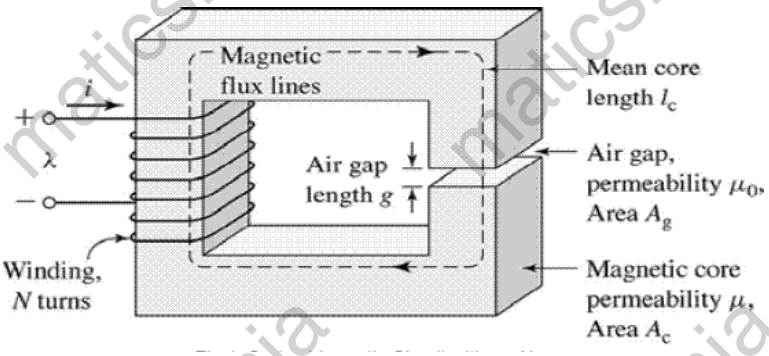
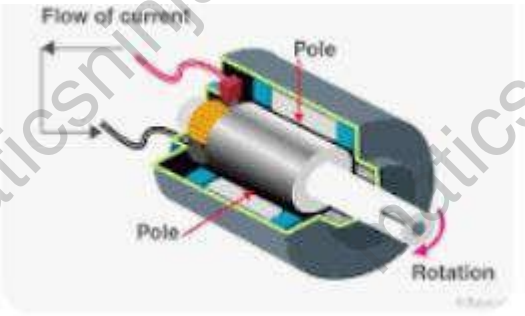
Unit I	Basic Electrical Fundamentals	
S. N.		**Marks**
1.	Permeability in a magnetic circuit corresponds to .....in an electric circuit A. Resistance B. Resistivity C. Conductivity D. Conductance Answer- C. Conductivity Explanation: For electric circuits we define conductance for magnetic circuits we define Permeability.	1M
2.	Those magnetic materials are best suited for making armature and transformer cores which have .....permeability and.....hysteresis loss A. High, high B. Low, high C. High, low D. Low, low Answer- C. High, low	1M
	E Explanation: For making transform cores the permeability of material should be high hysteresis loss should be low	

3.	The property of a material which opposes the creation of magnetic flux in it is known as A. Reluctivity B. Magnetomotive force C. Permeance D. Reluctance Answer- D. Reluctance Explanation: Reluctance is defined as the opposition of magnetic flux in magnetic circuit.	1M
4.	The unit of magnetic flux is A. Henry B. Weber C. Ampere-turn/weber D. Ampere/meter Answer- B. Weber Explanation: The total number of magnetic lines of force in a magnetic field is called as magnetic flux & its unit is Weber (wb)	1M
5.	The unit of reluctance is A. Meter/henry B. Henry/meter C. Henry D. 1/henry Answer-D. 1/henry Explanation: The unit of reluctance is ampere-turns per weber i.e 1/Henry.	1M

6.	**Reciprocal of reluctance is** **A. Reluctivity** **B. Permeance** **C. Permiability** **D. Susceptibility** **Answer- B. Permeance** **Explanation: Permeance is reciprocal of reluctance is a measure of magnetic flux for a number of current turns in a magnetic circuit.**	**1M**
7.	**Conductivity is analogous to** **A. Retentivity** **B. Resistivity** **C. Permeability** **D. Inductance** **Answer- C. Permeability** **Explanation:Conductivity of a metallic wire is defined as its ability to allow electric charges or heat to pass through it. It is analogous to permeability. Permeability is the measure of magnetization produced in a material in response to an applied magnetic field.**	**1M**

8.	An air gap is usually inserted in magnetic circuits to A. Increase m.m.f B. Increase the flux C. Prevent saturation D. None of the above Answer-C. Prevent Saturation Explanation: An air gap is usually inserted in magnetic circuits to Prevent saturation. One of main reasons for an Air Gap is to increase the reluctance of the magnetic circuit. The amount of air or another non-magnetic material like a fibre plate or fibre board increases the reluctance of the circuit, thereby increasing the amount of current that we could put in a coil before we reach saturation. Also, the air gaps help the magnetic flux to expand outside the magnetic circuit.  	1M
9.	Magnetic effect of current was discovered by A. Oersted B. Faraday C. Bohr D. Ampere Answer- A. Oersted Explanation: Oersted showed that electricity and magnetism were related phenomena.	1M

10.	Inside the magnet, the field lines moves A. From north to south B. from south the north C. away from south pole D. away from north pole Answer: - A. From north to south Explanation: According to properties of Magnetic field inside the magnet moves from south to north pole.	1M
11.	Direction of rotation of a coil in electric motor is determined by A. fleming's right hand rule B. fleming's left hand rule C. faraday law of electromagnetic inductors D. None of above Answer: - B. Fleming's left hand rule Explanation: The Fleming'sleft-hand rule is used to help remember the direction of the magnetic field, the direction of the current, and the direction of magnetic thrust force when a conducting rod is introduced to a magnetic field. It is commonly used to determine the direction of motion of an electric motor.	1M
12.	We can induce the current in a coil by A. moving the coil in a magnetic field B. by changing the magnetic field around it C. by changing the orientation of the coil in the magnetic field D. All of above Answer: A. moving the coil in a magnetic field Explanation: The method can be used to induce the potential difference across the ends of a coil and hence to induce the	1M

	current.	
13.	A D.C generator works on the principle of A. ohnis law B. Joule's law of heating C. faraday's law of electromagnetic induction. D. none of the above Answer: C. Faraday's law of electromagnetic induction. Explanation: DC generators generate electricity using the principle of Faraday's law of electromagnetic induction. When a conductor is placed in a varying magnetic field, an electromotive force gets induced within the conductor.  	1M
14.	Which among the following is true about Faraday's law of Induction? A. An emf is induced in a conductor when it cuts the magnetic flux B. An emf is induced in a conductor when it moves parallel to the magnetic field C. An emf is induced in a conductor when it moves perpendicular to the magnetic field D. An emf is induced in a conductor when it is just entering a magnetic field Answer: A. An emf is induced in a conductor when it cuts the magnetic flux	1M

	Explanation: According to Faraday's law of electromagnetic induction, an emf is induced in a conductor when it cuts across the flux of a magnetic field. If the two ends of the conductor are connected to an outside circuit, the induced emf causes current to flow in the circuit.	
15.	**What is proportional to the magnitude of the induced emf in the circuit?** **A. Rate of change of current in the circuit** **B. Rate of change of resistance offered** **C. Rate of change of magnetic flux** **D. Rate of change of voltage** **Answer: C. Rate of change of magnetic flux** **Explanation: The magnitude of induced emf is equal is equal to the time rate of change of magnetic flux. It is mathematically expressed as:** **$\varepsilon = -d\phi dt$** **The negative sign indicates the direction of the emf induced. This is Faraday's second law of electromagnetic induction.**	**1M**
16.	**Faraday's laws are result of the conservation of which quantity?** **A. Momentum** **B. Energy** **C. Charge** **D. Magnetic field** **Answer: B. Energy** **Explanation: Faraday's laws are result of the conservation of energy. These laws are based on the conversion of electrical energy into mechanical energy. Mechanical energy can be converted into electrical energy such as in the example of a dynamo. In the same way, electrical energy can be converted**	**1M**

	into mechanical energy such as in the example of electric motor. Both of the above examples work on the principle of Faraday's law.	
17.	The induced emf persists only as long as the change in magnetic flux continues. A. True B. False Answer: A. True Explanation: According to Faraday's first law, whenever the amount of magnetic flux linked with a circuit changes, an emf is induced in the circuit. This induced emf persists as long as he change in magnetic flux continues. Therefore, this is a true statement.	1M
18.	The polarity of induced emf is given by A. Ampere's circuital law B. Biot-Savart law C. Lenz's law D. Fleming's right hand rule Answer: C. Lenz's law Explanation: Lenz's law is used to measure the polarity of induced e.m.f. Ampere's law correlates with the magnetic field induced in a coil. Biot–Savart law describes the magnetic field generated by a constant electric current. Fleming's right-hand rule gives the estimate that in which direction the current will flow.	1M
19.	When an insulated wire coil is connected to a battery, the pointer of the galvanometer is deflected due to A. the induced current produced B. the coil acts like a magnet C. the number of turns in the coil of the galvanometer is changed D. None of these	1M

	Answer: A. the induced current produced **Explanation: A galvanometer measures the amount of current flowing through the circuit. In a current flowing conductor connected to a battery, the pointer of the galvanometer fluctuates and points to the amount of current flowing. Thus a galvanometer measures the amount of induced current in the circuit.**	
20.	**Give the SI unit of self-inductance.** **A. Farad** **B. Ampere** **C. Henry** **D. Maxwell** **Answer: C. Henry** **Explanation: The self-inductance of a coil is said to be one henry if an induced emf of one volt is set up in it when the current in it changes at the rate of one ampere per second. Self-inductance is defined as the induction of a voltage in a current-carrying wire when the current in the wire itself is changing.**	**1M**
21.	**Mutual inductance is called the inertia of electricity.** **A. True** **B. False** **Answer: B. False** **Explanation: Self-induction of a coil is that the property by which it tends to take care of the magnetic flux linked with it and opposes any change within the flux by inducing a current in it. This is the reason why self-induction is named inertia of electricity.**	**1M**
22.	**What is the self-inductance of the coil, if the magnetic flux of 10 microwebers is linked with a coil when a current of 5 mA flows through it?** **A. 20 mH**	**1M**

	B. 5 mH C. 2 mH D. 250 mH **Answer: C** **Explanation: Self-inductance = Magnetic flux x Current** **Self-inductance = 10×10 ^-6 X 5×10^-3** **Self-inductance = 2×10^{-3} H** **Self-inductance = 2mH**	
23.	**What are the positive and negative terminals of direct current (DC) known to have?** **A. fixed polarity** **B. no polarity** **C. always negative polarity** **D. variable polarity** **Answer:A. Fixed polarity** **Explanation: The direction and magnitude of the current, in a Direct Current (DC), do not change. Simply, both positive and negative terminals of a battery are always positive and negative. Therefore, the current that flows always is in the same direction between both terminals. Examples: Fuel cells, Batteries, and Solar cells**	**1M**
24.	**The peak value of alternating supply is 600 V. What is its rms voltage?** **a. 410 V** **b. 312.5 V** **c. 424.3 V** **d. 130 V** **Answer: C. 424.3 V** **Explanation: Given, the peak value of alternating voltage,**	**1M**

	$V_0 = 600$ V We have, rms voltage, $V_{rms} = V_0/\sqrt{2} = 600/1.414 = 424.3$ V	
25.	Find the average value of current when the current that are equidistant are 4A, 5A and 6A. A. 5A B. 6A C. 15A D. 10A Answer: A. 5A Explanation: The average value of current is the sum of all the currents divided by the number of currents. Therefore average current = (5+4+6)/3=5A.	1M
26.	RMS stands for _____ A. Root Mean Square B. Root Mean Sum C. Root Maximum sum D. Root Minimum Sum Answer: A. Root Mean Square Explanation: RMS stands for Root Mean Square. This value of current is obtained by squaring all the current values, finding the average and then finding the square root.	1M
27.	What is the effective value of current? A. RMS current B. Average current C. Instantaneous current D. Total current Answer: A. RMS current Explanation: RMS current is also known as the effective current. RMS stands for Root Mean Square. This value of current is obtained by squaring all the current values, finding the average and then finding the square root.	1M

28.	In a sinusoidal wave, average current is always _____ rms current. A. Greater than B. Less than C. Equal to D. Not related Answer: B. Less than Explanation: The average value of current is the sum of all the currents divided by the number of currents whereas RMS current is obtained by squaring all the current values, finding the average and then finding the square root. Hence RMS current is greater than average current.	1M
29.	For a rectangular wave, average current is _____ rms current. A. Greater than B. Less than C. Equal to D. Not related Answer: C. Equal to Explanation: The rms value is always greater than the average except for a rectangular wave, in which the heating effect remains constant so that the average and the rms values are the same.	1M
30.	The Unit of Magnetic Flux is A. Tesla B. Weber C. Weber - metre D. None of the above Answer: - B. Weber Explanation: The SI unit of magnetic flux is Weber (Wb) or tesla meter squared (Tm^2) named after German physicist Wilhelm Weber.	1M

31.	**EMF Stands for** **A. Electromechanical force** **B. Electromagnetic l force** **C. Electromotive force** **D. None of the above** **Answer: - C. Electromotive force** **Explanation: Electromotive force is defined as the electric potential produced by either an electrochemical cell or by changing the magnetic field. EMF is the commonly used acronym for electromotive force.**	**1M**
32.	2) **Volt is equal to** **A. Joule/Coulomb** **B. Ampere/Seconds** **C. Joule/Seconds** **D. Coulomb/Seconds** **Answer: - A. Joule/Coulomb** **Explanation: One Volt is equal to 1 Joule/Coulomb. There are many different definitions for the Volt, but the most common is equal to 1 Joule/Coulomb. A volt is a unit of electromotive force that measures the potential difference in electric potential between two points. It is also known as a voltage measured in volts (V).**	**1M**
33.	**B in B-H curve is known as** **A. Reluctance** **B. Magnetizing Force** **C. Magnetic flux density** **D. Magnetic Intensity** **Answer: -C. Magnetic flux density** **Explanation: The B-H curve, also known as the magnetization curve or hysteresis curve, is a graphical representation that describes the magnetic properties of a material. It shows the**	**1M**

	relationship between the magnetic field strength (H) and the magnetic flux density (B) of a material.	
34.	The Unit of Magnetic Flux Density is A. Tesla B. Weber C. Weber - metre D. None of the above Answer: - A. Tesla Explanation: The tesla (symbolized T) is the standard unit of magnetic flux density. It is equivalent to one weber per meter squared (1 Wb/m^2).	1M
35.	MMF stands for A. Magnetic Memory field B. Magnetic Material Force C. Magneto Motive Force D. None of the above Answer: - C. Magneto Motive Force Explanation: MMF is the abbreviation used for Magnetomotive force	1M
36.	H in B-H curve is known as A. Reluctance B. Magnetizing Force C. Magnetic flux density D. Magnetic Intensity Answer: - B. Magnetizing force Explanation: Magnetising force is represented by H, and has the unit $A.m^{-}$	1M
37.	Hysteresis in magnetic circuit is phenomenon of A. Lagging of B behind H B. Lagging of H behind B	1M

	C. Setting up constant flux D. None of the above Answer: - A. Lagging of B behind H Explanation: The B-H curve or magnetisation curve is the graph plotted between magnetic flux density (B) and magnetising force (H). The meaning of hysteresis is"lagging". Hysteresis is characterised as a lag of magnetic flux density (B) behind the magnetic field strength (H).	
38.	The SI Unit of Actual Permeability of free space is A. Henry B. Henry/Metre C. Weber - metre D. Farad/Metre Answer: - B. Henry/Metre Explanation: It is a constant of proportionality that exists between magnetic flux density and magnetic field intensity. The SI unit of permeability is Henry/meter.	1M
39.	Magnetic flux passes more readily through A. Wood B. Air C. Iron D. Vacuum Answer: - C. Iron Explanation:The magnetic field lines prefer to pass through iron than because the permeability of iron is much larger.	1M
40.	MMF in magnetic circuit corresponds to in electric circuit A. Potential Difference B. EMF C. Current D. Resistance	1M

	Answer: -B. EMF **Explanation: The magneto motive force, mmf or f, is analogous to the electromotive force i.e EMF and may be considered the factor that sets up the flux.**	
41.	**The B-H curve of_____will not be a straight line** **A. Wood** **B. Air** **C. Soft Iron** **D. Copper** **Answer: - C .Soft Iron** **Explanation: Soft iron is a ferromagnetic material that is commonly used in electromagnets and magnetic circuits due to its high magnetic permeability. Soft iron has a nonlinear B – H curve due to its high saturation magnetization.**	**1M**
42.	**Direction of induced EMF can be found out from** **A. Faradays law** **B. Amperes law** **C. Fleming right hand Rule** **D. Lenz´s law** **Answer: - C. Fleming right hand Rule** **Explanation: Lenz's law suggests that the direction of induced emf opposes the change in magnetic flux. The negative sign in Faraday's law can be related to this law. Lenz's law gives the direction of induced emf with respect to the change in magnetic flux but Fleming's law gives the direction of induced emf more accurately.**	**1M**
43.	**Which of the following material has least area of Hysteresis loop** **A. Wrought Iron** **B. Hard Steel** **C. Soft Iron**	**1M**

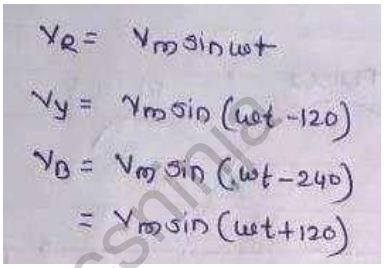
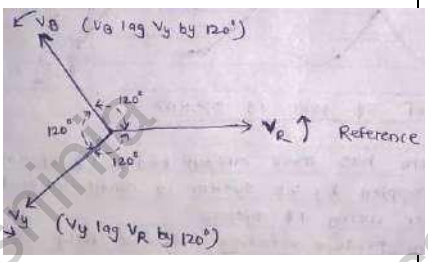
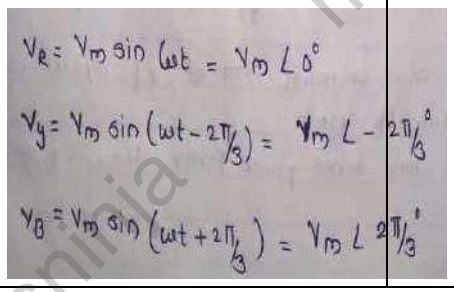
	D. Silicon Steel Answer: -C. Soft Iron Explanation: Soft iron has the least hysteresis loop area because it has low coercivity and high permeability. Hysteresis loop area is a measure of the energy loss in a ferromagnetic material when it is repeatedly magnetized and demagnetized.	
44.	If charge Q is 4 coulombs and time t is 1 seconds then current I is A. 1 Ampere B. 5 Ampere C. 3 Ampere D. 4 Ampere Answer: - D. 4 Ampere Explanation: - I = Q/t = 4/1 = 4 A	1M
45.	If 3 joules work is done to charge a body to one coulomb Q then voltage V is A. 1 Volt B. 2 Volt C. 3 Volt D. 4 Volt Answer: - C. 3 Volt Explanation: - V = J/Q	1M
46.	If current I is 7 amperes and time is 1 seconds then charge Q is A. 6 coulombs B. 7 coulombs C. 8 coulombs	1M

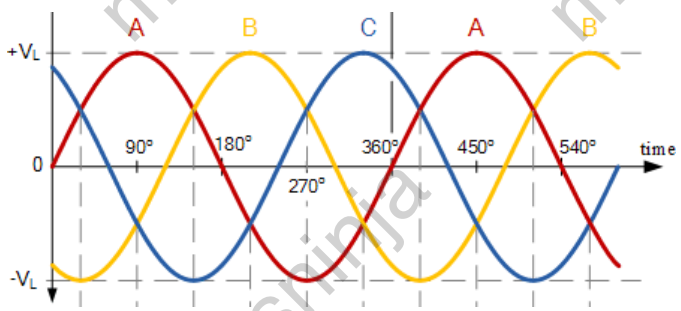
	D. 1 coulombs Answer: - B. 7 coulombs Explanation: - Q = I*t	
47.	The unit of frequency is A. Cycle B. Cycle-second C. Hertz/second D. Hertz Answer: - D. Hertz Explanation: Scientist Heinrich Rudolf Hertz was a German physicist who first conclusively proved the existence of the waves which are electromagnetic and this was predicted by James Clerk Maxwell's equations of electromagnetism. The unit that is of frequency is the cycle per second was named "hertz" in his honour.	1M
48.	The frequency of an alternating current is A. The speed with which the alternator runs B. The number of cycles generated in one minute C. The number of waves passing through a point in one second D. The number of electrons passing through a point in one second Answer: -C. The number of waves passing through a point in one second Explanation: The frequency of a wave is the number of waves that pass a point in a certain period of time. Frequency can also be described as the number of waves that pass a point in one second.	1M

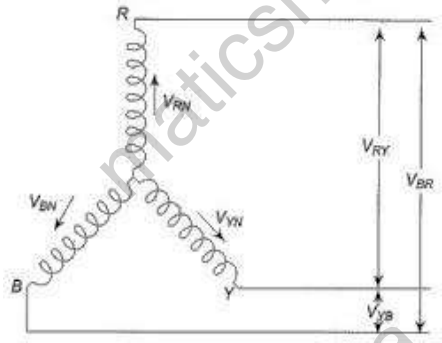
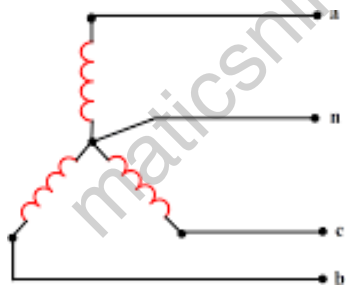
49.	The power factor of an AC circuit is equal to A. Cosine of the phase angle B. Sine of the phase angle C. Unity for a capacitive circuit D. Unity for a inductive circuit Answer: - A. Cosine of the phase angle Explanation: Power factor of an ac circuit is equal to the cosine of the angle between voltage and current.	1M
50.	If two sinusoids of the same frequency but of different amplitudes and phase angles are subtracted, the resultant is A. A sinusoid of the same frequency B. A sinusoid of half the original frequency C. A sinusoid of double the frequency D. Not a sinusoid Answer: - A. A sinusoid of the same frequency Explanation: - sinusoidal quantities with same frequency can be added or subtracted & the resultant wave has same frequency.	1M
5.1	Form factor for a sine wave is A. 1.414. B. 0.707 C. 1.11. D. 0.637 Answer: - C. 1.11 Explanation: - form factor=RMS Value/Average Value=1.11	1M

52.	In an A.C. circuit power is dissipated in A. Resistance only B. Inductance only C. Capacitance only D. None of the above Answer: - A. Resistance only Explanation: - Resistance in a circuit that has a voltage drops across it and dissipates power	1M
	The voltage of domestic supply is 220 V. This value represents A. Mean value B. R.M.S value C. Peak value D. Average value Answer: - B. R.M.S value Explanation: - The voltage of domestic ac is 220 V, it represents the root mean square voltage of supply.	1M
53.	The power consumed in a circuit element will be least when the phase difference between the current and voltage is A. 180° B. 90° C. 60° D.0° Answer: - B. 90°	1M

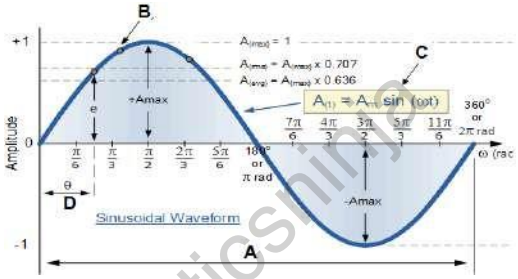
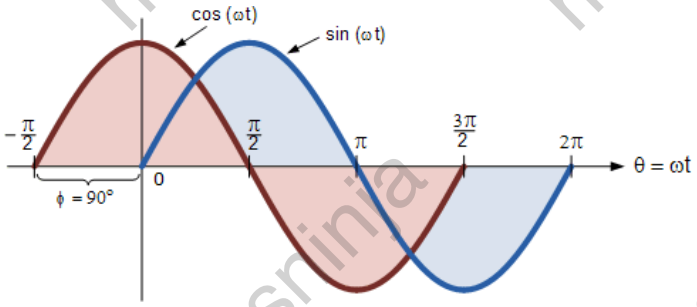
	Explanation: The cosine of an angle is maximum when the angle is 0 and minimum when the angle is 90 degrees. Therefore, the power consumed by a circuit element will be least when the phase difference between the current and voltage is 90 degrees.	
54.	**The power consumed by 230 volt, 10 ampere and 0.8 power factor circuit is** **A. 2300 Watt** **B. 1840 Watt** **C. 230 Watt** **D. 1000 Watt** **Answer: - A. 2300Watt** **Explanation: P = V*I* Power factor**	**1M**
55.	**Power factor of the following pure circuit will be zero** **A. Resistance** **B. Inductance** **C. Capacitance** **D. Both (B) and (C)** **Answer: - D. Both (B) and (C)** **Explanation: For the purely inductive circuit, the power factor is zero, because true power equals zero. For the purely inductive circuit, the power factor is zero, because true power equals zero.**	**1M**
56.	**The magnetic flux density in a magnetic field in which flux is 600 Microweber and area is 0.1 m2** **A. 6000 microtesla** **B. 600 microtesla** **C. 6 tesla** **D. 0.6 tesla**	**1M**

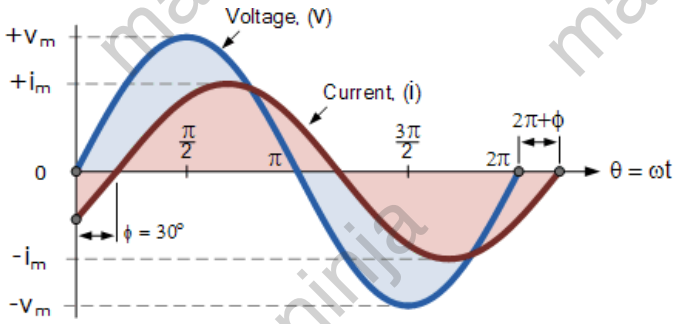
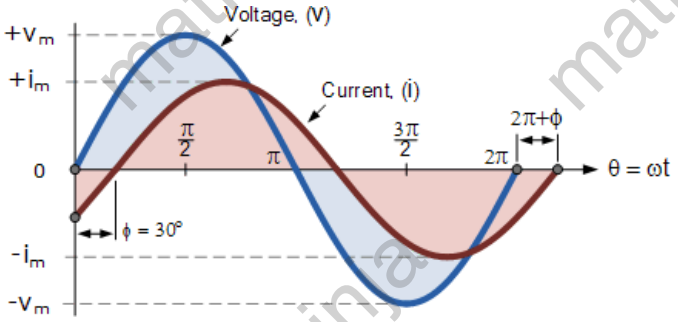
	Answer: - A. 6000microtesla **Explanation= flux/Area**	
57.	**Can we apply Kirchhoff's law to magnetic circuits?** **A. Yes** **B. No** **C. Depends on the circuit** **D. Insufficient information provided** **Answer: A. Yes** **Explanation: Magnetic circuits have an equivalent to the potential difference of electric circuits. This is the magnetic potential difference which allows us to apply Kirchhoff's laws to magnetic circuit analysis.**	**1M**
58.	**WhichoffollowingisPhasorrepresentationof3phasevoltages?** **(A)**  **(B)**  **(C)**  **(D) Noneofthese** **Answer:-OptionB**	**1M**

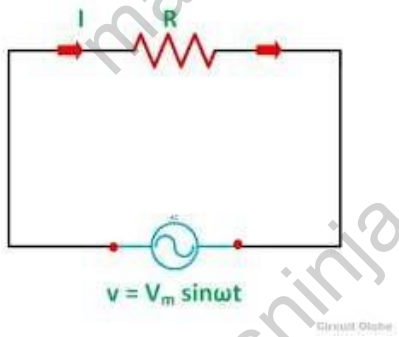
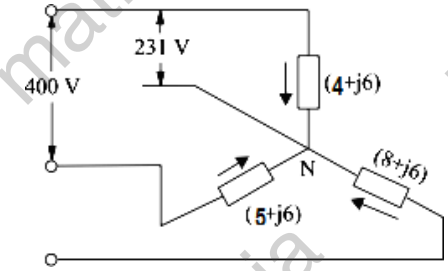
59.	**Which of following is advantage on 3 Phase AC over 1 Phase AC System?** **A. More output power** **B. Less space required to produce same power** **C. Self-starting of machine is possible** **D. All of them** **Answer: - D. All of them** **Explanation: - To transmit a specific power over a specific distance at a given rated voltage, a three phase system needs less conductor material as compared to the single phase system.** **The size of a three phase system operated machine is less than the machine operated at single phase voltage having the same output rating.** **In a three phase power supply system, the less voltage drop occurs from source to the load points,** **A three phase supply produces uniform rotating magnetic field therefore three phase motors are simpler in construction, small in size and can be started automatically with smooth operation.**	**1M**
60.	**Identifythecorrectphasesequence?**  **(A) B-C-A (B)A-B-C** **(C)C-A-B (D)Noneofabove**	**1M**

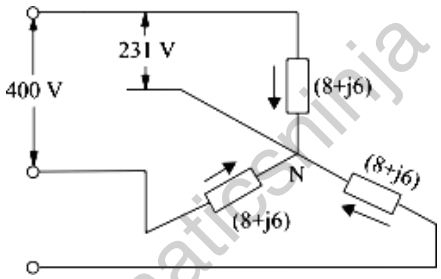
	Answer:-B. A-B-C on:- PhaseSequenceisasequenceinwhich3phasevoltagesreachtheirmaximumpositivevalues	
61.	Identify thetype of three phase connection?  A. ThreePhaseThreeWireStarConnectedSystem B. ThreePhaseFourWireStarConnectedSystem C. ThreePhaseThreeWireDeltaConnectedSystem D. Noneofabove Answer:-A. ThreePhaseThreeWireStarConnectedSystem	1M
62.	Identifythetypeofthreephaseconnection?  A. ThreePhaseThreeWireStarConnectedSystem B. ThreePhaseFourWireStarConnectedSystem C. ThreePhaseThreeWireDeltaConnectedSystem D. ssNoneofabove Answer:-B. ThreePhaseFourWireStarConnectedSystem	1M

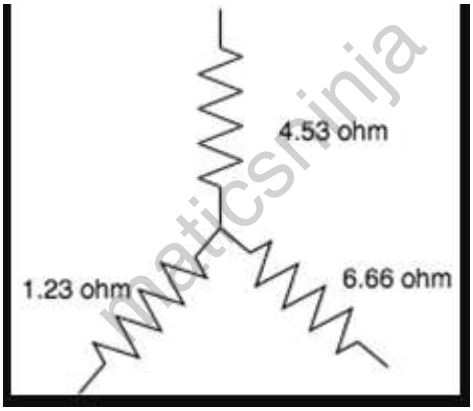
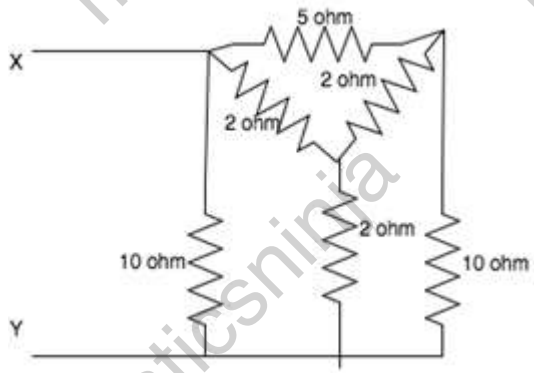
63	AlltherulesandlawsofD.C.circuitalsoapplytoA.C.circuitcontaining A. Capacitanceonly B. Inductanceonly C. Resistanceonly D. All above Answer:-C. Resistance only Explanation:- Resistanceisnotchargeorenergystoringelementofelectricalcircuit.	1M
64	Capacitivereactanceismorewhen A. Capacitanceandfrequencyofsupplyisless B. Capacitanceislessandfrequencyofsupplyismore C. Capacitance is more and frequency of supply is less D. Capacitanceandfrequencyofsupplyismore Answer:-A. Capacitanceandfrequencyofsupplyisless $X_C = \frac{1}{2\pi fC}$	1M
65	Pureinductivecircuit A. Consumessomepoweronaverage B. Doesnottakepoweratallfromaline C. Storeenergyinmagneticfieldandagainreturntosource D. Noneoftheabove Answer:-C. Storeenergyinmagneticfieldandagainreturntosource Explanation:-Nopowerisconsumedinthecircuit.	1M
66	Powerfactorofthefollowingpurecircuitwillbezero A. Resistance B. Inductance C. Capacitance D. Both(B)and(C)	1M

	Answer:-D. Both B and C Explanation:-Power=V*I*cosΦ=V*I*cos(90)=0	
67	InfollowingfigureArepresents.....  (A) Timeperiod (B) Amplitude (C)Cycle (D) InstantaneousValue Answer:-A. Time period Explanation:- The period of a wave is the amount of time it takes for a wave to complete one cycle.	1M
67	InfollowingfigurePhasedifferenceis.....  (A)45º (B)90º (C)30º (D)0º Answer:-B. 90º	1M

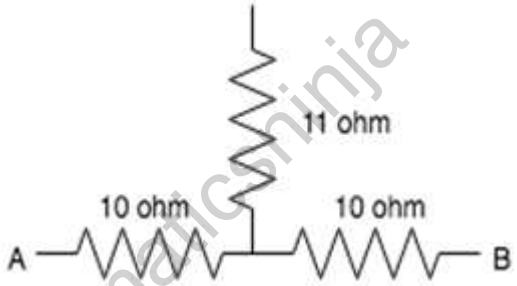
68	Infollowingfigure…….  (A) Currentleadsvoltageby30º (B)Currentlagsvoltageby30º (C)Currentleadsvoltageby45º (D)Currentlagsvoltageby45º Answer:-B. Currentlagsvoltageby30º	1M
69	Infollowingfigure…….  (A) Voltageleadscurrentby30º (B)Voltagelagscurrentby30º (C)Voltageleadscurrentby45º (D)Voltagelagscurrentby45º Answer:-A. Voltageleadscurrentby30º	1M

70	FollowingfigurerepresentswhichtypeofACCircuit.....  (A) PureResistive (B)Purecapacitor (C)PureInductive (D)noneofthese Answer:-A. PureResistive Explanation:-In a purely resistive circuit, all circuit power is dissipated by the resistor(s). Voltage and current are in phase with each other.	1M
70	 Identifytypeofload (A) UnbalancedStarLoad (B) UnbalancedDeltaLoad (C)BalancedStarLoad (D)BalancedDeltaLoad Answer:-A. UnbalancedStarLoad Explanation:-Allimpedancesarenotequal	1M

71	Identifytypeofload  (A) UnbalancedStarLoad (B) UnbalancedDeltaLoad (C)BalancedStarLoad (D)BalancedDeltaLoad Answer:-C. BalancedStarLoad Explanation:-Allimpedancesareequal	1M
78	InbalancedstarorDeltaconnectedloadallphaseandlinevaluesofcurrent&voltagewillbe……. (A) Unequal (B) Dependsontypeofload (C) Equal (D)Noneofabove Answer:-C. Equal Explanation:-Allimpedancesareequalsoallvalueswillbeequal	1M
79	InUnbalancedstarorDeltaconnectedloadallphaseandlinevaluesofcurrent&voltagewillbe……. (A) Unequal (B) Dependsontypeofload (C) Equal (D)Noneofabove	1M

	Answer:-A. Unequal Explanation:-Allimpedancesareunequalsoallvalueswillbeunequal	
80	**Find the equivalent delta circuit.**  **A. 9.69 ohm, 35.71 ohm, 6.59 ohm** **B. 10.69 ohm, 35.71 ohm, 6.59 ohm** **C. 9.69 ohm, 34.71 ohm, 6.59 ohm** **D. 10.69 ohm, 35.71 ohm, 7.59 ohm** **Answer: A. 9.69 ohm, 35.71 ohm, 6.59 ohm** **Explanation: Using the star to delta conversion:** **R_1 = 4.53+6.66+4.53*6.66/1.23 = 35.71 ohm** **R_2 = 4.53+1.23+4.53*1.23/6.66 = 6.59 ohm** **R_3 = 1.23+6.66+1.23*6.66/4.53 = 9.69 ohm.**	**1M**
81	**Find the equivalent resistance between X and Y.**  **A. 3.33 ohm**	**1M**

	B. 4.34 ohm C. 5.65 ohm D. 2.38 ohm Answer: D. 2.38 ohm Explanation: The 3 2ohm resistors are connected in star, changing them to delta, we have R1=R2=R3= 2+2+2*2/2=6 ohm. The 3 6ohm resistors are connected in parallel to the 10 ohm 5 ohm and 10ohm resistors respectively. This network can be further reduced to a network consisting of a 3.75ohm and 2.73ohm resistor connected in series whose resultant is intern connected in parallel to the 3.75 ohm resistor.	
82	Delta connection is also known as_____ A. Y-connection B. Mesh connection C. Either Y-connection or mesh connection D. Neither Y-connection nor mesh connection Answer: B. Mesh connection Explanation: Delta connection is also known as mesh connection because its structure is like a mesh, that is, a closed loop which is planar.	1M
83	Ra is resistance at A, Rb is resistance at B, Rc is resistance at C in star connection. After transforming to delta, what is resistance between B and C? A. Rc+Rb+Rc*Rb/Ra B. Rc+Rb+Ra*Rb/Rc	1M

	C. Ra+Rb+Ra*Rc/Rb D. Rc+Rb+Rc*Ra/Rb Answer: A. Rc+Rb+Rc*Rb/Ra Explanation: After converting to the delta, each delta connected resistance is equal to the sum of the two resistances it is connected to+product of the two resistances divided by the remaining resistance. Hence, resistance between B and C = Rc+Rb+Rc*Rb/Ra.	
84	Find the equivalent resistance between A and B.  A. 32ohm B. 31ohm C. 30ohm D. 29ohm Answer: D. 29ohm Explanation: The equivalent resistance between node 1 and node 3 in the star connected circuit is R= (10×10+10×11+11×10)/11=29ohm.	1M
85	In a delta-connected load, the relation between line voltage and the phase voltage is? A. line voltage > phase voltage B. line voltage < phase voltage C. line voltage = phase voltage D. line voltage >= phase voltage	1M

	Answer: C. line voltage = phase voltage **Explanation: In a delta-connected load, the relation between line voltage and the phase voltage is line voltage = phase voltage**	
86	**A polyphase system is generated by ____ ?** **A. Having two or more generator windings separated by equal electrical angle.** **B. Having generator windings at equal distances** **C. None of the above** **D. A and C** **Answer: Having two or more generator windings separated by equal electrical angle.** **Explanation: A generator having two or more electrical windings which are separated by equal electrical angle generates a polyphase electrical system. The electrical angle or displacement depends upon the number of windings or phases. For example, in a three-phase electrical system, the generated voltages are separated from each other by 120° degrees.**	**1M**
87	**In a three phase AC circuit, the sum of all three generated voltages is_____?** **A. Infinite (∞)** **B. Zero (0)** **C. One (1)** **D. None of the above** **Answer: B. Zero (0)** **Explanation: Three phase voltages are generated by having**	**1M**

	an alternator with three armature windings such that each winding is displaced from the other by 120 degrees. When these windings are placed in a rotating magnetic field or rotated in a stationary magnetic field, electromotive force is generated in each coil, of same magnitude and direction.	
88	For a star connected three phase AC circuit ——— A. Phase voltage is equal to line voltage and phase current is three times the line current B. Phase voltage is square root three times line voltage and phase current is equal to line current C. Phase voltage is equal to line voltage and line current is equal to phase current D. None of the above Answer: B. Phase voltage is square root three times line voltage and phase current is equal to line current Explanation: A star connected AC circuit is achieved by connecting each end of the winding to a common point known as neutral point and leaving the other end of each winding free. While voltage across each coil is the phase voltage, potential difference between each free end is the line voltage.	1M
89	What is the type of current obtained by finding the square of the currents and then finding their average and then fining the square root? A. RMS current B. Average current C. Instantaneous current D. Total current Answer: A. RMS current Explanation: RMS stands for Root Mean Square. This value of current is obtained by squaring all the current values, finding the average and then finding the square root.	1M

90	Find the total current in the circuit if two currents of 4+5j flow in the circuit. A. 4+5j A B. 4A C. 5A D. 8+10j A Answer: D. 8+10j A Explanation: The total current in the circuit is the sum of the two currents where we add the real parts and imaginary parts separately. Therefore, I total= 8+10j A.	1M
91	What is the correct expression of ω? A. ω=2π B. ω=2πf C. ω=πf D.ω=2f^2 Answer: B. ω=2πf Explanation: The correct expression for ω is ω=2πf where f is the angular frequency of the alternating voltage or current.	1M
92	Find the value of ω if the frequency is 5Hz? A. 3.14 rad/s B. 31.4 rad/s C. 34 rad/s D. 341 rad/s Answer: B. 31.4 rad/s Explanation: The expression for ω is ω=2*π*f. Substituting the value of f from the question, we get ω=31.4 rad/s.	1M

93	When one sine wave passes through the zero following the other, it is _____ A. Leading B. Lagging C. Neither leading nor lagging D. Either leading or lagging Answer: B. Lagging Explanation: The sine wave is said to lag because it passes though zero following the other, hence it crosses zero after the first wave, therefore it is said to lag.	1M
94	The time axis of an AC phasor represents? A. Time B. Phase angle C. Voltage D. Current Answer: B. Phase angle Explanation: The time axis while measuring an AC sinusoidal voltage or current represents the phase angle when converting it to a phasor.	1M
95	The length of the phasor represents? A. Magnitude of the quantity B. Direction of the quantity C. Neither magnitude nor direction D. Either magnitude or direction Answer: A. Magnitude of the quantity Explanation: The length of the phasor arrow represents the magnitude of the quantity, whereas the angle between the phasor and the reference represents the phase angle.	1M

96	**The average power supplied to an inductor over one complete alternating current cycle is:** A. **0** B. **IV^2** C. **I^2** D. **IR^2** **Answer: A.0** **Explanation: For a pure inductor circuit, $\phi = 90°$ ($\because$ current lags the voltage by 90° in the pure inductive circuit)** **$\text{Cos } \phi = \text{Cos } 90° = 0$** **$P = V_{rms}I_{rms}$ 0** **P = 0 W**	**1M**
97	**Ohm's law for magnetic circuits is _____** **A. $F=\phi S$** **B. $F=\phi/S$** **C. $F=\phi^2 S$** **D. $F=\phi/S^2$** **Answer: A. $F=\phi S$** **Explanation: Ohm's law for magnetic circuits states that the MMF is directly proportional to the magnetic flux where reluctance is the constant of proportionality.**	**1M**
98	**What happens to the MMF when the magnetic flux decreases?** **A. Increases** **B. Decreases** **C. Remains constant** **D. Becomes zero**	**1M**

	Answer: B. Decreases **Explanation: Ohm's law for the magnetic circuit's states that the MMF is directly proportional to the magnetic flux hence as the magnetic flux decreases, the MMF also decreases.**	
99	**Calculate the MMF when the magnetic flux is 5Wb and the reluctance is 3A/Wb.** **A. 10At** **B. 10N** **C. 15N** **D. 15At** **Answer: D. 15At** **Explanation: We know that:** **F=ϕS** **Substituting the given values from the question, we get MMF = 15At.**	**1M**
100	**A ring having a cross-sectional area of 500 mm^2, a circumference of 400 mm and ϕ=800microWb has a coil of 200 turns wound around it. Calculate the flux density of the ring.** **A. 1.6T** **B. 2.6T** **C. 3.6T** **D. 4.6T** **Answer: A. 1.6T** **Explanation: ϕ=BA => Flux density B = ϕ/A** **Substituting the values, we get B=1.6T.**	**1M**

Thank You

Unit II	Electrical Machines	
S. N.		**Marks**
1	**What is Transformer?** **a) Transformer is a device used to convert low alternating voltage to a high alternating voltage** **b) Transformer is a device used to convert alternating current to direct current** **c) Transformer is a device used to convert low alternating current to a high alternating current** **d) Transformers are used only for low alternating voltage** **Answer: a. Transformer is a device used to convert low alternating voltage to a high alternating voltage** **Explanation: A Transformer is a device used to convert low alternating voltage to a high alternating voltage and vice versa. Transformers are based on the phenomena of mutual induction. A transformer consists of a soft iron coil with two coils wound around it which are not connected to one another.**	**1M**
2	**What is the function of a transformer?** **a) Transformer is used to step down or up the AC voltages and**	**1M**

	currents b) Transformer is used to step down or up the DC voltages and currents c) Transformer converts DC to AC voltages d) Transformer converts AC to DC voltages Answer: a. Transformer is used to step down or up the AC voltages and currents Explanation: A Transformer does not work on DC and operates only on AC, therefore it Step up or Step down the level of AC Voltage or Current, by keeping frequency of the supply unaltered on the secondary side.	
3	What is the working principle of a Transformer? a) Transformer works on the principle of self-induction b) Transformer works on the principle of mutual induction c) Transformer works on the principle of ampere law d) Transformer works on the principle of coulomb law Answer: bTransformer works on the principle of mutual induction Explanation: A transformer is an electrical device used to vary the input voltage. Transformer works on the principle of mutual induction.	1M
4	Transformer ratings are given in _____ a) kVA b) HP c) kVAR d) kW Answer: a. kVA Explanation: There are two types of losses in a transformer, Copper Losses and Iron Losses or Core Losses or Insulation	1M

	Losses. Copper losses (I^2R) depends on current passing through transformer winding while Iron losses or Core Losses or Insulation Losses depends on Voltage. That's why the rating of Transformer is in kVA.	
5	**What is the current transformer?** **a) transformer used with an A.C. voltmeter** **b) transformer used with an A.C. ammeter** **c) transformer used with an D.C. voltmeter** **d) transformer used with an D.C. ammeter** **Answer: b. transformer used with an A.C. ammeter** **Explanation: A transformer used to extend the range of an A.C. ammeter is known as a current transformer. A current transformer is also abbreviated as C.T.**	**1M**
6	**Transformer core is generally made of _____** **a) Cannot be determined** **b) Can be made with any of the above method** **c) By stacking large number of sheets together** **d) Single block of core material** **Answer: c. By stacking large number of sheets together** **Explanation: Transformer core experiences eddy current losses when transformer is in the operations. In order to reduce eddy current losses, it is advisable to use large number of sheets laminated from each other are stick together than using one single block.**	**1M**
7	**The purpose of the transformer core is to provide _____** **a) Low reluctance path** **b) High inductive path** **c) High capacitive path** **d) High reluctance path**	**1M**

	Answer: a. Low reluctance path **Explanation: The purpose of a transformer core is to provide a low-reluctance path for the magnetic flux linking primary and secondary windings. In doing so, the core experiences iron losses due to hysteresis and eddy currents flowing within it which, in turn, show themselves as heating of the core material.**	
8	**Transformers are generally designed for _____** **a) one-time use** **b) off-site problem solving** **c) short-time use** **d) on-site problem solving** **Answer: d. on-site problem solving** **Explanation: Every transformer is designed for use it for multiple years, thus transformers are designed to handle the problems on site itself because it not only saves time but also makes repairing work easy.**	**1M**
9	**Primary winding of a transformer _____** **a) Could either be a low voltage or high voltage winding** **b) Is always a high voltage winding** **c) Cannot be determined** **d) Is always a low voltage winding** **Answer: a. Could either be a low voltage or high voltage winding** **Explanation: Primary winding used in a transformer, can be at higher or lower voltage potential, depending on the number of turns with secondary winding. For step up and step-down transformers primary winding will be at lower and higher potential respectively.**	**1M**

10	An ideal transformer will have maximum efficiency at a load such that _____ a) copper loss > iron loss b) cannot be determined c) copper loss = iron loss d) copper loss < iron loss Answer: c. copper loss = iron loss Explanation: Maximum efficiency of a transformer is defined at that value when copper losses become completely equal to the iron losses. In all other cases the efficiency will be lower than the maximum value.	1M
11	Power transformers are designed to have maximum efficiency at a) Full load b) 50% load c) 80% load d) No load Answer: - a) Full load Explanation: Power transformers are operated on full load hence power transformers are designed to have maximum efficiency at full load.	1M
12	Transformer core are laminated in order to a) Reduce hysteresis loss b) Reduce hysteresis & eddy current loss c) Minimize eddy current loss d) Copper loss Answer: - a) Reduce hysteresis loss Explanation:The iron core of a transformer is laminated to reduce eddy currents. Eddy currents are the small currents that result from the changing magnetic field ...	1M
	Breather is provided in a transformer to a) Absorb moisture of air during breathing	1M

13	b) Provide cold air in the transformer c) The filter of transformer oil d) None of above Answer: - a) Absorb moisture of air during breathing Explanation: The breather is used in the transformer *to filter out the moisture from the air*.	
14	The leakage flux in a transformer depends upon the value of a) Frequency b) Mutual Flux c) Load current d) Applied Voltage Answer: -c) Load current Explanation: The leakage flux depends on load current, independent of voltage, frequency, and power factor.	1M
15	In a transformer ideally the resistance between its primary and secondary is a) Zero b) Infinite c) 1000 ohm d) 100 ohm Answer: - b) Infinite Explanation: An ideal transformer should have infinite resistance between the primary and secondary winding. However, the resistance may be in order of Gega ohms or Tera Ohms depending on the insulation between the primary and secondary winding.	1M
16	Which winding in a transformer has more number of turns? (A) Secondary winding (B) Primary winding (C) High voltage winding (D) Low voltage winding	1M

	Answer: - C. High voltage winding **Explanation: High voltage winding always has a large number of turns, as voltage is directly proportional to the number of turns.**	
17	**An autotransformer can be used as** **(A) Step up device** **(B) Step down device** **(C) Both step up and step down** **(D) None of the above** **Answer: - C Both step up and step down** **Explanation: An autotransformer can be both a step-up and step-down transformer. It is a type of transformer that has a single winding that is shared by both the primary and secondary circuits. This means that the autotransformer can be used to either increase or decrease the voltage, depending on how the windings are connected.**	**1M**
18	**In an Auto Transformer, The Primary and Secondary are_____ Coupled** **(A) Electrically only** **(B) Magnetically only** **(C) Both electrically & magnetically** **(D) None of the above** **Answer: -C Both electrically & magnetically** **Explanation: An auto transformer is a one winding (or) single circuit transformer, in which a portion of the winding is common for both high voltage and low voltage winding. And this entire winding will be placed on a single magnetic core**	**1M**
19	**Which of the following are applications of Auto-transformer?** **(A) Used as switch** **(B) Used as Variac** **(C) Used for voltage correction** **(D) All of the above** **Answer: - D. All of the above**	**1M**

	Explanation: Autotransformer is used as switch, it is used for voltage correction.	
20	**Which of the following is the major disadvantage of Autotransformer?** **(A) No primary and secondary wire isolation** **(B) Insulation failure of primary winding may damage the whole autotransformer** **(C) Individual earthing of winding is not possible** **(D) All of the above** **Answer: - D All of the above** **Explanation: The main disadvantage of the autotransformer is that it does not have electrical isolation between primary and secondary windings. If primary winding may damage the whole autotransformer may fail.) Individual earthing of winding is not possible**	**1M**
21	**The size of the transformer core mainly depends on** **(A) Frequency** **(B) Area of core** **(C) Flux density of core** **(D) Both frequency and area of core** **Answer: - D. Both frequency and area of core** **Explanation:For a given transformer rating, as the frequency increases the product of window area and cross sectional area of the limb decreases; which means the iron required for the core decreases. Therefore as the frequency increases, the transformer becomes lighter and smaller in size.**	**1M**
23	**Auto-transformer makes effective saving on copper and copper losses, when its transformation ratio is** **a) Approximately equal to one** **b) Less than one** **c) Great than one** **d) Cannot be found**	**1M**

	Answer: a. Approximately equal to one **Explanation: Copper In auto transformer /copper in two-winding transformer = 1- T2/T1. This means that an auto transformer requires the use of lesser quantity of copper given by the ratio of turns. Hence, if the transformation ratio is approximately equal to one, then the copper saving is good and the copper loss is less.**	
24	**Auto-transformer makes effective saving on copper and copper losses, when its transformation ratio is** **a) Approximately equal to one** **b) Less than one** **c) Great than one** **d) Cannot be found** **Answer: a. Approximately equal to one** **Explanation: Copper In auto transformer /copper in two-winding transformer = 1- T2/T1. This means that an auto transformer requires the use of lesser quantity of copper given by the ratio of turns. Hence, if the transformation ratio is approximately equal to one, then the copper saving is good and the copper loss is less.**	**1M**
25	**Total windings present in a autotransformer are _____** **a) 1** **b) 2** **c) 3** **d) 4** **Answer: a. 1** **Explanation: Autotransformer is the special transformer for which the single winding acts as a primary and secondary both. Thus, by taking the appropriate winding into consideration a**	**1M**

	variable secondary voltage is obtained.	
26	What are the modes in which power can be transferred in an autotransformer? a) Conduction b) Induction c) Conduction and Induction d) Cannot be said Answer: c. Conduction and Induction Explanation: In two winding transformer there is no electrical connection between primary and secondary. So, the power is transferred through induction. But in auto-transformer there is a common electrical path between primary and secondary. So, power is transferred through both conduction and induction processes.	1M
27	What will happen if DC shunt motor is connected across AC supply? a) Will run at normal speed b) Will not run c) Will Run at lower speed d) Burn due to heat produced in the field winding Answer: d Burn due to heat produced in the field winding Explanation: In case of parallel field connection, it won't rotate at all and will start humming and will create vibrations, as a torque produced by positive and negative cycle will cancel out each other. DC motor will be heated up and it may burn.	1M
	What will happen if the back emf of a DC motor vanishes suddenly? a) The motor will stop	1M

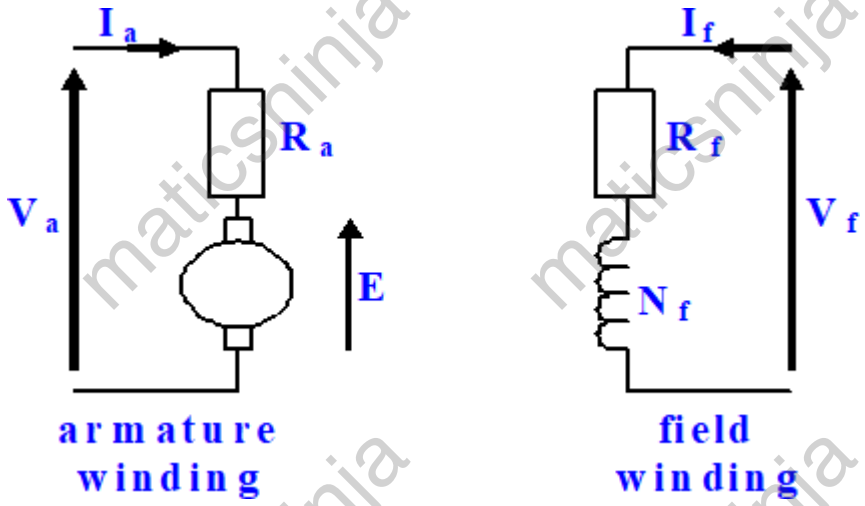
28	b) The motor will continue to run c) The armature may burn d) The motor will run noisy Answer: c. The armature may burn Explanation: If back emf vanishes suddenly, motor circuit will try to retain back emf by drawing more current from supply. If supplying unit didn't trip down by this time, excess current in armature may heat up the armature.	
29	What will happen, with the increase in speed of a DC motor? a) Back emf increase but line current falls. b) Back emf falls and line current increase. c) Both back emf as well as line current increase. d) Both back emf as well as line current fall. Answer: a. Back emf increase but line current falls. Explanation: In case of DC motor, the speed is proportional to the back emf ($E_a \propto N$). So, with the increase in speed, the back emf also increases. Therefore, armature current is also decreased, in case of series motor, armature current is equal to the line or load current.	1M
30	Which part will surely tell that given motor is DC motor and not an AC type? a) Winding b) Shaft c) Commutator d) Stator Answer: c. Commutator Explanation: All other parts except brushes and commutator	1M

	are same in AC machine when outer looks are only taken in consideration. Commutator is used only in DC machine for providing mechanical rectification and not in AC machine.	
31	Direction of rotation of motor is determined by _____ a) Faraday's law b) Lenz's law c) Coulomb's law d) Fleming's left-hand rule Answer: d. Fleming's left-hand rule Explanation: Flemings laws can be summarized as whenever, a current carrying conductor comes under a magnetic field, there will be a force acting on the conductor and on the other hand, if a conductor is forcefully brought under a magnetic field, there will be an induced current in that conductor.	1M
32	The current drawn by the armature of DC motor is directly proportional to _____ a) Torque b) Speed c) The voltage across the terminals d) Cannot be determined Answer: a. Torque Explanation: From the equation of torque generated in a DC machine, we know that in both DC motor and DC generator, current drawn is directly proportional to the torque required by the machine.	1M
	Which power is mentioned on a name plate of a motor? a) Gross power b) Power drawn in kVA	1M

33	c) Power drawn in kW d) Output power available at the shaft Answer: d. Output power available at the shaft Explanation: Name plate of the motor shows rated values i.e. rated speed, rated current, rated voltage. It also shows output power available at shaft when all other quantities are set to rated values.	
34	Which of the following quantity will decrease if supply voltage is increased? a) Starting torque b) Operating speed c) Full-load current d) Cannot be determined Answer: c. Full-load current Explanation: When supply voltage is increased full load current will decrease in order to keep output power constant, which will decrease torque at that moment, while starting torque will remain as it is, irrespective of any change in supply voltage.	1M
35	The main parts of d.c. motor (a) Yoke (b) Armature core (c) Commentator (d) Brush (e) All of the above Answer: - (e) All of the above Explanation: The main components are: a stator, a rotor, a yoke, poles, armature windings, field windings, commutator, and	1M

	brushes.	
36	**Application of Universal Motor** **(a) Robotics** **(b) Textile industries** **(c) Mixer** **(d) Automotive** **Answer :- (c) Mixer** **Explanation: The Universal motor is used for purposes where speed control and high values of speed are necessary. The various applications of the Universal Motor are as follows:** • **Portable drill machines.** • **Used in hairdryers, grinders, and table fans.** • **A universal motor is also used in blowers, polishers, and kitchen appliances.**	
37	**Where is field winding mounted in a DC machine?** **a) Stator** **b) Rotor** **c) Absent** **d) Anywhere on stator or rotor** **Answer: a. Stator** **Explanation: The field winding (concentrated type) is mounted on salient-poles on the stator and the armature winding (distributed type) is wound in slots on a cylindrical rotor.**	**1M**
	What are the materials used for brushes in dc machines? **a) Iron** **b) Carbon** **c) Aluminum** **d) Steel**	**1M**

38	Answer: b. Carbon Explanation: On some extent carbon brush can act as a self-lubricating brush. On moment, polishes the commutator segments. Damage to the commutators is less when copper brushes are used on occurrence of sparkover.	
39	Function of yoke is to provide the return path for magnetic flux. a) True b) false Answer: a) True Explanation: The function of yoke is that it protects the entire machine from dust and dirt. It also provides mechanical support for the magnetic poles. It acts as the return path for the magnetic flux.	1M
40	Which of the following part is used in construction of DC machine but not in AC machine? a) Armature Winding b) Field winding c) Commutator d) Shaft Answer: c. Commutator Explanation: Commutator is used in mechanical rectification process, to convert induced AC to output DC. In AC machine, we don't need rectification process.	1M
	In normal dc machines operating at full-load conditions, the most powerful electromagnet is _____ a) Field winding b) Interpole Winding c) Interpole and compensating winding together d) Armature winding	1M

41	**Answer: a) Field winding** **Explanation: Electromagnet is more powerful when its MMF is high. At full-load condition, field winding contains maximum ampere turns, hence it is most powerful electromagnet in a DC machine.**	
42	**Which of the following d.c. motor has highest speed at no-load condition?** **A. Cumulative compound motor** **B. Shunt motor** **C. Differentially compound motor** **series motor** **Answer: D. series motor** **Explanation: At no load, armature current tends to zero, flux φ tends to zero, where speed is inversely proportional to the flux, and speed will tend to infinity. Thus, no load speed of DC series motor is highest.**	**1M**
43	**Following diagram represents the equivalent circuit of**  **A. Long shunt compound wound motor** **B. Short shunt compound wound motor** **C. Separately excited d.c. motor**	**1M**

	Shunt wound d.c. motor Answer: C. Separately excited d.c. motor Explanation: A separate power supply is provided to field in separately excited d.c. motor.	
44	Differentially compound DC motors are used in applications requiring _____ a) High starting torque b) Low starting torque c) Variable speed d) Frequent on-off cycles Answer: b. Low starting torque Explanation: Compound motor shows combine effect of shunt and series field windings. Differential compound series motor gives low starting torque, examined by torque current characteristic. Hence, applications with low starting torque are called in differentially compound DC motor.	1M
45	A universal motor is one which A. Is available universally B. Can be marketed internationally C. Can be operated either on dc or ac supply Runs at dangerously high speed on no-load Answer: C. Can be operated either on dc or ac supply Explanation: Universal Motor is a special type of motor that can run on a DC supply or a single-phase AC supply. Since it can run both on AC and DC, it is called a universal motor.	1M
46	Speed of the universal motor is A. Dependent on frequency of supply B. Proportional to frequency of supply C. Independent of frequency of supply None of the above	1M

	Answer: C. Independent on frequency of supply **Explanation: Brushed universal motors are largely independent of AC frequency,**	
47	**Which of the following motor can be referred as a universal motor?** **a) DC shunt motor** **b) DC compound motor** **c) Permanent magnet motor** **d) DC series motor** **Answer: d DC series motor** **Explanation: DC series motor can operate on DC and AC. It is a universal motor. Universal motors are those motors that can operate on both DC and AC. DC shunt motor can only operate on DC because of pulsating torque in AC.**	**1M**
48	**Universal motor have which of the following application?** **A. Domestic pump.** **B. Food mixer.** **C. Traction.** **D. Lift.** **Answer: B. Food mixer.** **Explanation: Out of the given options, a food mixer is a common application for a universal motor. Food mixers typically require a motor that can operate on both AC and DC power, allowing for versatile use in different settings. The universal motor's ability to operate on both AC and DC power makes it suitable for powering food mixers, where the user may switch between AC and DC power sources.** **While domestic pumps, traction systems, and lifts can use electric motors, they often require specific types of motors that**	**1M**

	are tailored to their specific requirements, such as induction motors, synchronous motors, or specialized DC motors.	
49	Universal motor is used in vacuum cleaners, table fans and portable drilling machine. a) True b) False Answer: a. True Explanation: The universal motor is dc series motor with ac supply with smaller torque. So it can be used for lower torque applications.	1M
50	The rotor of a stepper motor has no a) Windings b) Commutator c) Brushes d) All of the mentioned Answer: d. All of the mentioned Explanation: A stepper motor has a cylindrical permanent magnet rotor. Thus it does not contain windings, commutator or brushes mounted on it.	1M
51	A stepping motor is a _____ device. a) Mechanical b) Electrical c) Analogue d) Incremental Answer: d) Incremental Explanation: A stepping motor is a motor in which the motion is in the form of steps and is an incremental device in which as the time increases the steps are increased.	1M
	The rotational speed of a given stepper motor is determined solely by the	1M

52	a) Shaft load b) Step pulse frequency c) Polarity of stator current d) Magnitude of stator current. Answer: b. Step pulse frequency Explanation: The stator part of a motor is the stationary part of the motor and rotational speed of a given stepper motor is given by the step pulse frequency.	
53	A stepper motor may be considered as a _____ converter. a) Dc to dc b) Ac to ac c) Dc to ac d) Digital-to-analogue Answer: d. Digital-to-analogue Explanation: A stepper motor is a motor in which the motion is in steps and it is an increemental device and may be considered as a digital to analog converter.	1M
54	Which type of motor uses brushes and a commutator? a) DC motor b) AC motor c) Induction motor d) Synchronous motor Answer: a) DC motor Explanation: DC motors use brushes and a commutator to achieve the conversion of electrical energy into mechanical energy.	1M
	Which type of motor does not require a separate power source for the rotor?	1M

55	a) Synchronous motor b) Induction motor c) Brushless DC motor d) Universal motor Answer: b) Induction motor Explanation: In an induction motor, the rotor is powered by electromagnetic induction from the stator, eliminating the need for a separate power source.	
56	What is the primary function of the stator in an electric motor? a) To provide mechanical support b) To generate a rotating magnetic field c) To convert electrical energy into mechanical energy d) To regulate the motor's speed Answer: b) To generate a rotating magnetic field Explanation: The stator carries the windings that create a rotating magnetic field, which interacts with the rotor to produce motion in an electric motor.	1M
57	Which type of motor is commonly used in household appliances like refrigerators and air conditioners? a) Single-phase induction motor b) Synchronous motor c) Brushless DC motor d) Universal motor Answer: a) Single-phase induction motor Explanation: Single-phase induction motors are widely used in household appliances due to their simplicity, low cost, and reliable performance.	1M

58	What determines the speed of a DC motor? a) Number of poles b) Applied voltage c) Armature resistance d) Back EMF Answer: d) Back EMF Explanation: The speed of a DC motor is determined by the back electromotive force (EMF) generated in the armature coil, which opposes the applied voltage.	1M
59	Which type of motor provides the highest starting torque? a) DC series motor b) DC shunt motor c) AC induction motor d) Brushless DC motor Answer: a) DC series motor Explanation: DC series motors provide high starting torque due to their characteristic of high armature current and strong field interaction.	1M
60	Which motor is suitable for applications requiring variable speed control? a) DC motor b) AC motor c) Stepper motor d) Synchronous motor Answer: a) DC motor Explanation: DC motors are suitable for variable speed control applications as their speed can be easily adjusted by	1M

	controlling the input voltage or current.	
61	Which motor is commonly used in ceiling fans? a) Single-phase induction motor b) Synchronous motor c) Brushless DC motor d) Universal motor Answer: a) Single-phase induction motor Explanation: Ceiling fans typically use single-phase induction motors due to their cost-effectiveness and reliable performance.	1M
62	Which type of motor is used in robotics and precision control applications? a) Stepper motor b) AC induction motor c) Synchronous motor d) Brushless DC motor Answer: a) Stepper motor Explanation: Stepper motors are commonly used in robotics and precision control applications due to their ability to move in discrete steps and hold position without the need for feedback.	1M
63	Which motor is commonly used in electric pumps? a) Single-phase induction motor b) Synchronous motor c) Brushless DC motor d) Universal motor Answer: a) Single-phase induction motor Explanation: Electric pumps often use single-phase induction motors due to their reliability and ability to operate on single-	1M

	phase power supply.	
64	Which motor type is suitable for high-speed applications? a) Brushless DC motor b) DC series motor c) Induction motor d) Universal motor Answer: a) Brushless DC motor Explanation: Brushless DC motors are suitable for high-speed applications due to their ability to operate at high rotational speeds and provide precise speed control.	1M
65	Which motor type is commonly used in household washing machines? a) Universal motor b) Induction motor c) Brushless DC motor d) Stepper motor Answer: b) Induction motor Explanation: Household washing machines typically use induction motors due to their reliability, low cost, and ability to handle variable loads.	1M
66	Which motor type is commonly used in robotic vacuum cleaners? a) Brushless DC motor b) DC series motor c) Induction motor d) Stepper motor Answer: d) Stepper motor	1M

	Explanation: Robotic vacuum cleaners often use stepper motors for precise control of movement and positioning.	
67	**What is the primary disadvantage of a universal motor?** **a) Limited speed range** **b) Lower efficiency** **c) Larger size** **d) Complex control circuitry** **Answer: b) Lower efficiency** **Explanation: Universal motors have lower efficiency compared to other motor types due to the energy losses associated with their universal commutator.**	**1M**
68	**Which motor type is commonly used in electric fans?** **a) Synchronous motor** **b) DC shunt motor** **c) Induction motor** **d) Universal motor** **Answer: a) Synchronous motor** **Explanation: Electric fans often use synchronous motors due to their ability to operate at a constant speed and maintain synchronization with the power supply frequency.**	**1M**
69	**Which motor type is commonly used in CNC machines and 3D printers?** **a) Stepper motor** **b) DC shunt motor** **c) Synchronous motor** **d) Brushless DC motor** **Answer: a) Stepper motor**	**1M**

	Explanation: CNC machines and 3D printers often use stepper motors due to their precise positioning capabilities and efficiency.	
70	**What is the primary disadvantage of a stepper motor?** **a) Limited speed range** **b) Higher cost** **c) Larger size** **d) Complex control circuitry** **Answer: a) Limited speed range** **Explanation: Stepper motors have a limited speed range compared to other motor types, which can be a disadvantage in certain high-speed applications.**	**1M**
71	**Which motor type is commonly used in electric bicycles?** **a) Brushless DC motor** **b) DC series motor** **c) Induction motor** **d) Universal motor** **Answer: a) Brushless DC motor** **Explanation: Electric bicycles often use brushless DC motors due to their high efficiency, compact size, and ability to provide assistance at various speeds.**	**1M**
72	**Which motor type is commonly used in electric drills and power tools?** **a) Universal motor** **b) Synchronous motor** **c) Induction motor** **d) Brushless DC motor**	**1M**

	Answer: a) Universal motor **Explanation: Electric drills and power tools often use universal motors due to their high power-to-weight ratio and ability to operate on both AC and DC power sources**	
73	**Which motor type is commonly used in electric cars?** **a) Brushless DC motor** **b) Synchronous motor** **c) Induction motor** **d) Universal motor** **Answer: a) Brushless DC motor** **Explanation: Electric cars often use brushless DC motors due to their high efficiency, compact size, and ability to provide high torque at various speeds.**	**1M**
74	**Which motor type is commonly used in dishwashers and washing machines?** **a) Universal motor** **b) Synchronous motor** **c) Induction motor** **d) Brushless DC motor** **Answer: c) Induction motor** **Explanation: Dishwashers and washing machines commonly use induction motors for their reliability, low maintenance, and ability to handle variable loads.**	**1M**
	Differentially compound DC motors are used in applications requiring _____ **a) High starting torque** **b) Low starting torque** **c) Variable speed** **d) Frequent on-off cycles**	**1M**

75	Answer: b. Low starting torque Explanation: Compound motor shows combine effect of shunt and series field windings. Differential compound series motor gives low starting torque, examined by torque current characteristic. Hence, applications with low starting torque are called in differentially compound DC motor.	
76	Which DC motor is more preferred for elevators? a) Shunt motor b) Series motor c) Differential compound motor d) Cumulative compound motor Answer: d. Cumulative compound motor Explanation: Cumulative wound DC motors give high starting torque like a series motor and reasonable good speed regulation at high speeds like a shunt dc motor. As this type of motor offers the best of both series and shunt motor, it is practically suitable for most common applications like elevators.	1M
77	Which DC motor has got maximum self-loading property? a) Series motor b) Shunt motor c) Cumulative compound motor d) Differential compound motor Answer: d. Differential compound motor Explanation: A differentially compound DC motor, flux reduces so sharply at small increase in load at higher values of load. It is advisable that motor should not be used beyond some load	1M

	value, as it may damage itself by self-loading.	
78	For the same H.P. rating and full load speed, which of the following motor has poor starting torque? a) Series motor b) Shunt motor c) Cumulative compound motor d) Differential compound motor Answer: d. Differential compound motor Explanation: In differential compound motor, series field opposes shunt field. It has poor starting torque as the resultant flux is minimized by this opposition. The flux starts decreasing with increase in load. The decrease in flux cause the starting torque to be less than any other DC motor.	1M
79	DC motor is to a drive a load which is almost zero for certain part of the load cycle and peak value for short duration. We will select _____ a) Series motor b) Shunt motor c) Compound motor d) Any DC motors Answer: c. Compound motor Explanation: We can't use series motor as our load is almost zero at some points. Thus, we'll use compound motor which can work on no load also. Cumulative compound motor is provided with flywheel so that this machine can deal with peak value.	1M
	The direction of rotation of universal motor can be reversed the by reversing the flow of current through a) Armature winding	1M

80	b) Field winding c) Either armature winding or field winding d) None of the above Answer: c. Either armature winding or field winding Explanation: The direction of rotation of universal motor can be reversed the by reversing the flow of current through Either armature winding or field winding	
81	Universal motor is used in vacuum cleaners, table fans and portable drilling machine. a) True b) False Answer: a. True Explanation: The universal motor is dc series motor with ac supply with smaller torque. So it can be used for lower torque applications.	1M
82	_____Generator is used in arc welding purposes. a) Differential compound dc b) Dc series c) Cumulative compounded dc d) Shunt Answer: a. Differential compound dc Explanation: The external characteristics of the differentially compound generator have minimum voltage for the high current voltages. This is best harnessed feature for a high current requirement by the welding application.	1M
83	Which value of the flux is involved in the EMF equation of transformer a) Average value	1M

	b) R.M.S. Value Critical value d) Maximum value Answer: Maximum value Explanation: The instantaneous value of the flux is constantly changing, and is not a useful value to consider for the e.m.f. equation of a transformer. Therefore, the value of flux involved in the e.m.f. equation of a transformer is the maximum value.	
84	What criteria's are necessary to consider when selecting a stepper motor? a) Mechanical Motion. b) Inertial Load c) Speed Requirements d) All of the above Answer: d. All of the above Explanation: The key performance specifications for sourcing a stepper motor are voltage, speed, torque, rotor inertia and step angle.	1M
85	Which of the following motor rotates in discrete angular steps? a) Servo motor b) DC motor Stepper motor d) Linear Induction Motor (LIM) Answer: c. Stepper motor Explanation: A stepper motor is a brushless DC electric motor whose rotor rotates in discrete angular increments when its stator winding energized in a programmed manner. They have multiple coils that are organized in groups called phases. By energizing each phase in sequence, the motor will rotate, one step at a time.	1M
86	Which type of device is a stepper motor? a) Electromechanical	1M

	b) Electrochemical c) Embedded system d) Electromagnetic Answer: a. Electromechanical Explanation: A stepper motor is an electromagnetic device which converts the electrical pulses into discrete mechanical movements. The shaft of the electrical motor.	
87	Stepper motors are extremely reliable. a) True b) False Answer: a. True Explanation: There are no contact brushes in the motor, therefore, the Stepper motors are extremely reliable. The life of the motor depends only upon the life of the bearings. Wide ranges of rotational speed are possible.	1M
88	Which among the following is not the type of a stepper motor? a) Variable reluctance b) Permanent magnet c) Hybrid d) Variable magnet Answer: d. Variable magnet Explanation: Variable magnet is not the type of a stepper motor. Variable reluctance stepper motor consists of a soft iron multi-toothed rotor and a wound stator. Permanent magnet stepper motors have a rotor made up of the permanent magnet. Hybrid stepper motor provides better performance with respect to step resolution, torque and speed.	1M
89	A stepper motor is a bad choice whenever control movement is required. a) True b) False	1M

	Answer: b. False **Explanation: A stepper motor is a good choice whenever control movement is required. They can be used in the applications where there is a need to control rotation angle, speed, position and synchronism. Due to all these reasons, stepper motors are used in many different applications.**	
90	**Which type of stepper motors have low cost and low-resolution motor?** **a) Permanent magnet stepper motor** **b) Variable reluctance stepper motor** **c) Hybrid stepper motor** **d) DC motor** **Answer: a. Permanent magnet stepper motor** **Explanation: The permanent magnet stepper motor has low cost and low-resolution type motor with the step angle of 7.5% to 15%. This type of stepper motor has a rotor made up of the permanent magnet. The other motors mentioned in the option do not have low cost as well as low redundancy.**	**1M**
91	**Which of the following is not the main selection criterion of a stepper motor?** **a) Resolution required** **b) Drive mechanism component required** **c) Torque required** **d) Speed** **Answer: d. Speed** **Explanation: Speed is not the main selection criteria of a stepper motor. The selection criteria of a stepper motor include resolution required, drive mechanism component, operating pattern required such as sequencing, accelerationetc. and torque required**	**1M**

92	What is the formula to calculate the step angle of a stepper motor? a) (360*ph.)/nph b) (ph/nph) c) (nph/ph) d) (360*nph)/ph Answer: a. (360*ph.)/nph Explanation: The step angle is given by (360*ph)/nph where 'nph' is the number of equivalent poles per phase or number of rotor poles, ' ph ' is the number of phases and ' n ' is the total number of poles in all phases.	1M
93	In a DC series motor, if the armature current is halved, the torque of the motor will be equal to a) 100% of the previous value b) 50% of the previous value c) 25% of the previous value d) 10% of the previous value Answer: c 25% of the previous value Explanation: Torque in the case of linear magnetization of DC series motor is directly proportional to square of the armature current. So, armature current is made 1/2th of the original value, then torque will be 1/4th of the original value.	1M
94	The slot edges in a DC machine are made of (A) mild steel (B) silicon steel (C) fibre (D) cast iron	1M

	Answer: D cast iron Explanation: The outer frame of a dc machine is called as yoke. It is made up of cast iron or steel. It not only provides mechanical strength to the whole assembly but also carries the magnetic flux produced by the field winding.	
95	In a shunt dc machine, the armature and field winding resistance are respectively (A) of higher values (B) of lower values (C) high and low (D) low and high Answer: D low and high Explanation: In DC shunt machine the armature resistance is low and field winding resistance is high.	1M
96	The principle of dynamically induced emf is utilized in (A) generator (B) transformer (C) thermocouple (D) choke Answer: A Generator Explanation: An electric generator works on the principle of electromagnetic induction.	1M
97	In a transformer, the winding is tapped in the middle (A) to avoid the radial forces on the windings (B) to reduce the insulation level of the windings (C) to provide a mechanical balance to the windings (D) to eliminate the axial forces on the windings Answer: D to eliminate the axial forces on the windings Explanation: In a transformer, the winding is tapped in the middle for voltage regulation and eliminate axial forces	1M
98	What is the working principle of DC motor? a) Fleming's right hand rule b) Fleming's left hand rule c) Maxwell's second law	1M

	d) Maxwell's third law Answer: b. Fleming's left hand rule Explanation: The working principle of motor Fleming's left hand rule. It states that, when a current carrying conductor is place in a magnetic field then it experiences a force. The direction of force can be determined by Fleming's left hand rule.	
99	What is the full form of CPR with respect to motor movement? a) Clocks per rotation b) Counts per revolution c) Counts per rotation d) Clocks per revolution Answer: b. Counts per revolution Explanation: CPR stands for Counts per revolution with respect to motor movement. 2 square pulses are generated at a time by a typical motor encoder, CPR (Counts per revolution) is the is the number of quadrature decode states that exists between these two square pulses	1M
100	AC motors do not have brushes. a) True b) False Answer: a. True Explanation: AC motors do not have brushes. Due to the absence of brush mechanism AC motors have longer life expectancy. DC motors comes in two forms, Brushed and Brushless motors. DC motors without brushes are termed as BLDC (Brushless DC) motors.	1M

Thank You

Unit III	Eectrical Safety and Protective Devices	Marks - 10
S. N.		Marks
1	What does “MCB” stand for? a) Miniature circuit breaker b) Mini circuit breaker c) Miniature capacitor breaker d) Mini Capacitance breaker Answer: a) Miniature circuit breaker Explanation: “MCB” stands for Miniature circuit breaker. It works on magnetic effect of electric current. When there is overflow of electric current, it creates a magnetic field that repels the magnet present in the switch. This repulsion breaks the circuit and restricts the flow of current.	1M
2	What is the principal on which MCB (Miniature circuit breaker) works? a) Magnetic effect of electric current b) Lenz law c) Faradays law of electric current d) Flemings Right hand rule	1M
	Answer: a) Magnetic effect of electric current Explanation: MCB (Miniature circuit breaker) works on magnetic effect of electric current. When there is overflow of electric current, it creates a magnetic field that repels the magnet present in the switch. This repulsion breaks the circuit and restricts the flow of current.	

3	What is the standard colour of ac supply ground wire in India? a) Red b) Magenta c) Pink d) Green Answer: d) Green Explanation: The standard colour of ac supply ground wire in India is green. Separate standard colours are assigned for wires carrying AC (Alternating current) supply which comes in our homes in order to easily understand the significance of each wires.	1M
4	What is the standard colour of ac supply live wire in India? a) Red b) Magenta c) Pink d) Green Answer: a) Red Explanation: The standard colour of ac supply live wire in India is Red. Separate standard colours are assigned for wires carrying AC (Alternating current) supply which comes in our homes in order to easily understand the significance of each wires.	1M

5	What is the standard colour of ac supply neutral wire in India? a) Red b) Black c) Pink d) Green Answer: b) Black Explanation: The standard colour of ac supply neutral wire in India is Black. Separate standard colours are assigned for wires carrying AC (Alternating current) supply which comes in our homes in order to easily understand the significance of each wires.	1M
6	Green and yellow striped wire is also used to indicate ac (alternating current) supply live wire. a) True b) False Answer: b) False Explanation: Green and yellow striped wire is also not used to indicate 220 volt ac(alternating current) supply live wire. It is used to denote ground wire of an ac (alternating current) supply. It is also called as earthing wire.	1M
7	Live wire and hot wire are same. a) True b) False Answer: a) True Explanation: Live wire and hot wire are same. Live wires are sometimes also referred as hot wires which carry's the supply voltage. In India red colour is assigned for the indication of AC (alternating current) live wire.	1M

8	Fuse is a device which is used for _____ _. a) protection b) amplification c) impedance matching d) none of above Answer: a) protection Explanation: A fuse protects a system or equipment from overload and short-circuit faults by cutting off the power to them.	1M
9	Fuse are connected in Parallel. a)True b)False Answer: b) False Explanation:Fuses are always connected in series with the circuit to be protected from excessive current. When the fuse blows it will open the entire circuit and interrupt or stop the flow of current through the circuit.	1M
10	Fuse are used in circuit for _____ _. a) Equipment Safety b) Human Safety c) None of Above d) a & b are correct Answer: d) a & b are correct Explanation: The primary use of an electric fuse is to protect electrical equipment from excessive current and to prevent short circuits or mismatched loads. Apart from protecting equipment, they are also used as safety measures to prevent any safety hazards to humans.	1M

11	**Fuse is an Electronic Component used for _____.** **a) current limiting** **b) power limiting** **c) a & b are correct** **d) none of above** **Answer: a) current limiting** **Explanation:a fuse is defined as an electrical *safety device that provides over-current protection to the functional electrical circuit*.**	**1M**
12	**The melting point of Fuse element is _____ _.** **a) low** **b) medium** **c) high** **d) all are correct** **Answer: a) low** **Explanation:A fuse is a piece of wire made of a material with a very low melting point, which means it melts and breaks when the temperature rises above its melting point.**	**1M**
13	**Fuse wire is always connected with_____ _.** **a) live** **b) neutral** **c) earth** **d) all are correct** **Answer: a) live** **Explanation:The fuse wire is always connected in the live wire of the circuit because if the fuse is put in the neutral wire, then due to excessive flow of current when the fuse burns, current stops flowing in the circuit, but the appliance remains connected to the high potential point of the supply**	**1M**

	through the live wire.	
14	Digital multimeter is used for _____ a) measuring a.c. and d.c. current, voltage and resistance b) measuring a.c. current and voltage c) measuring d.c. current and resistance d) measuring a.c. voltage and resistance Answer: a) measuring a.c. and d.c. current, voltage and resistance Explanation: Digital multimeter is usually used for the measurement of a.c. current, voltage and resistance. It is also used for the measurement of d.c. current, voltage and resistance as well over several range.	1M
15	Current is converted to voltage _____ a) through a voltmeter b) through a resistance c) through an ammeter d) through a galvanometer Answer: b) through a resistance Explanation: Current is passed through a low shunt resistance and is converted to voltage. A.C. quantities are converted to D.C. through various rectifiers and filter circuits. Voltmeter and ammeter are used for voltage and current measurement respectively.	1M
16	Quantities are digitised using _____ a) D/A converter b) oscillator c) amplifier d) A/D converter Answer: d) A/D converter Explanation: Quantities such as current, voltage and resistance are digitised by making use of an A/D converter.	1M

	They are then displayed on the screen by making use of a digital display.	
17	Analog mulimeters require power supply. a) True b) False Answer: b) False Explanation: Analog multimeters are less affected by electric noise and isolation problems. As a result analog multimeters don't require a power supply.	1M
18	Output of a digital multimeter is _____ a) mechanical b) optical c) electrical d) analog Answer: c) Electrical Explanation: Digital multimeter gives an electrical signal as the output. A/D converter is employed for the conversion from analog to digital signal. This can be used for interfacing with external equipment.	1M
19	Basic building blocks of digital multimeter are _____ a) oscillator, amplifier b) diode, op amp c) rectifier, schmitt trigger d) A/D, attenuator, counter Answer: d) A/D, attenuator, counter Explanation: Usually dual slope integrating type ADC is preferred in multimeter. It basically consists of several A/D converters, counter circuits and an attenuation circuit.	1M

20	Resistance is measured using _____ a) constant current source b) constant voltage source c) variable current source d) variable voltage source Answer: a) constant current source Explanation: Constant current source is used to measure resistance in a digital multimeter. Standard known value of current is passed through an unknown resistance and the drop in voltage across the resistance is measured.	1M
21	A.C. voltages are measured using _____ a) oscillators and op amps b) rectifiers and filters c) resistor and capacitor d) inductor and resistor Answer: b) rectifiers and filters Explanation: Rectifiers and filter circuits with various configurations are employed for measuring A.C. voltages. A.C. is converted to D.C. and is applied to the A/D converter.	1M
22	Which material is commonly used for making the arch of circuit breakers? a) Copper b) Tungsten c) Aluminium d) Copper tungsten alloy Answer: d) Copper tungsten alloy Explanation: Copper tungsten alloy is commonly used for making the arch of circuit breakers. Tungsten has an advantage that it has a very high level temperature resistance, whereas copper provides an excellent conducting property.	1M

23	The full form of ELCB is a) Earth Line Circuit Breaker b) Earth Line Current Breaker c) Earth Leakage Current Breaker d) Earth Leakage Circuit Breaker Answer: d) Earth Leakage Circuit Breaker Explanation:Full form of E.L.C.B is Earth Leakage Circuit Breaker. It directly detects current leakage and directs it to the earth from the circuit and breaks the circuit.	1M
24	The rated current of MCB is a) Less than 10 A b) Less than 100 A c) More than 100A d) More than 200A Answer: b) Less than 100 A Explanation: The rated current of MCB is less than 100A	1M
25	What is earthing? a) connecting electrical machines to earth b) providing a connection to the ground c) connecting the electrical machines to source d) providing a source of current Answer: a) connecting electrical machines to earth Explanation: Connecting electrical machines to the general mass of the earth by making use of a conducting material with very low resistance is known as earthing.	1M
26	What is an earth electrode? a) electrode that is connected to earth b) material used for earthing c) electrode connected to the circuit d) electrode which is connected to the mains Answer: b) material used for earthing	1M

	Explanation: Electrode connected to the main is basically a source of e.m.f. Conducting material that is used for connecting electrical machinery to the earth is known as an earth electrode.	
27	**Earth electrode provides _____** **a) high resistance** **b) medium resistance** **c) low resistance** **d) very high resistance** **Answer: c) low resistance** **Explanation: In the case of occurrence of any leakage currents due to poor shielding of the apparatus, the earth electrode is used to provide a very low resistance path from the electrical appliances to the earth.**	**1M**
28	**How is the condition of an earth electrode measured?** **a) by measuring the voltage** **b) by measuring the current** **c) by measuring the power** **d) by measuring resistance** **Answer: d) by measuring resistance** **Explanation: The resistance of the earth electrode is measured in order to check whether it is in a good condition or not.**	**1M**
29	**In a three phase system, the neutral is _____** **a) earthed** **b) connected to low voltage** **c) connected to high voltage** **d) not connected** **Answer: a) earthed** **Explanation: Earthing can be used to maintain a constant line voltage in a three phase system. This is achieved by earthing the neutral.**	**1M**

30	Earthing does not help in protecting the equipment. a) True b) False Answer: b) False Explanation: Spike voltages occurring as a result of lightning or any other fault can be dissipated to ground by earthing, thus protecting the equipment.	1M
31	After earthing, the different parts of an electrical machinery are at _____ a) infinite potential b) intermediate potential c) zero potential d) undefined potential Answer: c) zero potential Explanation: After earthing, the various parts of electrical machinery such as casing, armoring of cables, etc are at zero potential.	
32	Connection of the various parts of a circuit to earth has a _____ a) medium resistance b) high resistance c) very high resistance d) very low resistance Answer: d) very low resistance Explanation: Once an electrical apparatus is grounded, most of its components are at ground potential. When the different parts of electrical machinery are connected to the ground, they possess very low resistance.	1M
33	Specific resistance of soil is _____ a) changes from soil to soil b) is constant c) depends on the circuit connected to it d) depends on the supply voltage Answer: a) changes from soil to soil	1M

	Explanation: Specific resistance depends on the nature and properties of a material. Specific resistance is different for various types of soils such as dry soil, rocky soil, wet soil, etc.	
34	**State true or false: Earthing helps prevent the risk of fire hazards.** **a. TRUE** **b. FALSE** **Answer: a) TRUE** **Explanation: When the insulation fault arises, earthing helps prevent the risk of fire hazards.**	**1M**
35	**Earthing helps to prevent** **a. Water leakage** **b. Current leakage** **c. Storms** **d. Device upgrade** **Answer: b) Current leakage** **Explanation: It helps to prevent current leakage and avoid shock.**	**1M**
36	**Choose YES or NO: Electric appliances like iron boxes, television, and refrigerator are connected to the earth wire while operating.** **a. YES** **b. NO** **Answer: a) YES** **Explanation: To safeguard all the equipment mentioned above, they are connected to the Earth while operating.**	**1M**

37	**Which among the following statement is true related to fuse?** **a. Greater the current smaller is the time taken by the fuse to blow out.** **b. Greater the current greater is the time taken by the fuse to blow out.** **c. The current is directly proportion to the blow out time of fuse.** **d. Is dependent on the temperature and atmospheric conditions.** **Answer: a) Greater the current smaller is the time taken by the fuse to blow out.** **Explanation: The *time* required to *blow out* is *fuse* depends on value of fault *current*, the *greater* the *current*, the *smaller* the *time* taken by the *fuse* to *blow out*.**	**1M**
38	**For a current upto 10A which material is used as the fusing element?** **a. Copper** **b. Silver** **c. Alloy of lead and tin** **d. Zinc** **Answer: c) Alloy of lead and tin** **Explanation: The fusing element for 10A current is *Lead and tin* because it attracts more current.**	**1M**
39	**What is fusing factor?** **a. The ratio of current rating of the fuse to the minimum fusing current.** **b. The ratio of minimum fusing current to the current rating of the fuse.** **c. The ratio of maximum fusing current to the current rating**	**1M**

	of the fuse. **d. The ratio of minimum fusing current to the voltage rating of the fuse** **Answer: b) The ratio of minimum fusing current to the current rating of the fuse.** **Explanation: The fusing factor of a fuse is a measure of how quickly a fuse will melt or "blow" when subjected to an overcurrent condition. The fusing factor is *the ratio of the minimum fusing current and the current rating of the fuse***	
40	**What should be the value of fusing factor?** **a. Equal to zero** **b. Equal to one** **c. Less than one** **d. More than one** **Answer: d) more than one** **Explanation:Fusing factor = minimum fusing current / current rating of fusing element. Its value is always more than 1 one.**	**1M**
41	**Which is a type of solid state switch?** **a) NPN Diode** **b) Bipolar junction transistor** **c) DPDT(Double pole double throw) Switch** **d) Push button Switch** **Answer: b) Bipolar junction transistor** **Explanation: Bipolar junction transistor is a type of solid state switch. Theses switches have no moving parts and no physical contacts which is why they are called so. They are also called as electronic switch.**	**1M**

42	Earth resistance is dependent on a) Depth of earth electrode in earth b) Size of earth electrode and earth wire c) Temperature of soil surrounding the earth electrode d) All of the above Answer:d) All of the above	1M
43	In case of HRC fuse a current carrying element is surrounding by_____to quench the arc. a) Oil b) Water c) Quartz powder d) Sf6 gas Answer: c)Quartz powder	1M
44	The combination of fuse and switch is called as _____ a) SFU b) FSU c) Both a and b d) None of these Answer: c) Both a and b	1M
45	In SFU the fuses are _____ a) Stationary b) Moving c) Adjustable Answer: a) Stationary	1M
46	It is not necessary to change a_____after tripping a) Fuse b) MCB c) None of the above Answer :b) MCB	1M

47	A current flowing from live point of ac supply to earth is called as_____ current. a) Load b) Source c) Leakage Answer :c) leakage	1M
48	_____is used for preventing electric shocks. a) MCB b) MCCB c) ELCB Answer : c) ELCB	1M
49	MCB provides protection against _____ a) Short circuit b) Overload c) Earth fault d) All of the above Answer : d) All of the above	1M
50	The length of earyhing electrode is about a) 0.5 meter b) 1.0 meter c) 2.5 meter d) 5 meter Answer : 2.5 meter	1M

Thank You

Unit IV	Special purpose diodes and their applications	Marks - 12
S. N.		**Marks**
1.	Why is there a sudden increase in current in Zener diode? a) Due to the rupture of ionic bonds b) Due to rupture of covalent bonds c) Due to viscosity d) Due to potential difference Answer: b. Due to rupture of covalent bonds Explanation: The sudden increase in current in a Zener diode is due to the rupture of the many covalent bonds present. Therefore, the Zener diode should be connected in reverse bias.	1M
2.	What is the semiconductor diode used as? a) Oscillator b) Amplifier c) Rectifier d) Modulator Answer: c. Rectifier Explanation: Semiconductor diode can be used as a rectifier. The function of a rectifier is that it converts an alternating current into direct current by allowing the current to pass through in one direction.	1M

3.	What is rectification? a) Process of conversion of ac into dc b) Process of conversion of low ac into high ac c) Process of conversion of dc into ac d) Process of conversion of low dc into high dc Answer: a. Process of conversion of ac into dc Explanation: Rectification is the process of conversion of alternating current into direct current. The conversion first powers to alternating current then use a transformer to change the voltage, and finally rectifies power back to direct current.	1M
4.	What is a Zener diode used as? a) Oscillator b) Regulator c) Rectifier d) Filter Answer: b. Regulator Explanation: Zener diode can be used as a voltage regulator. They can also be used as shunt regulators to regulate the voltage across small circuits. Zener diodes are always operated in a reverse-biased condition.	1M
5.	Forward biasing of p-n junction offers infinite resistance. a) True b) False Answer: b. False Explanation: No, this is a false statement. Forward biasing of p-n junction offers low resistance. In the case of an ideal p-n junction, the resistance offered is zero. So, forward biasing does not offer any resistance.	1M

6.	When a junction diode is reverse biased, what causes current across the junction? a) Diffusion of charges b) Nature of material c) Drift of charges d) Both drift and diffusion of charges Answer: c. Drift of charges Explanation: The reverse current is mainly due to the drift of charges. It is due to the carriers like holes and free electrons passing through a square centimeter area that is perpendicular to the direction of flow.	1M
7.	What can a p-n junction diode be used as? a) Condenser b) Regulator c) Amplifier d) Rectifier Answer: d. Rectifier Explanation: A junction diode can be used as a rectifier. The rectifier converts alternating current into direct current. During the positive half cycle, the diode is forward biased and allows electric current through it.	1M
8.	In a PN junction with no external voltage, the electric field between acceptor and donor ion is called a a) Peak b) Barrier c) Threshold d) Path Answer: (b) Barrier Explanation:In p-n junction with no external voltage, the electric field between the acceptor and the donor ions is	1M

	called a barrier.	
9.	In a PN junction the potential barrier is due to the charges on either side of the junction, these charges are a) Majority carriers b) Minority carriers c) Both (a) and (b) d) Fixed donor and accepter ions Answer: (d) Fixed donor and accepter ions Explanation:The potential barrier created throughout the P-N junction is due to the diffusion of electrons and holes, and this potential barrier normally does not allow charging flow through the junction.	1M
10.	The capacitance of a reverse-biased PN junction a) Increases as reverse bias is increased b) Decreases as reverse bias is increased c) Increases as reverse bias is decreased d) Is significantly low Answer: (c) Increases as reverse bias is decreased Explanation: When reverse bias decreases, the depletion region width "d" decreases. As "d" increases, the capacitance increases.	1M
11.	For a PN junction diode, the current in reverse bias maybe a) Few milliamperes b) Between 0.2 A and 15 A c) Few amperes d) Few micro or nano amperes Answer: (d) Few micro or nano amperes	1M

	Explanation:n a reverse-biased diode, the current is very low, typically in the nanoampere (nA) to picoampere (pA) range. This is because the reverse bias causes the depletion region to widen, making it difficult for current to flow across the diode. The diode acts as an insulator in the reverse bias condition.	
12.	When PN junction is in forward bias, by increasing the battery voltage a) Circuit resistance increases b) Current through P_N junction increases c) Current through P_N junction decreases d) None of the above Answer: (b) Current through P_N junction increases Explanation:When the voltage increases up to around measurable current starts to flow through the diode in the forward direction. As the voltage moves a little above , the current through the diode rises rapidly.	1M
13.	When a PN junction is reverse biased a) Holes and electrons tend to concentrate towards the junction b) The barrier tends to break down c) Holes and electrons tend to move away from the junction d) None of these Answer: (c) Holes and electrons tend to move away from the junction Explanation: Reverse bias applied to a p-n junction diode raises the potential barrier because p-type material connected to the negative terminal and pulls the holes away from the junction. Similarly, n-type material connected to the positive terminal and pulls the electrons	1M

14.	**A PN junction** **a) Has low resistance in forward as well as reverse directions** **b) Has high resistance in forward as well as reverse directions** **c) Conducts in the forward direction only** **d) Conducts in the reverse direction only** **Answer: (c) Conducts in the forward direction only** **Explanation:Diode is a combination of p-type and n-type semiconductors. This combination creates a potential barrier at the junction. Therefore, the external power source must overcome the potential barrier to conduct. In the forward bias, the diode conducts and in the reverse bias, it will not conduct.**	**1M**
15.	**A PN junction is said to be forward-biased when** **a) The positive terminal of the battery is connected to P-side and the negative side to the N-side** **b) Junction is earthed** **c) N-side is connected directly to the p-side** **d) The positive terminal of the battery is connected to N-side and the negative side to the P-side.** **Answer: (a) The positive terminal of the battery is connected to P-side and the negative side to the N-side** **Explanation:In forward biasing, the p-type is connected with the positive terminal and the n-type is connected with negative terminal of the battery.**	**1M**
16.	**PN Junction is also called_____.** **a) diode** **b) transistor** **c) triode**	**1M**

	d) inductor Answer: a) Diode Explanation:Pn junctions are called diodes because they allow the flow of current in one direction and not in another, and also because they are two terminals or distinct electrodes, which are anode and cathode.	
17.	The P-type region of diode is called_____. a) cathode b) anode c) grid d) both a & b Answer: b) anode Explanation:The anode is a positive terminal in a forward-biased p-n junction diode (that p-type is linked to the positive terminal and n-type is connected to the negative). On this type of junction, the cathode terminal is negative. The anode is a positively charged electrode or wire that charges the p-n junction with holes.	1M
18.	The N-type of region of PN Junction diode is called Cathode. True / False Answer: True Explanation:We call the lead affixed to the N-type semiconductor the cathode. Therefore, the cathode is the negative side of a diode.	1M
19.	When a diode is_____bias then it shows the conventional direction of current. a) forward b) reverse	1M

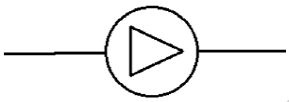
	Answer:a) forward **Explanation:The Conventional flow of current is from P side to N side. As in a forward bias p-n junction the electrons move from n side to p side, hence causing the conventional current flow from P to N. *Conventional current flow is always opposite to the direction of electrons flow.**	
20.	**How can we identify the positive and negative leads of a diode?** **a) colour coding** **b) colour band** **c) both a & b** **d) none is correct** **Answer: c) both a & b** **Explanation:We can identify the positive and negative leads of a diode by using colour coding colour band**	**1M**
21.	**PN Junction diode is a _____ device.** **a) one way** **b) two way** **c) double way** **d) b & c are correct** **Answer: a) one way** **Explanation:A diode is often referred to as a one-way valve because it allows current to flow in only one direction. When a diode is forward-biased, it conducts current, but when it is reverse-biased, it effectively blocks the flow of current.**	**1M**

22.	The barrier potential of germanium is .3v. True / False Answer: True Explanation:Germanium (Ge) has a potential barrier of 0.3 eV	1M
23.	The barrier potential of silicon is_____. a) .3v b) .7v c) .5v d) .4v Answer: b) 0.7 v Explanation:Silicon (Si) has a potential barrier of 0.7 eV	1M
24.	The reverse saturation (Is) or maximum (Io) current during reverse bias of a PN junction diode depends on_____. a) temperature b) doping level c) physical size of junction d) all are correct Answer: d)all are correct Explanation:The reverse saturation (Is) or maximum (Io) current during reverse bias of a PN junction diode depends on temperature, doping level, physical size of junction	1M
25.	How to protect a diode from increasing voltages of breakdown level? a) Filter capacitor b) Limiting resistor	1M

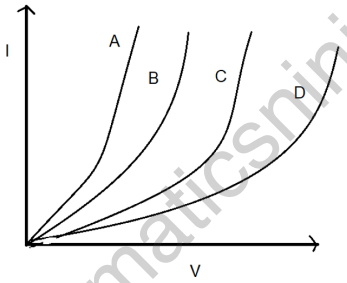
	c) Zener diode d) None is correct Answer: b) Limiting resistor Explanation: There is a series resistor connected to the circuit in order to limit the current into the diode. It is connected to the positive terminal of the d.c. It works in such a way the reverse-biased can also work in breakdown conditions.	
26.	Zener diodes are also known as a) Voltage regulators b) Forward bias diode c) Breakdown diode d) None of the mentioned Answer: c) Breakdown diode Explanation: Zener diodes are used as voltage regulators but they aren't called voltage regulators. They are called breakdown diodes since they operate in breakdown region.	1M
27.	Which of the following is true about the resistance of a Zener diode? a) It has an incremental resistance b) It has dynamic resistance c) The value of the resistance is the inverse of the slope of the i-v characteristics of the Zener diode d) All of the mentioned Answer: d) All of the mentioned Explanation: All of the statements are true for the resistance of the zener diode.	1M

28.	Zener diode is designed to specifically work in which region without getting damaged? a) Active region b) Breakdown region c) Forward bias d) Reverse bias Answer: b) Breakdown region Explanation: The Zener diode is a specifically designed diode to operate in the breakdown region without getting damaged. Because of this characteristic, it can be used as a constant-voltage device.	1M
29.	What is the level of doping in Zener Diode? a) Lightly Doped b) Heavily Doped c) Moderately Doped d) No doping Answer: b) Heavily Doped Explanation: A Zener diode is heavily doped so that the breakdown voltage occurs at a lower voltage. If it were lightly/moderately doped, it would breakdown at a comparatively high voltage and, thus, would not be able to serve its purpose.	1M
30.	When the reverse voltage across the Zener diode is increased _____ a) The value of saturation current increases b) No effect c) The value of cut-off potential increases d) The value of cut-off potential decreases	1M

	Answer: c) The value of cut-off potential increases **Explanation: As the frequency of the incident radiation increases, the kinetic energies of the emitted electron are higher and therefore require more repulsive force to be applied to stop them.** **The value of saturation current increases, as the intensity of the incident radiation, increases.** **The value of cut-off potential decreases, as the frequency decreases.**	
31.	**Zener Diode is mostly used as _____** **a) Half-wave rectifier** **b) Full-wave rectifier** **c) Voltage Regulator** **d) LED** **Answer: c) Voltage Regulator** **Explanation: The Zener diode, once in the breakdown region, keeps the voltage in the circuit to which it is connected as constant. Thus it is widely used as a voltage regulator.**	**1M**
32.	**Which of the following is the correct symbol for the zener diode?** **a)**  **b)**  **c)** 	**1M**

	d)  **Answer: d**  **Explanation: The following figure is the correct symbol for the Zener diode.** **The following figure is the symbol of a normal p-n junction diode.** 	
33.	**In normal junctions, the breakdown is same as Zener breakdown.** **a) True** **b) False** **Answer: b) False** **Explanation: In normal p-n unction diodes, the breakdown takes place by avalanche breakdown which is different than the Zener breakdown. Zener diode is specifically made to operate in that region.**	**1M**
34.	**The depletion region of the Zener diode is _____** **a) Thick** **b) Normal** **c) Very Thin** **d) Very thick**	**1M**

	Answer: c) Very Thin **Explanation: Zener diode is fabricated by heavily doping both p- and n-sides of the junction, which results in an extremely thin depletion region.**	
35.	**A light emitting diode is _____** **a) Heavily doped** **b) Lightly doped** **c) Intrinsic semiconductor** **d) Zener diode** **Answer: a) Heavily doped** **Explanation: A light emitting diode, LED, is heavily doped. It works under forward biased conditions. When the electrons recombine with holes, the energy released in the form of photons causes the production of light.**	**1M**
36.	**Which of the following materials can be used to produce infrared LED?** **a) Si** **b) GaAs** **c) CdS** **d) PbS** **Answer: b) GaAs** **Explanation: GaAs has an energy band gap of 1.4 eV. It can be used to produce infrared LED. Various other combinations can be used to produce LED of different colors.**	**1M**
37.	**The reverse breakdown voltage of LED is very low.** **a) True** **b) False** **Answer: a) True** **Explanation: The reverse breakdown voltages of LEDs are very low, typically around 5 V. So, if access voltage is**	**1M**

	provided, they will get fused.	
38.	What should be the band gap of the semiconductors to be used as LED? a) 0.5 eV b) 1 eV c) 1.5 eV d) 1.8 eV Answer: d) 1.8 eV Explanation: Semiconductors with band gap close to 1.8 eV are ideal materials for LED. They are made with semiconductors like GaAs, GaAsP etc.	1M
39.	What should be the biasing of the LED? a) Forward bias b) Reverse bias c) Forward bias than Reverse bias d) No biasing required Answer: a) Forward bias Explanation: The LED works when the p-n junction is forward biased i.e., the p- side is connected to the positive terminal and n-side to the negative terminal.	1M
40.	Which of the following would have highest wavelength?  	1M

	a) A b) B c) C d) D Answer: a) A Explanation: In the I-V characteristic of an LED, as the frequency increases, the voltage required to achieve the same current increases. Hence A would have the highest wavelength.	
41.	Increase in the forward current always increases the intensity of an LED. a) True b) False Answer: b) False Explanation: As the forward current is increased for an LED, the intensity of the light increases up to a certain maximum value. After that, the intensity starts decreasing.	1M
42.	Which process of the Electron-hole pair is responsible for emitting of light? a) Generation b) Movement c) Recombination d) Diffusion Answer: c) Recombination Explanation: When the recombination of electrons with holes takes place, the energy is released in the form of photon. This photon is responsible for the emission of light.	1M

43.	**Which of the following is not a characteristic of LED?** **a) Fast action** **b) High Warm-up time** **c) Low operational voltage** **d) Long life** **Answer: b) High Warm-up time** **Explanation: The warm-up time required should be lower so that the lighting action can take place faster. This is one of the advantages LED have over incandescent lamps.**	**1M**
44.	**LEDs work on the principle of_____.** **a) Electromagnetic induction** **b) Conduction** **c) Electroluminescence** **d) Induction** **Answer: c) Electroluminescence** **Explanation: Electroluminescence is an electrical and optical phenomenon where material emits light when electricity flows through it.**	**1M**
45.	**State true or false: High warm-up time is needed for LEDs.** **a) TRUE** **b) FALSE** **Answer: b) FALSE** **Explanation: little or no warm-up time is needed for light emitting diodes.**	**1M**
46.	**Aluminium alloys are used to obtain _____ light.**	**1M**

	a) Red b) Orange c) Yellow d) All of the above Answer: d) All of the above Explanation: Aluminium alloys are used to obtain yellow, orange, and red colour lights.	
47.	Why is there a sudden increase in current in Zener diode a) Due to the rupture of ionic bonds b) Due to rupture of covalent bonds c) Due to viscosity d) Due to potential difference Answer: b) Due to rupture of covalent bonds Explanation: The sudden increase in current in a Zener diode is due to the rupture of the many covalent bonds present. Therefore, the Zener diode should be connected in reverse bias.	1M
48.	In a pure semiconductor crystal, if current flows due to breakage of crystal bonds, then what is the semiconductor is called? a) Acceptor b) Donor c) Intrinsic semiconductor d) Extrinsic semiconductor Answer: c) Intrinsic semiconductor Explanation: Pure semiconductors are called intrinsic semiconductors. The number of electrons in the conduction band will be equal to the number of holes in the valence band. Intrinsic semiconductors are also called undoped and	1M

	i-type semiconductors	
49.	In a p-type semiconductor, germanium is doped with which of the following? a) Gallium b) Copper c) Phosphorous d) Nitrogen Answer: a) Gallium Explanation: Substances such as gallium, boron, and aluminum are all trivalent atoms. These are called acceptor impurities and they produce p-type semiconductors. Therefore, germanium is doped with gallium in a p-type semiconductor	1M
50.	What are the majority charge carriers in P-type semiconductors? a) Electrons b) Holes c) Negative Ions d) Positive Ions Answer: b) Holes Explanation: Holes are the majority charge carriers in P-type semiconductors. These holes are actually electron vacancies that contain positive charge. The holes are responsible for the conduction in p-type semiconductors.	1M
5.1	Which of the following is operated in forward bias? a) LED b) Zener diode c) Photodiode	1M

	d) Solar cell Answer: a) LED Explanation: A light-emitting diode (LED) converts electric energy into light energy. A LED is a heavily doped p-n junction which under forward bias emits spontaneous radiation. The semiconductor used for the fabrication of visible LEDs must at least have a bandgap of 1.8 eV.	
52.	In a shunt capacitor filter, the mechanism that helps the removal of ripples is a) The current passing through the capacitor b) The property of capacitor to store electrical energy c) The voltage variations produced by shunting the capacitor d) Uniform charge flow through the rectifier Answer: b) The property of capacitor to store electrical energy Explanation: Filtering is frequently done by shunting the load with capacitor. It depends on the fact that a capacitor stores energy when conducting and delivers energy during non-conduction. Throughout this process, the ripples are eliminated.	1M
	The charge (q) lost by the capacitor during the discharge time for shunt capacitor filter. a) IDC*T b) IDC/T c) IDC*2T d) IDC/2T Answer: a) IDC*T Explanation: The „T" is the total non-conducting time of capacitor. The charge per unit time will give the current flow.	1M

53.	Which of the following are true about capacitor filter? a) It is also called as capacitor output filter b) It is electrolytic c) It is connected in parallel to load d) It helps in storing the magnetic energy Answer: b) It is electrolytic Explanation: The rectifier may be full wave or half wave. The capacitors are usually electrolytic even though they are large in size	1M
54.	The rms ripple voltage (Vrms) of a shunt filter is a) IDC/2$\sqrt{3}$ b) IDC2$\sqrt{3}$ c) IDC/$\sqrt{3}$ d) IDC$\sqrt{3}$ Answer: a) IDC/2$\sqrt{3}$ Explanation: The ripple waveform will be triangular in nature. The rms value of this wave is independent of slopes or lengths of straight lines. It depends only on the peak value.	1M
55.	What is the effect of an inductor filter on a multi frequency signal? a) Dampens the AC signal b) Dampens the DC signal c) To reduce ripples d) To change the current Answer: a) Dampens the AC signal Explanation: Presence of inductor usually dampens the AC signal. Due to self-induction induces opposing EMF or changes in the current.	1M

56.	The inductor filter gives a smooth output because a) It offers infinite resistance to ac components b) It offers infinite resistance to dc components c) Pulsating dc signal is allowed d) The ac signal is amplified Answer: a) It offers infinite resistance to ac components Explanation: The inductor does not allow the ac components to pass through the filter. The main purpose of using an inductor filter is to avoid the ripples. By using this property, the inductor offers an infinite resistance to ac components and gives a smooth output	1M
57.	Which of the following can be a source of supply in dc power supplies? a) Battery b) Dry cell c) Full wave rectifier d) All of the mentioned Answer: d) All of the mentioned Explanation: Source of supply will be a battery, dry cell or full wave rectifier etc.	1M
58.	Which of the application's filters used for? a) Reducing ripples b) Increasing ripples c) Increasing phase change d) Increasing amplitude Answer: a) Reducing ripples Explanation: Ripples are ac components and filters are used	1M

	for eliminating ac components from a signal.	
59.	Which of the following represent a change of output voltage when load current is increased? a) Line regulation b) Load regulation c) Current regulation d) Voltage regulation Answer: b) Load regulation Explanation: Load regulation is the process of fractional change of output voltage when load current is increased from zero to maximum value.	1M
60.	Why zener diodes are provided in dc supply? a) For forward conduction b) For reverse conduction c) For reference voltage d) For increasing amplitude Answer: c) For reference voltage Explanation: Zener diodes in dc power supplies are used for providing a reference voltage used for comparison.	1M
61.	Stability of output voltage is entirely depended on _____ a) Stability of transformer b) Stability of zener diode c) Quality of wires d) Capacitor values	1M

	Answer: b) Stability of zener diode **Explanation: Stability of zener diodes used is an important factor in determining the stability of output voltage in dc power supply.**	
62.	**Which of the following are not the standard value of Zener diodes?** **a) 5.1 V** **b) 5.6 V** **c) 5.8V** **d) 6.2V** **Answer: c) 5.8V** **Explanation: Standard values of zener voltages are 5.1V, 5.6V, 6.2V and 9.1V etc.**	**1M**
63	**Which of the following can be used in series with a Zener diode so that combination has almost zero temperature coefficient?** **a) Diode** **b) Resistor** **c) Transistor** **d) MOSFET** **Answer: a) Diode** **Explanation: If a Zener diode of TC of about -2mV is connected with a forward diode (which has a TC of about +2mV) in series, the combination can be used to obtain a very low (close to zero) TC.**	**1M**

64	_____ is used for critical loads where temporary power failure can cause a great deal of inconvenience. a) SMPS b) UPS c) MPS d) RCCB Answer: b) UPS Explanation: Uninterruptible Power Supply is used where loads where temporary power failure can cause a great deal of inconvenience.	1M
65	_____is used in the rotating type UPS system to supply the mains. a) DC motor b) Self excited DC generator c) Alternator d) Battery bank Answer: c) Alternator Explanation: When the supply is gone, the diesel engine is started, which runs the alternator and the alternator supplies power to the mains. Non-rotating type UPS are not used anymore.	1M
66	Static UPS requires _____ a) only rectifier b) only inverter c) both inverter and rectifier d) none of the mentioned Answer: c) both inverter and rectifier Explanation: Rectifier to converter the dc from the battery to	1M

	ac. Inverter to charge the battery from mains.	
67	Usually _____ batteries are used in the UPS systems. a) NC b) Li-On c) Lead acid d) All of the mentioned Answer: c) Lead acid Explanation: Lead acid batteries are cheaper and have certain advantages over the other types. NC batteries would however be the best, but are three to four times more expensive than Lead Acid.	1M
67	What is the expansion ofUPS? a) Uninterrupted Power System b) Uninterrupted Power Supply c) Uninterrupted Power Solution d) Uninterrupted Power Section Answer: Uninterrupted Power Supply Explanation: The full form of UPS is Uninterrupted Power Supply	1M
68	Which electrical / electronic devicerequires ups? a) Air conditioner b) Micro wave oven c) Computer d) Television Answer: Computer	1M

	Explanation: Computer is required UPS for back up.	
69	**What is the number of capacitors and inductors used in a CLC filter?** **a) 1, 2 respectively** **b) 2, 1 respectively** **c) 1, 1 respectively** **d) 2, 2 respectively** **Answer: b) 2, 1 respectively** **Explanation: A very smooth output can be obtained by a filter consisting of one inductor and two capacitors connected across each other. They are arranged in the form of letter 'pi'. So, these are also called as pi filters.**	**1M**
70	**Major part of the filtering is done by the first capacitor in a CLC filter because _____** **a) The capacitor offers a very low reactance to the ripple frequency** **b) The capacitor offers a very high reactance to the ripple frequency** **c) The inductor offers a very low reactance to the ripple frequency** **d) The inductor offers a very high reactance to the ripple frequency** **Answer: a) The capacitor offers a very low reactance to the ripple frequency** **Explanation: The CLC filters are used when high voltage and low ripple frequency is needed than L section filters. The capacitor in a CLC filter offers very low reactance to the ripple frequency. So, maximum of the filtering is done by the first capacitor across the L section part.**	**1M**

70	The inductor is placed in the L section filter because_____ a) It offers zero resistance to DC component b) It offers infinite resistance to DC component c) It bypasses the DC component d) It bypasses the AC component Answer: a) It offers zero resistance to DC component Explanation: The inductor offers high reactance to ac component and zero resistance to dc component. So, it blocks the ac component which cannot be bypassed by the capacitors.	1M
71	In practice the output from the diode rectifier has a) AC component only b) DC component only c) AC + DC component d) None of the mentioned Answer: c) AC + DC component Explanation: The output contents along with the DC components the AC harmonics which does no useful work & reduces the efficiency.	1M
78	Choose the correct statement a) The AC component in the output of rectifier does the useful work b) The AC component in the output of rectifier increases the efficiency of the system c) The AC component in the output of rectifier causes ohmic losses d) The AC component in the output of rectifier does not affect the operation Answer: c) The AC component in the output of rectifier	1M

	causes ohmic losses Explanation: A rectifier is used to convert AC to DC. Lower the AC (Non-DC) components in the output lower are the ohmic losses.	
79	An L filter is connected _____ a) in series b) in parallel c) in both series and parallel d) none of the mentioned Answer: a) in series Explanation: Inductor (L) has a very important property that the current through it cannot change rapidly. We can make use of this property by connecting it in series.	1M
80	In case of an L filter connected with a rectifier in series with the load, it offers _____ impedance to ac whereas _____ resistance to dc respectively. a) high, high b) high, low c) low, high d) low, low Answer: b)) high, low Explanation: It offers high impedance to AC such as the AC ripples do not pass through the load.	1M
81	In case of a C filter, the AC is not allowed to pass to the load by a) offering it high impedance b) offering it low impedance c) short circuiting the AC component d) open circuiting the AC component	1M

	Answer: c) short circuiting the AC component **Explanation: AC ripples are not allowed to pass, by S.C the AC ripples as the C is always connected in parallel with the load.**	
82	**A capacitor filter or C filter can be used in a rectifier by connecting it** **a) in parallel with the load** **b) in series with the load** **c) in parallel with the supply** **d) in series with the supply** **Answer: a) in parallel with the load** **Explanation: AC ripples are not allowed to pass, by S.C the AC ripples as the C is always connected in parallel with the load.**	**1M**
83	**In a shunt capacitor filter, the mechanism that helps the removal of ripples is_____** **a) The current passing through the capacitor** **b) The property of capacitor to store electrical energy** **c) The voltage variations produced by shunting the capacitor** **d) Uniform charge flow through the rectifier** **Answer: b) The property of capacitor to store electrical energy** **Explanation: Filtering is frequently done by shunting the load with capacitor. It depends on the fact that a capacitor stores energy when conducting and delivers energy during non-conduction. Throughout this process, the ripples are eliminated.**	**1M**

84	The cut-in point of a capacitor filter is_____ a) The instant at which the conduction starts b) The instant at which the conduction stops c) The time after which the output is not filtered d) The time during which the output is perfectly filtered Answer: a) The instant at which the conduction starts Explanation: The capacitor charges when the diode is in ON state and discharges during the OFF state of the diode. The instant at which the conduction starts is called cut-in point. The instant at which the conduction stops is called cut-out point.	1M
85	The rectifier current is a short duration pulses which cause the diode to act as a_____ a) Voltage regulator b) Mixer c) Switch d) Oscillator Answer: c) Switch Explanation: The diode permits charge to flow in capacitor when the transformer voltage exceeds the capacitor voltage. It disconnects the power source when the transformer voltage falls below that of a capacitor.	1M
86	The output waveform of CLC filter is superimposed by a waveform referred to as_____ a) Square wave b) Triangular wave c) Saw tooth wave d) Sine wave	1M

	Answer: c) Saw tooth wave **Explanation: Since the rectifier conducts current only in the forward direction, any energy discharged by the capacitor will flow into the load. This result in a DC voltage upon which is superimposed a waveform referred to as a saw tooth wave.**	
87	**A PN junction has a thickness of the order** **a. 1 cm** **b. 1 mm** **c. 10-6 m** **d. 10-12 cm** **Answer: (c) 10-6 m** **Explanation: When P- type semiconductor is mixed with N - type semiconductor, PN - junction is formed. There is very small region { which is in order of micro metre } . This region is known as depletion region. so, the thickness of junction { depletion region } is in order of 10 – 6 m**	**1M**
88	**In the depletion region of an unbiased PN junction diode there are** **a. Only electrons** **b. Only holes** **c. Both electrons and holes** **d. Only fixed ions** **Answer: (d) Only fixed ions** **Explanation:Depletion region or depletion layer is a region in a P-N junction diode where no mobile charge carriers are present. Depletion layer acts like a barrier that opposes the flow of electrons from n-side and holes from p-side.**	**1M**

89	In Zener diode, the Zener breakdown takes place a) Below 6 V b) At 6 V c) Above 6 V d) None of the above Answer: a) Below 6 V Explanation: Zener breakdown occurs where breakdown voltage is below 6 V and Avalanche breakdown occurs for other voltages.	1M
90	A Zener diode when biased correctly a) Never overheats b) Has a constant voltage across it c) Acts as a fixed resistance d) Has a constant current passing through it Answer: c) Has a constant voltage across it Explanation: When biased correctly, the Zener diode has a constant voltage across it.	1M
91	Depletion region behaves as a) Semiconductor b) Insulator c) Conductor d) High resistance Answer: b) Insulator Explanation: In the depletion region, an electric field exists that quickly sweeps out electron-hole pairs that may be thermally generated and reduces the equilibrium	1M

	concentration of the charge carriers to exceedingly low levels. Under these circumstances. This region, called the depletion layer, behaves as an insulator.	
92	The advantages of a pi-flter is_____ a) low output voltage b) low PIV c) low ripple factor d) high voltage regulation Answer: c) low ripple factor Explanation: Due to the involvement of 2 capacitors in addition with one inductor it provides improved filtering action. This leads to decrement in ripple factor. A low ripple factor means the ratio of current due to AC ripples and direct Current is low.	1M
93	The basic purpose of flter at the output of a rectifer is to a) minimize variations in ac input signal b) suppress harmonics in rectifed output c) remove ripples from the rectifed output d) stabilize dc output voltage Answer: c) remove ripples from the rectifed output Explanation: Rectifier is an electrical device that converts AC into DC by using one or more p-n junction diodes. But the output of rectifiers is pulsating (means contains both AC component and DC component). Hence, to remove all the AC components we use filters.	1M

94	What is correct about the ripple factor of LC flter? a) Increases with the load current b) increases with the load resistance c) remains constant with the load current d) has the lowest value Answer: c) remains constant with the load current Explanation: the ripple factor of LC flterremains constant with the load current	1M
95	Commercial power supplies have voltage regulation _____ A. of 10% B. of 15% C. of 25% D. within 1% answer: d) within 1% Explanation: Commercial power supplies have voltage regulation within 1%	1M
96	In an unregulated power supply, if load current increases, the output voltage _____ a) Remains the same b) Decreases c) Increases d) None of the above answer: b)Decreases Explanation: The DC voltage output is dependent on an internal voltage reduction transformer and should be matched as closely as possible to the current required by the load. Typically the output voltage will decrease as the current output to the load increases.	1M

97	Two similar 15 V Zeners are connected in series. What is the regulated output voltage? a) 15 V b) 5 V c) 30 V d) 45 V Answer: c) 30 V Explanation: As voltage and watt rating is more useful in real applications. Now if we connect two 15 volts of Zener diodes in series as above, then the total voltage will be 30 volts.	1M
98	The voltage regulator output impedance is _____ a) Very small b) Large c) Infinite d) None Answer: a) Very small Explanation:A low impedance allows the source to deliver current without significant voltage drop, ensuring the voltage remains stable even when connected to different loads. This is important for many electrical and electronic systems where a stable voltage is required for proper operation.	1M
99	A Zener diode utilises ..... characteristic for voltage regulation a) Forward b) Reverse c) Both forward and reverse	1M

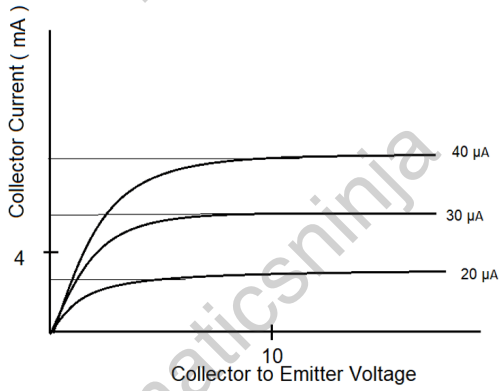
	d) None of the above Answer : b) Reverse Explanation: A Zener diode utilises reverse characteristic for voltage regulation	
100	A Zener diode is used as a..... voltage regulating device a) Shunt b) Series c) Series-shunt d) None of the above Answer : a) Shunt Explanation: The Zener diode begins regulation operation only when the input voltage (V_{in}) is equal (or more than) Zener breakdown voltage (V_z). Otherwise, the diode remains "Off-state". Due to the parallel operation with load, Zener diodes are referred to as shunt voltage regulators.	1M
101	Which of the following is true about the temperature coefficient or TC of the Zener diode? a) For Zener voltage less than 5V, TC is negative b) For Zener voltage around 5V, TC can be made zero c) For higher values of Zener voltage, TC is positive d) All of the mentioned Answer: d) All of the mentioned Explanation: All of the mentioned are true for the TC of a zener diode.	1M

102	**Zener diodes can be effectively used in voltage regulator. However, they are these days being replaced by more efficient** **a) Operational Amplifier** **b) MOSFET** **c) Integrated Circuits** **d) None of the mentioned** **Answer: c) Integrated Circuits** **Explanation: ICs have been widely adapted by the industries over conventional zener diodes as their better replacements for a voltage regulators.**	**1M**
103	**Which of the following is true about the resistance of a Zener diode?** **a) It has an incremental resistance** **b) It has dynamic resistance** **c) The value of the resistance is the inverse of the slope of the i-v characteristics of the Zener diode** **d) All of the mentioned** **Answer: d) All of the mentioned** **Explanation: All of the statements are true for the resistance of the zener diode.**	**1M**

Thank You

Unit V	Transistors	Marks - 12
S. N.		Marks
1.	BJT stands for _____ a) Bi-Junction Transfer b) Blue Junction Transistor c) Bipolar Junction Transistor d) Base Junction Transistor Answer: c) Bipolar Junction Transistor Explanation: BJT stands for Bipolar Junction Transistor. It was the first transistor to be invented. It is widely used in circuits.	1M
2.	The doped region in a transistor are _____ a) Emitter and Collector b) Emitter and Base c) Collector and Base d) Emitter, Collector and Base Answer: d) Emitter, Collector and Base Explanation: There are three doped regions forming two p-n junctions between them. There are two types of transistors n-p-n transistor and p-n-p transistor.	1M

3.	**Which region of the transistor is highly doped?** **a) Emitter** **b) Base** **c) Collector** **d) Both Emitter and Collector** **Answer: a) Emitter** **Explanation: In a transistor, emitter is of moderate size and heavily doped. Collector is moderately doped and larger as compared to the emitter. Base is very thin and lightly doped.**	1M
4.	**Both the junctions in a transistor are forward biased.** **a) True** **b) False** **Answer: b)False** **Explanation: Emitter-base junction of the transistor is forwards biased while the collector-base junction of the transistor is reverse biased or vice versa depending on the condition desired**	1M
5.	**Which junction is forward biased when transistor is used as an amplifier?** **a) Emitter-Base** **b) Emitter-Collector** **c) Collector-Base** **d) No junction is forward biased** **Answer: a) Emitter-Base** **Explanation: For Transistor to be used as an amplifier, the emitter-base junction is forward biased and the base-collector region is reverse biased. This state is called an active state.**	1M

6.	If I_e is the current entering the emitter, I_b is the current leaving the base and I_c is the current leaving the collector in a p-n-p transistor used for amplification, what is the relation between I_e, I_b and I_c? a) $I_e < I_c$ b) $I_c < I_b$ c) $I_b < I_c$ d) $I_e < I_b + I_c$ Answer: c) $I_b < I_c$ Explanation: The total current entering the emitter, I_e, goes to the base form where most of the current enters the collector and a very small fraction of the current leaves the base. Thus, $I_b < I_c$.	1M
7.	In the active state, the emitter-base junction has a higher resistance than the collector-base junction. a) True b) False Answer: b) False Explanation: Since the emitter-base junction is forward biased, their resistance is lower than the collector-base junction, which is reverse biased.	1M
8.	From the figure, what is β_{ac} when V_{CE} is 10V and I_c is 4 mA?  	1M

	a) 50 **b) 100** **c) 150** **d) 200** **Answer: c) 150** **Explanation: We know, $\beta_{ac} = \Delta I_c/\Delta I_b$** **Now, at V_{CE} = 10V, we read two values of I_c from the graph.** **Then, ΔI_b = 10 µA, ΔI_c = 1.5 mA** **Therefore, β_{ac} = 1.5 mA/10 µA** **= 150.**	
9.	**A low input to the transistor gives _____** **a) Low output** **b) High Output** **c) Normal Output** **d) No Output** **Answer: b) High Output** **Explanation: A low input to the transistor gives a high output and a high input gives a low output. The switching circuits are designed such a way that the transistor does not stay in the active state.**	1M
10.	**From the output characteristics of a transistor, one cannot calculate _____** **a) I_B** **b) V_{BE}** **c) I_c** **d) V_{CE}** **Answer: b) V_{BE}** **Explanation: The output characteristics graph for a transistor gives us the relation between the collector current and the emitter voltage. It also gives us the value of base current. But it gives no information about the base-emitter voltage.**	1M

11.	**What is the expression for the Current Amplification factor?** **a) ΔIcΔVc** **b) ΔVcΔIc** **c) (ΔICΔIB)VCE** **d) (ΔICΔIB)VBE** **Answer: c) (ΔICΔIB) VCE** **Explanation: Amplification factor can be defined as the ratio of the change in collector current to the change in base current at a constant collector-emitter voltage when the transistor is in active state. The correct expression for the amplification factor is: (ΔICΔIB) VCE.**	1M
12.	**A transistor has ……..** • **a) one pn junction** • **b) two pn junctions** • **c) three pn junctions** • **d) four pn junctions** **Answer: b) two pn junctions** **Explanation:A transistor consists of 2 pn junctions in the series of p-n-p or n-p-n.**	1M
13.	**The number of depletion layers in a transistor is ……..** • **a) four** • **b) three** • **c) one** • **d) two** **Answer: d) two** **Explanation:Number of depletion layers in a transistor is two. A transistor made up of two PN diodes connected back to back.**	1M

14.	**The element that has the biggest size in a transistor is ……..** • **a) collector** • **b) base** • **c) emitter** • **d) collector-base junction** **Answer: a) collector** **Explanation:The collector is the biggest component in the transistor.**	1M
15.	**In a pnp transistor, the current carriers are ……..** • **a) acceptor ions** • **b) donor ions** • **c) free electrons** • **d) holes** **Answer: d) holes** **Explanation: In PNP transistors, in this type of transistor, majority charge carriers are holes, and minority charge carriers are electrons.**	1M
16.	**A transistor is a …….. operated device.** **a) current** **b) voltage** **c) both voltage and current** **d) none of the above** • **Answer: a) current** • **Explanation: It is a current-driven device since the collector current is controlled via the base current.**	1M

17.	In an npn transistor,------- are the minority carriers a) free electrons b) holes c) donor ions d) acceptor ions Answer: b) holes Explanation:In an NPN transistor, holes are the minority carriers and free electrons are the majority carriers.	1M
18.	In a transistor, the base current is about ..... of emitter current. a) 25% b) 20% c) 35% d) 5% Answer: d) 5% Explanation:The Base current is typically 1% to 5% of the emitter or collector current for small-signal transistors.	1M
19.	The input impedance of a transistor is ..... • a) high • b) low • c) very high • d) almost zero • Answer:c) very high • Explanation:Since the transistors have a constant current source in the emitter circuit, the input impedance is very high.	1M
20.	In a transistor, • IC = IE + IB • IB = IC + IE • IE = IC – IB	1M

	• **IE = IC + IB** **Answer: IE = IC + IB** **Explanation:It can also be seen from the common emitter circuit above that the emitter current Ie is the sum of the collector current, Ic and the base current, Ib, added together so we can also say that " Ie = Ic + Ib " for the common emitter configuration.**	
21.	**The value of α of a transistor is ……..** • **a) more than 1** • **b) less than 1** • **c) 1** • **d) none of the above** **Answer: less than 1** **Explanation:collector current is almost same as emitter current. Hence ratio of collector to emitter current is less than unity always. So alpha is less than unity. It's value lies between 0.9 to 0.995.**	1M
22.	**The most commonly used transistor arrangement is …….. arrangement.** • **a) common emitter** • **b) common base** • **c) common collector** • **d) none of the above** **Answer: a) common emitter** **Explanation:The most commonly used transistor arrangement is common emitter arrangement.**	1M

23.	In a BJT a) The base region is sandwiched between emitter and collector b) The collector is sandwiched between base and emitter c) The emitter region is sandwiched between base and collector D.None of the above Answer: a) The base region is sandwiched between emitter and collector Explanation: In a BJT The base region is sandwiched between emitter and collector	1M
24.	Amplifiers and oscillators using BJT, operate in ..... region a) Inverted mode b) Active c) Cut off d) Saturation Answer: b)Active Explanation: BJT operate in active region to work as Amplifier and Oscillators.	1M
25.	Base is always a __ and __ doped layer. a) Thin, lightly b) Thick , lightly c) Thin , heavily Answer: a) Thin, lightly Explanation: In a transistor, the base is very lightly doped as compared to the emitter because by doing so. Base current is high. Recombination is decreased in the base region.	1M
26.	For a BJT, for common base configuration the input characteristics are represented by a plot between which of the following parameters? a) V_{BE} and I_E b) V_{BE} and I_B	1M

	c) V_{CE} and I_C **d) V_{CC} and I_C** **Answer: a) V_{BE} and I_E** **Explanation: The input signal is applied between the base and the emitter terminals. Input current flowing is the base current and hence characteristics are represented by a plot between V_{BE} and I_B.**	
27.	**In a BJT, if the collector-base junction is reverse-biased and the base-emitter junction is forward-biased, which region is the BJT operating in?** **a) Saturation region** **b) Active region** **c) Cutoff region** **d) Reverse active region** **Answer: b) Active region** **Explanation: If the collector-base junction is reverse-biased and the base-emitter junction is forward-biased, then the BJT functions in the active region of the output characteristics.**	1M
28.	**In a BJT, if the collector-base junction is forward-biased and the base-emitter junction is forward-biased, which region is the BJT operating in?** **a) Saturation region** **b) Active region** **c) Cutoff region** **d) Reverse active region** **Answer: a) Saturation region** **Explanation: If the collector-base junction and the base-emitter junction are both forward-biased, then the BJT functions in the saturation region of the output characteristics.**	1M

29.	In a BJT, if the collector-base junction and the base-emitter junction are both reverse-biased, which region is the BJT operating in? a) Saturation region b) Active region c) Cutoff region d) Reverse active region Answer: c) Cutoff region Explanation: If the collector-base junction and the base-emitter junction are both reverse-biased, then the BJT functions in the cutoff region of the output characteristics.	1M
30.	In P-N-P transistor, base will be of a) P material b) N material c) Either of the above d) None of the above Answer:b) N material Explanation:The transistor in which one n-type material is doped with two p-type materials such type of transistor is known as PNP transistor.Base will be of N type material	1M
31.	A P-N-P transistor has a) Only acceptor ions b) Only donor ions c) Two P-regions and one N-region d) Three P-N junction Answer:c)Two P-regions and one N-region Explanation:The transistor in which one n-type material is doped with two p-type materials such type of transistor is known as PNP transistor.	1M

32.	**Which type of amplifiers exhibits the current gain approximately equal to unity without any current amplification?** **a) CE** **b) CB** **c) CC** **d) Cascade** **Answer: b) CB** **Explanation: In common base amplifier, input signal is applied at emitter terminal while the amplified output signal is obtained at the collector terminal with respect to ground.** **For the AC signals, the base terminal is specifically connected to ground through the capacitor.** **Even, the output resistance is very high & hence, the current gain is approximately equal to unity. Due to this, there is no possibility of current amplification. Consequently, the CB amplifier exhibits high voltage gain.**	1M
33.	**The configuration in which voltage gain of transistor amplifier is lowest is _____** **a) common collector** **b) common emitter** **c) common base** **d) common emitter & base** **Answer: a) common collector** **Explanation: In common collector configuration (also known as the emitter follower) because the emitter voltage follows that of the base. Offering a high input impedance and a low output impedance it is extensively used as a buffer. The voltage gain is unity, even though current gain is high. The input and output signals are in phase.**	1M

34.	**The configuration in which current gain of transistor amplifier is lowest is _____** **a) common collector** **b) common base** **c) common emitter** **d) common emitter & base** **Answer: b) common base** **Explanation: In Common base configuration, the input impedance is very low; While offering a high output impedance. Although the voltage is high, the current gain is low and the overall power gain is also low when compared to the other transistor configurations available. Thus, there is no current amplification because of unity current gain.**	1M
35.	**The configuration in which input impedance of transistor amplifier is lowest is _____** **a) common collector** **b) common emitter** **c) common base** **d) common emitter & base** **Answer: c) common base** **Explanation: In Common base configuration, the input impedance is very low; While offering a high output impedance. Although the voltage is high, the current gain is low and the overall power gain is also low when compared to the other transistor configurations available.**	1M
36.	**The configuration in which output impedance of transistor amplifier is highest is _____** **a) common collector** **b) common base** **c) common emitter**	1M

	d) common collector and base **Answer: b) common base** **Explanation: In Common base configuration, the input impedance is very low; While offering a high output impedance. Although the voltage is high, the current gain is low and the overall power gain is also low when compared to the other transistor configurations available.**	
37.	**In which region a transistor acts as an open switch?** **a) cut off region** **b) inverted region** **c) active region** **d) saturated region** **Answer: a) cut off region** **Explanation: In this mode, both the junctions are reverse biased. The transistor has practically zero current because the emitter does not emit charge carriers to the base. There is negligibility current due to minority carriers. In this mode the transistor acts as an open switch.**	1M
38.	**In which region a transistor acts as a closed switch?** **a) cut off region** **b) inverted region** **c) active region** **d) saturated region** **Answer: d) saturated region** **Explanation: In this mode, both the junctions are forward biased. The negative terminal of the battery is connected to the emitter. The collector current becomes independent of base current. In this mode the transistor acts as a closed switch.**	1M

39.	The current which is helpful for LED to turn on is_____ a) emitter current b) base current c) collector current d) depends on bias Answer: c) collector current Explanation: Depending on the type of load, a collector current is induced that would turn on the motor or LED. The transistor in the circuit is switched between cut off and saturation. The load, for example, can be a motor or a light emitting diode or any other electrical device.	1M
40.	Which of the following statements is true? a) Solid state switches are applications for an AC output b) LED's can be driven by transistor logics c) Only NPN transistor can be used as a switch d) Transistor operates as a switch only in active region Answer: b) LED's can be driven by transistor logics Explanation: Output devices like LED's only require a few milliamps at logic level DC voltages and can therefore be driven directly by the output of a logic gate. However, high power devices such as motors or lamps require more power than that supplied by an ordinary logic gate so transistor switches are used.	1M
41.	The base emitter voltage in a cut off region is_____ a) greater than 0.7V b) equal to 0.7V c) less than 0.7V d) cannot be predicted Answer: c) less than 0.7V	1M

	Explanation: From the cut off characteristics, the base emitter voltage (V_{BE}) in a cut off region is less than 0.7V. The cut off region can be considered as 'off mode'. Here, $V_{BE} > 0.7$ and $I_C=0$. For a PNP transistor, the emitter potential must be negative with respect to the base	
42.	**In saturation region, the depletion layer_____** **a) increases linearly with carrier concentration** **b) decreases linearly with carrier concentration** **c) increases by increasing the emitter current** **d) decreases by decreasing the emitter voltage drop** **Answer: d) decreases by decreasing the emitter voltage drop** **Explanation: Here, the transistor will be biased so that maximum amount of base current is applied, resulting in maximum collector current resulting in minimum emitter voltage drop which results in depletion layer as small as possible and maximum current flows through the transistor.**	1M
43.	**The base emitter voltage in a saturation region is_____** **a) greater than 0.7V** **b) equal to 0.7V** **c) less than 0.7V** **d) cannot be predicted** **Answer: d) cannot be predicted** **Explanation: From the saturation mode characteristics, the transistor acts as a single pole single throw solid state switch. A zero collector current flows. With a positive signal applied to the base of transistor it turns on like a closed switch.**	1M

44.	**The switching of power with a PNP transistor is called_____** **a) sourcing current** **b) sinking current** **c) forward sourcing** **d) reverse sinking** **Answer: a) sourcing current** **Explanation: Sometimes DC current gain of a bipolar transistor is too low to directly switch the load current or voltage, so multiple switching transistors is used. The load is connected to ground and the transistor switches the power to it.**	1M
45.	**The switching of power with a NPN transistor is called_____** **a) sourcing current** **b) sinking current** **c) forward sourcing** **d) reverse sinking** **Answer: b) sinking current** **Explanation: Sometimes DC current gain of a bipolar transistor is too low to directly switch the load current or voltage, so multiple switching transistors is used. The load is connected to supply and the transistor switches the power to it.**	1M
46.	**Which of the following is not a part of a BJT?** **a) Base** **b) Collector** **c) Emitter** **d) None of the mentioned** **Answer: d) None of the mentioned** **Explanation: BJT consists of three semiconductor regions, base region, emitter region and collector region.**	1M

47.	**In which of the following modes can a BJT be used?** **a) Cut-off mode** **b) Active mode** **c) Saturation mode** **d) All of the mentioned** **Answer: d) All of the mentioned** **Explanation: These three are the defined regions in which a BJT operates.**	1M
48.	**If a BJT is to be used as a switch, it must operate in_____** **a) Cut-off mode or active mode** **b) Active Mode or saturation mode** **c) Cut-off mode or saturation mode** **d) Cut-off mode or saturation mode or active mode** **Answer: c) Cut-off mode or saturation mode** **Explanation: A BJT operates as an amplifiers in active mode and as a switch in cut-off or saturation mode.**	1M
49.	**In cut off mode** **a) The base-emitter junction is forward biased and emitter-collector junction is reversed biased** **b) The base-emitter junction is forward biased and emitter-collector junction is forward biased** **c) The base-emitter junction is reversed biased and emitter-collector junction is reversed biased** **d) The base-emitter junction is reversed biased and emitter-collector junction is forward biased** **Answer: c) The base-emitter junction is reversed biased and emitter-collector junction is reversed biased** **Explanation: In cut-off mode there is no current flowing through the BJT hence both junctions must be reversed biased else if either of them is forward biased then the current will flow.**	1M

50.	On which of the following does the collector current not depends upon? a) Saturation current b) Thermal voltage c) Voltage difference between the base and emitter d) None of the mentioned Answer: d) None of the mentioned Explanation: Collector current depends linearly of the saturation current and exponentially to the ratio of the voltage difference between the base and collector and thermal voltage.	1M
5.1	Where is the input measured in a common base transistor physical model? a) Collector terminal b) Emitter terminal c) Base terminal d) Ground Answer: b) Emitter terminal Explanation: In the physical model of a common base transistor amplifier the input is measured at the emitter terminal of the BJT biased device. Whereas, the output is measured across the collector terminal of the biased BJT device.	1M
52.	Which parameter of the physical model is varied while measuring the input characteristics of a common-base transistor? a) Emitter current b) Emitter voltage c) Collector current d) Emitter base voltage Answer: d) Emitter base voltage	1M

	Explanation: To determine the input characteristics, the collector-base voltage is kept constant at zero volts and the emitter base voltage is increased from zero volts to different voltage levels. For each voltage level of the input voltage, the input current is recorded.	
	Where is the output measured in a common base transistor physical model? **a) Collector terminal** **b) Emitter terminal** **c) Base terminal** **d) Ground** **Answer: a) Collector terminal** **Explanation: In the physical model of a common base transistor amplifier the output is measured at the collector terminal of the BJT biased device. Whereas, the input is measured across the emitter terminal of the biased BJT device.**	1M
53.	**Which parameter of the physical model is varied while measuring the output characteristics of a common-base transistor?** **a) Emitter current** **b) Emitter voltage** **c) Collector current** **d) Collector base voltage** **Answer: d) Collector base voltage** **Explanation: To determine the output characteristics, the emitter current is kept constant at zero and the collector base voltage is increased from zero volts to varying voltage levels. For each voltage level of the output voltage, the collector current is recorded.**	1M

54.	**How do you calculate the dynamic input resistance of a CB transistor?** **a) ΔV_{BE} / ΔI_C** **b) ΔV_{BE} / ΔI_E** **c) ΔV_{CB} / ΔI_C** **d) ΔV_{CB} / ΔI_E** **Answer: b) ΔV_{BE} / ΔI_E** **Explanation: Dynamic input resistance is defined as the ratio of change in emitter base voltage to the corresponding change in the emitter current. While the collector voltage is kept at a constant value. Therefore, $r_i = \Delta V_{BE} / \Delta I_E$.**	1M
55.	**A bipolar junction transistor has beta=250 and base current=10micro ampere. What is the collector current?** **a) 25 micro ampere** **b) 10 micro ampere** **c) 2.5 milli ampere** **d) 10 milli ampere** **Answer: c) 2.5 milli ampere** **Explanation: Given:** **Base current(Ib)=10micro ampere** **Beta=250** **Since Ic(collector current)=beta*Ib(base current)** **Ic(collector current)=250*10 micro ampere=2.5 milli ampere.**	1M
56.	**What happens to the collector current if the emitter current increases while no base voltage is applied?** **a) Increases** **b) Decreases** **c) No current** **d) First increases then decreases**	1M

	Answer: c) No current **Explanation: When no voltage is provided at the base then no current passes from emitter to collector, so even if very high potential difference is applied at the emitter collector junction, no current flows through it. This configuration is used for switching in various appliances using bipolar junction transistor.**	
57.	**Which is an example of bipolar junction transistor?** **a) BC547B** **b) CMCP793V-500** **c) SLB700A/06VA** **d) MBR5H100MFST1G** **Answer: a) BC547B** **Explanation: BC547B is an example of bipolar junction transistor. It is most common and widely used NPN transistor. It is small, cheap, uses less power and fulfills most of the requirement for general purpose use.**	1M
58.	**In bipolar junction transistors both electron and holes are responsible for conduction.** **a) True** **b) False** **Answer: a) True** **Explanation: In bipolar junction transistors both electron and holes are responsible for conduction. The term "bipolar" itself mean two polarities which represents that both charged particle are responsible for the conduction in the bipolar junction transistor.**	1M

59.	Three PN junctions is present in a bipolar junction transistor. a) True b) False Answer: b) False Explanation: A bipolar junction transistor has 2 PN junctions. First PN junction is between the base emitter terminal and second PN junction is between base collector terminals. A base is always between emitter and collector.	1M
60.	What is the minimum voltage required to make base emitter junction of a real silicon bipolar junction transistor in forward biased? a) 0.7 volts b) 1.8 volts c) 2.3 volts d) 0.3 volts Answer: a) 0.7 volts Explanation: 0.7 volts is the minimum voltage required to make the base emitter junction of a real silicon bipolar junction transistor in forward biased. This 0.7 volt potential difference between base and emitter terminal makes the PN junction in forward biased.	1M
61.	What are the parameters over which transfer characteristics curve of bipolar junction transistor is made in common emitter configuration? a) Emitter Current and time b) Emitter Voltage and time c) Collector Current and frequency d) Collector to Emitter Voltage and Collector current	1M

	Answer: d) Collector to Emitter Voltage and Collector current **Explanation: Collector to Emitter Voltage and Collector current are the parameters considering which transfer characteristics curve of bipolar junction transistor is made. It is voltage versus current graph in which Current is denoted on Y-axis and voltage is denoted on (X-axis).**	
62.	**A bipolar junction transistor has beta=100 and base current= 8 micro ampere. What is the collector current?** **a) 25 micro ampere** **b) 0.8 micro ampere** **c) 0.8 milli ampere** **d) 10 milli ampere** **Answer: c) 0.8 milli ampere** **Explanation: Given;** **Base current (Ib) = 8 micro ampere** **Beta=100** **Since Ic(collector current)=beta*Ib(base current)** **Ic(collector current)=100*8 micro ampere=0.8 milli ampere.**	1M
63	**FET is a voltage controlled device.** **a) True** **b) False** **Answer: a) True** **Explanation: Field Effect Transistors are voltage controlled devices, by applying some voltage between the gate and source, the drain current can be controlled. In order to control the operation of FET the gate to drain voltage is varied to operate the FET in different regions of operation.**	1M

64	**Which of the following statement is true about FET?** **a) It has high output impedance** **b) It has high input impedance** **c) It has low input impedance** **d) It does not offer any resistance** **Answer: b) It has high input impedance** **Explanation: Because of the Sio2 insulator, doped between drain and source at the top, the resistance offered by this is very high. The insulator will stop the flow of electron from one part to another which acts as an open circuit.**	1M
65	**Comparing the size of BJT and FET, choose the correct statement?** **a) BJT is larger than the FET** **b) BJT is smaller than the FET** **c) Both are of same size** **d) Depends on application** **Answer: a) BJT is larger than the FET** **Explanation: BJT usually are built with a thickness of up to 1cm whereas the FET uses a fabrication technique which makes its size in mm.**	1M
66	**What is the main advantage of FET which makes it more useful in industrial applications?** **a) Voltage controlled operation** **b) Less cost** **c) Small size** **d) Semiconductor device** **Answer: c) Small size** **Explanation: Because of its small size, the IC chips can be made**	1M

	even smaller which reduces the wear and tear. The process technology used with process technology constant at which is the ratio of Width and Length, the FET is made more advantageous.	
67	For a FET when will maximum current flows? a) V_{gs} = 0V b) V_{gs} = 0v and V_{ds} >= $\|V_p\|$ c) V_{DS} >= $\|V_p\|$ d) V_p = 0 Answer: b Explanation: For a FET the current reaches maximum that is IDSS occurs when V_{gs} = 0V and V_{DS} >= $\|V_p\|$	1M
67	What is the value of current when the gate to source voltage is less than the pinch off voltage? a) 1A b) 5A c) 100A d) 0 Answer: d) 0 Explanation: When the gate to source voltage is less than pinch off, both of the junctions will be reverse biased and hence no current flows.	1M
68	What is the value of drain current when V_{gs}=pinch off voltage? a) 0A b) 1A c) 2A d) Cannot be determined Answer: a) 0A Explanation: $I_D = I_{DSS}(1-V_{gs}/V_p)^2$ If $V_{gs} = V_p$,then $I_D = I_{DSS}(1-1)=0$.	1M

69	To use FET as a voltage controlled resistor, in which region it should operate? a) Ohmic region b) cut off c) Saturation d) cut off and saturation Answer: a) Ohmic region Explanation: By varying the gate to source voltage, Resistance can be varied as follows $r_d = r_o/(1-V_{gs}/V_p)^2$	1M
70	For an n-channel FET, What is the direction of current flow? a) Source to drain b) Drain to source c) Gate to source d) Gate to drain Answer: b) Drain to source Explanation: When a voltage greater than pinch off is applied, the current starts flowing from Drain to source.	1M
70	For a p-channel FET, What is the direction of current flow? a) Source to drain b) Drain to source c) Gate to source d) Gate to drain Answer: a) Source to drain Explanation: When the voltage is lesser than pinch off, the current flows from Source to Drain. The forward bias drain and gate is the reason for the flow of electron from Drain to source, as the conventional current flows opposite to the electron flow, the current will flow from Source to Drain.	1M

71	**Field effect transistors are known as** **a) unipolar device** **b) bipolar device** **c) tripolar device** **d) multipolar device** **Answer: a) unipolar device** **Explanation: Field effect transistors are unipolar transistors as they involve single-carrier-type operation.**	1M
78	**Field effect transistor's conductivity is regulated by** **a) input current** **b) output current** **c) terminal voltage** **d) supply voltage** **Answer: c) terminal voltage** **Explanation: Field effect transistor's conductivity is regulated by the voltage applied to a terminal (the gate) which is insulated from the device.**	1M
79	**In FET, the current enters the channel through** **a) source** **b) drain** **c) gate** **d) nodes** **Answer: a) source** **Explanation: In field effect transistor, the current enters the channel through source and the current leaves the junction through drain.**	1M

80	**Which terminal bias the transistor to operation?** **a) source** **b) drain** **c) gate** **d) base** **Answer: d) Base** **Explanation: Other than the three terminals, source drain and gate, there is a fourth terminal called as body or base. This is used to bias the transistor to operation.**	1M
81	**In FET, the width is greater than the length of the gate.** **a) true** **b) false** **Answer: a) true** **Explanation: In FET, the width is greater than the length of the gate. Length gives the distance between source and drain. Width is the extension of the transistor, in the direction perpendicular to cross section.**	1M
82	**Which terminal controls the electron flow passage?** **a) source** **b) drain** **c) gate** **d) base** **Answer: c) gate** **Explanation: Gate permits the electron to flow through or block their passage by creating or eliminating the channel between source and drain.**	1M
83	**The expansion of depletion region in n-channel device makes the channel** **a) narrow** **b) wide** **c) does not affect the channel**	1M

	d) cannot be determined **Answer: a) narrow** **Explanation: In n-channel depletion mode device, as the depletion region width expands, it encroaches the channel from the sides and the channel becomes narrow.**	
84	**Which voltage increases the channel size?** **a) negative Vgs** **b) positive Vgs** **c) negative Vds** **d) positive Vds** **Answer: b) positive Vgs** **Explanation: A positive gate to source voltage increases the channel size and allows the electrons to flow easily.**	1M
85	**Which mode of operation of FET is used, when amplification is needed?** **a) active** **b) saturation** **c) non saturation** **d) linear** **Answer: b) saturation** **Explanation: Saturation mode, which is in between the ohmic and saturation region is used when amplification is needed.**	1M
86	**Which of the following relation is true about gate current?** **a) $I_G=I_D+I_S$** **b) $I_D=I_G$** **c) $I_S= I_G$** **d) $I_G=0$** **Answer: d) $I_G=0$** **Explanation: The FET physical structure which contains silicon dioxide provides infinite resistance. Hence no current will flow through the gate terminal.**	1M

87	**For a fixed bias circuit the drain current was 1mA, what is the value of source current?** **a) 0mA** **b) 1mA** **c) 2mA** **d) 3mA** **Answer: c) 2mA** **Explanation: We know that for an FET same current flows through the gate and source terminal, Hence source current=1mA.**	1M
88	**For a fixed bias circuit the drain current was 1mA, V_{DD}=12V, determine drain resistance required if V_{DS}=10V?** **a) 1KΩ** **b) 1.5KΩ** **c) 2KΩ** **d) 4KΩ** **Answer: c) 2KΩ** **Explanation: $V_{DS}=V_{DD}-I_D R_D$** **$\Rightarrow 10=12-R_D\times 1mA$** **$\Rightarrow R_D=2/1mA=2$ KΩ.**	1M
89	**Field effect transistors are different from BJTs in that they are _____** **a) monopolar devices** **b) bipolar devices** **c) bidirectional device** **d) none of the mentioned** **Answer: a) monopolar devices** **Explanation: FETs are called monopolar devices, with only one carrier type, either electrons or holes providing current flow through the device. N-channel FETs employ electrons while p-channel FETs employ holes as source of current.**	1M

90	**JFET is a _____ carrier device.** **a) Unipolar** **b) Bipolar** **c) Minority** **d) Majority** **Answer: d) Majority** **Explanation: The current flow in the device is due to majority carriers. In an n-type JFET, it is due to the electrons and in a p-type JFET- it is due to the holes.**	1M
91	**he n-channel JFET, the pinch off voltage is _____** **a) not greater than 0** **b) greater than or equal to 0** **c) less than or equal to 0** **d) not less than 0** **Answer: a) not greater than 0** **Explanation: The pinch off voltage for an N-channel JFET is negative. The depletion region would extend into the N-channel if the reverse bias in the gate to source voltage increases which means that the gate to source voltage has to be negative since the gate is N-type.**	1M
92	**An N-channel JFET is _____** **a) Always ON** **b) Always OFF** **c) Enhancement mode JFET** **d) Has a p-type substrate** **Answer: a) Always ON** **Explanation: An N-channel is always ON depletion mode JFET since the channel for current flow from source to drain is always present. This is in contrast to a P-channel JFET which needs to be provided with a channel for the flow of current.**	1M

93	**A JFET has three terminals, namely .....** **a) cathode, anode, grid** **b) emitter, base, collector** **c) source, gate, drain** **d) none of the above** **Answer : c) source, gate, drain** **Explanation:A JFET has three terminals, namelysource, gate, drain**	1M
94	**The gate of a JFET is ..... biased** **a) reverse** **b) forward** **c) reverse as well as forward** **d) none of the above** **Answer : a) reverse** **Explanation:Gate source p-n junction is always reverse biased because if it is forward then all the channel current will flow to the Gate and not to the source, ultimately damaging JFET.**	1M
95	**A common base configuration of a pnp transistor is analogous to ..... of a JFET** **a) common source configuration** **b) common drain configuration** **c) common gate configuration** **d) none of the above** **Answer : c) common gate configuration** **Explanation: A common base configuration of a pnp transistor is analogous to common gate configuration of a JFET**	1M
96	**In a JFET, when drain voltage is equal to pinch-off voltage, the depletion layers .....** **a) almost touch each other** **b) have large gap** **c) have moderate gap** **d) none of the above**	1M

	Answer : a) almost touch each other **Explanation:when drain voltage is equal to pinch-off voltage, the depletion layers almost touch each other**	
97	**In a JFET, IDSS is known as ……..** **a) drain to source current** **b) drain to source current with gate shorted** **c) drain to source current with gate open** **d) none of the above** **Answer : b) drain to source current with gate shorted** **Explanation:IDSS is referred to as the drain current for zero bias, because the gate-source voltage requires no bias voltage to operate. The gate-source voltage is just zero. No voltage needs to be applied to it**	1M
98	**A JFET has high input impedance because _____** **a) it is made of semiconductor material** **b) input is reverse biased** **c) of impurity atoms** **d) none of the above** **Answer: b) input is reverse biased** **Explanation:A JFET has high input impedance becauseinput is reverse biased**	1M
99	**JFET in properly biased condition acts as a** **a) current controlled current source** **b) voltage controlled voltage source** **c) voltage controlled current source** **d) impedance controlled current source** **Answer: c) voltage controlled current source** **Explanation:JFET in properly biased condition acts as avoltage controlled current source**	1M

100	**The input resistance of a FET is of the order of** **a) 100 Ω** **b) 10 kΩ** **c) 1 MΩ** **d) 100 MΩ** **Answer: d) 100 MΩ** **Explanation:The input resistance of a FET is typically very high, on the order of mega ohms (MΩ).**	1M
	FET is which type of device? **a) 4 terminal voltage controlled device** **b) 3 terminal voltage controlled device** **c) 3 terminal current controlled device** **d) 2 terminal current controlled device** **Answer:b) 3 terminal voltage controlled device** **Explanation:FET is a voltage-driven/controlled device, i.e. the output current is controlled by the electric field applied& it is three terminal device.**	
	In which mode the JFET can operate? **a) depletion-mode only** **b) enhancement-mode only** **c) saturation mode only** **d) noise mode only** **Answer : a) depletion-mode only** **Explanation:Unlike MOSFETs (metal-oxide-semiconductor field-effect transistors), JFETs are predominantly depletion-mode devices, meaning they are normally on and require a gate-source voltage to turn them off. The physical structure and doping of JFETs make it difficult to achieve enhancement mode operation.**	
	The most common semiconductor used for manufacturing of	

	FET is **a) Gallium Arsenide** **b) Indium Arsenide** **c) Indium Gallium Arsenide** **d) Silicon** **Answer:-d** **Explanation:Usually the semiconductor of choice is *silicon*. Some chip manufacturers, most notably IBM and Intel, use an alloy of silicon and germanium (SiGe) in MOSFET ...**	

Thank You

Unit VI	Sensors and Transducers	Marks - 10
S. N.		Marks
1.	Which of the following is not a characteristic of an ideal transducer? a) High dynamic range b) Low linearity c) High repeatability d) Low noise Answer: b) Low linearity Explanation: An ideal transducer should show high linearity. A linear system should produce exact output according to input.	1M
2.	Which of the following represent active transducer? a) Strain gauge b) Thermistor c) LVDT d) Thermocouple Answer: d) Thermocouple Explanation: Active transducers are self-generating type, they don't require external power to work while passive transducers require external power to work.	1M
3.	Which transducer is known as 'self-generating transducer'? a) Active transducer b) Passive transducer c) Secondary transducer d) Analog transducer Answer: a) Active transducer Explanation: The name self-generating transducer is due to its property of working without the use of external power.	1M

4.	Which of the following is an analog transducer? a) Encoders b) Strain gauge c) Digital tachometers d) Limit switches Answer: b) Strain gauge Explanation: Analog transducers convert physical quantity to analog signals while digital transducers convert physical quantity to digital signals. Strain gauge is an example of an Analog transducer.	1M
5.	What is the principle of operation of LVDT? a) Mutual inductance b) Self-inductance c) Permanence d) Reluctance Answer: a) Mutual inductance Explanation: Linear variable differential transformer (LVDT) is a type of transformer used for measuring displacement, and it has the same principle of operation of transformer.	1M

6.	Which of the following can be measured using Piezo-electric transducer? a) Velocity b) Displacement c) Force d) Sound Answer: c) Force Explanation: Piezo-electric crystals produces an electric signal when pressure applied. Examples are quartz, Rochelle salt. That is, it converts force into electric signals.	1M
7.	Capacitive transducer is used for? a) Static measurement b) Dynamic measurement c) Transient measurement d) Both static and dynamic Answer: b) Dynamic measurement Explanation: Capacitive transducers convert measurant into changes in capacitance. Change in capacitance is caused by change in dielectric or change in distance between plates.	1M
8.	Which of the following is used in photo conductive cell? a) Selenium b) Quartz c) Rochelle salt d) Lithium sulphate Answer: a) Selenium Explanation: Photo conductive action is the property of reduction of resistance when exposed to light. Selenium shows photoconductive action.	1M

9.	What are transducers? a) They convert power from one form to another b) They convert work from one form to another c) They convert work to power d) They convert energy from one form to another Answer: d) They convert energy from one form to another Explanation: Transducer are devices that convert energy from one form to another. This energy can be either mechanical energy, light energy, heat energy or any other forms of energy.	1M
10.	Active transducer do not require any type of additional power source for an operation. a) True b) False Answer: a) True Explanation: Active transducers do not require any additional power source for converting the energy from one form to another as they work on the principle of energy conversion. One such example of active transducer is thermocouple.	1M
11.	What type of energy conversion does a piezoelectric transducer perform? a) It converts mechanical energy to sound energy b) It converts sound energy to mechanical energy c) It converts mechanical energy to electrical energy d) It converts electrical energy to mechanical energy Answer: c) It converts mechanical energy to electrical energy Explanation: A piezoelectric transducer converts mechanical energy to electrical energy. They are generally used to detect a knock or any impulsive force. They are also used in electronic drum pads to detect the impulse provided by the drumsticks.	1M

12.	The IC LM35 is used as which type of sensor? a) Pressure sensor b) Temperature sensor c) Light sensor d) Mechanical sensor Answer: b)) Temperature sensor Explanation: The LM35 IC manufactured by Texas Instruments is used as a temperature sensor. The output voltage generated by this IC is linearly proportional to the temperature in Centigrade. The output voltage is directly proportional to the temperature.	1M
13.	What is the range of frequency of the waves produced by the Ultrasonic transducer? a) 20 Kilohertz to several Gigahertz b) 1 Kilohertz to several Gigahertz c) 40 Kilohertz to several Megahertz d) less than 20 Kilohertz Answer: a) 20 Kilohertz to several Gigahertz Explanation: Ultrasonic transducers produce frequency ranging from 20 Kilohertz to several Gigahertz. Ultrasounds have a wide range of application in many fields, but majorly they are used for measuring the distance of objects.	1M
14.	What is the full form of LVDT with respect to displacement transducer? a) Linear variable differential temperature b) Linear variable differential transformer c) Liquid visible differential transformer d) Liquified visible differential transformer Answer: b) Linear variable differential transformer Explanation: LVDT stands for Linear variable differential transformer. It is a displacement transducer that converts	1M

	rectilinear motion to electric signals. They are used widely due to their robustness.	
15.	What is the effect on properties of LDR when light falls on it? a) Its resistance remains same b) Its resistance changes c) Its capacitance changes d) Its inductance changes Answer: b) Its resistance changes Explanation: When light falls on LDR (Light dependant resistor) its resistance changes. It is inversely proportional to the intensity of light. When light falls on LDR, the resistance decreases and more current starts to flow through it. It is used to measure the intensity of light.	1M
16.	What is measured by a hall effect transducer? a) Electric flux b) Electric Field c) Magnetic field d) Temperature Answer: c) Magnetic field Explanation: Hall effect transducers or Hall effect sensor is used for measuring the magnitude of the magnetic field. The output voltage produced by the sensor is directly proportional to the strength of the magnetic field passing through it.	1M
17.	Which of the following represents the application of inductive transducers? a) Displacement measurement b) Thickness measurement c) Both displacement and thickness measurement d) None of the mentioned Answer: c) Both displacement and thickness measurement Explanation: Inductive transducers can be used for measuring displacement and thickness of thin plate etc.	1M

18.	Inductive potentiometers are used to measure _____ a) Voltage b) Current c) Displacement d) None of the mentioned Answer: c) Displacement Explanation: It has same function as linear potentiometers and is used for measuring displacement.	1M
19.	Capacitive transducers can be used by _____ a) Measuring change in distance between plates b) Measuring change in area of plates c) Change in a dielectric material d) All of the mentioned Answer: d) All of the mentioned Explanation: Capacitance of a material is affected by area and distance of separation of plates and dielectric material.	1M
20.	Capacitive transducers cannot be used as strain gauges. a) True b) False Answer: b) False Explanation: Strain to be measured is applied to parallel plates of a capacitor and total displacement change will be proportional to strain.	1M
21.	Which of the following is correct for the capacitive transducer? a) Capacitive strain gauges b) Capacitive tachometers c) Capacitive pressure transducer d) All of the mentioned Answer: d) All of the mentioned Explanation: Capacitive transducers find application in	1M

	measurement of both strain, pressure and angular displacement. Hence all of the mentioned can be treated as application of capacitive transducer.	
22.	For a material capacitance increases with _____ a) Decrease in area of plates, all other factors constant b) Increase in distance between plates, all other factors constant c) Decrease in distance between plates, all other factors constant d) None of the mentioned Answer: c) Decrease in distance between plates, all other factors constant Explanation: Capacitance can be represented as $C=\varepsilon_0\varepsilon_r A / d$ Where, ε_r represents dielectric constant A is the area of plate d is the distance between plates.	1M
23.	Which of the following quantities cannot be measured by capacitive transducers? a) Displacement b) Speed c) Moisture d) None of the mentioned Answer: d) None of the mentioned Explanation: Capacitive transducer finds application in measuring almost all quantities like displacement, thickness, moisture speed etc.	1M

24.	Thermometers are not possible using a capacitive transducer. a) True b) False Answer: b) False Explanation: Capacitive transducers can be used to measure temperature in a way similar to moisture measurement.	1M
25.	Who invented the piezoelectric effect? a) Mary Elizabeth Barber b) Christian Doppler c) Marie curie and Pierre curie d) Pierre curie and Jacques curie Answer: d) Pierre curie and Jacques curie Explanation: Piezoelectric effect was first invented and explained by curie brothers, Pierre curie and Jacques curie in 1980.	1M
26.	Which of the following represents piezoelectric materials? a) ADP b) Quartz c) Bernilite d) All of the mentioned Answer: d) All of the mentioned Explanation: Quartz, ADP (Ammonium dihydrogen Phosphate), and bernilite are examples of piezoelectric materials.	1M
27.	Which of the following quantities cannot be measured using piezoelectric transducers? a) Pressure b) Strain c) Acceleration d) None of the mentioned	1M

	Answer: d) None of the mentioned **Explanation: Piezoelectric transducers can be used to measure a wide range of quantities like pressure, acceleration, strain displacement etc.**	
28.	**In piezoelectric strain transducer voltage developed is _____ to strain applied.** **a) Directly proportional** **b) Inversely proportional** **c) Equal** **d) Independent** **Answer: a) Directly proportional** **Explanation: For a piezoelectric strain transducer, as the strain applied increases output voltage also increases.**	**1M**
29.	**Photoelectric devices are sensitive to all wavelength.** **a) True** **b) False** **Answer: b) False** **Explanation: Photoelectric devices are sensitive to certain wavelength only hence they should be calibrated before every use.**	**1M**
30.	**In photo emissive transducers, electrons are attracted by _____** **a) Cathode** **b) Anode** **c) Grid** **d) Body** **Answer: b) Anode** **Explanation: In photo emissive transducers, electrons emitted by the cathode are attracted by anode plates.**	**1M**
31.	**The quantity to be measured by an instrumentation system is**	

	a) Measurement b) Measurand c) Signal Answer: b) Measurand Explanation: The quantities that can be measured are called as physical quantityor measurand.	
32.	LVDT is a _____ a) Active b) Passive c) Hybrid Answer: b) Passive Explanation: A passive transducer is an externally powered transducer. This device cannot convert a physical signal into an electrical signal on its own to another energy source, the passive element. When connected, it transforms the motion by the fluctuations generated from the power source.	1M
33.	Which of the following materials can be used as photoconductive transducer? a) Selenium b) Silicon c) Germanium d) All of the mentioned Answer: d) All of the mentioned Explanation: Photoconductive cells are materials which changes conductivity on the application of light.	1M
34.	Semiconductor layer using silicon and germanium is known as _____ a) Photo diodes b) Photo junction diodes c) Photo material	1M

	d) Photo sensitive materials Answer: b) Photo junction diodes Explanation: Photo junction diodes are semiconductor layers formed by silicon and germanium which are used in photovoltaic cells.	
35.	Which of the following are used to form photo transistors? a) Two photo diodes b) Three photo diodes c) Normal diodes d) None of the mentioned Answer: a) Two photo diodes Explanation: Photo transistors are formed by placing two photo diodes back to back.	1M
36.	Thermocouple is a _____ a) Primary device b) Secondary transducer c) Tertiary transducer d) None of the mentioned Answer: a) Primary device Explanation: Thermocouple is a device which converts thermal energy to electrical energy and it can be treated as a primary device.	1M
37.	Operation of thermocouple is governed by _____ a) Peltier effect b) Seebeck effect c) Thomson effect d) All of the mentioned Answer: d) All of the mentioned Explanation: Operation of thermocouple is based on three major effects- Peltier, Thomson and seebeck, all describe the relation between current flow and temperature between two	1M

	different metal.	
38.	Thermocouple cannot used for measurement of temperature of liquid. a) True b) False Answer: b) False Explanation: Immersion type thermocouple can be used to measure temperature of liquid, in which thermocouple is immersed in liquid.	1M
39.	Active transducers are classified into _____ a) 4 types b) 2 types c) 6 types d) 8 types Answer: a) 4 types Explanation: Active transducers can be subdivided into four types. They are as follows: • Photovoltaic • Thermoelectric • Piezoelectric • Electromagnetic.	1M
40.	Active transducers develops _____ a) mechanical parameter b) electrical parameter c) chemical parameter d) physical parameter Answer: b) electrical parameter Explanation: Active transducers are also known as self-generating type of transducers. They develop an electrical voltage or current proportional to the quantity being measured.	1M

41.	How do passive transducers develop electrical signals? a) using a transformer b) using internal source c) using external source d) using a diode Answer: c) using external source Explanation: Passive transducers develop electrical signals by means of an external source. They are usually known as externally power driven sources.	1M
42.	Capacitive transduction involves _____ a) change in resistance b) change in inductance c) change in resistance d) change in capacitance Answer: d) change in capacitance Explanation: In capacitive transduction, measurand involves the change in the capacitance. Capacitance changes when the distance between the plates is varied or by a change in the dielectric.	1M
43.	In electromagnetic based transduction measurand is _____ a) converted into mechanical force b) converted into electromotive force c) converted into chemical force d) converted into physical force Answer: b) converted into electromotive force Explanation: Electromagnetic transduction involves the conversion of the measurand into electromotive force. Magnetic flux is produced as a result of the relative motion between the magnet and an electromagnet.	1M
44.	Inductive transduction involves _____ a) change in self-inductance	1M

	b) change in capacitance c) change in mutual inductance d) change in resistance Answer: a) change in self-inductance Explanation: In an inductive transduction based system, measurand involves change in the self-inductance of the coil.	
45.	Photovoltaic transduction involves _____ a) voltage generation heat b) voltage generation through sound c) voltage generation through light d) voltage generation current Answer: c) voltage generation through light Explanation: In a photovoltaic transduction based system, measurand is converted into voltage when the junction between dissimilar elements is illuminated.	1M
46.	Analog transducers convert input into _____ a) voltage b) current c) digital d) analog Answer: d) analog Explanation: The analog transducers convert input into analog signal. The output is a continuous function of time. Strain gauge, LVDT, thermistor etc are analog transducers as they produce outputs which are a continuous function of time.	1M
47.	Inverse transducer converts electrical into a physical quantity. a) True b) False Answer: a) True	1M

	Explanation: An inverse transducer is used to convert an electrical quantity into a physical quantity. For example, loudspeaker converts electrical signal into sound signal.	
48.	**Digital transducers produce analog output.** **a) True** **b) False** **Answer: b) False** **Explanation: Digital transducers produce digital output in response to an input signal. A unique code is generated for each discrete value sensed.**	**1M**
49.	**Selection of a transducer depends on the quantity being measured.** **a) True** **b) False** **Answer: a) True** **Explanation: A transducer is selected based on the nature of the quantity that is being measured. For example temperature measurement involves the use of temperature sensors whereas measurement of stress involves a strain gauge.**	**1M**
50.	**Transducers must operate under _____** **a) zero electromagnetic field** **b) constant electromagnetic fields** **c) varying electromagnetic fields** **d) infinite electromagnetic field** **Answer: c) varying electromagnetic fields** **Explanation: A transducer should operate under strong electromagnetic fields. Generally transducers with a low value of output impedance, high value of output voltage and shorter cable length are not susceptible to such interference.**	**1M**

5.1	How many passive transducers are there? a) 1 b) 3 c) 5 d) 7 Answer: b) 3 Explanation: There are three passive transducers. They are as follows: Resistor Capacitor Inductor.	1M
52.	Smallest change which a sensor can detect is _____ a) Resolution b) Accuracy c) Precision d) Scale Answer: a) Resolution Explanation: Resolution is the smallest change a sensor can detect.	1M
	Thermocouple generate output voltage according to _____ a) Circuit parameters b) Humidity c) Temperature d) Voltage Answer: c) Temperature Explanation: Thermocouple is a device which is capable of producing output voltage according to input temperature.	1M

53.	Sensor is a type of transducer. a) True b) False Answer: a) True Explanation: Sensor is a device which enables measurement of input value.	1M
54.	Which of the following is not an analog sensor? a) Potentiometer b) Force-sensing resistors c) Accelerometers d) None of the mentioned Answer: d) None of the mentioned Explanation: All of the mentioned devices are analog sensors.	1M
55.	A_____is thermally sensitive resistor that exhibits a large change in resistance. a) Thermistor b) Resistance Thermometer c) Thermo couple d) Semiconductor based sensor Answer: a) Thermistor Explanation: A thermistor is a thermally sensitive resistor that exhibits a large, predictable, and precise change in resistance correlated to variations in temperature.	1M
56.	_____measures temperature by correlating the resistance of the RTD with temperature. a) Thermistor b) Resistance Thermometer c) Thermo couple d) Semiconductor based sensor Answer: b) Resistance Thermometer Explanation: A Resistance Thermometer measures	1M

	temperature by correlating the resistance of the RTD with temperature. An RTD consists of a film or, for greater accuracy, a wire wrapped around a ceramic or glass core.	
57.	_____consists of two different metals connected at two points. a) Thermistor b) Resistance Thermometer c) Thermocouple d) Semiconductor based sensor Answer: c) Thermocouple Explanation: Thermocouple consists of two different metals connected at two points. The varying voltage between these two points reflects proportional changes in temperature.	1M
58.	Which type of temperature sensor is placed in Integrated Circuits? a) Thermistor b) Resistance Thermometer c) Thermocouple d) Semiconductor based sensor Answer: d) Semiconductor based sensor Explanation: A semiconductor based temperature sensor is placed on Integrated Circuits. They are linear but have the lowest accuracy.	1M
59.	Which sensor is linear and low accuracy? a) Thermistor b) Resistance Thermometer c) Thermocouple d) Semiconductor based sensor Answer: d) Semiconductor based sensor Explanation: A semiconductor based temperature sensor is placed on Integrated Circuits. They are linear but have the lowest accuracy.	1M

60.	Inverse transducers are also known as _____ a) Open loop transducers b) Closed loop transducers c) Input transducers d) Output transducers Answer: d) Output transducers Explanation: Output transducers are which converts electrical quantity to non-electrical quantity, known as inverse transducers.	1M
61.	Inverse transducer is system which converts _____ a) Electrical quantity to non-electrical quantity b) Non-electrical quantity to electrical quantity c) Electrical quantity to electrical quantity itself d) Non- electrical quantity to non-electrical quantity itself Answer: a) Electrical quantity to non-electrical quantity Explanation: Transducers are devices which transfers measurand which will be a non-electrical quantity to electrical quantity. Inverse transducers are the devices operating just opposite to transducers.	1M
62.	Which of the following is an inverse transducer _____ a) Piezoelectric transducer b) LVDT c) Load cell d) Bourdon tube Answer: a) Piezoelectric transducer Explanation: Piezo electric transducers are devices which are capable of converting electrical quantity to non-electrical quantity, which is an inverse transducer.	1M

63	Input transducers and inverse transducers are the same. a) True b) False Answer: b) False Explanation: Input transducers are devices which convert non-electrical quantity to electrical quantity and Inverse transducers are devices which convert electrical quantity to non-electrical quantity.	1M
64	Which of the following cannot act as inverse transducer? a) Quartz b) Barium titanate c) Lead zirconate d) Cadmium Answer: d) Cadmium Explanation: Quartz, Barium titanate and Lead zirconate are piezo electrical substances which are known for its ability to act as inverse transducers.	1M
65	Which type of transducer requires energy to be put into it in order to translate changes due to the measurand? a) active transducers b) passive transducers c) powered transducers d) local transducers Answer: b) passive transducers Explanation: Passive transducers are transducers that require energy to translate changes due to the measurand. Active transducers convert one form of energy directly into another. For example photovolatic cell in which light energy is converted into electrical energy.	1M

66	Active transducers work on the principle of _____ a) energy conversion b) mass conversion c) energy alteration d) volume conversion Answer: a) energy conversion Explanation: Active transducers work on the principle of energy conversion. They convert one form of energy to another. They don't require any power to operate.	1M
67	Accuracy is _____ a) ability of the transducer or sensor to see small differences in reading b) ability of the transducer or sensor to see small differences in reading c) algebraic difference between the indicated value and the true or theoretical value of the measurand d) total operating range of the transducer Answer: c) algebraic difference between the indicated value and the true or theoretical value of the measurand Explanation: Accuracy describes the algebraic difference between the indicated value and the true or theoretical value of the measurand. Resolution is the ability of the transducer or sensor to see small differences in reading. Precision refers to the degree of repeatability of a measurant.	1M
67	The smallest change in measurant that will result in a measurable change in the transducer output is called _____ a) offset b) linearity c) resolution d) threshold	

	Answer: d) threshold **Explanation: The threshold of the transducer is the smallest change in measurant that will result in a measurable change in the transducer output. Offset is the output that will exist when it should be zero. Linearity shows closeness of a transducer's calibration curve to a specific straight line with in a given percentage of full scale output.**	
68	**Unwanted signal at the output due either to internal sources or to interference is called _____** **a) offset** **b) noise** **c) drift** **d) threshold** **Answer: b) noise** **Explanation: Noise is the unwanted signal at the output due either to internal sources or to interference. Offset is the output that will exist when it should be zero. The threshold of the transducer is the smallest change in measurant that will result in a measurable change in the transducer output.**	**1M**
69	**The ability of the sensor to see small differences in reading is called _____** **a) resolution** **b) drift** **c) offset** **d) linearity** **Answer: a) resolution** **Explanation: The ability of the sensor to see small differences in reading is called the resolution of the sensor. Offset is the output that will exist when it should be zero. Linearity shows closeness os a transducer's calibration curve to a specific straight line with in a given percentage of full scale output.**	**1M**

70	Linearity of transducer is _____ a) Closeness of the transducer's calibration curve to a special curved line within a given percentage of full scale output b) Closeness of the transducer's calibration curve to a special straight line within a given percentage of full scale output c) Closeness of the transducer's calibration curve to a special straight line within a given percentage of half scale output d) Closeness of the transducer's calibration curve to a special curved within a given percentage of half scale output Answer: b) Closeness of the transducer's calibration curve to a special straight line within a given percentage of full scale output Explanation: Linearity of transducer is closeness of the transducer's calibration curve to a special straight line within a given percentage of full scale output. Basically, it reflects that the output is in some way proportional to the input. A linear sensor produces an output value which is directly proportional to the input.	1M
70	What is the principle behind photoelectric transducers? a) Conversion of wind energy to electrical energy b) conversion of light energy to electrical energy c) conversion of mechanical energy to electrical energy d) conversion of electrical energy to light energy Answer: b) conversion of light energy to electrical energy Explanation: Photoelectric transducers are based on the principle of conversion of light energy into electrical energy. This is done by causing the radiation to fall on a photosensitive element and measuring the electrical current so generated with a sensitive galvanometer directly or after suitable amplification.	1M

71	Which of the following material is used to build photovoltaic cells? a) Selenium b) celenuim c) silicon d) iron Answer: a) selenium Explanation: Photovoltaic or barrier layer cells usually consist of a semiconducting substance, which is generally selenium deposited on a metal base which may be iron and which acts as one of the electrodes. The semiconducting substance is covered with a thin layer of silver or gold deposited by cathodic deposition in a vacuum. This layer acts as a collecting electrode.	1M
78	Photo-diodes work in _____ a) forward biased b) reverse biased c) independent of forward and reverse biasing d) any configuration Answer: b) reverse biased Explanation: The photodiode is a P-N junction semiconductor diode. It always operated in the reversed biased condition. The light is always focused through a glass lens on the junction of the photo diode.	1M
79	Photovoltaic cells need an external electrical supply to function. a) True b) False Answer: b) False Explanation: Photovoltaic cells are very robust in construction, need no external electrical supply and produce a	1M

	photocurrent sometimes stronger than other photosensitive elements. Typical photocurrents produced by these cells are as high as 120 mA/lumen. At constant temperature, the current set up in the cell usually shows a linear relationship with the incident light intensity.	
80	Thermistor is used to measure _____ a) temperature b) pressure c) height d) displacement Answer: a) temperature Explanation: Thermistor is used to measure temperature. It is a temperature transducer. With a change in temperature its resistance changes. Thus its working principle is variable resistance. Thermistors are the oxides of certain metals like manganese, cobalt and nickel which have large negative temperature coefficient, i.e. resistance decreases with increase in temperature.	1M
81	Inverse transducers are also known as _____ a) Open loop transducers b) Closed loop transducers c) Input transducers d) Output transducers Answer: d) Output transducers Explanation: Output transducers are which converts electrical quantity to non-electrical quantity, known as inverse transducers.	1M
82	Inverse transducer is system which converts _____ a) Electrical quantity to non-electrical quantity b) Non-electrical quantity to electrical quantity c) Electrical quantity to electrical quantity itself d) Non- electrical quantity to non-electrical quantity itself	1M

	Answer: a) Electrical quantity to non-electrical quantity **Explanation: Transducers are devices which transfers measurand which will be a non-electrical quantity to electrical quantity. Inverse transducers are the devices operating just opposite to transducers.**	
83	**Which of the following is an inverse transducer _____** **a) Piezoelectric transducer** **b) LVDT** **c) Load cell** **d) Bourdon tube** **Answer: a) Piezoelectric transducer** **Explanation: Piezo electric transducers are devices which are capable of converting electrical quantity to non-electrical quantity, which is an inverse transducer.**	**1M**
84	**Input transducers and inverse transducers are the same.** **a) True** **b) False** **Answer: b) False** **Explanation: Input transducers are devices which convert non-electrical quantity to electrical quantity and Inverse transducers are devices which convert electrical quantity to non-electrical quantity.**	**1M**
85	**Which of the following cannot act as inverse transducer?** **a) Quartz** **b) Barium titanate** **c) Lead zirconate** **d) Cadmium** **Answer: d) Cadmium** **Explanation: Quartz, Barium titanate and Lead zirconate are piezo electrical substances which are known for its ability to act as inverse transducers.**	**1M**

86	Which of the following has the widest range of temperature measurement? a) RTD b) Thermocouple c) Thermistor d) Mercury thermometer Answer: b) Thermocouple Explanation: Thermocouple has the widest range of temperature measurement from -184^{0}C to +2300^{0}C. RTD has a range of -200^{0}C to +850^{0}C. Thermistor has a range of 0^{0}C to 100^{0}C where as conventional mercury thermometers range is -37^{0}C to +356^{0}C.	1M
87	The junction at a higher temperature in thermocouple is termed as measuring junction. a) True b) False Answer: a) True Explanation: The junction at a higher temperature in thermocouple is termed as measuring junction. The junction at lower temperature in the thermocouple is called the reference temperature. The cold junction is usually kept at 0^{0}C.	1M
88	When two wires of different material are joined together at either end, forming two junctions which are maintained at a different temperature, a_____ force is generated. a) thermo-motive b) electro-motive c) chemical reactive d) mechanical	1M

	Answer: a) thermo-motive **Explanation: When two wires of different material are joined together at either end, forming two junctions which are maintained at a different temperature, a thermo-motive force is generated causing a current to flow around the circuit. This arrangement is called thermocouple. The junction at higher temperature in thermocouple is termed as measuring junction. The junction at lower temperature in the thermocouple is called the reference temperature.**	
89	**The junction at a lower temperature in the thermocouple called measuring junction.** **a) True** **b) False** **Answer: b) False** **Explanation: The junction at a lower temperature in the thermocouple is called the reference temperature. The cold junction is usually kept at 0^0C. The junction at a higher temperature in thermocouple is termed as measuring junction.**	**1M**
90	**The lower temperature junction in thermocouple is maintained at _____** **a) -273 K** **b) 0 K** **c) -327 K** **d) 273 K** **Answer: d) 273 K** **Explanation: The lower temperature junction in thermocouple is maintained at 273 K (0^0C). The junction at lower temperature in the thermocouple is called the reference temperature. The junction at higher temperature in thermocouple is termed as measuring junction.**	**1M**

91	RTD stands for _____ a) resistance temperature device b) resistance temperature detector c) reluctance thermal device d) resistive thermal detector Answer: b) resistance temperature detector Explanation: RTD stands for Resistance Temperature Device. It is a passive sensor and requires current excitation to produce an output voltage. RTD has very low temperature coefficient. Voltage drop across RTD is much larger than thermocouple output voltage.	1M
92	Thermister is used to measure _____ a) temperature b) pressure c) height d) displacement Answer: a) temperature Explanation: Thermistor is used to measure temperature. It is a temperature transducer. With a change in temperature its resistance changes. Thus its working principle is variable resistance. Thermistors are the oxides of certain metals like manganese, cobalt and nickel which have large negative temperature coefficient, i.e. resistance decreases with increase in temperature.	1M
93	What is the principle of operation of LVDT? a) Mutual inductance b) Self-inductance c) Permanence d) Reluctance Answer: a) Mutual inductance Explanation: Linear variable differential transformer (LVDT) is a type of transformer used for measuring displacement, and it has the same principle of operation of transformer.	1M

94	Which of the following can be measured using Piezo-electric transducer? a) Velocity b) Displacement c) Force d) Sound Answer: c) Force Explanation: Piezo-electric crystals produces an electric signal when pressure applied. Examples are quartz, Rochelle salt. That is, it converts force into electric signals.	1M
95	Capacitive transducer is used for? a) Static measurement b) Dynamic measurement c) Transient measurement d) Both static and dynamic Answer: b) Dynamic measurement Explanation: Capacitive transducers convert measurant into changes in capacitance. Change in capacitance is caused by change in dielectric or change in distance between plates.	1M
96	Which of the following is used in photo conductive cell? a) Selenium b) Quartz c) Rochelle salt d) Lithium sulphate Answer: a) Selenium Explanation: Photo conductive action is the property of reduction of resistance when exposed to light. Selenium shows photoconductive action.	1M

97	What are transducers? a) They convert power from one form to another b) They convert work from one form to another c) They convert work to power d) They convert energy from one form to another Answer: d) They convert energy from one form to another Explanation: Transducer are devices that convert energy from one form to another. This energy can be either mechanical energy, light energy, heat energy or any other forms of energy.	1M
98	Active transducer do not require any type of additional power source for an operation. a) True b) False Answer: a) True Explanation: Active transducers do not require any additional power source for converting the energy from one form to another as they work on the principle of energy conversion. One such example of active transducer is thermocouple.	1M
99	What type of energy conversion does a piezoelectric transducer perform? a) It converts mechanical energy to sound energy b) It converts sound energy to mechanical energy c) It converts mechanical energy to electrical energy d) It converts electrical energy to mechanical energy Answer: c) It converts mechanical energy to electrical energy Explanation: A piezoelectric transducer converts mechanical energy to electrical energy. They are generally used to detect a knock or any impulsive force. They are also used in electronic drum pads to detect the impulse provided by the drumsticks.	1M

100	**The IC LM35 is used as which type of sensor?** **a) Pressure sensor** **b) Temperature sensor** **c) Light sensor** **d) Mechanical sensor** **Answer: b) Temperature sensor** **Explanation: The LM35 IC manufactured by Texas Instruments is used as a temperature sensor. The output voltage generated by this IC is linearly proportional to the temperature in Centigrade. The output voltage is directly proportional to the temperature.**	**1M**
101	**What is the full form of LVDT with respect to displacement transducer?** **a) Linear variable differential temperature** **b) Linear variable differential transformer** **c) Liquid visible differential transformer** **d) Liquified visible differential transformer** **Answer: b)Linear variable differential transformer** **Explanation: LVDT stands for Linear variable differential transformer. It is a displacement transducer that converts rectilinear motion to electric signals. They are used widely due to their robustness.**	**1M**

102	What is the effect on properties of LDR when light falls on it? a) Its resistance remains same b) Its resistance changes c) Its capacitance changes d) Its inductance changes Answer: b) Its resistance changes Explanation: When light falls on LDR (Light dependent resistor) its resistance changes. It is inversely proportional to the intensity of light. When light falls on LDR, the resistance decreases and more current starts to flow through it. It is used to measure the intensity of light.	1M
103	What is measured by a hall effect transducer? a) Electric flux b) Electric Field c) Magnetic field d) Temperature Answer: c) Magnetic field Explanation: Hall effect transducers or Hall effect sensor is used for measuring the magnitude of the magnetic field. The output voltage produced by the sensor is directly proportional to the strength of the magnetic field passing through it.	1M

Thank You