Measurements

Time: 2 hour Max. Marks: 80

Q1	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
Q1.	Strain gauge, LVDT and thermocouple are examples of
Option A:	Storage Devices
Option B:	Filters
Option C:	Transducers
Option D:	Display Units
Q2.	A digital storage oscilloscope has _____of operation
Option A:	3 primary modes
Option B:	2 primary modes
Option C:	4 primary modes
Option D:	5 primary modes
Q3.	The analog signal is digitized using _____
Option A:	D/A converter
Option B:	Oscillator
Option C:	A/D converter
Option D:	Rectifier
Q4.	Which part is called as heart of CRO?
Option A:	CRT
Option B:	Sweep generator
Option C:	Trigger circuit
Option D:	Amplifier
Q5.	In terms of the division on screen, the voltage of the waveform in CRO is
Option A:	Average voltage
Option B:	RMS voltage
Option C:	Peak to peak voltage
Option D:	Maximum voltage
Q6.	Smallest change which a sensor can detect is _____

Option A:	Resolution
Option B:	Accuracy
Option C:	Precision
Option D:	Scale
Q7.	A rotameter is a device used to measure
Option A:	Velocity of fluid in pipes
Option B:	Velocity of gauges
Option C:	Vortex flow
Option D:	Flow of fluids
Q8.	A type J thermocouple is made of the following metals:
Option A:	Aluminum and Tungsten
Option B:	Iron and Constantan
Option C:	Platinum and Platinum/Rhodium alloy
Option D:	Copper and Constantan
Q9.	Function of transducer is to convert
Option A:	Electrical signal into non electrical quantity
Option B:	Non electrical quantity into electrical signal
Option C:	Electrical signal into mechanical quantity
Option D:	Mechanical to non mechanical quantity
Q10.	Change in output of sensor with change in input is _____
Option A:	Threshold
Option B:	Slew rate
Option C:	Sensitivity
Option D:	Fidelity
Q11	Wheatstone bridge is a _____
Option A:	A.c. bridge
Option B:	D.c. bridge
Option C:	High voltage bridge
Option D:	Power dissipation bridge
Q12.	Sensitivity is defined as _____
Option A:	Amount of voltage per unit current
Option B:	Amount of power per unit voltage
Option C:	Amount of resistance per unit voltage
Option D:	Amount of deflection per unit current
Q13	Kelvin's bridge consists of _____
Option A:	Double bridge
Option B:	Single bridge

Option C:	Half bridge
Option D:	Three fourth bridge
Q14	Closeness of measured value to true value is _____
Option A:	Accuracy
Option B:	Precision
Option C:	Correction
Option D:	Uncertainty
Q15	Which of the following is caused by Careless handling?
Option A:	Systematic error
Option B:	Gross error
Option C:	Random error
Option D:	Non systematic error
Q16	In a measurement, what is the term used to specify the closeness of two or more measurements?
Option A:	Precision
Option B:	Accuracy
Option C:	Fidelity
Option D:	Threshold
Q17	In function generator, the output waveform of integrator is
Option A:	Sinusoidal
Option B:	Square
Option C:	Triangular
Option D:	Saw-tooth
Q18	Vibration galvanometers are used for _____
Option A:	Very high frequency
Option B:	Very low frequency
Option C:	Low audio frequency
Option D:	High audio frequency
Q19	For very small value of resistances we use
Option A:	Maxwells Bridge
Option B:	Wheatstones bridge
Option C:	Kelvins double bridge
Option D:	Megger
Q20	On what Principle does the Q meter operate
Option A:	Series Resonance
Option B:	Parallel Resonance

Option C:	Partial Indication
Option D:	Null Deflection

Q2 **(20 marks)**	**Solve any four out of six** **5 marks each**
A	How can we minimize errors in Instruments
B	Explain in detail potentiometric transducer
C	Explain megger bridge (mega ohmmeter) for high resistance measurement with diagram.
D	What are Lissajous patterns ? Give its application
E	Compare sensors and transducers
F	Explain the operation of spectrum analyzer

Q3. **(20 Marks)**	**Solve any Four out of Six** **5 marks each**
A	Compare between CRO and DSO.
B	Draw the neat diagram and explain the operation of successive Approximation type DVM.
C	Explain the operation of Electromagnetic flow meter
D	Explain Fidelity & Dynamic Error
E	Describe operating principle of heterodyne wave analyzer with a neat block diagram.
F	Compare RTD, Thermocouple and Thermistor.