(19)

* Draw the circuit diagram of transformer coupled amplifier and Explain its operation?

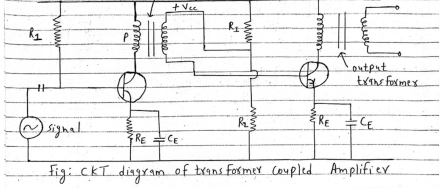


Fig: ckt diagram of transformer coupled Amplifier

↳ The input Impedance of an amplifier is low while it's output impedance is very high.
↳ When they are coupled to make a multi stage amplifier the high output impedance of one stage come in parallel with the low input impedance of next stage. Hence, effective load (R_{ac}) is decreased.

↳ The resistance on the secondary side of a transformer reflected on the primary depend upon the turn ratio of the transformer.

* Operation of Principle.
↳ When an a.c. signal is applied to the base of first transistor it appears in the amplified form across primary "P" of the coupling transformered to the input of the next stage by the secondary transformer.
↳ The next stage renders amplification in an exact similar manner. Amplification in the an exactly similar manner.

(22)

* Explain operation of class 'A' Amplifier?
↳ A simple transistor amplifier that is operated class A is shown in the figure below.
Since, the output signal is a 100% (or 360) copy of the input signal, current in the output circuit must flow for 100% of the input signal time.
This is the definition of a class A amplifier. Amplifier current flows for 100% of the input signal.

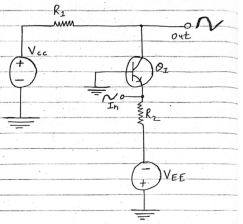


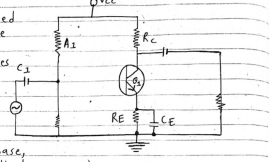
Fig: A simple class A transistor amplifier

↳ The class A amplifier has the characteristics of good Fidelity and low efficiency. Fidelity means that the output signal is just like the input signal in all respects except amplitude. It has the same shape and Frequency.
↳ In some cases, there may be a phase difference between input and output signal (usually 180) but the signal are still considered to be good copies.

* class "c" amplifier.
↳ The output signal most bears very little resemblance to the input signal class 'c' amplifiers are used where the output signal need only be present during parth of one-half of the input signal. Any amplifier that operates on less than 50% of the input signal is operated class 'c'.

(20)

* Explain the Principle of operation of Common Emitter (CE) amplifier. ?
↳ When a signal is applied across the emitter-base Juction. The forward bias across this Juction increases during the upper half cycle.
This lead to an increases in the Flow of electron from the emitter to a collector through the base, hence increases the collector current.
↳ The increases collector current makes more voltage drops across the collector load resistance Rc.
↳ The negative half cycle decrease the forward bias voltage across the emitter base Juction.
↳ The decreases collect base voltage decreases the collector base current in the hole collector Resistance Rc.
↳ Thus, the amplifier load resistor appears across the collector resistor. The Common emitter circuit is shown above.



Ans: Characteristics of common emitter Amplifier.
↳ The voltage gain of common emitter amplifier is medium and also current gain is medium.
↳ The power gain of common emitter circuit is high.
↳ Input/output is having a phase relation of 180°.
↳ Input and output resistance of common emitter amplifier is medium.

(20)

* What is Multiplexer (MUX)? Explain operation of 4*1 multiplexer with circuit diagram and truth table.
↳ A multiplexer (MUX) is a network device that allows one or more analog or digital input signals to travel together over the same communications transmission link.
↳ It has many inputs lines and only one output line. It is also known as data selector.
↳ The inputs are selected by selection line.
e.g: 4X1 MUX, 8X1 MUX, 16X1 MUX
↳ A multiplexer is a combinational circuit that has 2^n input lines and a single output line.

* 4X1 Multiplexer (MUX)

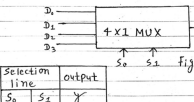
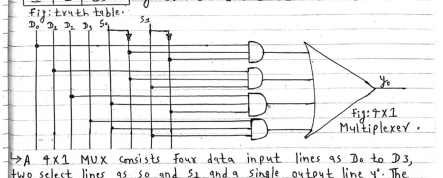


Fig: 4X1 MUX

Selection line		output
S_0	S_1	y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

$y = D_0 \bar{S}_0 \bar{S}_1 + D_1 S_0 \bar{S}_1 + D_2 \bar{S}_0 S_1 + D_3 S_0 S_1$.

Fig: truth table.



↳ A 4X1 MUX consists four data input lines as D_0 to D_3, two select lines as s_0 and S_1 and a single output line 'y'. The select lines S_0 and S_1 select one of the four input lines to connect the output line.

(23)

* Explain about T-Flip-Flop With diagram.?
↳ The T Flip-Flop is also called toggle Flip-Flop.
↳ It is a change of the Jk Flip-Flop.
↳ The T Flip-Flop is received by relating both inputs of a JK Flip-Flop. The T Flip-Flop is received by relating the inputs J and K.
When T=0 both AND gates are disabled. Therefore there is no change in the output. When T=1 the output toggles.
↳ The diagram demonstrates the circuit diagram of a T flip-flop.

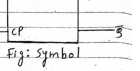


Fig: Symbol

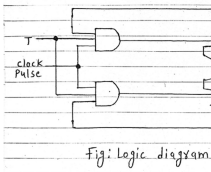


Fig: Logic diagram of T-Flip-Flop.

Q_N	T	Q_{N+1}
0	0	0
0	1	1
1	0	1
1	1	0

Q_N \ T	0	1
0		1
1	1	

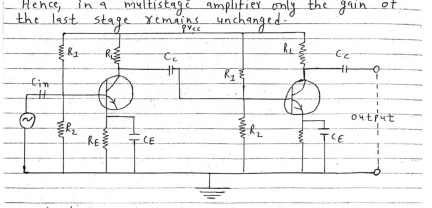
$Q_{n+1} = T.\bar{Q} + \bar{T}.Q_n$

Fig: truth table.

(24)

* Explain operation of Rc Coupled amplifier?
↳ When a Ac signal Applied to the base First transistor, it get amplified and appears At the Collector load Rl which is then passed through the coupling capacitor Cc to the next stage.
↳ This becomes the input of the next stage whose amplified output again appears across its collector load.
Thus, the signal amplified in stage by stage action.

↳ The important point that has to be noted here is that the total gain is less than the product of the gains of individual stages.
Hence, in a multistage amplifier only the gain of the last stage remains unchanged.



Introduction.
↳ Rc coupling is the most common widely used method of coupling in multistage amplifiers.
↳ A Resistance capacitance (R) Coupled amplifier is basically a multi-stage amplifier circuit extensively used in electronic circuit.

(19)

* Define Flip-Flop? Explain the operation of 'D' Flip-Flop with suitable diagram & truth table.
↳ A Flip-Flop in digital electronics is a circuit with two stables states that can be used to store binary data.
↳ The stored data can be changed by applying varying inputs.

* D-Flip-Flop or (Delay or Data Flip-Flop)
↳ It is also known as delay Flip-Flop.
↳ It has only one data input that is 'D' and one clock pulse input with two outputs Q and Q bar. This Flip-Flop is also called a delay flip-flop because when the input data is provided into the d Flip-Flop the output follows the input.

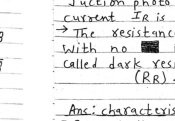


Fig: Block Diagram.

Data delay by one clock pulse
↳ The given circuit represents the D Flip-Flop ckt diagram, where the whole circuit is designed with the help of the NAND gate. Here the output of one NAND gate is feed as one input to the other NAND gate, which forms a latch. then the latch is gated with two more NAND gate where D is one input and clock is the other input.

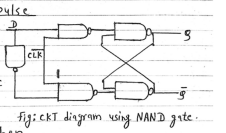


Fig: ckt diagram using NAND gate.

Q(t)	D	Q(t+1)
0	0	0
0	1	1
1	0	0
1	1	1

Fig: truth table

Q_{n+1} \ D	0	1
0	0	1
1	0	1

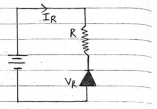
$Q_{t+1} = D$

Fig: characteristics table.

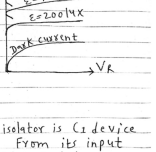
(21)

* Explain photo diode and it's operation characteristics?
Ans: Photo diode.
↳ A photodiode is a reverse-biased silicon or Gremanium P-N Juction in which reverse current increase when the Juction is Exposed to light.

Operation.
When no light indicate on the PN-Juction photo diode the reverse current I_R is extremely small.
↳ The resistance of photo diode with no incident light is called dark resistance.
(RR). i.e. $R_R = \frac{V_R}{I_R}$



Ans: characteristics.
① Reverse voltage-reverse current curve.
↳ show the graph between reverse current (IR) and reverse voltage (VR) for various illumination level.
↳ It is clear reversed-biased voltage (VR) and reverse current (IR) increases as the illumination (E) on the P-N Juction.



* Opto Coupler (or optoisolator).
↳ An opto couple is also called optoisolator is (1 device that uses light to couple a signal from its input (a photo emitter e.g: LED) to it's output (a photo detector, e.g: a photo diode).
Operation (Working Principle).
↳ The working Principle is simple an interesting a power full light Emitting diode (LED) is connected across a variable sources.
↳ A current is first applied to the opto coupler, which makes the infrared LED emit a light that's proportional to the current.

(22)

* Digital to analog (DAC) conversion?
↳ Digital to analog conversion (DAC) is the process of converting a digital signal to analog signal.
↳ This is typically done by assigning a voltage or current value to each discrete digital value and then using these value and then using these value to reconstruct a continous analog wave form.
↳ The resulting analog signal can then be used to drive various types of analog output devices such as speakers motors or control systems.
↳ DACs can be found in a wide range of electronic devices including audio systems, video displays and sensors to convert digital data streams into analog audio signals.

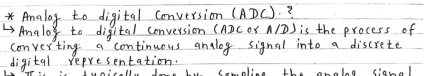


Fig: DAC symbol.

* Analog to digital Conversion (ADC).?
↳ Analog to digital conversion (ADC or A/D) is the process of converting a continuous analog signal into a discrete digital representation.
↳ This is typically done by sampling the analog signal at regular intervals and measuring its amplitude at each sample point.
↳ The resulting sequence of digital values can then be stored processed or transmitted digitally.
↳ The quality of the digital representation is determined by factors such as the resultation of the converters the sampling rate and the accuracy of the measurement circuitary.
↳ ADC is widely used in various applications such as audio recording, instrumentation, and control systems.