University of Mumbai
Examination 2020 under cluster Vidyavardhini's College of Engg & Tech

Program: BE Electronics Engineering

Curriculum Scheme: Revised 2016 (CBCGS)

Examination: Second Year Semester III

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

Time: 1 hour **Max. Marks: 50**

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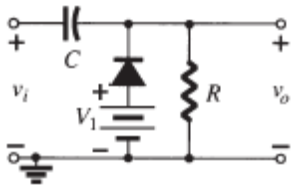
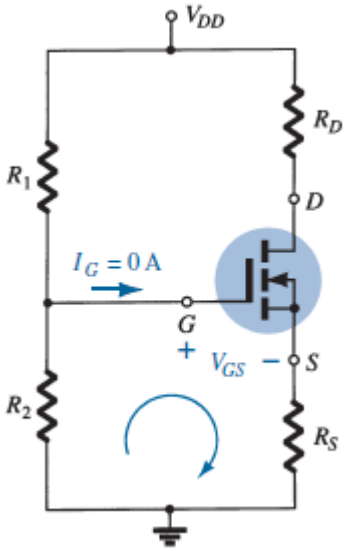
Note:

1. All Questions are compulsory and carry equal marks.

2. Assume suitable data wherever necessary.

Q1.	Diffused impurities with five valence electrons are called ----------.
Option A:	acceptor atoms
Option B:	donor atoms
Option C:	neutral atoms
Option D:	positive ions
Q2.	The general characteristics of a semiconductor diode can be defined by the ---------- equation.
Option A:	$I_D = I_s(e^{V_D/nV_T} - 1)$
Option B:	$I_D = I_s(e^{V_D/nV_T} + 1)$
Option C:	$I_D = (e^{V_D/nV_T} - 1)$
Option D:	$I_D = I_s(e^{V_D/V_T} - 1)$
Q3.	Name the following circuit: 
Option A:	Biased positive clamper network
Option B:	Biased negative clamper network
Option C:	Biased negative clipper network
Option D:	Biased positive clipper network
Q4.	The Fermi level lies close to the ---------- in n-type material and it is close to ---------- in p-type material.
Option A:	conduction band, valence band
Option B:	valence band, conduction band

Option C:	conduction band, conduction band
Option D:	valence band, valence band
Q5.	Statement 1: The doping of the sandwiched layer is considerably less than that of the outer layers in BJT. Statement 2: The outer layers have widths much greater than the sandwiched *p*- or *n*-type material. Statement 3: The emitter layer is lightly doped, the base lightly doped, and the collector is heavily doped
Option A:	Only statement 1 and 2 is correct
Option B:	Only statement 2 and 3 is correct
Option C:	Only statement 1 and 3 is correct
Option D:	All statements are correct
Q6.	Which statement is false for transistor
Option A:	In PNP transistor IE = IB+IC
Option B:	In NPN transistor direction of Emitter current is into emitter terminal
Option C:	In NPN transistor IE = IB+IC
Option D:	In PNP transistor direction of Emitter current is into emitter terminal
Q7.	In small signal BJT amplifier the magnitude of I_B is in _____ ,and I_C is in _____
Option A:	Milliamperes , microamperes
Option B:	Microamperes, microamperes
Option C:	Microamperes , Milliamperes
Option D:	Amperes, Milliamperes
Q8.	In emitter biased if external resistance is fixed and *VCC* Is varied, the Q point shifts towards_____
Option A:	cutoff
Option B:	left
Option C:	right
Option D:	saturation
Q9.	BJT transistor amplifiers are referred to as
Option A:	current-controlled current source.
Option B:	voltage-controlled current source
Option C:	voltage-controlled voltage source
Option D:	current-controlled voltage source.
Q10.	Which statement is false _____.
Option A:	In common collector configuration voltage gain is one
Option B:	In common collector configuration input impedance is low
Option C:	In common base configuration current gain is one
Option D:	In emitter follower configuration voltage gain is one

Q11.	The ---------- is a unipolar device depending solely on either electron or hole conduction.
Option A:	BJT
Option B:	FET
Option C:	Capacitor
Option D:	Inductor
Q12.	The relationship between I_D and V_{GS} is defined by Shockley's equation for JFET:
Option A:	$I_D = (1 - \frac{V_{GS}}{V_P})^2$
Option B:	$I_D = I_{DSS}(1 - \frac{V_{GS}}{V_P})^2$
Option C:	$I_D = I_{DSS}(1 + \frac{V_{GS}}{V_P})^2$
Option D:	$I_D = I_{DSS}(1 - \frac{V_{DS}}{V_D})^2$
Q13.	For E-MOSFETs, the relationship between output current and controlling voltage is defined by----------.
Option A:	$I_D = (V_{GS} - V_{GS(Th)})^2$
Option B:	$I_D = k(V_{GS} - V_{SB})^2$
Option C:	$I_D = k(V_{GS} - V_{DS)})^2$
Option D:	$I_D = k(V_{GS} - V_{GS(Th)})^2$
Q14.	Name the following circuit: 
Option A:	Voltage-divider biasing arrangement for an n-channel enhancement MOSFET
Option B:	Voltage-divider biasing arrangement for an p-channel enhancement MOSFET
Option C:	Voltage-divider biasing arrangement for an p-channel depletion MOSFET
Option D:	Voltage-divider biasing arrangement for an n-channel depletion MOSFET

Q15.	The insulating layer of SiO2 in the MOSFET construction accounts for the very desirable high ---------- of the device.
Option A:	input impedance
Option B:	output impedance
Option C:	voltage gain
Option D:	current gain
Q16.	_____is also called as a breakdown diode operated with reverse breakdown voltage.
Option A:	Zener diode
Option B:	Tunnel diode
Option C:	Varactor diode
Option D:	Photodiode
Q17.	Which is not the category of optoelectronic devices?
Option A:	Light Emitting Diode
Option B:	Photodiode
Option C:	Solar Cell
Option D:	Varactor diode
Q18.	Reverse breakdown voltage of conventional diode and LED is _____ respectively
Option A:	Very low and high
Option B:	High and very high
Option C:	Low and very low
Option D:	High and very low
Q19.	Peak inverse voltage in Schottky diode is
Option A:	High
Option B:	Low
Option C:	Very High
Option D:	Moderate
Q20.	In a center tap full wave rectifier, if Vm is the peak voltage between center tap and one end of the secondary, the maximum voltage coming across the reverse bias diode is
Option A:	Vm
Option B:	Vm/2
Option C:	2 Vm
Option D:	Vm/√2
Q21.	If the line frequency is 50 Hz, the output frequency of bridge rectifier is--------.
Option A:	25 Hz
Option B:	50 Hz
Option C:	100 Hz

Option D:	200 Hz
Q22.	The ripple factor of a LC filter -----
Option A:	Increases with the load current
Option B:	Increases with the load resistance
Option C:	has the lowest value
Option D:	remains constant with the load current
Q23.	The reverse breakdown voltage ---------- with temperature in case PN- junction diode
Option A:	decreases
Option B:	increases
Option C:	does not change
Option D:	increases as well as decreases
Q24.	_____ is a required step in order to calculate Zo.
Option A:	Setting IG equal to zero
Option B:	Setting Vi equal to zero
Option C:	Setting ID equal to IDSS
Option D:	Setting ID equal to IDSS/4
Q25.	Which is the Correct sequence of design steps for RC coupled CS amplifier _____ I: Determine drain resistance , II: Calculate drain current , III: Determine Q point, IV: Calculate VGS, V : Calculate gm
Option A:	IV,II,III,I,V
Option B:	II, IV,V, I, III
Option C:	III,II,IV,V,I
Option D:	III,IV,II,I,V

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Program: BE Electronics Engineering

Curriculum Scheme: Revised 2016 (CBCGS)

Examination: Second Year Semester III

Course Code: ELX303 Course Name: Digital Circuit Design

Time: 1 hour **Max. Marks: 50**

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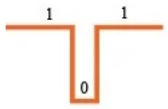
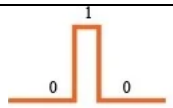
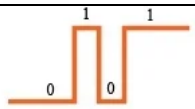
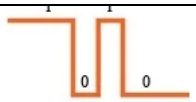
Note:

1. All Questions are compulsory and carry equal marks.

2. Assume suitable data wherever necessary.

Q1.	The binary equivalent of Decimal$(53)_{10}$ is_____
Option A:	$(101011)_2$
Option B:	$(110101)_2$
Option C:	$(101010)_2$
Option D:	$(111011)_2$
Q2.	Find 2's complement of $(1100010)_2$
Option A:	$(0011101)_2$
Option B:	$(1100011)_2$
Option C:	$(0011110)_2$
Option D:	$(0011111)_2$
Q3.	The decimal equivalent of hexadecimal no (3A) is _____
Option A:	34
Option B:	40
Option C:	57
Option D:	58
Q4.	The logic expression A'B +AB' can be implemented by giving the inputs A and B to a two input
Option A:	NOR gate
Option B:	NAND gate
Option C:	EX-OR gate
Option D:	EX-NOR gate
Q5.	Which of the following is not weighted code?
Option A:	Octal
Option B:	Hexadecimal
Option C:	Gray
Option D:	Natural Binary

Q6.	The simplified form of the Boolean expression (X + Y) (X + Z) is
Option A:	X + Y+ Z
Option B:	XY + YZ
Option C:	X + YZ
Option D:	XZ+Y
Q7.	To realize Half adder the gates required are _____
Option A:	One AND gate and one EX-OR gate
Option B:	One NAND gate and one EX-OR gate
Option C:	One OR gate and one EX-NOR gate
Option D:	One NOR gate and one EX-NOR gate
Q8.	A multiplexer with 4 select lines is a _____
Option A:	4:1 multiplexer
Option B:	8:1 multiplexer
Option C:	16:1 multiplexer
Option D:	32:1 multiplexer
Q9.	To realize full subtractor using active low decoder we need _____
Option A:	One 1:8 active low decoder and two NAND gates with 4 inputs.
Option B:	Two 1:8 active low decoder and two NAND gates with 4 inputs.
Option C:	Two 1:4 active low decoder and two OR gates with 4 inputs.
Option D:	One 1:8 active low decoder and two OR gates with 4 inputs.
Q10.	The number of select lines for 1:16 active high decoder are_____
Option A:	2
Option B:	3
Option C:	4
Option D:	5
Q11.	How many AND, OR and EX-OR gates are required for the configuration of full adder?
Option A:	1, 2, 2
Option B:	2, 1, 2
Option C:	3, 1, 2
Option D:	4, 0, 1
Q12.	How many inputs will a decimal-to-BCD encoder have?
Option A:	4
Option B:	8
Option C:	10
Option D:	16

Q13.	Number of NAND gates required to realize OR gate are _____
Option A:	2
Option B:	3
Option C:	4
Option D:	5
Q14.	Identify Static 0 hazard
Option A:	
Option B:	
Option C:	
Option D:	
Q15.	The logic family which has highest noise margin is _____
Option A:	TTL
Option B:	ECL
Option C:	MOS
Option D:	CMOS
Q16.	TTL logic family gives inbuilt Noise margin of
Option A:	0.2V
Option B:	0.1V
Option C:	0.5V
Option D:	0.4V
Q17.	The propagation delay of standard TTL family is _____
Option A:	10 nsec
Option B:	100 nsec
Option C:	200 nsec
Option D:	500 nsec
Q18.	If clock frequency of mod 16 up ripple counter is 2KHz then the square wave available from MSB flip flop will be _____
Option A:	1KHz
Option B:	500Hz
Option C:	250Hz
Option D:	125Hz
Q19.	Find the correct statement related to Reset, Preset pins of JKMS flip flop IC 7476.

Option A:	Both are active low
Option B:	Both are active high
Option C:	Reset is active low and Preset is active high
Option D:	Reset is active high and Preset is active low
Q20.	The characteristic equation of a T flip flop is
Option A:	$Q_{N+1}=Q_N$
Option B:	$Q_{N+1}=T\,Q_N'+T'Q_N$
Option C:	$Q_{N+1}=Q_N'$
Option D:	$Q_{N+1}=T'Q_N'+Q_NT$
Q21.	Convert JK flip-flop to Toggle switch the condition is _____
Option A:	J=0, K=0
Option B:	J=1, K=1
Option C:	J=0, K=1
Option D:	J=1, K=0
Q22.	If propagation delay of JKMS flip flop is 40nsec then the time required to get output of mod 16 up synchronous counter after application of clock pulse is _____
Option A:	40nsec
Option B:	80nsec
Option C:	120nsec
Option D:	160nsec
Q23.	The number of D Flip-Flops required for mod 10 Johnson counter are ____
Option A:	4
Option B:	5
Option C:	6
Option D:	10
Q24.	The minimum number of flip flops required for mod 12 ripple counter is ____
Option A:	3
Option B:	4
Option C:	6
Option D:	12

<table>
<tr><td>Q25.</td><td>The given excitation table shows conversion of B flip flop into A flipflop. Identify it.
<table>
<tr><th>Input A</th><th>Present state</th><th>Next state</th><th>Flip flop input B</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td></tr>
</table></td></tr>
<tr><td>Option A:</td><td>Conversion from D to T</td></tr>
<tr><td>Option B:</td><td>Conversion from SR to D</td></tr>
<tr><td>Option C:</td><td>Conversion from T to D</td></tr>
<tr><td>Option D:</td><td>Conversion from D to JK</td></tr>
</table>

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Program: BE Electronics Engineering

Curriculum Scheme: Revised 2016 (CBCGS)

Examination: Second Year Semester III

Course Code: ELX304 Course Name: Electrical Network Analysis & Synthesis

Time: 1 hour **Max. Marks: 50**

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Note:

1. All Questions are compulsory and carry equal marks.

2. Assume suitable data wherever necessary.

Q1.	According to Kirchhoff's voltage law, the algebraic sum of all IR drops and e.m.fs. in any closed loop of a network is always
Option A:	Negative
Option B:	Positive
Option C:	Determined by battery e.m.fs.
Option D:	Zero
Q2.	A dependent source
Option A:	May be a current source or a voltage source
Option B:	Is always a voltage source
Option C:	Is always a current source
Option D:	Neither a current source nor a voltage source
Q3.	For determining the polarity of a voltage drop across a resistor, it is necessary to know the
Option A:	Value of resistor
Option B:	Value of current
Option C:	Direction of current flowing through the resistor
Option D:	Value of e.m.f. in the circuit
Q4.	Maximum power output is obtained from a network when the load resistance is equal the output resistance of the network as seen from the terminals of the load. The above statement is associated with
Option A:	Maximum Power Transfer Theorem
Option B:	Thevenin's Theorem
Option C:	Superposition Theorem
Option D:	Milliman's Theorem
Q5.	Norton's equivalent resistance is the _____ as Thevenin's equivalent resistance
Option A:	Not same
Option B:	Same
Option C:	Less than

Option D:	More than
Q6.	The emf induced in a coil due to the changing current in the neighboring coil is called
Option A:	Self Induced emf
Option B:	Self Inducatnce
Option C:	Mutual Inductance
Option D:	Mutually Induced emf
Q7.	The coupling between any two magnetically coupled coils is said to be ideal, if, the coefficient of coupling is
Option A:	1
Option B:	0.1
Option C:	0
Option D:	2
Q8.	In time domain analysis, the initial condition from t = $-\infty$ to t = 0^- denotes
Option A:	Just after switching condition
Option B:	Just before switching condition
Option C:	After switching condition
Option D:	Steady State Condition
Q9.	Sometimes conditions at t = ∞ are used in evaluation of
Option A:	Initial Condition
Option B:	Scalar Constants
Option C:	Arbitrary Constants
Option D:	Vector Constants
Q10.	In Transient Time Response, to differentiate between time immediately before & immediately after switching, the signs
Option A:	1 & 2 are used
Option B:	3 & 4 are used
Option C:	0 & - are used
Option D:	- & + are used
Q11.	With zero initial condition at t = 0^+, _____ acts as an open circuit
Option A:	Resistor
Option B:	Capacitor
Option C:	Inductor
Option D:	Both Capacitor & Inductor
Q12.	For synthesizing the transfer function in Pole-Zero Plot, if degree of Numerator is not equal to degree of Denominator than
Option A:	we add a pole/zero towards infinity in LHS of s-plane
Option B:	we add a pole/zero towards infinity in RHS of s-plane
Option C:	we add a pole/zero towards infinity in LHS & RHS of s-plane

Option D:	we add a pole/zero towards Zero in LHS of s-plane
Q13.	In Pole-Zero Plot, the transfer function F(S) = H x (Zero Factors/Pole Factors), where H represents
Option A:	Complex Frequency
Option B:	Constant or Scalar Vector
Option C:	Variable Frequency
Option D:	Poles
Q14.	If all the poles & zeros are lying on negative s-plane (LHS of s-plane) than, the transfer function is
Option A:	Perfectly Stable
Option B:	Unstable
Option C:	Marginally Stable
Option D:	Infinite
Q15.	Which is the correct condition of symmetry observed in z-parameters?
Option A:	Z11 = Z12
Option B:	Z11 = Z22
Option C:	Z12 = Z22
Option D:	Z12 = Z21
Q16.	For a T-Network the value of Za is represented as
Option A:	Za = Z11 - Z12 = Z11 - Z21
Option B:	Za = Z21 - Z22 = Z21 - Z11
Option C:	Za = Z11 - Z22
Option D:	Za = Z22 - Z21
Q17.	Which among the following represents the precise condition of reciprocity for transmission parameters?
Option A:	AB - CD = 1
Option B:	AD – BC = 1
Option C:	AC – BD = 1
Option D:	AC – BD = 0
Q18.	If the two ports are connected in cascade configuration, then which arithmetic operation should be performed between the individual transmission parameters in order to determine overall transmission parameters?
Option A:	Addition
Option B:	Subtraction
Option C:	Multiplication
Option D:	Division
Q19.	If P(S) = P1(S) * P2(S) than, P(S) is said to be Hurwitz Polynomial, if
Option A:	P1(S) is Hurwitz Polynomial
Option B:	P2(S) is Hurwitz Polynomial
Option C:	P1(S) is Hurwitz Polynomial & P2(S) is not a Hurwitz Polynomial

Option D:	P1(S) & P2(S) both are Hurwitz Polynomial
Q20.	In Routh Array Method, the given Polynomial P(S) is said to be Hurwitz Polynomial, if, all the elements in first column are
Option A:	Positive & Non-Zero
Option B:	Positive & Zero
Option C:	Zero
Option D:	Negative
Q21.	To realize the Foster form of Impedance Function Z(S)
Option A:	The degree of numerator > The degree of denominator
Option B:	The degree of numerator < The degree of denominator
Option C:	The degree of numerator = The degree of denominator
Option D:	The degree of numerator ≤ The degree of denominator
Q22.	The Cauer - II form is obtained by
Option A:	Continued Fraction Expansion about the pole at infinity
Option B:	Partial Fraction Expansion of the admittance function Y(S)
Option C:	Continued Fraction Expansion about the pole at origin
Option D:	Partial Fraction Expansion of the impedance function Z(S)
Q23.	A low-pass filter (LPF) is a filter that passes signals with a frequency _____ than a selected cutoff frequency
Option A:	Higher
Option B:	Marginal
Option C:	Lower
Option D:	Critical
Q24.	The attenuation constant α decreases gradually to zero at the cut-off frequency and remains at _____ through the pass band
Option A:	zero
Option B:	π
Option C:	-π
Option D:	1
Q25.	A bandpass filter (BPF) is a device that passes frequencies _____ a certain range and rejects frequencies outside that range
Option A:	above
Option B:	below
Option C:	above & below
Option D:	within

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Examination 2020 under cluster Vidyavardhini's College of Engg & Tech

Program: BE Electronics Engineering

Curriculum Scheme: Revised 2016 (CBCGS)

Examination: Second Year Semester III

Course Code: ELX305 Course Name: Electronics Instruments and Measurements

Time: 1 hour **Max. Marks: 50**

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Note:

1. All Questions are compulsory and carry equal marks.

2. Assume suitable data wherever necessary.

Q1.	Accuracy of a measuring instrument indicates the---
Option A:	Closeness of the output reading to the true value
Option B:	Ratio of output value to the input value
Option C:	Change in output with each change in input
Option D:	Degree of freedom from random errors
Q2.	Which of the following are NOT dynamic characteristics of measurement systems?
Option A:	Speed of response
Option B:	Fidelity
Option C:	Linearity
Option D:	Lag
Q3.	Which type of error occurs after taking all precautions during measurement and we cannot avoid it?
Option A:	Systematic Error
Option B:	Random Error
Option C:	Instrument Error
Option D:	Observation Error
Q4.	Under balanced condition, the current flowing through the detector is equal to
Option A:	1
Option B:	0
Option C:	Sum of the currents flowing in the adjacent arms
Option D:	Difference between the current flowing in the adjacent arms
Q5.	For the measurement of unknown inductance in terms of Known capacitance, suitable AC bridge's are------
Option A:	Maxwell and Wein
Option B:	Maxwell and Kelvin
Option C:	Maxwell and Schering
Option D:	Maxwell and Hay
Q6.	For measuring a very high resistance we should use

Option A:	Kelvin's bridge
Option B:	Wheat stone bridge
Option C:	Meggar
Option D:	Maxwell's bridge
Q7.	Maxwell's Inductance bridge is used to measure inductance with ------
Option A:	High Q value
Option B:	Low Q value
Option C:	Medium Q value
Option D:	Very low Q value
Q8.	Which of the following is NOT part of CRO?
Option A:	Bridge circuit
Option B:	Sweep generator
Option C:	Trigger circuit
Option D:	CRT
Q9.	The shape of Lissajous figure depends on----
Option A:	Deflecting plates
Option B:	Sweep generator
Option C:	Delay between two waves
Option D:	Phase difference of two waves
Q10.	The trigger circuit of a CRO is excited by the-----
Option A:	Y-Plates
Option B:	X-Plates
Option C:	Sweep generator
Option D:	Base generator
Q11.	Which part of CRO develops a saw tooth voltage?
Option A:	Sweep generator
Option B:	Trigger circuit
Option C:	Deflecting plates
Option D:	Power supply
Q12.	In the delay line, the vertical signal voltage to the CRT plates is delayed by------- and the horizontal sweep is started prior to the vertical deflection.
Option A:	100ns
Option B:	200 ns
Option C:	300ns
Option D:	400 ns
Q13.	A complex waveform is made up of Fundamental frequency and its components are called as--------
Option A:	Signal
Option B:	Harmonics
Option C:	waveform

Option D:	Pulse wave
Q14.	Which of the following Instrument measures precise harmonic components of the distorted signal?
Option A:	Oscilloscope
Option B:	Digital Multimeter
Option C:	Wave Analyzer
Option D:	DSO
Q15.	Successive approximation type is of -------DVM.
Option A:	Potentiometric type
Option B:	Ramp type
Option C:	Linear type
Option D:	Non linear type
Q16.	What advantage does a spectrum analyzer have over an oscilloscope in noise measurements?
Option A:	Operation of the spectrum analyzer is fast and simple
Option B:	The spectrum analyzer is more accurate
Option C:	The spectrum analyzer makes it easy to check high frequency content at a specific frequency
Option D:	The spectrum analyze can operate to low frequencies.
Q17.	A--------is a resistance thermometer whose resistance is dependent on the temperature.
Option A:	Thermocouple
Option B:	Thermistor
Option C:	Thermowell
Option D:	Thermometer
Q18.	Which of following is NOT classification factor of electrical transducer?
Option A:	Ambient temperature
Option B:	Application area.
Option C:	Method of energy conversion
Option D:	O/P signal.
Q19.	Operation of thermocouple is governed by _____
Option A:	Coulomb effect
Option B:	Seebeck effect
Option C:	Faraday effect
Option D:	Planck effect
Q20.	Gauge factor of strain guage G_f is given by which of the following relation?
Option A:	$G_{f=}\ \Delta R/R\Delta l$
Option B:	$G_f = R\Delta l/l$
Option C:	$G_f = \Delta R/R/\Delta l/l$
Option D:	$G_f = \Delta R\Delta l/l$

Q21.	------ is used for the measurement of liquid, gas and very low flow rates.
Option A:	Turbine flow meter
Option B:	Rotameter
Option C:	Magnetic flow meter
Option D:	Venturi tubes
Q22.	In dead weight gauge, weights are added to the top of piston with piston reaches a datum level, This level is known as----
Option A:	Lowest level point of fluid in container
Option B:	Highest level point of fluid in container
Option C:	Null point, downward force balances fluid pressure
Option D:	Middle level point of fluid in container
Q23.	Which of the following instruments is NOT used for the measurement of pressure?
Option A:	Bellows
Option B:	Diaphragms
Option C:	Strain gauge
Option D:	Thermocouple
Q24.	The most widely used inductive transducer that converts the linear motion into the electrical signal is
Option A:	Thermistor
Option B:	RTD
Option C:	LVDT
Option D:	Thermocouple
Q25.	McLeod gauge is used for measurement of
Option A:	High pressure
Option B:	Low pressure
Option C:	Very high Pressure
Option D:	Medium pressure

University of Mumbai

Examination 2020 under Cluster 06

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

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

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: SE Semester III

Course Code: ELX305 and Course Name: Electronics Instruments and Measurement

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following error can arise as a result of mistake in reading , parallax, improper instrument location and inadequate lighting
Option A:	Construction error
Option B:	Transmission Error
Option C:	Observation Error
Option D:	Translation Error
2.	Which of the following is static characteristic?
Option A:	Speed of response
Option B:	Fidelity
Option C:	Lag
Option D:	Resolution
3.	The degree to which sensor characteristics remain constant over time is
Option A:	Sensitivity
Option B:	Linearity
Option C:	Stability
Option D:	Inverse sensitivity
4.	A simple bridge circuit consists of a network of _____
Option A:	2 resistance arms
Option B:	6 resistance arms
Option C:	4 resistance arms
Option D:	3 resistance arms
5.	Which principle operates a bridge circuit?
Option A:	Kirchhoff's laws
Option B:	ampere's rule
Option C:	partial indication
Option D:	null indication
6.	Which of the following bridges is used for measurement of inductance with Quality Factor (Q) higher than 10
Option A:	Anderson Bridge

Option B:	Hay Bridge
Option C:	Maxwell Bridge
Option D:	Kelvin Double Bridge
7.	Which of the following is not part of CRO?
Option A:	Sweep Generator
Option B:	Trigger circuit
Option C:	CRT
Option D:	Bridge Circuit
8.	Control grid is given _____
Option A:	positive voltage
Option B:	negative voltage
Option C:	neutral voltage
Option D:	zero voltage
9.	The sweep generator of a CRO is used to produce
Option A:	Saw tooth voltage for the horizontal deflection of electron beam
Option B:	Sinusoidal voltage for the vertical deflection of electron beam
Option C:	Saw tooth voltage for the vertical deflection of electron beam
Option D:	Sinusoidal voltage for the horizontal deflection of electron beam
10.	If the two input waveforms of equal amplitude and 90 degree phase difference is applied to the CRO then the Lissajous patterns obtained will be
Option A:	Straight line tilted at 45 degree with respect to X-axis
Option B:	Vertical straight line
Option C:	Ellipse
Option D:	Circle
11.	Which of the following is inverting type of DVM?
Option A:	Linear Ramp Type
Option B:	Staircase Ramp Type
Option C:	Successive Approximation Type
Option D:	Duel Slope Integrating Type
12.	Loading effect is principally caused by____ instruments
Option A:	High resistance
Option B:	Low sensitivity
Option C:	High sensitivity
Option D:	High Range
13.	Digital instruments are those which
Option A:	Have numerical readout
Option B:	Use LED or LCD display
Option C:	Have circuitry of digital design
Option D:	Use deflection type meter movement
14.	Self generating type transducers are _____ transducers.
Option A:	Inverse
Option B:	Secondary

Option C:	Passive
Option D:	Active
15.	LVDT which is an instrument for the measurement of displacement, works on the principal of
Option A:	Mutual inductance
Option B:	Linear inductance
Option C:	Non - linear inductance
Option D:	Linear capacitance
16.	Relation between temperature and resistance of a conductor is _____
Option A:	$R_t = R_{ref}$ [1+t]
Option B:	$R_t = R_{ref}$ [1+αΔt]
Option C:	$R_t = R_{ref}$ [1-αt]
Option D:	$R_t = R_{ref}$ [1-t]
17.	A thermocouple consists of
Option A:	2 wires
Option B:	1 wire
Option C:	4 wire
Option D:	3 wire
18.	The ionization gauge an instrument used for the measurement of
Option A:	Medium pressure
Option B:	High pressure
Option C:	Very high pressure
Option D:	Very low pressure
19.	Which of the following is not a type of pressure sensing element?
Option A:	Bellows
Option B:	Bourdon tube
Option C:	Orifice plate
Option D:	Diaphragm
20.	Turbine meters are generally preferred for
Option A:	High viscosity and low flow measurements
Option B:	High viscosity and high flow measurements
Option C:	Low viscosity and low flow measurements
Option D:	Low-viscosity and high flow measurements

Q2	**Solve any Four out of Six** **5 marks each**
A	Define and Explain 1) Sensitivity 2) Precision
B	Write difference between Maxwell's and Hay's Bridge
C	Explain the function of delay line in CRO with diagram
D	With a neat diagram, explain the principle of digital time measurement
E	Define transducers and explain the selection criteria of transducers
F	Draw the detailed diagram of Mcleod gauge

Q3.	Solve any Four out of Six 5 marks each
A	Explain the different types of errors
B	Draw the neat labelled diagram of LCR Q meter and explain its operating principle
C	Draw a block diagram of CRO and explain electron gun assembly
D	Describe the digital frequency meter along with the diagram
E	Write a short note on LVDT
F	Write a short note of rotameter

University of Mumbai
Examination 2020
Program: BE Electronics Engineering
Curriculum Scheme :Revised 2016(CBCGS)
Examination : Second Year Semester III
Course Code :ELX301 Course Name: Applied Mathematics-III
Time: 1 hour Max.Marks:50

Note:
1. All Questions are compulsory and carry equal marks
2. Assume suitable data wherever necessary

Q1	L$\left[\frac{cosat}{t}\right]$ is
Option A:	$\frac{1}{2}\log(S^2+a^2)$
Option B:	$\log(S^2+a^2)$
Option C:	$-\frac{1}{2}\log(S^2+a^2)$
Option D:	Does not exist
Q2	In the half range cosine Fourier Series of f(x) = x in (0 , π) the value of a_n is
Option A:	$\frac{2[(-1)^n+1]}{\pi n^2}$
Option B:	0
Option C:	$\frac{2[(-1)^n-1]}{\pi n^2}$
Option D:	1
Q3	For Scalar field $\emptyset = xy^2z^3$ the magnitude of the gradient at point (1,-1,1) is
Option A:	$\sqrt{40}$
Option B:	$\sqrt{14}$
Option C:	$\sqrt{44}$
Option D:	$\sqrt{140}$
Q4	Harmonic conjugate function of $u = y^3 - 3x^2y$ is
Option A:	$y^3 - 3y^2x$
Option B:	$x^3 - 3x^2y$
Option C:	$x^3 - 3y^2x$
Option D:	$x^3 - y^3 - 3x^2y$
Q5	In Fourier series of $f(x) = x^2 - 2$ in (-2 , 2) then coefficient of sin10x is
Option A:	$\frac{16}{100\pi^2}$
Option B:	-4/3
Option C:	$\frac{-16}{100\pi^2}$
Option D:	0
Q6	Value of $\int_0^\infty \frac{e^{-4t}-e^{-2t}}{t}$ dt
Option A:	Log2
Option B:	Log6
Option C:	Log4
Option D:	Log(1/2)

Q7	Normal vector to the surface $2xz^2 = 3xy + 4x + c$ at point (1 , -1 , 2) is
Option A:	6i -3j +8k
Option B:	7i -3j +8k
Option C:	6i -3j -8k
Option D:	7i -3j -8k
Q8	Using Stoke's theorem value of integral $\int_C (yzi + zxj + xyk).d\bar{r}$ where C encloses the area bounded by $x = y^2 \; and \; y = x^2$ and z=0 is
Option A:	2/3
Option B:	64
Option C:	-1/20
Option D:	0
Q 9	In a Fourier series of f(x) = 2x in (0,2π) ; the value of a_3 is
Option A:	-4/3
Option B:	1
Option C:	4/9
Option D:	0
Q10	In a Fourier series of f(x) = e^{-x} in (0 , 2π) ; coefficient of sin3x is
Option A:	$\left[\frac{1-e^{-2\pi}}{\pi}\right]\frac{2}{5}$
Option B:	$\frac{1}{10}\left[\frac{1-e^{-2\pi}}{\pi}\right]$
Option C:	$\frac{-1}{10}\left[\frac{1-e^{-2\pi}}{\pi}\right]$
Option D:	$\frac{3}{10}\left[\frac{1-e^{-2\pi}}{\pi}\right]$
Q11	$\frac{J_{\frac{1}{2}}(x)}{J_{-\frac{1}{2}}(x)}$ = P then P is
Option A:	sinx
Option B:	cosx
Option C:	tanx
Option D:	cotx
Q12	Value of $\int_0^\infty t^2 e^{-4t} cosh2t dt$ is
Option A:	$\frac{7}{45}$
Option B:	$\frac{11}{54}$
Option C:	$\frac{7}{54}$
Option D:	$\frac{5}{54}$
Q13	Laplace transform of $sin^2 x$ is
Option A:	$\frac{1}{2}\left(\frac{1}{s}+\frac{1}{s^2+4}\right)$
Option B:	$\frac{1}{2}\left(\frac{1}{s}-\frac{s}{s^2+4}\right)$

Option C:	$\frac{1}{2}\left(\frac{1}{s}-\frac{1}{s^2+4}\right)$
Option D:	$\frac{1}{2}\left(\frac{1}{s}+\frac{s}{s^2+4}\right)$
Q14	Which of the following functions is analytic function of z ?
Option A:	$\bar{z}-z$
Option B:	e^z
Option C:	$2x + ixy^2$
Option D:	$\frac{z}{\bar{z}}$
Q15	Which of the following functions satisfies Laplace equation in polar form?
Option A:	$\sqrt{r}\,cos\left(\frac{\theta}{2}\right)$
Option B:	$r\,cos\left(\frac{\theta}{2}\right)$
Option C:	$r\,sin\left(\frac{\theta}{2}\right)$
Option D:	$\sqrt{r}\,sin(\theta)$
Q16	$L^{-1}\left[\frac{1}{s(s^2+9)}\right]$ is
Option A:	$-\frac{2}{t}(1-sin2t)$
Option B:	$\frac{2}{t}(1-cos2t)$
Option C:	$-\frac{1}{3}(1-cos3t)$
Option D:	$\frac{1}{9}(1-cos3t)$
Q17	Orthogonal trajectories to the curve $2x - 2xy = c$ is
Option A:	$x^2-y^2+2y=c$
Option B:	$x^2+y^2+2y=c$
Option C:	$x^2-y^2-2xy=c$
Option D:	$x^2+y^2-2y=c$
Q18	For $\bar{F}=x^2i+yj$, $\int_c \bar{F}.\overline{dr}$ along the curve $y^2=2x$ from (0,0) to(1,1) is
Option A:	$^{13}/_{12}$
Option B:	$^{13}/_{22}$
Option C:	$^{11}/_{24}$
Option D:	$^{13}/_{24}$
Q19	$L^{-1}\left[\frac{1}{2}log\left[\frac{S^2-a^2}{S^2}\right]\right]$ is
Option A:	$\frac{1-cosat}{t}$
Option B:	$\frac{1-sinat}{t}$
Option C:	$\frac{1-coshat}{t}$
Option D:	$\frac{1-sinhat}{t}$

Q20	If $\overline{F}(r)=\frac{\bar{r}}{r^3}$ then which of the following statement is true
Option A:	$\overline{F}$ is solenoidal but not irrotational
Option B:	$\overline{F}$ is irrotational but not solenoidal
Option C:	$\overline{F}$ is neither solenoidal nor irrotational
Option D:	$\overline{F}$ is both solenoidal and irrotational
Q21	If L$[f''(t)] = \cot^{-1}(S)$, f(0) =3 and $f'(0)$ = -2 then L[f(t)] is
Option A:	$\frac{1}{S^2}[cot^{-1}(S) + 3S - 2]$
Option B:	$\frac{1}{S}[cot^{-1}(S) + 3S - 2]$
Option C:	$\frac{1}{S^2}[cot^{-1}(S) + S - 2]$
Option D:	$\frac{1}{S^2}[cot^{-1}(S) + 2S - 2]$
Q22	If M and N are two functions of x and y and their partial derivatives are single valued continuous function over the closed region bounded by the curve C then
Option A:	$\int_C (\mathrm{Mdx} + \mathrm{Ndy}) = \iint_R \left[\frac{\partial \mathrm{N}}{\partial \mathrm{x}} - \frac{\partial \mathrm{M}}{\partial \mathrm{y}}\right]$ dxdy
Option B:	$\int_C (\mathrm{Mdx} + \mathrm{Ndy}) = \iint_R \left[\frac{\partial \mathrm{M}}{\partial \mathrm{y}} - \frac{\partial \mathrm{N}}{\partial \mathrm{x}}\right]$ dxdy
Option C:	$\int_C (\mathrm{Mdx} + \mathrm{Ndy}) = \iint_R \left[\frac{\partial \mathrm{N}}{\partial \mathrm{y}} - \frac{\partial \mathrm{M}}{\partial \mathrm{x}}\right]$dxdy
Option D:	$\int_C (\mathrm{Mdx} + \mathrm{Ndy}) = \iint_R \left[\frac{\partial \mathrm{M}}{\partial \mathrm{x}} - \frac{\partial \mathrm{N}}{\partial \mathrm{y}}\right]$dxdy
Q23	$L^{-1}\left[\frac{1}{\sqrt{4s+1}}\right]$ is
Option A:	$\frac{e^{\frac{-t}{4}}}{2\sqrt{\pi t}}$
Option B:	$\frac{e^{\frac{-t}{2}}}{2\sqrt{\pi t}}$
Option C:	$\frac{e^{\frac{-t}{4}}}{\sqrt{\pi t}}$
Option D:	$\frac{e^{\frac{-t}{4}}}{\sqrt{2\pi t}}$
Q24	Using Gauss Divergence theorem Value of integral $\iint_S (xi + yj + zk) . \overline{N}$ds over the surface $x^2 + y^2 + z^2 = 1$ is
Option A:	4π
Option B:	$\frac{5\pi}{3}$
Option C:	$\frac{4\pi}{3}$
Option D:	$4\pi^2$
Q25	If L$[f(t)]$ =$\frac{1}{\sqrt{S}}$ $e^{-1/S}$ then $L[e^{-3t}f(4t)]$ is
Option A:	$e^{\frac{-1}{S+3}}\left[\frac{S-3}{(S+3)^{5/2}}\right]$
Option B:	$\frac{1}{4}e^{\frac{-4}{S+3}}\left[\frac{S-5}{(S+3)^{5/2}}\right]$
Option C:	$\frac{1}{2}e^{\frac{-4}{S+3}}\left[\frac{1}{(S+3)^{1/2}}\right]$
Option D:	$\frac{1}{4}e^{\frac{-4}{S+3}}\left[\frac{S+5}{(S+3)^{5/2}}\right]$