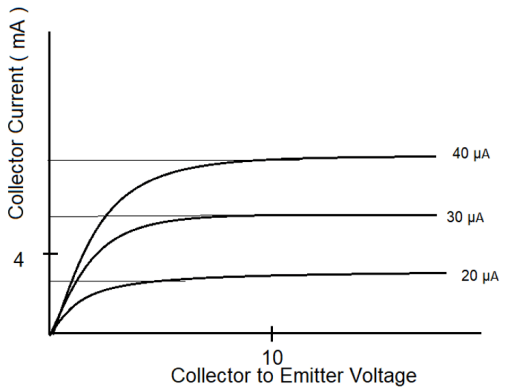
Unit V	Transistors	Marks - 12
S. N.	MSBTE Board Asked Questions	Marks
1.	BJT stands for _____ a) Bi-Junction Transfer b) Blue Junction Transistor c) Bipolar Junction Transistor d) Base Junction Transistor Answer: c) Bipolar Junction Transistor Explanation: BJT stands for Bipolar Junction Transistor. 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: $V_{DS}=V_{DD}-I_D R_D$** **$=>10=12-R_D\times1mA$** **$=>R_D=2/1mA=2$ 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

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