INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	ELECTRONIC DEVICES AND CIRCUITS
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OBJECTIVES:

I	To introduce components such as Diodes, BJT's and FET's.
II	To know the applications of components.
III	To know the switching characteristics of components.
IV	To give the understanding of various types of amplifier circuits.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		MODULE -I DIODE AND APPLICATIONS				
1	Define conductor	A conductor is a material which has very high conductivity. Ex: Copper, Aluminum, Silver.	Remember	CO 1	CLO 1	AECB06.01
2	Define semiconductor	A semiconductor is a material that has its conductivity lies between the insulator and conductor. Ex: Si & Ge.	Remember	CO 1	CLO 1	AECB06.01
3	What is an insulator	An insulator is a material that offers a very low level of conductivity when voltage is applied. Ex: Wood, Glass.	Remember	CO 1	CLO 1	AECB06.01
4	Define Electronics	The branch of engineering which deals with conduction of current through vacuum or gas or a semiconductor.	Remember	CO 1	CLO 1	AECB06.01
5	Define conductivity	Conductivity is the ability of a metal to conduct electricity when a potential difference (Voltage) is applied.	Remember	CO 1	CLO 1	AECB06.01
6	Define Intrinsic	A pure form of semiconductor is called	Remember	CO 1	CLO 1	AECB06.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	Semiconductor	as intrinsic semiconductor. Ex: Si and Ge				
7	Define Extrinsic Semiconductor	The current conduction capability of intrinsic semiconductor can be increased significantly by adding a small amount of impurity to the intrinsic semiconductor.	Remember	CO 1	CLO 1	AECB06.01
8	Define Diode	A p-n junction diode is a basic semiconductor device that controls the flow of electric current in a circuit.	Understand	CO 1	CLO 1	AECB06.01
9	What is Static resistance?	The resistance of a diode at a particular operating point is called the dc or static resistance diode. $R_D = V_D/I_D$	Understand	CO 1	CLO 2	AECB06.02
10	What is Dynamic resistance?	The ac resistance is determined by a straight line drawn between the two intersections of the maximum and minimum values of input voltage. $r_d = \Delta V_D / \Delta I_D$	Understand	CO 1	CLO 2	AECB06.02
11	Define voltage	Potential difference in charge between two points in an electrical field. The unit of voltage is Volt (V).	Remember	CO 1	CLO 1	AECB06.01
12	Define Drift current?	Drift current is the electric current, or movement of charge carriers, which is due to the applied electric field, often stated as the electromotive force over a given distance.	Remember	CO 1	CLO 1	AECB06.01
13	Define Diffusion current.	Diffusion Current is a current in a semiconductor caused by the diffusion of charge carriers (holes and/or electrons). This is the current which is due to the transport of charges occurring because of non-uniform concentration of charged particles in a semiconductor.	Remember	CO 1	CLO 1	AECB06.01
14	What is Capacitance?	Capacitance is the ability of a component or circuit to collect and store energy in the form of an electrical charge.	Understand	CO 1	CLO 1	AECB06.01
15	Define Diffusion capacitance	Diffusion Capacitance is the capacitance due to transport of charge carriers between two terminals of a device. $C_D = dQ / dV$	Remember	CO 1	CLO 2	AECB06.02
16	Define circuit	Circuit comes from the word circle. A circuit is a collection of real components, power sources, and signal sources, all connected so current can flow in a complete circle.	Remember	CO 1	CLO 1	AECB06.01
17	Define Transition capacitance	The amount of capacitance changed with increase in voltage is called transition capacitance. $C_T = dQ / dV$	Remember	CO 1	CLO 2	AECB06.02
18	What is load line?	A load line is a line drawn on the characteristic curve, a graph of the current vs. voltage in a nonlinear device like a diode.	Understand	CO 1	CLO 1	AECB06.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
19	Define storage time	The time period for which the diode remains in the conduction state even in the reverse biased state, is called as Storage time.	Remember	CO 1	CLO 3	AECB06.03
20	Define transition time	The time elapsed in returning back to the state of non-conduction, i.e. steady state reverse bias, is called Transition time.	Remember	CO 1	CLO 3	AECB06.03
21	Define forward recovery time	The time required for the diode to change from reverse bias to forward bias is called as Forward recovery time.	Remember	CO 1	CLO 3	AECB06.03
22	Define current	Current is a flow of electrical charge carriers, usually electrons or electron-deficient atoms.	Remember	CO 1	CLO 1	AECB06.01
23	Define Resistance	The opposition offered to the flow of electrons.	Remember	CO 1	CLO 1	AECB06.01
24	Define reverse recovery time	The time required for the diode to change from forward bias to reverse bias is called as Reverse recovery time.	Remember	CO 1	CLO 3	AECB06.03
25	What is a rectifier?	A circuit that converts ac voltage of main supply into pulsating dc voltage using one or more PN junction diodes is called rectifier.	Understand	CO 1	CLO 4	AECB06.04
26	Define PIV	Peak inverse voltage (PIV) or peak reverse voltage (PRV) is the maximum value of reverse voltage which occurs at the peak of the input cycle when the diode is reverse-biased.	Remember	CO 1	CLO 4	AECB06.04
27	Define ripple factor	The ratio of the root mean square (rms) value of the ripple voltage to the absolute value of the DC component of the output voltage.	Remember	CO 1	CLO 4	AECB06.04
28	Define efficiency	Efficiency signifies a level of performance that describes using the least amount of input to achieve the highest amount of output.	Remember	CO 1	CLO 4	AECB06.04
29	Define Clipper	Clipper circuits, also called limiter circuits, are used to eliminate portion of a signal that are above or below a specified level – clip value.	Remember	CO 1	CLO 5	AECB06.05
30	What is biased clipper?	A biased clipper is a clipper when a small portion of positive or negative half cycles of the signal voltage is to be removed	Understand	CO 1	CLO 5	AECB06.05
31	Define electronic circuit	An electronic circuit is composed of individual electronic components such as resistors, transistors, capacitors, inductors and diodes.	Remember	CO 1	CLO 1	AECB06.01
32	Define cut-in voltage.	The forward voltage at which the current through the junction starts increasing rapidly, is called the knee-voltage or cut-in voltage.	Remember	CO 1	CLO 1	AECB06.01
33	Define Clamper	A circuit which adds DC value to an AC wave form without changing its	Remember	CO 1	CLO 5	AECB06.05

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		waveform.				
34	What is positive clamper	In positive clamper diode is forward biased and current flow is maximum.	Understand	CO 1	CLO 5	AECB06.05
35	What is negative clamper	In negative clamper capacitor negatively charged and the output is double of the input of the negative side.	Understand	CO 1	CLO 5	AECB06.05
36	What is clamping circuit theorem?	The ratio of the area under the output voltage curve in the forward direction to that in the reverse direction is equal to the ratio R_f/R.	Understand	CO 1	CLO 5	AECB06.05
37	Define comparator	An amplitude comparator is a circuit that compares two different signals.	Remember	CO 1	CLO 5	AECB06.05
38	What is regenerative comparator?	Regenerative comparator is a circuit that uses positive feedback.	Understand	CO 1	CLO 5	AECB06.05
39	What is non regenerative comparator?	Non regenerative comparator is a circuit that uses negative feedback.	Understand	CO 1	CLO 5	AECB06.05
40	What is doping?	The process of adding impurities to the intrinsic semiconductor is called as doping.	Understand	CO 1	CLO 1	AECB06.01
MODULE – II BIPOLAR JUNCTION TRANSISTOR (BJT)						
1	What is transistor?	A transistor is a semiconductor device which transfers a weak signal from low resistance (input) circuit to high resistance (output) circuit. The word 'trans' means transfer property and 'istor' means resistance property offered to the junctions.	Understand	CO 2	CLO 6	AECB06.06
2	Define operating point?	The operating point of a device, also known as bias point, quiescent point, or Q-point, is the steady-state DC voltage or current at a specified terminal of an active device such as a transistor with no input signal applied.	Remember	CO 2	CLO 7	AECB06.07
3	What is h-parameter or Hybrid parameter?	Hybrid parameters (also known as h parameters) are known as 'hybrid' parameters as they use Z parameters, Y parameters, voltage ratio, and current ratios to represent the relationship between voltage and current in a two port network. H parameters are useful in describing the input-output characteristics of circuits where it is hard to measure Z or Y parameters (such as a transistor).	Understand	CO 2	CLO 8	AECB06.08
4	Define AC load line?	Whereas the load line drawn under the conditions when an input signal along with the DC voltages are applied, such a line is called as an AC load line.	Remember	CO 2	CLO 7	AECB06.07

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
5	Define DC load line?	The DC load line is the load line of the DC equivalent circuit, defined by reducing the reactive components to zero (replacing capacitors by open circuits and inductors by short circuits). It is used to determine the correct DC operating point, often called the Q point.	Remember	CO 2	CLO 7	AECB06.07
6	Define Active region?	This is also called as linear region. A transistor while in this region, acts better as an Amplifier. This region lies between saturation and cutoff. The transistor operates in active region when the emitter junction is forward biased and collector junction is reverse biased.	Remember	CO 2	CLO 6	AECB06.06
7	Define saturation region?	A transistor in saturation mode acts like a short circuit between collector and emitter. In saturation mode both of the "diodes" in the transistor are forward biased.	Remember	CO 2	CLO 6	AECB06.06
8	Define cutoff region?	In cutoff condition emitter current is zero and the collector current consists of small reverse saturation currents. In cutoff mode both of the "diodes" in the transistor are reverse biased.	Remember	CO 2	CLO 6	AECB06.06
9	What is forward current gain h_{fe}?	The forward current gain for the common-emitter configuration is defined as the change in collector current divided by the change in base current when the collector to emitter voltage is constant.	Understand	CO 2	CLO 9	AECB06.09
10	Define input impedance h_{ie}?	It is the ratio of input voltage to input current with output shortened. In common emitter configuration it is the ratio of base emitter voltage to base current.	Remember	CO 2	CLO 9	AECB06.09
11	Define reverse voltage gain h_{re}?	It is the ratio of input voltage to output voltage with input open circuited. In common emitter configuration it is the ratio of base emitter voltage to collector emitter voltage with base current zero.	Remember	CO 2	CLO 9	AECB06.09
12	Define output impedance h_{oe}?	It is the ratio of output current to output voltage with input open. In common emitter configuration it is the ratio of collector current to collector emitter voltage with base current zero.	Remember	CO 2	CLO 9	AECB06.09
13	Define Stability factor?	The stability factor is the rate of change of collector current with respect to the reverse saturation current when the collector-emitter current gain (β) and base current is constant. The stability factor can be expressed as $S= dI_C / dI_{co}$.	Understand	CO 2	CLO 11	AECB06.11

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
14	What are the advantages of h-parameter model?	Hybrid method has following advantages: 1. The value of circuit components are easily available., 2. Procedure following is quite simple and easy to understand.	Remember	CO 2	CLO 12	AECB06.12
15	What is BJT?	Bipolar Junction Transistor (BJT) is a Semiconductor device constructed with three doped Semiconductor Regions (Base, Collector and Emitter) separated by two p-n Junctions.	Remember	CO 2	CLO 7	AECB06.07
16	Explain the breakdown voltage in transistor?	In PN junction a very small amount of current , called reverse saturation current is flowing in reverse biased condition. This current is due to the movement of minority carriers across the junction and is independent of the applied reverse voltage. If the reverse bias is increased to a large value, the current through the junction increases abruptly. This abrupt increased voltage is known as breakdown voltage.	Remember	CO 2	CLO 7	AECB06.07
17	Define transistor current?	In NPN transistor the direction of a conventional current is same as that of a hole current in PNP transistor. $I_E = I_B + I_C$. since base current is very small, therefore $I_E \approx I_C$.	Understand	CO 2	CLO 7	AECB06.07
18	Define early effect or Base width modulation?	The variation in the effective width of the base in a bipolar junction transistor (BJT) due to a variation in the applied base-to-collector voltage.	Remember	CO 2	CLO 6	AECB06.06
19	Define current amplification factor?	Current Amplification Factor. Current amplification factor in a BJT transistor is defined as the ratio of output current to its input current. In a common base configuration, current amplification factor is the ratio of collector current to the emitter current. $\alpha = Ic / Ie$.	Remember	CO 2	CLO 6	AECB06.06
20	Explain about transistor an amplifier?	In a transistor, the input PN junction is forward biased and output junction is in reverse bias then it acts as an amplifier. That means the transistor must be operated in active region.	Remember	CO 2	CLO 13	AECB06.13
21	Explain how transistor acts as a switch?	In a transistor, unless a current flows in the base circuit, there is no current can flow in the collector circuit. This property will allow a transistor to be used as a switch.	Understand	CO 2	CLO 11	AECB06.11
22	What are the various regions in a transistor?	In bipolar junction transistor, there are three different regions : 1.Cutoff region 2. Active region 3. Saturation region.	Understand	CO 2	CLO 7	AECB06.07

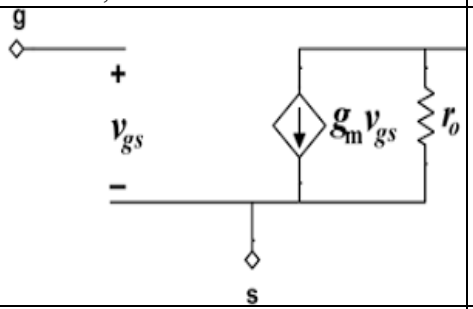
S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
23	Write the relation between I_c , I_b, β, I_{co} in BJT?	The total collector current is $I_c = \beta I_b + (1+\beta) I_{co}$	Remember	CO 2	CLO 7	AECB06.07
24	Describe various components in a BJT?	The bipolar junction transistor has three terminals Emiter, Base and Collector	Remember	CO 2	CLO 7	AECB06.07
25	Define base spreading resistance?	In common emitter configuration the width of the base region is extremely small. The resistance offered by this narrow path region is called base spreading resistance. The value of base spreading resistance ($r_b^{'}$) is about 50 to 150 ohms.	Understand	CO 2	CLO 7	AECB06.07
26	Define leakage current in a transistor?	The leakage current is due to the minority charge carriers, flowing in the transistor. It flows in the same direction as the current due to the majority charge carriers.	Remember	CO 2	CLO 11	AECB06.11
27	Define Avalanche breakdown in a transistor?	Due to the increase in the reverse voltage, increase the amount of energy imparted to minority carriers, as they diffuse across the junction. As the reverse voltage is increased, further, the minority carriers acquire a large amount of energy. As the result of this, the reverse current increases rapidly. This cumulative process of carrier generation is known as avalanche multiplication or avalanche breakdown.	Remember	CO 2	CLO 7	AECB06.07
28	Write the relation between the current gain α and β?	We know that emitter current I_E of a transistor is the sum of its base current I_B and collector current I_C i.e., $I_E = I_B + I_C$. Dividing above equation on both sides by I_C,$I_E / I_C = (I_B/I_C) + 1$ $\alpha = I_C/I_E$, $\beta = I_C/I_B$, $\alpha=\beta/(1+\beta)$ the above expression may be written as $\beta=\alpha/(1-\alpha)$.	Remember	CO 2	CLO 7	AECB06.07
29	What is NPN transistor?	Bipolar junction transistor formed by sandwiching P-type semiconductor layer in between two N-type semiconductor layers.	Remember	CO 2	CLO 7	AECB06.07
30	What is PNP transistor?	Bipolar junction transistor formed by sandwiching N-type semiconductor layer in between two P-type semiconductor layers.	Remember	CO 2	CLO 7	AECB06.07
31	Define forward current gain h_{fb}.	The forward current gain for the common-base configuration is defined as the change in collector current divided by the change in emitter current when the base-to-collector voltage is constant.	Remember	CO 2	CLO 7	AECB06.07
32	Define input impedance h_{ib}	It is the ratio of input voltage to input current with output shortened. In	Remember	CO 2	CLO 10	AECB06.10

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		common base configuration it is the ratio of emitter base voltage to emitter current.				
33	Define reverse voltage gain $h_{rb.}$	It is the ratio of input voltage to output voltage with input open circuited. In common base configuration it is the ratio of emitter base voltage to collector base voltage with emitter current zero.	Remember	CO 2	CLO 10	AECB06.10
34	Define output impedance $h_{ob.}$	It is the ratio of output current to output voltage with input open. In common base configuration it is the ratio of collector current to collector base voltage with base current zero.	Remember	CO 2	CLO 10	AECB06.10
35	Defin forward current gain $h_{fc.}$	The forward current gain for the common-collector configuration is defined as the change in emitter current divided by the change in base current when the emitter-to-collector voltage is constant.	Remember	CO 2	CLO 10	AECB06.10
36	Define input impedance $h_{ic.}$	It is the ratio of input voltage to input current with output shortened. In common collector configuration it is the ratio of base collector voltage to base current.	Remember	CO 2	CLO 10	AECB06.10
37	Define reverse voltage gain $h_{rc.}$	It is the ratio of input voltage to output voltage with input open circuited. In common collector configuration it is the ratio of base collector voltage to emitter collector voltage with base current zero.	Remember	CO 2	CLO 10	AECB06.10
38	Define output impedance $h_{oc.}$	It is the ratio of output current to output voltage with input open. In common collector configuration it is the ratio of emitter current to emitter collector voltage with base current zero.	Remember	CO 2	CLO 10	AECB06.10
39	What is input characteristic of BJT?	Curve that give the relationship between the input current and input voltage for a given output voltage for a given input current of a transistor.	Remember	CO 2	CLO 8	AECB06.08
40	What is output characteristic of BJT?	Curve that give the relationship between the output current and output voltage for a given input current of a transistor.	Remember	CO 2	CLO 8	AECB06.08
		MODULE – III TRANSISTOR BIASING AND STABILIZATION				
1	What is an amplifier?	An amplifier is an electronic device that increases the voltage, current, or power of a signal. Amplifiers are used in wireless communications and broadcasting, and in audio equipment of all kinds.	Understand	CO 3	CLO 13	AECB06.13
2	What is voltage gain?	Voltage gain is term related to amplifier capacity, amplifier amplify the amplitude of signal it means convert Vin (low) to Vout(high) . It is ratio of this	Understand	CO 3	CLO 14	AECB06.14

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		output to input is called voltage gain.				
3	What is bypass capacitor	A bypass capacitor is a capacitor that shorts AC signals to ground, so that any AC noise that may be present on a DC signal is removed, producing a much cleaner and pure DC signal.	Understand	CO 3	CLO 15	AECB06.15
4	What is coupling capacitor	A coupling capacitor is a capacitor which is used to couple or link together only the AC signal from one circuit element to another. The capacitor blocks the DC signal from entering the second element and, thus, only passes the AC signal.	Understand	CO 3	CLO 15	AECB06.15
5	Define cutoff frequency	The cutoff frequency by definition is the half-power frequency and is the frequency where the power gain is half at a mid-band frequency – i.e. between the lower and upper cutoff frequencies where frequency effects can be ignored.	Remember	CO 3	CLO 15	AECB06.15
6	Define current gain	Current gain of an amplifier is defined as the ratio of output current to input current	Understand	CO 3	CLO 14	AECB06.14
7	Define common base amplifier	A single transistor BJT amplifier in which the input signal is applied to the emitter terminal, the output is taken from the collector terminal, and the base terminal is connected to a constant voltage.	Understand	CO 3	CLO 14	AECB06.14
8	Define common collector amplifier	A single transistor BJT amplifier in which the input signal is applied to the base terminal, the output is taken from the emitter terminal, and the collector terminal is connected to a constant voltage.	Remember	CO 3	CLO 14	AECB06.14
9	What is common emitter?	a basic transistor amplifier stage whose emitter is common to both input and output loops. It amplifies voltage, current, and hence power.	Remember	CO 3	CLO 14	AECB06.14
10	Define common emitter amplifier	a single transistor BJT amplifier in which the input signal is applied to the base terminal, the output is taken from the collector terminal, and the emitter terminal is connected to a constant voltage.	Remember	CO 3	CLO 10	AECB06.10
11	Define biasing	The technique of applying a direct current voltage to a transistor or an active network to establish the desired operating point.	Remember	CO 3	CLO 11	AECB06.11
12	What is Thermal runaway?	The self-destruction of an unstabilised transistor is known as thermal runaway.	Understand	CO 3	CLO 11	AECB06.11
13	Why CE configuration is	The current, voltage and power gains are quite high and the ratio of output	Understand	CO 3	CLO 11	AECB06.11

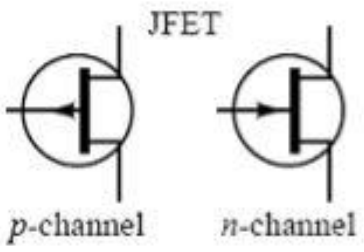
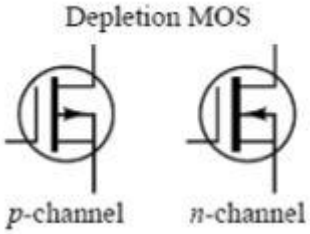
S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	most popular in amplifier circuits?	impedance and input impedance are quite moderate.				
14	Define base bias with collector feedback.	A transistor biasing circuit in which base resistor is connected between base and collector to act as a feedback resistor.	Remember	CO 3	CLO 11	AECB06.11
15	Define base bias with emitter feedback.	A transistor biasing circuit in which emitter resistor is connected to control base current acting as a feedback.	Remember	CO 3	CLO 11	AECB06.11
16	Define self-bias or voltage divider bias.	A transistor biasing circuit in which the biasing voltage for base is supplied by a voltage divider resistor circuit.	Remember	CO 3	CLO 11	AECB06.11
17	Define stability factor S.	Rate of change of collector current with respect to the reverse saturation current keeping the common emitter current gain and base current as constant.	Remember	CO 3	CLO 11	AECB06.11
18	Define stability factor S'.	Rate of change of collector current with respect to the base current keeping the common emitter current gain and reverse saturation current as constant.	Remember	CO 3	CLO 11	AECB06.11
19	Define stability factor S''.	Rate of change of collector current with respect to the common emitter current gain keeping the base current and reverse saturation current as constant.	Remember	CO 3	CLO 11	AECB06.11
20	Define compensation technique.	The use of temperature sensitive devices such as diodes, thermistors, sensistors etc instead of d.c. biasing circuits to stabilize the Q-point is called compensation.	Remember	CO 3	CLO 11	AECB06.11
21	Define linear amplifier.	A linear amplifier provides amplification of a signal without any distortion so that the output signal is an exact amplified replica of the input signal.	Remember	CO 3	CLO 12	AECB06.12
22	Define a.c analysis.	Analyzing the ac signal operation of an amplifier with an ac equivalent circuit by short circuiting d.c sources and capacitors.	Remember	CO 3	CLO 13	AECB06.13
23	Define attenuation.	Attenuation is the reduction in signal voltage as it passes through a circuit and corresponds to a gain of less than 1.	Remember	CO 3	CLO 13	AECB06.13
24	Define load current.	A load current is the amount of current drawn from the output of an amplifier or other circuit through a load resistance.	Remember	CO 3	CLO 11	AECB06.11
25	Define stability.	Stability is a measure of how well an amplifier maintains its design values over changes in temperature or for a transistor with a different β.	Remember	CO 3	CLO 11	AECB06.11
26	Define power gain.	The overall power gain is the product of the overall voltage gain (Av 9) and the overall current gain (Ai).	Remember	CO 3	CLO 11	AECB06.11

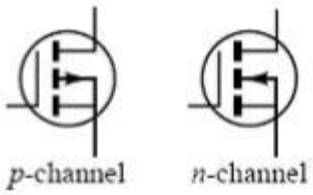
S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
27	Define decibel.	A logarithmic measure of the ratio of one voltage to another or one power to another.	Remember	CO 3	CLO 11	AECB06.11
28	Define ac ground.	A point in a circuit that appears as ground to ac signals only.	Remember	CO 3	CLO 12	AECB06.12
29	Define Voltage Amplifiers	The amplifier circuit that increases the voltage level of the input signal, is called as Voltage amplifier.	Remember	CO 3	CLO 13	AECB06.13
30	Define Power Amplifiers.	The amplifier circuit that increases the power level of the input signal, is called as Power amplifier.	Remember	CO 3	CLO 13	AECB06.13
31	Define Small signal Amplifiers.	When the input signal is so weak so as to produce small fluctuations in the collector current compared to its quiescent value, the amplifier is known as Small signal amplifier.	Remember	CO 3	CLO 12	AECB06.12
32	What is Purpose of the DC biasing circuit?	To turn the device "ON" and to place it in operation in the region of its characteristic where the device operates most linearly, i.e. to set up the initial dc values of IB, IC, and VCE	Remember	CO 3	CLO 11	AECB06.11
33	Define frequency response of an amplifier.	It is a measure of magnitude and phase of the output as a function of frequency, in comparison to the input.	Remember	CO 3	CLO 12	AECB06.12
34	Define Bandwidth	The difference between lower and upper cutoff frequencies.	Remember	CO 3	CLO 13	AECB06.13
35	Define d.c analysis.	Analyze d.c operation by drawing dc equivalent circuit by replacing all capacitors by open circuits and inductors by short circuits and find Q-point from dc equivalent circuit by using appropriate large-signal transistor model.	Remember	CO 3	CLO 13	AECB06.13
36	Define inverting amplifier.	Inverting voltage amplifier is the circuit which produces an output signal which is an inversion of input like Common emitter or Common source amplifier.	Remember	CO 3	CLO 12	AECB06.12
37	Define current follower.	A current follower is a circuit designed to copy a current through one active device by controlling the current in another active device of a circuit, keeping the output current constant regardless of loading like Common base or Common gate .	Remember	CO 3	CLO 12	AECB06.12
38	Define voltage follower.	A voltage follower also called a unity-gain amplifier, a buffer amplifier, and an isolation amplifier is a circuit which has a voltage gain of 1 like Common collector or Common drain amplifier.	Remember	CO 3	CLO 11	AECB06.11
39	Define Stabilization technique.	It refers to the use of resistive biasing circuits which allow IB to vary so as to keep IC relatively constant with variations in ICO, β and VBE.	Remember	CO 3	CLO 13	AECB06.13

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
40	Define stability factor	It is defined as the degree of change in operating point due to variation in temperature.	Remember	CO 3	CLO 13	AECB06.13
MODULE – IV JUNCTION FIELD EFFECT TRANSISTOR						
1	Why FET is called as "Voltage operated device"?	The voltage applied between gate and source (VGS) controls the drain current i_d Therefore, FET is a voltage controlled device	Understand	CO 4	CLO 16	AECB06.16
2	Why it is called field effect transistor?	The drain current i_d of the transistor is controlled by the electric field that extends into the channel due to reverse biased voltage applied to the gate, hence this device has been given the name Field Effect Transistor.	Understand	CO 4	CLO 16	AECB06.16
3	Define the term threshold voltage.	The threshold voltage, commonly abbreviated as V_{th}, of a field-effect transistor (FET) is the value of the gate–source voltage when the conducting channel just begins to connect the source and drain contacts of the transistor, allowing significant current.	Remember	CO 4	CLO 17	AECB06.17
4	Define body bias voltage	Body bias is the voltage at which the body terminal (4th terminal of mos) is connected. Body effect occurs when body or substrate of transistor is not biased at same level as that of source.	Remember	CO 4	CLO 20	AECB06.20
5	What are the pa rameters in threshold voltage?	Threshold voltage depends on Gate material, Gate insulator material, insulator thickness, Channel doping, voltage between source and substrate and temperature.	Understand	CO 4	CLO 20	AECB06.20
6	Why FET is known as unipolar device?	All FETs can be called UNIPOLAR devices because the charge carriers that carry the current through the device are all of the same type i.e. either holes or electrons, but not both.	Understand	CO 4	CLO 17	AECB06.17
7	Give small signal model of JEFT		Understand	CO 4	CLO 21	AECB06.21
8	Give the interrelationshi p between μ , gm and rd.	Amplification factor = drain resistance * Transconductance μ = rd * gm	Understand	CO 4	CLO 18	AECB06.18
9	Why the input impedance of	The input impedance of FET is more than that of a BJT because the input	Understand	CO 4	CLO 18	AECB06.18

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	FET is more than that of a BJT?	circuit of FET is reverse biased whereas the input circuit of BJT is forward biased.				
10	Why NMOS technology is preferred more than PMOS technology?	NMOS is faster than PMOS as mobility of carriers (electrons) in NMOS greater than that of holes in PMOS.	Understand	CO 4	CLO 20	AECB06.20
11	What is body ef fect?	Body effect refers to the change in the transistor threshold voltage (VT) resulting from a voltage difference between the transistor source and body. Because the voltage difference between the source and body affects the VT, the body can be thought of as a second gate that helps determine how the transistor turns on and off.	Understand	CO 4	CLO 20	AECB06.20
12	Define pinch off voltage of a FET	It is the voltage at which the channel is pinched off, i.e. all the free charge from the channel get removed. At Pinch-off voltage VP the drain current becomes constant.	Remember	CO 4	CLO 17	AECB06.17
13	Mention the disadvantages of FET compared to BJT.	1. FET is a voltage controlled device 2. Less sensitivity to changes in applied voltage	Understand	CO 4	CLO 18	AECB06.18
14	Define I_{DSS}.	The maximum possible current with V_{GS} held at 0 V	Remember	CO 4	CLO 17	AECB06.17
15	What is Field-Effect Transistor?	Field-Effect Transistor: A transistor in which the voltage on one terminal (the gate) creates a field that allows or disallows conduction between the other two terminals (the source and drain).	Understand	CO 4	CLO 17	AECB06.17
16	What is Ohmic Region?	When $V_{GS} = 0$ the depletion layer of the channel is very small and the JFET acts like a voltage controlled resistor.	Understand	CO 4	CLO 17	AECB06.17
17	What is Cut-off Region?	This is also known as the pinch-off region were the Gate voltage, V_{GS} is sufficient to cause the JFET to act as an open circuit as the channel resistance is at maximum.	Understand	CO 4	CLO 17	AECB06.17
18	What is Saturation or Active Region?	The JFET becomes a good conductor and is controlled by the Gate-Source voltage, (V_{GS}) while the Drain-Source voltage, (V_{DS}) has little or no effect.	Understand	CO 4	CLO 17	AECB06.17
19	What is Breakdown Region?	The voltage between the Drain and the Source, (V_{DS}) is high enough to causes the JFET's resistive channel to break down and pass uncontrolled maximum current.	Understand	CO 4	CLO 18	AECB06.18

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
20	Write the Drain current in the active region	$I_D = I_{DSS}\left[1-\frac{V_{GS}}{V_P}\right]^2$	Understand	CO 4	CLO 18	AECB06.18
21	Write the expression for Drain-Source Channel Resistance	$R_{DS} = \frac{\Delta V_{DS}}{\Delta I_D} = \frac{1}{g_m}$	Understand	CO 4	CLO 18	AECB06.18
22	What is the significance of source terminal in FET?	It is there terminal where the majority carriers enter in to JFET bar. As for the FET bar concern this terminal is the source of majority carriers so it is called as source terminal and the current flow in this terminal is Is.	Understand	CO 4	CLO 17	AECB06.17
23	Define noise figure	The noise figure for field-effect transistors is normally specified on the data sheet as "spot noise", the noise at a particular frequency. The noise figure will vary with frequency and also with the resistance at the input of the device.	Remember	CO 4	CLO 19	AECB06.19
24	What is Gate Leakage Current?	GSS — the reverse-bias gate-to-source current with the drain shorted to the source. Because the leakage current across a reverse-biased p-n junction (in the case of a JFET) and across a capacitor (in the case of a MOSFET) is very small, the input resistance is extremely high.	Understand	CO 4	CLO 20	AECB06.20
25	What is the significance of drain terminal in FET?	This terminal is the end terminal which collects the majority carriers sourced by the source. I.e. it is draining the majority carriers from FET bar and giving to the output terminal so it is called as drain terminal and the current in drain is Id.	Understand	CO 4	CLO 16	AECB06.16
26	What is $V_{GS(off)}$ in a FET?	Value of V_{GS} that completely pinches – off the current to zero. Magnitude of the two is same i.e. $\|\boldsymbol{V}_{GS(off)}\| = \|\boldsymbol{V}_P\|$	Understand	CO 4	CLO 18	AECB06.18
27	Define MOSFET capacitors	The oxide layer below the Gate terminal is a very good insulator, it contributes to an oxide capacitance in the circuit. The capacitance of MOS capacitor changes its value with the variation in Gate voltage. This is because application of gate voltage results in band bending in silicon substrate and hence variation in charge concentration at Si-SiO2 interface.	Remember	CO 4	CLO 20	AECB06.20
28	What is CMOS stands for?	CMOS stands for complementary MOS	Understand	CO 4	CLO 20	AECB06.20

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
29	Mention the operating modes of MOSFET.	The two operating modes are 1) Depletion Mode 2) Enhancement Mode	Understand	CO 4	CLO 20	AECB06.20
30	What is meant by gate source threshold voltage of a FET?	The voltage at which the channel is completely cut off and the drain current becomes zero is called as gate source threshold voltage. Also called as VGS(off).	Understand	CO 4	CLO 19	AECB06.19
31	What is the significance of gate terminal in FET?	This important control element in FET as it acts like gate to the majority carriers flow. I.e. by operating the gate terminal voltage opening or closing of majority carries can be obtained, so this terminal called Gate terminal and the current in gate is Ig.	Understand	CO 4	CLO 18	AECB06.18
32	What are the operating regions of a JFET?	The operating regions of a JFET are 1. Ohmic region 2. Pinch-off region 3. Breakdown region	Understand	CO 4	CLO 17	AECB06.17
33	Define the amplification factor in the JFET	Amplification factor (μ) is the negative of rate of change of drain voltage vDS with gate voltage VGS with keeping ID constant. Thus, $\mu \equiv \Delta vDS / \Delta vGS$	Remember	CO 4	CLO 21	AECB06.21
34	Why the input impedance in FET is very high in comparison with BJT?	JFET have very high input impedance because of the reverse biased Gate-Source pn-junction.	Understand	CO 4	CLO 18	AECB06.18
35	Why is FET preferred as a Buffer Amplifier?	FET is used as a buffer in measuring instruments, receivers since it has high input impedance and low output impedance.	Understand	CO 4	CLO 19	AECB06.19
36	Draw the symbol for i) P-channel JFET, ii) N-channel JFET		Understand	CO 4	CLO 17	AECB06.17
37	Draw the symbol for i) P-channel depletion MOSFET ii) N-channel depletion MOSFET		Understand	CO 4	CLO 20	AECB06.20

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
38	Draw the symbol for (i) P-channel enhancement MOSFET ii) N-channel enhancement MOSFET	Enhancement MOS 	Understand	CO 4	CLO 20	AECB06.20
39	What are the parameters of JFET?	1. AC drain resistance rd 2. Transconduction gm 3. Amplification factor μ	Understand	CO 4	CLO 16	AECB06.16
40	List the advantages of FET	1. Input impedance is very high. 2. Exhibits high input resistance 3. Less noisy 4. Exhibits zero offset value at zero drain current 5. Simpler to fabricate	Understand	CO 4	CLO 16	AECB06.16
		MODULE – V FET AMPLIFIERS				
1	What is JFET amplifier?	FET amplifiers provide an excellent voltage gain with the added advantage of high input impedance.	Understand	CO 5	CLO 21	AECB06.21
2	Define trans conductance-g_m.	It is defined as the ratio of change in drain current to the change in gate to source voltage.	Remember	CO 5	CLO 21	AECB06.21
3	Define drain resistance-r_d	It is defined as the change in drain to source voltage to the change in drain current at a constant gate to source voltage.	Remember	CO 5	CLO 21	AECB06.21
4	Define common source amplifier.	A common-source amplifier is one of three basic single-stage field-effect transistor (FET) amplifier topologies, typically used as a voltage or transconductance amplifier in which souce terminal is made common to input and output terminals.	Remember	CO 5	CLO 22	AECB06.22
5	Define common drain amplifier.	A common-drain amplifier, also known as a source follower, is one of three basic single-stage field effect transistor (FET) amplifier topologies, typically used as a voltage buffer in which drain terminal is made common to input (Gate) and output terminals(Source).	Remember	CO 5	CLO 22	AECB06.22
6	Define common gate amplifier.	A common-gate amplifier is one of three basic single-stage field-effect transistor (FET) amplifier topologies, typically used as a current buffer or voltage amplifier in which gate terminal is made common to input (source) and output terminals (drain).	Remember	CO 5	CLO 22	AECB06.22
7	Define current gain for common drain	It is defined as the ratio of output source current to the input gate current. $A_I=I_S/I_G=\infty$	Remember	CO 5	CLO 22	AECB06.22

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	amplifier					
8	Define voltage gain for common drain amplifier	It is defined as the ratio of output source to drain voltage to the input gate to drain voltage. $A_V=V_{SD}/V_{GD}=1$.	Remember	CO 5	CLO 22	AECB06.22
9	Define input impendence for common drain amplifier	It is defined as the ratio of input gate to drain voltage to the input gate current. $R_{in}=V_{GD}/I_G=\infty$.	Remember	CO 5	CLO 22	AECB06.22
10	Define output impendence for common drain amplifier	It is defined as the ratio of output source to drain voltage to the output source current. $R_{out}=V_{SD}/I_S=1/g_m$.	Remember	CO 5	CLO 22	AECB06.22
11	Define current gain for common souce amplifier	It is defined as the ratio of output drain current to the input gate current. $A_I=I_D/I_G=\infty$	Remember	CO 5	CLO 21	AECB06.21
12	Define voltage gain for common source amplifier	It is defined as the ratio of output drain to source voltage to the input gate to source voltage. $A_V=V_{DS}/V_{GS}=-\frac{g_m R_D}{1+g_m R_S}$.	Remember	CO 5	CLO 21	AECB06.21
13	Define input impendence for common source amplifier	It is defined as the ratio of input gate to source voltage to the input gate current. $R_{in}=V_{GS}/I_G=\infty$.	Remember	CO 5	CLO 21	AECB06.21
14	Define output impendence for common source amplifier	It is defined as the ratio of output drain to source voltage to the output drain current. $R_{out}=V_{DS}/I_D=R_D$.	Remember	CO 5	CLO 21	AECB06.21
15	Define current gain for common gate amplifier	It is defined as the ratio of output drain current to the input source current. $A_I=I_D/I_S$	Remember	CO 5	CLO 21	AECB06.21
16	Define voltage gain for common gate amplifier	It is defined as the ratio of output drain to gate voltage to the input source to gate voltage. $A_V=V_{DG}/V_{SG}$.	Remember	CO 5	CLO 21	AECB06.21
17	Define input impendence for common gate amplifier	It is defined as the ratio of input source to gate voltage to the input drain current. $R_{in}=V_{SG}/I_S$.	Remember	CO 5	CLO 21	AECB06. 21
18	Define output impendence for common gate amplifier	It is defined as the ratio of output drain to gate voltage to the output drain current. $R_{out}=V_{SG}/I_D$.	Remember	CO 5	CLO 21	AECB06.21
19	Define MOSFET.	The MOSFET (Metal Oxide Semiconductor Field Effect Transistor) transistor is a semiconductor device	Remember	CO 5	CLO 23	AECB06.23

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		which is widely used for switching and amplifying electronic signals in the electronic devices.				
20	What is working principle of MOSFET?	The MOSFET works by electronically varying the width of a channel along which charge carriers flow. The charge carriers enter the channel at source and exit via the drain. The width of the channel is controlled by the voltage on an electrode is called gate which is located between source and drain. It is insulated from the channel near an extremely thin layer of metal oxide.	Understand	CO 5	CLO 23	AECB06.23
21	Define depletion mode MOSFET.	When there is no voltage on the gate, the channel shows its maximum conductance. As the voltage on the gate is either positive or negative, the channel conductivity decreases.	Remember	CO 5	CLO 23	AECB06.23
22	Define enhancement mode MOSFET.	When there is no voltage on the gate the device does not conduct. More is the voltage on the gate, the better the device can conduct.	Remember	CO 5	CLO 23	AECB06.23
23	Define P-channel MOSFET.	The P- Channel MOSFET has a P-Channel region between source and drain. The drain and source are heavily doped p+ region and the body or substrate is n-type	Remember	CO 5	CLO 23	AECB06.23
24	Define N-channel MOSFET.	The N-Channel MOSFET has a N-channel region between source and drain. his type of MOSFET the drain and source are heavily doped n+ region and the substrate or body is P- type.	Remember	CO 5	CLO 23	AECB06.23
25	What is zener diode?	A Zener diode is a type of diode that allows current to flow not only from its anode to its cathode, but also in the reverse direction, when the Zener voltage is reached.	Understand	CO 5	CLO 24	AECB06.24
26	What are applications of zener diode?	Zener diodes are widely used to generate low-power stabilized supply rails from a higher voltage and to provide reference voltages for circuits, especially stabilized power supplies. They are also used to protect circuits from overvoltage, especially electrostatic discharge (ESD).	Understand	CO 5	CLO 24	AECB06.24
27	Define voltage regulator.	The function of a regulator is to provide a constant output voltage to a load connected in parallel with it in spite of the ripples in the supply voltage or the variation in the load current and the zener diode will continue to regulate the voltage.	Remember	CO 5	CLO 24	AECB06.24
28	Define zener break down.	When a reverse voltage is applied to a zener diode, it causes a very intense	Remember	CO 5	CLO 24	AECB06.24

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		electric field appear across a narrow depletion region. Such an intense electric field is strong enough to pull some of the valence electrons into the conduction band by breaking their covalent bonds. These electrons become free electrons. A large number of such electrons will constitute a large reverse current and breakdown occurs.				
29	Define avalanche break down.	If the reverse bias applied to zener diode is increased, the minority carriers tend to be accelerated. Therefore kinetic energy associated with them is increases. While travelling, these carriers collide with stationary atoms and carrier will be multiplied and break down occurs.	Remember	CO 5	CLO 24	AECB06.24
30	Define UJT.	A **unijunction transistor** (**UJT**) is a three-lead electronic semiconductor device with only one junction that acts exclusively as an electrically controlled switch.	Remember	CO 5	CLO 25	AECB06.25
31	Define varactor diode.	Varactor diode is a p-n junction diode whose capacitance is varied by varying the reverse voltage. Before going to varactor diode, let's first take a look at the capacitor.	Remember	CO 5	CLO 25	AECB06.25
32	Define SCR.	Silicon controlled rectifier or semiconductor controlled rectifier is a four-layer solid-state current-controlling device.	Remember	CO 5	CLO 25	AECB06.25
33	Define modes of SCR.	There are three modes of operation for an SCR depending upon the biasing given to it: 1. Forward blocking mode (off state) 2. Forward conduction mode (on state) 3. Reverse blocking mode (off state)	Remember	CO 5	CLO 25	AECB06.25
34	Define Forward blocking mode	An SCR can be brought from blocking mode to conduction mode in two ways: Either by increasing the voltage between anode and cathode beyond the breakover voltage, or by applying a positive pulse at the gate.	Remember	CO 5	CLO 25	AECB06.25
35	Define reverse blocking mode	When a negative voltage is applied to the anode and a positive voltage to the cathode, the SCR is in reverse blocking mode, making J1 and J3 reverse biased and J2 forward biased. The device behaves as two reverse-biased diodes connected in series. A small leakage current flows. This is the reverse	Remember	CO 5	CLO 25	AECB06.25

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		blocking mode.				
36	Define applications of SCR.	SCRs are mainly used in devices where the control of high power, possibly coupled with high voltage, is demanded. Their operation makes them suitable for use in medium- to high-voltage AC power control applications, such as lamp dimming, power regulators and motor control.	Remember	CO 5	CLO 25	AECB06.25
37	Define tunnel diode.	Tunnel diode is a highly doped semiconductor device and is used mainly for low voltage high frequency switching applications. It works on the principle of Tunneling effect. It is also called as Esaki diode named after Leo Esaki, who in 1973 received the Nobel Prize in Physics for discovering the electron tunneling effect used in these diodes.	Remember	CO 5	CLO 25	AECB06.25
38	Define tunneling effect.	According to the classical laws of physics a charged particles in order to cross an energy barrier should possess energy at least equal to the energy barrier. Hence the particle will cross the energy barrier if its energy is greater than the barrier .But quantum mechanically there exists non zero probability that the particle with energy less than the energy barrier will cross the barrier as if it tunnels across the barrier. This is called as **Tunneling effect**.	Remember	CO 5	CLO 25	AECB06.25
39	Define negative resistance.	Negative resistance (NR) is a property of some electrical circuits and devices in which an increase in voltage across the device's terminals results in a decrease in electric current through it	Remember	CO 5	CLO 25	AECB06.25
40	What are applications of tunnel diode?	The tunnel diode can be used as an amplifier and as an oscillator for detecting small high-frequency or as a switch. It is a high-frequency component because it gives the very fast responses to the inputs.	Understand	CO 5	CLO 25	AECB06.25

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