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BESCK104C/ BESCKC104

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
Introduction to Electronics and Communication

Time: 3 hrs. Max. Marks: 100

Note: ***1. Answer any FIVE full questions, choosing ONE full question from each module.***
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Draw the block diagram of DC power pply and explain the individual blocks.	8	L2	CO1
	b.	Draw the circuit diagram of voltage regulation and explain the operation.	6	L2	CO1
	c.	An amplifier produces an output voltage of 2V for an input of 50mV. If the input and output currents in this condition are 4mA and 200mA respectively. Find : i) The voltage gain ii) The current gain iii) The power gain.	6	L3	CO1
		OR			
Q.2	a.	With a neat circuit diagram and waveform. Explain the working operation of a full wave bridge rectifier.	8	L2	CO1
	b.	Draw the circuit diagram of voltage doubler and the working operation.	6	L2	CO1
	c.	Discuss briefly a Negative feedback amplifier with block diagram.	6	L1	CO1
		Module – 2			
Q.3	a.	With circuit diagram, explain the operation of an wien bridge oscillator.	8	L2	CO2
	b.	Define the following operational amplifier parameters value. i) Open loop voltage gain ii) Output Resistance iii) Slew Rate.	6	L1	CO2
	c.	Draw the circuit diagram and input and output waveform of the following operational amplifier circuits i) Differentiators ii) Integrator.	6	L1	CO2
		OR			
Q.4	a.	Explain the single state astable oscillator with circuit diagram.	8	L1	CO2
	b.	What is oscillator? And mention condition for oscillations.	6	L1	CO2
	c.	Explain the operation of summing amplifier using operational amplifier and write the output equation.	6	L2	CO2

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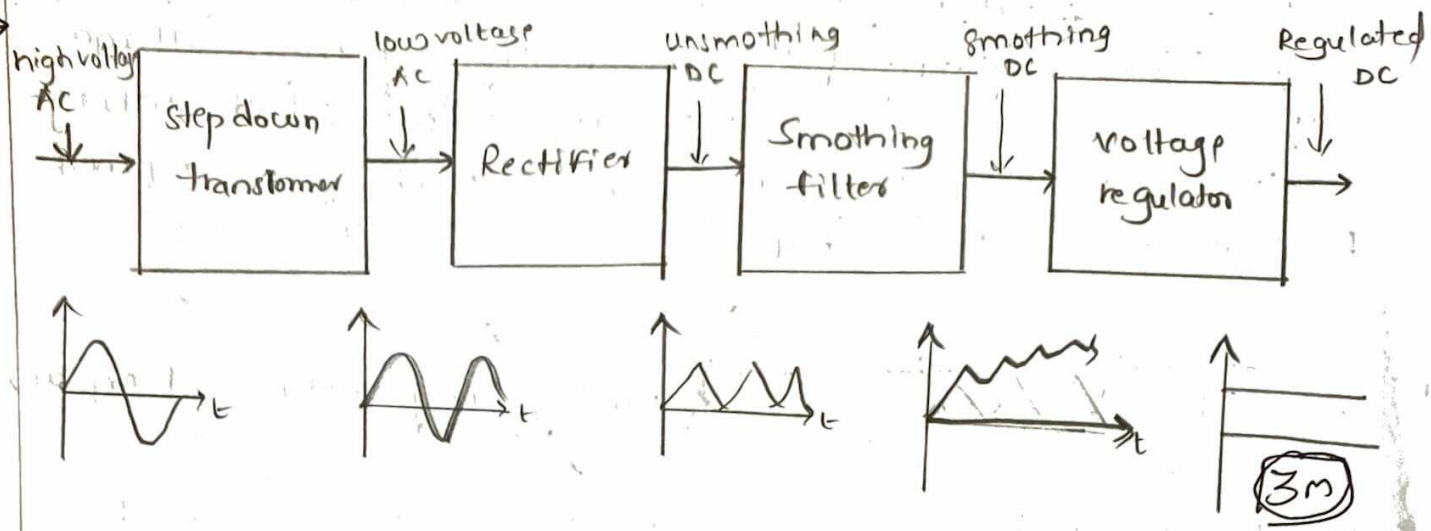
		Module – 3			
Q.5	**a.**	Implement full adder using two half adders and one OR gate. Write the equations for Sum and C_{out}.	**8**	**L3**	**CO3**
	b.	Convert the following numbers to its equivalent numbers and show the steps. i) $(10110001101011.111100000)_2 = (?)_8$ ii) $(10110001101011.11110010)_2 = (?)_{16}$ iii) $(1010.011)_2 = (?)_{10}$	**6**	**L2**	**CO3**
	c.	Using basic Boolean theorems prove i) $(x + y)(x + z) = x + yz$ ii) $xy + x\bar{z} + y\bar{z} = xz + y\bar{z}$	**6**	**L3**	**CO3**
		OR			
Q.6	**a.**	Express the Boolean function i) $F = A + \bar{B}C$ in a sum of minterms form ii) $F = xy + \bar{x}z$ in a product of maxterms form.	**8**	**L2**	**CO3**
	b.	Subtract the following using 10's complement i) $(72532 - 3250)_{10}$ ii) $(3250 - 72532)_{10}$	**6**	**L2**	**CO3**
	c.	Write the step by step procedure to design a combinational circuit.	**6**	**L1**	**CO3**
		Module – 4			
Q.7	**a.**	What is an Embedded system? Compare Embedded systems with general computer systems.	**8**	**L2**	**CO4**
	b.	Mention the classification of Embedded system based on complexity and performance.	**6**	**L1**	**CO4**
	c.	Write a short note on – 7-segment LED display.	**6**	**L2**	**CO4**
		OR			
Q.8	**a.**	Discuss the typical embedded system elements.	**8**	**L2**	**CO4**
	b.	What is the difference between RISC and CISC processors?	**6**	**L1**	**CO4**
	c.	Write a short note on : i) Transducers ii) Sensors.	**6**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Draw the block diagram of basic communication system and briefly explain the individual blocks.	**10**	**L2**	**CO5**
	b.	Discuss the types of communication systems.	**5**	**L2**	**CO5**
	c.	List the advantages of digital communication over analog communication.	**5**	**L1**	**CO5**
		OR			
Q.10	**a.**	Define Amplitude and Frequency modulation. Sketch AM and FM waveform.	**10**	**L1**	**CO5**
	b.	Write a short note on : Amplitude Shift Keying (ASK) modulator and demodulator.	**10**	**L2**	**CO5**

* * * * *

19] Draw the block diagram of DC power supply and explain the individual blocks? 8M

→



3M

DC power supply consist of mainly 4 Subunits

1] Stepdown transformer it is AC to AC converter. It has two windings primary and secondary It is used to convert high AC voltage to required low AC voltage.

2] Rectifier :- It is circuit which convert AC signals into pulsating DC. It uses one or more diode to convert low voltage AC to unsmoothing DC.

3] smoothing filter :- It is circuit used to remove fluctuation Present in the rectifier output

Ex:- Capacitor filter, LC filter

4] voltage regulator :- It is a device which provides constant DC output voltage irrespective of fluctuation and input voltage.

5M

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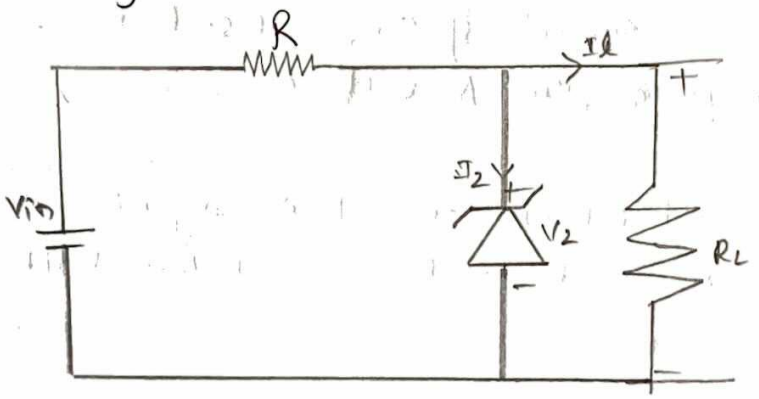
In the above figure we can see that stepdown transform converts high voltage AC into low voltage AC and feeds it to a rectifier circuit rectifier output is unsmoothed DC which is given to smoothing filter consisting of high voltage capacitor to minimise reples. The output of smoothing-filter is given to voltage regulator. which gives required DC voltage at the output.

1b] Draw the circuit diagram of voltage regulator and explain the operation?

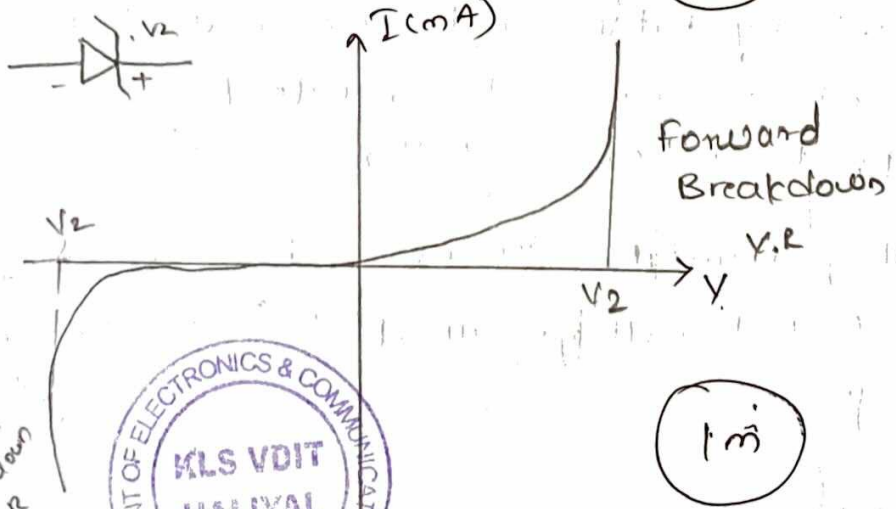
→ Voltage Regulator is a circuit that maintain a constant DC output voltage irrespective of variation in the input line voltage or in the load.

6M



Vout
Regulated dc output

1M



1M

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$V_o = \frac{V_{in} \times R_L}{R_s + R_L}$ when zener diode is in off state

* Input voltage is less than regulating voltage then zener diode act as off state the output voltage.

$$V_{out} = \frac{V_{in} \times V_{RL}}{R_S \times R_L} \quad \text{---} (1) \quad \text{when } V_{in} < V_L$$

* When input voltage exceeds the regulator voltage, the zener diode is in the ON state the output voltage

$$V_{out} = V_z \quad \text{---} (2) \quad \text{when } V_{in} \geq V_z$$

* The Maximum value of Rs can be determined from Eq^ns below.

$$V_{out} = \frac{V_{in} \times R_L}{R_s + R_L} \qquad V_{out} = V_2$$

$$R_s + R_L = \frac{V_{in} \times R_L}{V_{out}}$$

$$R_{smax} = \frac{V_{in} \times R_L}{V_{out}} - R_L \quad \text{---} (3)$$

4m

The ~~min~~ max value of Rs will be

$$R_{smin} = \frac{V_{in} - V_z}{I_z} \quad \text{---} (4)$$

$$= \frac{V_{in} - V_z}{\frac{P_{zmax}}{V_z}}$$

$$= \frac{(V_{in} - V_z) V_z}{P_{z\,max}}$$

$$R_{smin} = \frac{V_{in} V_z - V_z^2}{P_{zmax}}$$

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1C] An amplifier produce an output voltage of 2v for a input of 50 mv. If the input and output current in this condition are 4mA & 200mA respectively find

6M

i] The voltage gain

ii] The current gain

iii] The power gain.

→ Given :- $V_{in} = 50 \times 10^{-3} V$ $I_{in} = 4 \times 10^{-3} A$

$V_{out} = 2V$ $I_{out} = 200 \times 10^{-3} A$

i] Voltage gain :- $A_V = \frac{V_{out}}{V_{in}} = \frac{2}{50 \times 10^{-3}}$ $A_V = 40$ 2M

ii] The current gain :- $I\,gain = AI = \frac{I_{out}}{I_{in}} = \frac{200 \times 10^{-3}}{4 \times 10^{-3}} = 50$ 2m

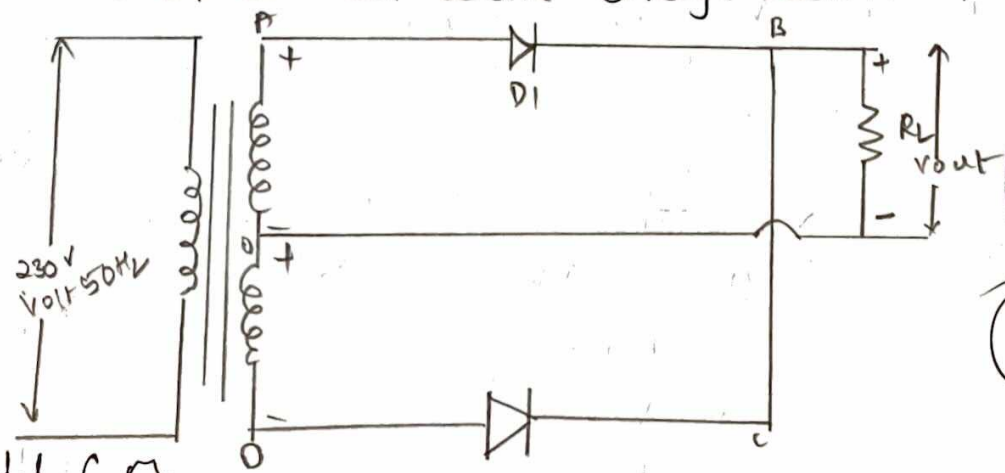
iii] The power gain $= \frac{V_{out} \times I_{out}}{V_{in} \times I_{in}}$ or $Ap = \frac{P_{out}}{P_{in}}$

$= \frac{2 \times 200 \times 10^{-3}}{50 \times 10^{-3} \times 4 \times 10^{-3}}$

$Ap = 2000$ 2m

9] a With neat circuit diagram and waveform Explain working operation of a full wave bridge rectifier.

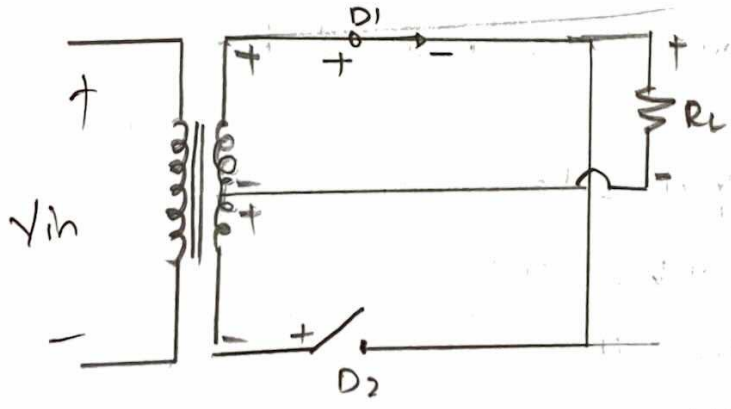
8M

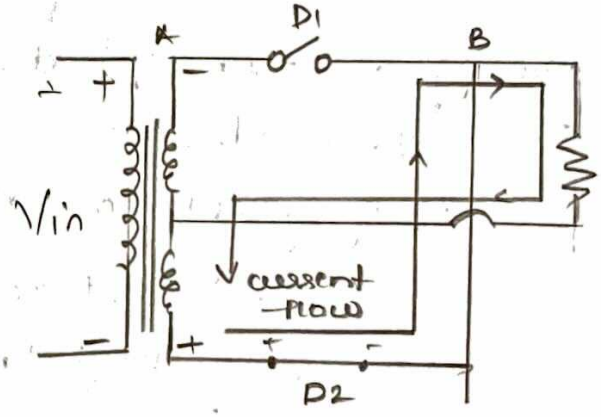


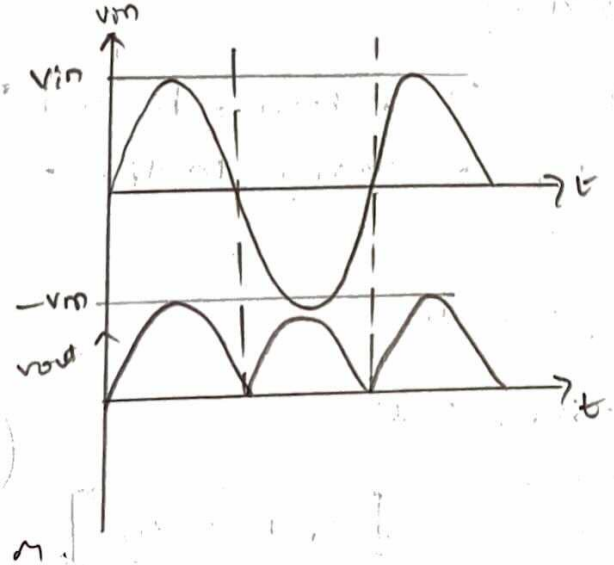
2m

* The figure above shows - bi-phase rectifier.
* During +ve half cycle node A is positive w.r.t to node O and D
* Diode D1 is forward biased and act as short circuit and the maximum current is passed through the load and the current is passed through the load and the current does not flow through D_2 since it is reverse biased and act as open circuit.
* In negative half cycle node D is +ve w.r.t node A & D this condition D_2 will allow condition because D_2 acts as short circuit while D_1 is reversed biased act as open circuit.

3m







2m

1m

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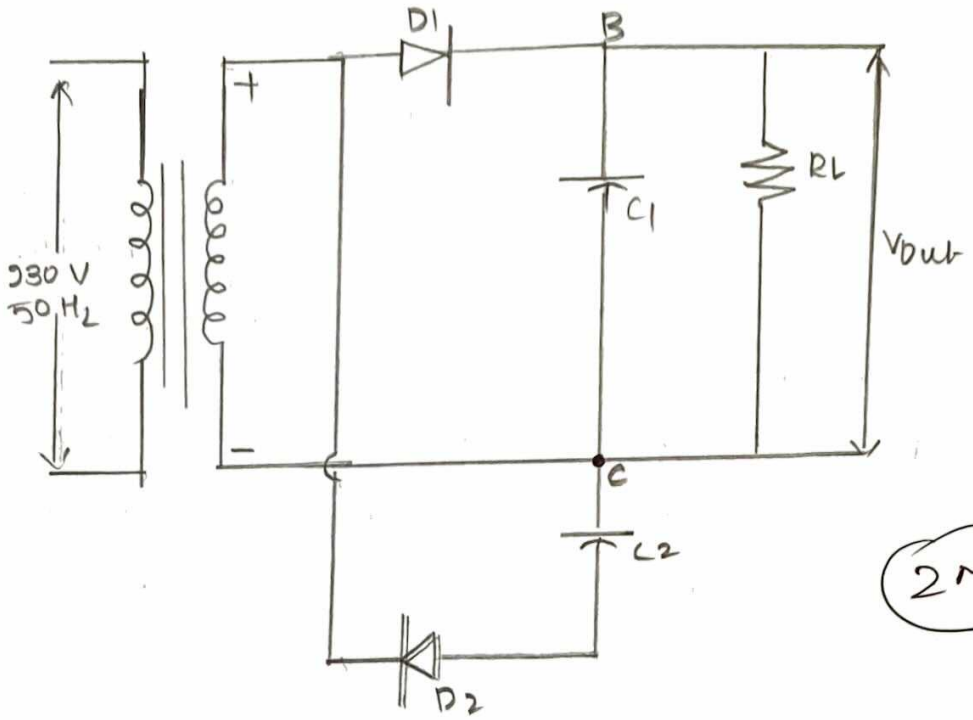
2b] Draw the circuit diagram of voltage doubler and the working operation

6M



2M

During the half cycle diode D_1 is forward biased. D_2 is reverse biased

Applying KVL to output side

$$-V_{out_1} + V_{C1} + V_{C2} = 0$$

$$V_{out_1} = V_m + 0.$$

$$\boxed{V_{out_1} = V_m}$$

During −ve half cycle Diode D_1 is reverse biased Diod D_2 is forward biased capacitor C_2 charge to the peak value of input voltage

Applying KVL to output side

$$-V_{out_2} + V_{C1} + V_{C2} = 0$$

$$V_{out_2} = V_{C1} + V_{C2}$$

Rabl C.M. $V_{out_2} = 0 + V_m \Rightarrow \boxed{V_{out_2} = V_m}$

2m

Here we get two voltage V_{m_1} and V_{m_2} at output source by given signal source of input here it is known as voltage doubler

$$-V_{out} + V_{c1} + V_{c2} = 0$$

$$V_{out} = V_{c1} + V_{c2}$$

$$V_{out} = V_m + V_m$$

$$V_{out} = 2V_m$$

+ve half cycle

$$-V_{out} + V_{c1} + V_{c2} = 0$$

$$-V_{out} + V_{c1} + 0 = 0$$

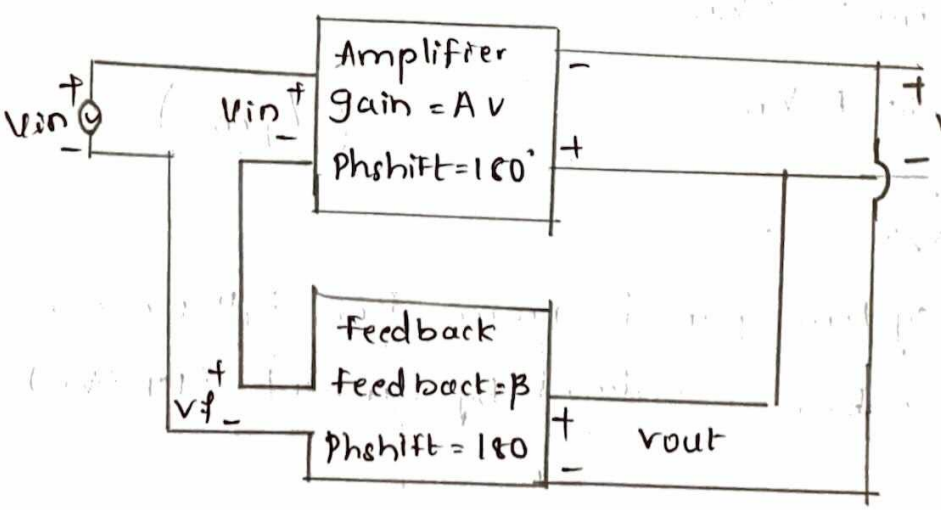
$$V_{out} = V_{c1}$$

$$V_{out} = V_m$$

2m

e] Discuss briefly a Negative feedback amplifier with blak diagram

6 M



2m

Apply KVL at input side.

$$-V_{in} + V_{in'} + V_f = 0 \quad \text{——} \ (1)$$

$$V_{in'} = V_{in} - V_f \quad \text{——} \ (2)$$

i/p is being subtracted from feedback voltage hence gain is said to be - ve

from eqn ①

$$V_{in} = V_{in}' + V_f \longrightarrow ③$$

W.K.T

$$V_f = \beta V_{out} \longrightarrow ④$$

But

$$V_{out} = A_V V_{in}' \longrightarrow ⑤$$

Sub eq ② in ⑤

$$V_{out} = A_V (V_{in} - V_f) \longrightarrow ⑥$$

Sub eq ④ in ⑥

$$V_{out} = A_V (V_{in} - \beta V_{out})$$

$$V_{out} + A_V \beta V_{out} = A_V V_{in}$$

$$V_{out} (1 + A_V \beta) = A_V V_{in}$$

$$\frac{V_{out}}{V_{in}} = \frac{A_V}{1 + A_V \beta}$$

4m

The overall system gain is from above eqn we can see that gain with feedback is reduced by amount $(1 + A_V \beta)$

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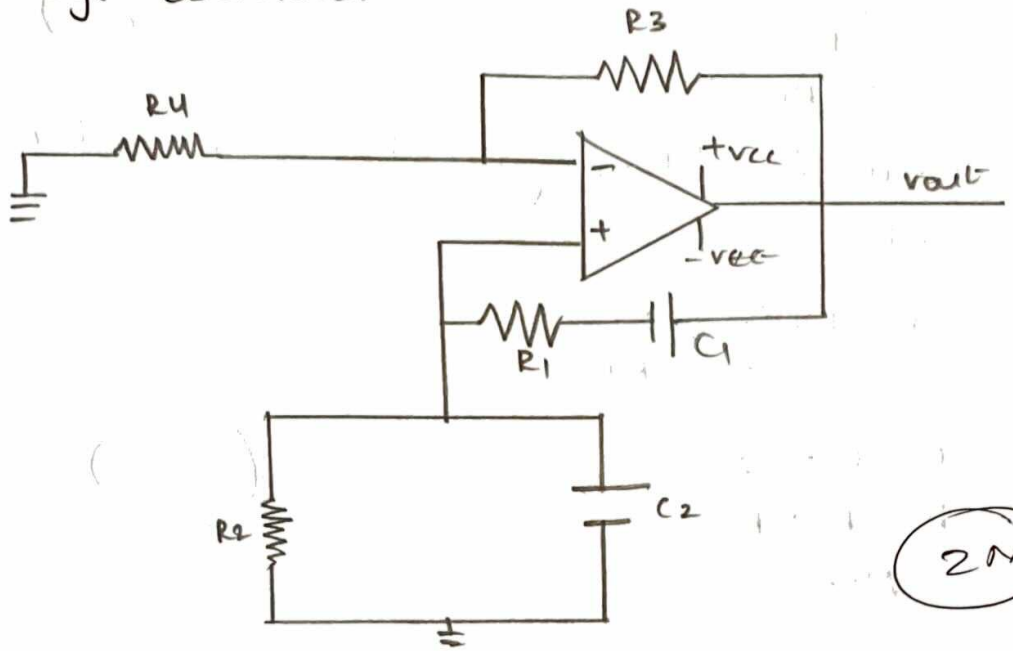
Module - 2

3 a] With circuit diagram, Explain the operation of an wien bridge oscillator

8M



2M

→ * The above figure shows wien bridge oscillator

* Here OpAmp is used as non-inverting Amplifier providing phase shift of 0°

* Part of output is feedback to input Vin, series and Parallel RC network

* R_1C_1 and R_2C_2 acts like Feedback Network providing Phase shift of zero degree, Hence the overall loop Phase shift is 0°

2M

* Conditions of Sustained are is given by

$$f = \frac{1}{2\pi\sqrt{R_2C_2 \times R_2C_2}}$$

$$f = \frac{1}{2\pi\sqrt{R_1C_1 \times R_2C_2}}$$

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Then

Let $R_1 = R_2 = R_3$

$C = C_1 = C_2$

∴ we get

$$f = \frac{1}{2\pi RC}$$

2m

The minimum Amplifier gain for sustained oscillation if given by

$$AV = 1 + \frac{C_1}{C_2} + \frac{R_2}{R_1}$$

Let $C = C_1 = C_2$

$R = R_1 = R_2$

$AV = 3$

2m

26] Define the following operational amplifier parameter value. 6M

i] open loop voltage gain

ii] output resistance.

iii] slew Rate

→ i] open loop voltage gain :-

It is the rate of output voltage to input voltage measured with no feedback

Ideally the open loop output gain an opAmp is infinity

Typically for 741 opAmp it is open loop voltage gain is 1,00,000

It is given by, $AV_{(OL)} = \frac{V_{out}}{V_{in}}$

2m

usually open loop voltage gain is expressed in dB

$$A_{V(OL)} = 20 \log \left(\frac{v_{out}}{v_{in}}\right)$$

iii) Closed loop voltage gain:

It is ratio of output voltage to input voltage with small portion of output feed back to input.

The offset of providing negative feedback is to reduce opAmp gain to normal value.

$$G_{V(CC)} = \frac{V_{out}}{v_{in}}$$

$$G_{V(OL)} = 20 \log \left(\frac{V_{out}}{v_{in}}\right) \text{ in dB}$$

2m

iii] Slew Rate:-

It is rate of change of output voltage w.r.t to time - It is given by

$$\text{Slew Rate} = \frac{\Delta v_{out}}{\Delta t}$$

2m

Ideally slew rate should be infinity. Typically for 741 opAmp slew rate is 0.5 V/μs.

3c] Draw the circuit diagram and input and output wave form of the following operational amplifier circuits

i] Differentiator ii] Integrator. 6M

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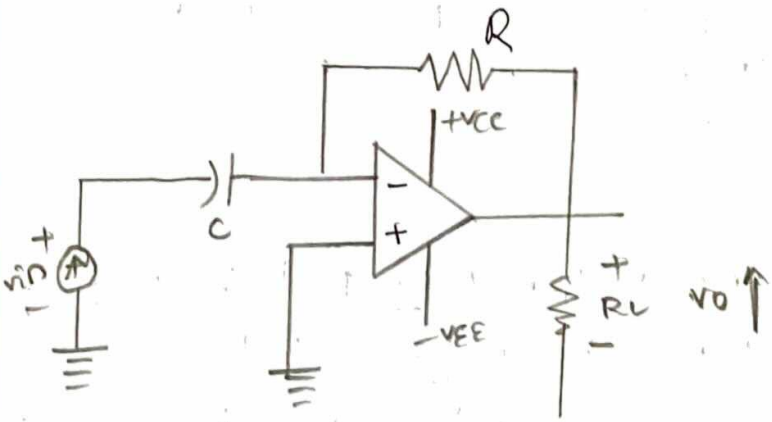
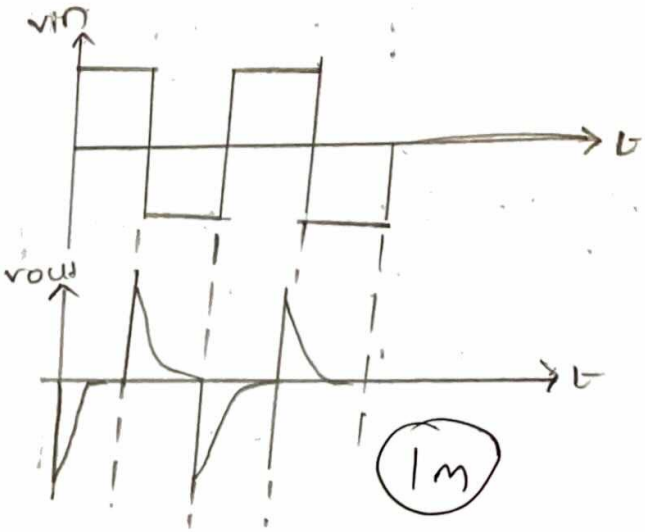




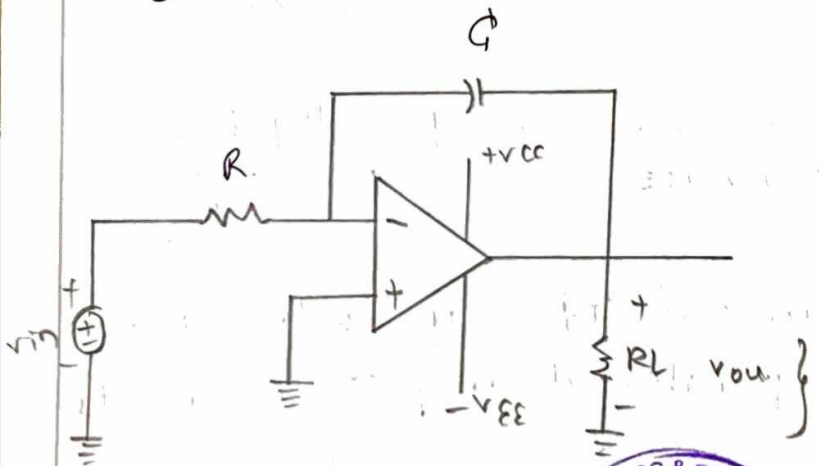
1m

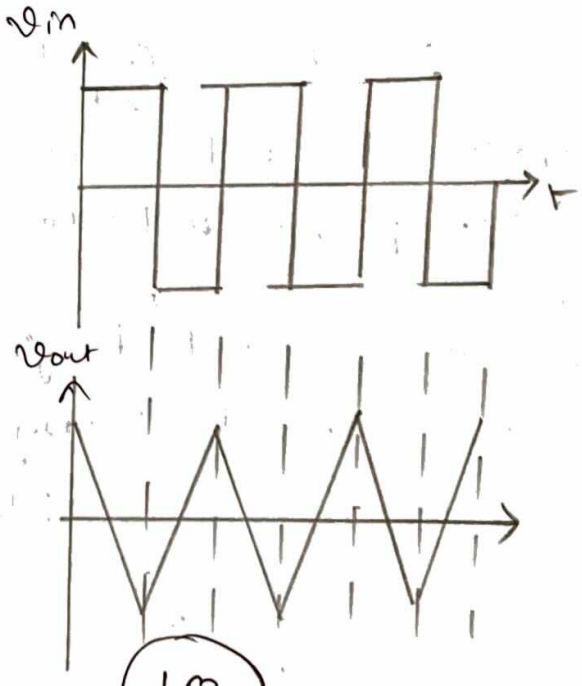
* Here input terminal applied to inverting terminal via C
* output terminal connected to inverting terminal via R
* non-inverting terminal grounded.
* Differentiator produce output voltage which is equal to rate of change of input w.r.t time.

The faster the input change, greater will be output change
* conversly of input remain constant and output constant.

2m

→ Integrator :-





1m

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* The circuit provides opposite function to that of differentiator here output is equivalent to area under the graph (input function)

* If input v remain constant (other than zero) output voltage is Equal to ramp function. (2m)

* ramp up or ramp down depending on polarity of input.

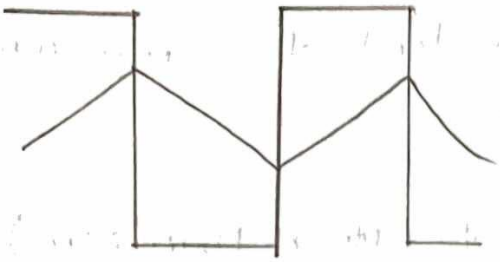
Q4 a] Explain the single state astable oscillator with circuit diagram. (8M)

→ Initially Capacitor voltage v=0v. Because of ~~partial~~ Potential divider biased, out R_1 & R_2 same +Vcc voltage is fed to Non-Inverting Terminal.

* Since Non-Inverting terminal is higher potential o/p OpAmp will be in positive and capacitor starts charging (3m)

* When capacitor voltage exceeds, the voltage of NIT voltage, Inverting terminal of higher potential, o/p OpAmp will be negative saturation.

* capacitor th. will discharging



1m

The upper threshould voltage is given by

$$V_{UT} = \frac{V_{cc} \times R_2}{R_1 + R_2}$$

The low threshould voltage is given by

$$V_{LT} = \frac{-V_{cc} \times R_2}{R_1 + R_2}$$

The overall frequency of o/p wave form generator is given by

$$T = 2RC \ln\left(1 + 2\left(\frac{R_2}{R_1}\right)\right)$$

4M

4 b] What is oscillator: And mention condition for oscillations

→ Oscillator is a device which produces sustained oscillators without having any input signals.

6M

conditions for oscillators: (Barkhausen)

1] The overall loop gain that is gain of amplifies and gain of feedback must be equal to 1

2] The overall loop phase shift induste amplifier and feedback session must be 0° or 360°

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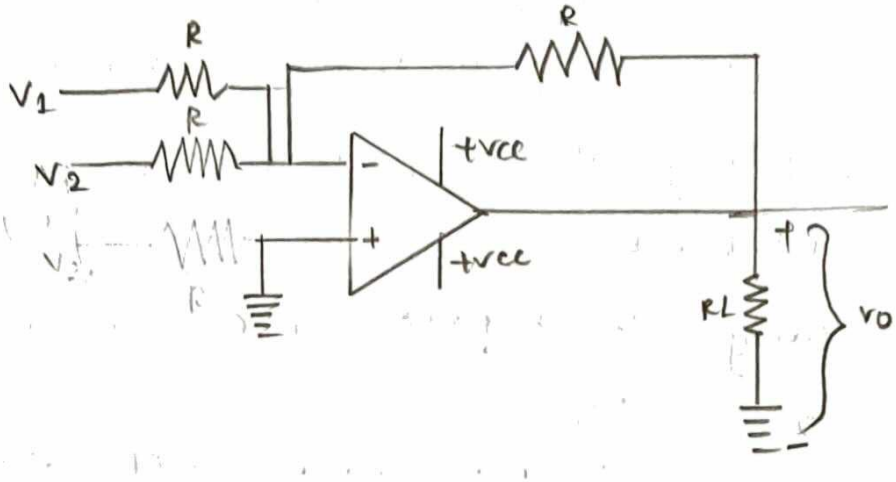
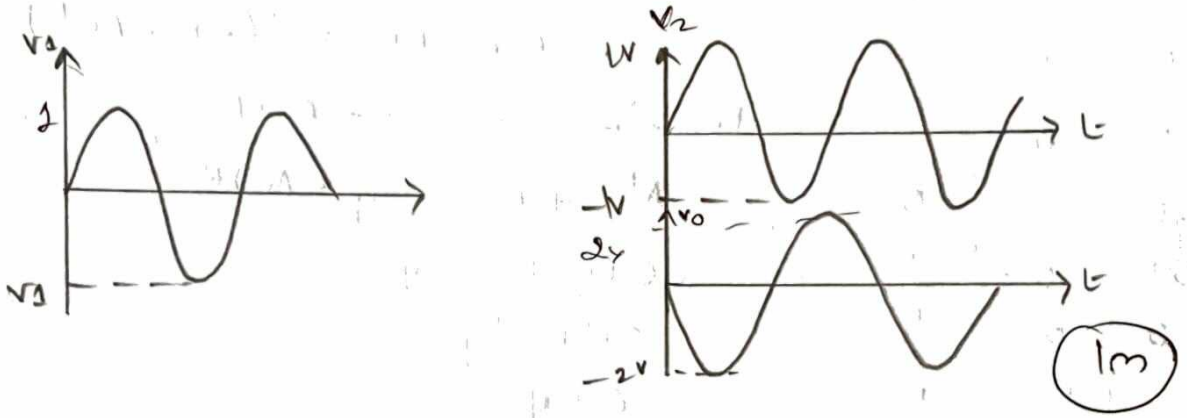
4] Explain the operation of summing amplifier using Operational amplifier and write the output equations

6M



2m



1m

$$V_o = -(V_1 + V_2)$$

* The circuit is similar to inverting Amplifies where more then 1 i/p is giving to the inverting o/p terminal

* The circuit produce the o/p which is equal to sum of two i/p voltages the equation of o/p voltage is given by

$$V_o = -(V_1 + V_2)$$

3m

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Module-3

Q5] a] Implement full adder using two half adders and one OR gate. write the Equations for sum and cassy.

→ full adder in a logical circuit that perform arthematic sum of 3 input bit's. 8M

ABC	sum	Carry
000	0	0
001	1	0
010	1	0
011	0	1
100	1	0
101	0	1
110	0	1
111	1	1

2m

The expression of sum is given by

$S = A'B'C + A'BC' + AB'C' + ABC$

$S = C(A'B' + AB) + C'(A'B + AB')$

Let $A'B + AB' = y = A \oplus B$

$A'B' + AB = y' = A \oplus B$

$C(y') + C'y$

$Cy' + C'y$

$C \oplus y$

$= C \oplus A \oplus B \quad [\because y = A \oplus B]$

2m

The expression of cassy is given by

$Cy = A'BC + AB'C + ABC' + ABC$

$= A'BC + AB'C + AB(C + C')$

$= A'BC + AB'C + AB$

$= A'BC + A(B'C + B)$

$= A'BC + A(B + C)$

$= A'BC + AB + AC$

$= B(A'C + A) + AC$

2m

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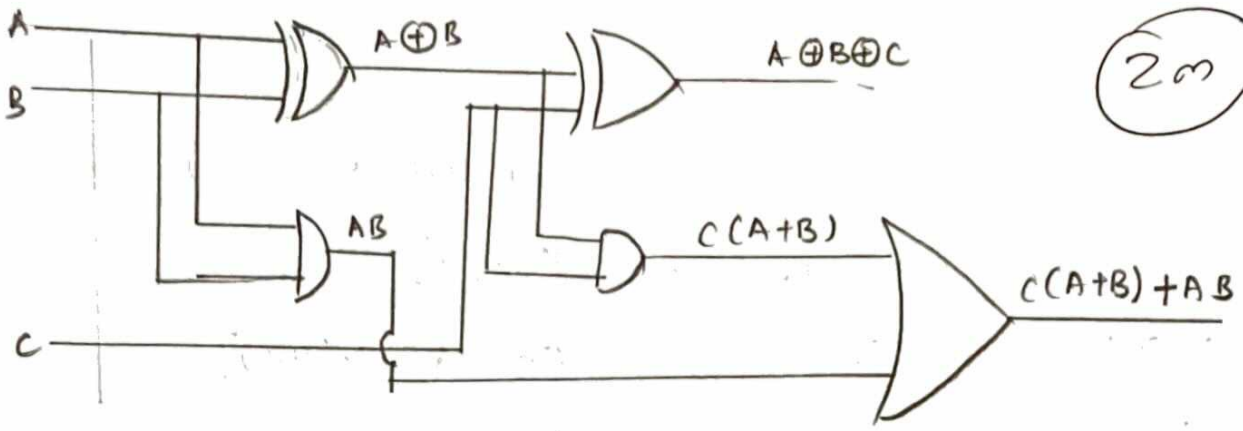
$= B(A+C)+AC$

$= AB + BC + AC$



2m

5b] Convert the following numbers to its equivalent numbers and show the steps. (6m)

i] $(10111000110101111 \cdot 111100000)_2 = (?)_8$

→ $(\underline{010}\underline{111}\underline{000}\underline{110}\underline{101}\underline{111} - \underline{111}\underline{100}\underline{000})_2 = (?)_8$

$(26153.740)_8$ (2m)

ii] $(10111000110101111 \cdot 11110010)_2 = (?)_{16}$

→ $(0010111000110101111 \cdot 11110010)_2$

$(2C6B.F2)_{16}$ (2m)

iii] $(1010.011)_2 = (?)_{10}$

$1\times2^3+0\times2^2+1\times2^1+0\times2^0 . 0\times2^{-1}+1\times2^{-2}+1\times2^{-3}$

$= (10.375)_{10}$ (2m)

Rahul. CM

5 c] Using basic Boolean theoprorems prove. 6M

i] $(x+y)(x+z) = x+yz$

RHS $= (x+y)(x+z)$

$= x.x + x.z + x.y + y.z$ (postulate (4a))

$= x + xz + xy + yz$ [1(b)]

$= x(z+1) + xy + yz$ (postulate(4a)]

$= x.1 + xy + yz$ [T - 2(a)]

$= x(y+1) + yz$ (postulate (4a)]

$= x.1 + yz$ [T- 2(a)]

$\therefore (x+y)(x+z) = x+yz$ // 3m

ii] $xy + xz + y\bar{z} = xz + y\bar{z}$

consider

$xy + xz + y\bar{z} = xy.1 + xz + y\bar{z}$ [2b)

$= xy(z+\bar{z}) + xz + y\bar{z}$

$= xyz + xy\bar{z} + xz + y\bar{z}$

$= xz(1+y) + y\bar{z}(1+x)$

$= xz.1 + y\bar{z}.1$

$= xz + y\bar{z}$ // 3m

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6] a] Express the Boolean function

8M

i] $F = A + \bar{B}C$ in a sum of minterm form

Consider

$$F = A + \bar{B}C$$
$$= A(B+\bar{B})(C+\bar{C}) + (A+A^{-}).\bar{B}C$$
$$= ABC + AB\bar{C} + A\bar{B}C + A\bar{B}\bar{C} + A\bar{B}C + \bar{A}\bar{B}C$$
$$= ABC + AB\bar{C} + A\bar{B}C + A\bar{B}\bar{C} + \bar{A}\bar{B}C$$

	A B C	F
m_0	0 0 0	0
m_1	0 0 1	1
m_2	0 1 0	0
m_3	0 1 1	0
m_4	1 0 0	1
m_5	1 0 1	1
m_6	1 1 0	1
m_7	1 1 1	1

$f = m_1 + m_6 + m_5 + m_4 + m_1$

$F = \Sigma m(1, 4, 5, 6, 7)$

4m

ii] $F = xy + \bar{x}z$ in a product of maxterm form

consider,

$$f = xy + \bar{x}z$$
$$= (xy + \bar{x}).(xy + z)$$
$$= (x + \bar{x}).(y + \bar{x}).(x + x).(y + z)$$
$$= 1.(\bar{x} + y).(x + z).(y + z)$$
$$= (\bar{x} + y + zz').(x + yy' + z).(xx' + y + z)$$
$$= (\bar{x} + y + z).(\bar{x} + y + \bar{z}).(x + y + z).(x + \bar{y} + z).(x + y + z)(\bar{x} + y + z)$$

4m

Rahul. C M

$= (\bar{x}+y+z)\cdot(\bar{x}+y+\bar{z})\cdot(x+y+z)\cdot(x+\bar{y}+z)$

$m_4 \qquad m_5 \qquad m_0 \qquad m_2$

	x y z	F
M_0	0 0 0	0
M_1	0 0 1	1
M_2	0 1 0	0
M_3	0 1 1	1
M_4	1 0 0	0
M_5	1 0 1	0
M_6	1 1 0	1
M_7	1 1 1	1

$\therefore F = \Pi M(0, 2, 4, 5)$ //

6b) Substract the following using 10's complement [6 M]

i) $(72532 - 3250)_{10}$

Here $M = (72532)_{10}$

$N = (03250)_{10}$

Applying r's complement for $N = (03250)_{10}$

r's complement $= r^n - N$

here $r = 10$

$n = 5$

$N = (03250)_{10}$

10's complement $= 10^5 - (03250)_{10}$

$= (96750)_{10}$

Adding $M + N$ = 73532

96750

169282

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The carry is 1, ignoring carry the answer is

$= (69282)_{10}$

$\therefore (72532)_{10} - (03250)_{10} = (69282)_{10}$ (3m)

ii) $(3250 - 72532)_{10}$

Here $M = (03250)_{10}$

$N = (72532)_{10}$

Applying r's complement for $N = (72532)_{10}$

r's complement $= r^n - N$

here $r = 10$

$n = 5$

$N = (72532)_{10}$

10's complement $= 10^5 - (72532)_{10}$

$= (27468)_{10}$

Adding $M + N = 03250 + 27468$

30718

The carry is 0, r's complement of result is r's complement $= r^n - N$

here $n = 5$

$r = 10$

$N = (30718)$

10's complement $= 10^5 - (30718)_{10}$

$= -(69282)_{10}$

$\therefore (03250)_{10} - (72532)_{10} = (-69282)_{10}$ (3m)

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6C] Write the step by step procedure to design a combination circuit. [6M]

→ Step1 :- Identifying the number of inputs to the circuit

Step2 :- Identifying the number of outputs from the circuit

Step3 :- creating the truth table, i,e we will create input columns and list all the possible combinations

step4: obtaining the expression for output from the truth table.

step5:- Simplifying the boolean function and expression for each.

Step6 :- Implementing the circuit using Boolean function obtained at step5.

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Module - 5

7a) What is an Embedded system? compare Embedded systems with General computer systems: 8M

→ An embedded system is an electronic slash, electro-mechanical system designed to perform specific function and in a combination and both hardware and software. (2M)

General purpose computing systems	Embedded systems
* A system which is a combination of a generic hardware and a general purpose operating system for executing a variety of application.	* A system which is a combination of special purpose hardware and embedded OS for executing a specific set of applications.
* contains a general purpose OS	* May or may not contain an OS for functioning
* Applications are alterable (programmable) by a user.	* The firmware of the embedded system is pre-programmed and is not alterable by end user
* performance is key-deciding-factor in selection of the system	* Application specific requirements are key-deciding factors.
* These are meant to reduce operating power requirements options for different levels of Power management	* These are highly meant to take advantage of power saving modes supported by hardware and OS (6m)

* Response requirement are not time-critical	* Response requirements are highly time critical
* Need not be deterministic in execution behaviour	* Execution behaviour is deterministic for Hard Real Time system

7b] Mention the classification of Embedded system based on complexity and performance. 6M

Classification of Embedded system based on complexity and performance -

i] Small - Scale Embedded system

* Embedded systems which are simple in application needs and where performance requirements are not critical under this category

Eg :- Electronic toy

* These Embedded systems are usually built using low-cost at 16-bit µc or µp

ii] Medium-scale Embedded system

* These Embedded systems are slightly complex in hardware and software.

* They are usually built using low-cost 16 or 32-bit µP/µC/ Digital signal processors (DSP)

iii] Large-Scale embedded system:

* These Embedded Systems involve highly complex hardware and software requirements

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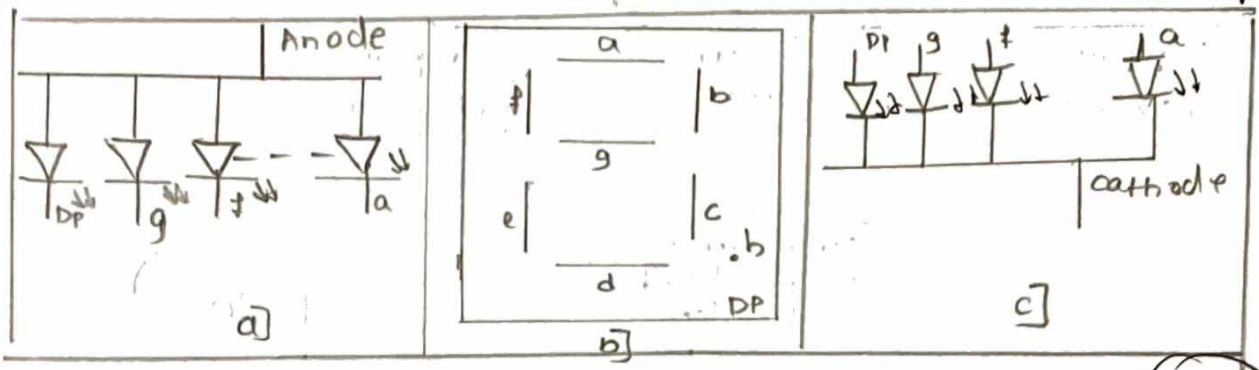
* These are built using high-performance 32 or 64-bit SC processor / controller or reconfigurable or multicore processor or programmable logic devices.

7c] Write a short note on 7-segment LED display (6M)



(2m)

a] common Anode LED display

b] 7-segment LED display

c] common cathode LED display.

* It is an o/p device for displaying numeric value,
* It contains 8 LED segments arranged in special form
* Out of 8 LED's 7 LED's are used for displaying a numeric ; for Eg :- To display no: 4 b, c, f, g are lighted. (4m)
* 7 segment LED's are available in 2 configurations Common anode and common cathode.
* In common anode configuration, Anode of 8 LED's are connected together (to supply). Hence in order to turn on LED. The corresponding cathode of the LED should go low.

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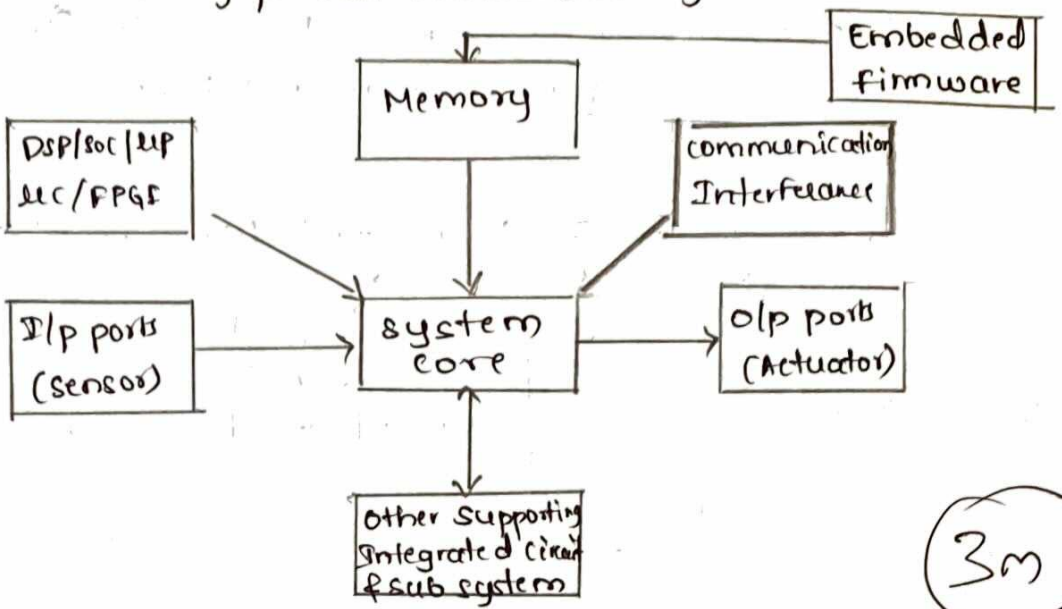
OR

8 a] Discuss the typical Embedded system elements. 8M



3m

* A typical Embedded system contains a single chip controller which acts as the brain of the system.
* The controller can be FPGA, DSP, SOC, RIP, µC.
* Embedded system are basically designed to control a physical variable by sending control signal to actuator in response to I/p signal provided by sensor
* keyboard, switches, push-buttons etc.. are common I/p devices and pseudoelectric electric buzzer etc. are o/p devices.
* Embedded systems are basically designed to sense the I/p parameters in accordance with changes in the real-coorld parameter to which they are interacting through sensor.

5m

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* The sensor information is passed to the processor after signal conditioning and digitalisation.

* Upon receiving the sensor data, the processor performs some pre-defined operations depending on the firmware embedded in the system.

* The processor then sends actuating signal to the actuator connected at the o/p port.

8b] What is the difference between RISC and CISC Processor ? 6M

RISC	CISC
* Reduced Instruction set	* complex Instruction set
* faster no of instructions	* Lesser no of instructions
* Orthogonal Instruction set	* Non-orthogonal instruction set.
* Instruction pipe-Lining and Increased execution speed	* Generally no instruction pipelining feature.
* operations are performed on registers only. The only memory operations are load and store	* operational are performed on registers or Memory
* Large no of registers are availble	* Limited no of general purpose register
* Programmer needs to write more no of instructions	* Programmer can achieve desired functionality a single instruction.

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* Single fixed length instructions	* Variable length instruction
* Less silicon usage and pincount	* More silicon usage.
* supports Harvard architecture	* can be Harvard or Von-Neumann architecture

8c] Write a short note on : 6M

i] Transducers :. These are devices that converts energy of form into Equivalent electrical system and vice-versa

Eg:- A laud speaker is a transducer that converts low frequency electric current into audible sound

* A microphone in other hand performs reverse function

* These may be used as both input and output devices from the above mentioned example. Loud speaker is an output transducer and microphone is an input transducer

3m

Eg:- for I/p transducer :- Microphone, thermocouple

Eg :- for O/p transducer : Laud speaker, Heating coil

ii) Sensors :

* It is a special kind of I/p transducers. It is a device that converts a physical quantity into electrical signal. It can be categorised as active or passive.

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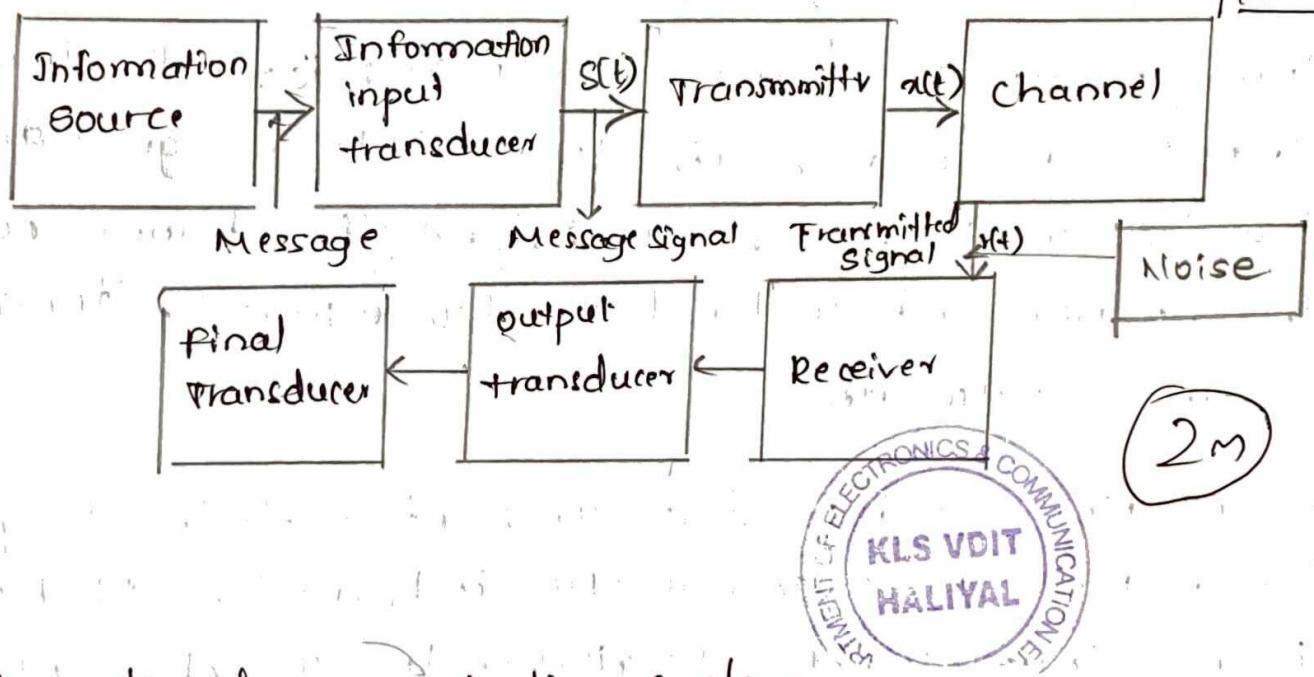
* An active sensor generates current or voltage as output
* A passive sensor requires source of current or voltage it to convert physical quantity into electrical signal.
* sensors can also be classified as digital or analog.
* The o/p of digital sensor exists in only 2 stages ON or off
* The o/p of analog sensor can take any of infinite no of voltage or current levels. (3m)

Module-5

9a] Draw the block diagram of basic communication system and briefly explain the individual block. (10M)



(2m)

Elements of communication system.

* Information source :- Message or information originates in the information source May be in the form of sound, picture, words, however, out of these messages only the desired message is selected and communicated. Rahul. C.M

2] Transducer :- A transducer is a device which converts one form of energy into another form. Generally, the i/p transducer converts the non-electrical signal (Ex: sound or light signal) into an electrical signal.

3] Transmitter :- The baseband signal, output form the i/p transducer in applied to the i/p of the transmitter. The transmitter performs three operations : filtering Amplification and modulation. The nature of Processing depends on the type of communication System.

4] channel :- The term channel means the Medium through which the message travels from the transmitter to the receiver. The transmitted signal should have adequate power to withstand the channel noise The channel characteristics also impose constraints on the bandwidth

5] Noise :- Noise is desined as unwanted electrical signal Which do not have any useful information. It has to be minimized. It deteriordes the waveform of the transmitted signal

8m

5] Typical Analog Receiver :- the main function of the receiver is to reproduce the original message signal. This reproduction of the original signal is accomplished by a process known as the demodulation or detection

4] Destination :- Destination is the final stage which is used to convert an electrical message into its original form. for example in radiobroad casting, the destination of is a laud speaker which works a transducer that converts the electrical signal to original sound signal.

9b] Discuss the type of communication systems : SM

→ communication systems based on physical infrasture

1) Line communication systems :
Uses power lines to transfer data from one part to another point. There is a physical link, called a hardware channel between the transmitter and the receiver inline communication system

Eg:- (Land Line telephony, cable TV)

2) Radio communication systems :-
Information is carried across space using radio waves

Eg:- Radio broadcatting.

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communication systems based on signal specifications

A] Based on Nature of baseband or information signal

1] Analog communication system.

Exchange of information between two points through analog signals.

Eg:- Audio, Video and pictures between two points using the analog signal

2] Digital communication system.

Exchange of information between two points through digital signals.

Eg:- Audio, HDTV.

B] Based on Nature of the transmitted signal

1] Baseband communication system :- Basebond signals are transmitted without translating to higher frequencies Eg :- Landline, fax etc

2] Cassier communication systems : The basebond signal (low frequency) is mixed with high frequency cassies signal. Eg :- Radio voice messages and calls.

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9.c] List the advantages of digital communication over analog communication. [5M]

→ 1] Trouble shooting is easy in digital communication

2] Analog signals are easily affected by noise whereas digital signals are stable and less prone to noise.

3] ~~Analog signals are easily aff~~ Accuracy is immune from the noise in digital communication

4] Analog signals are use more power where as digital signals use less power.

5] fast, cassier and cheaper.

OR

10] a] Define Amplitude and frequency Modulation. sketch waveform. [10M]

→ Amplitude Modulation:

a It is the process in which the amplitude of the cassier System is varied according to the instantaneous values of the message signal, wherpas the frequency and phase are kept constant. [2M]

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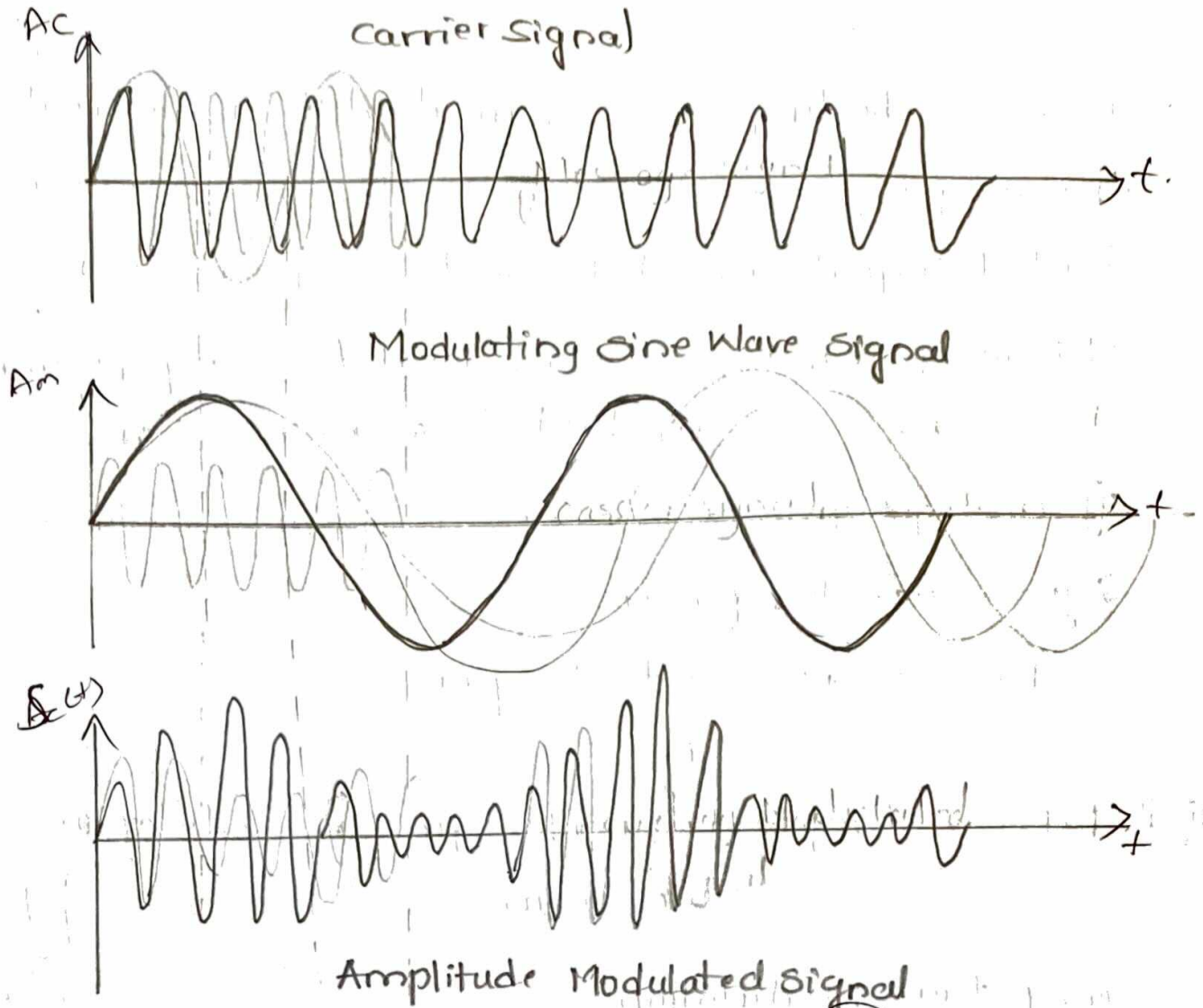


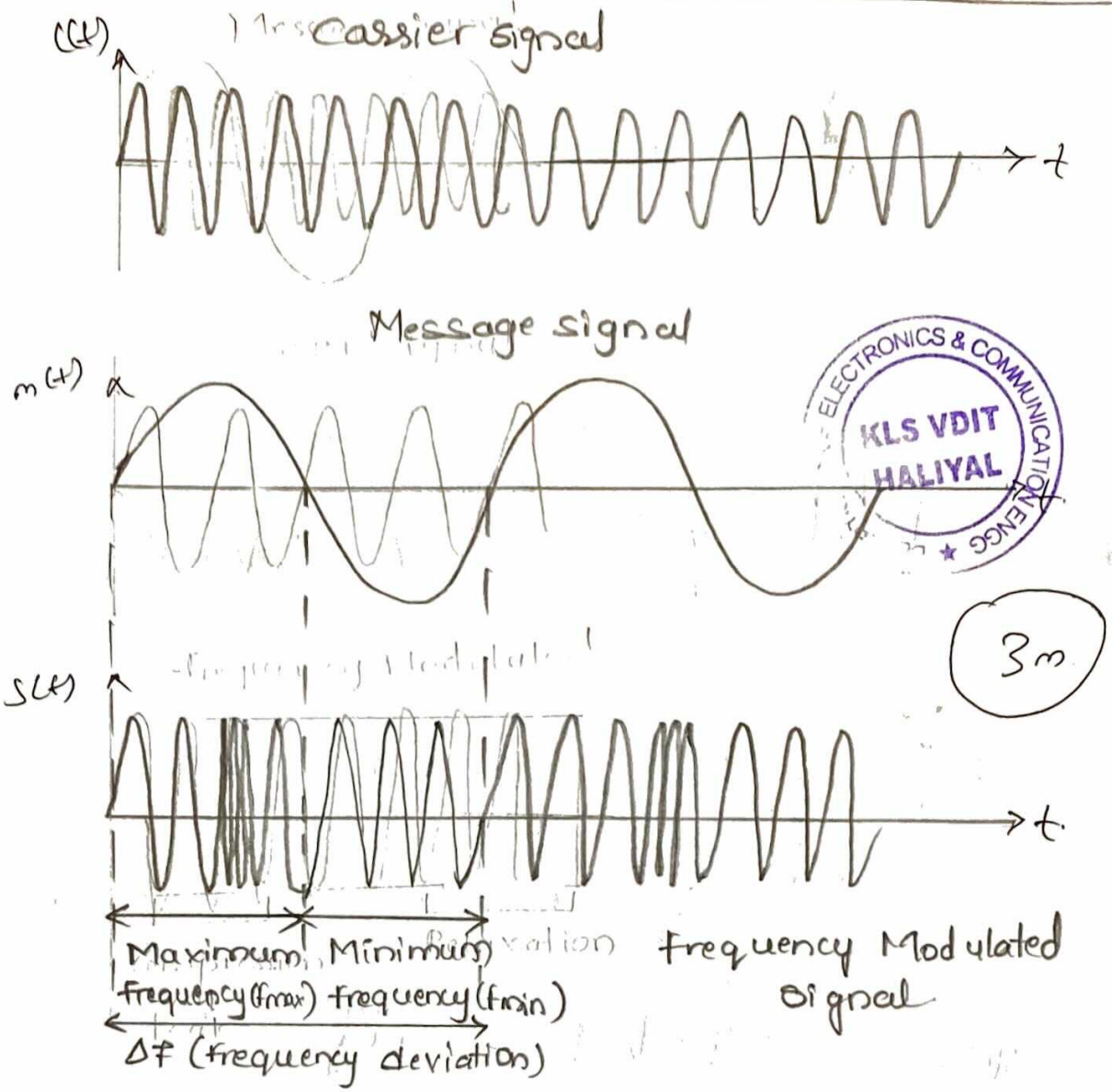
3m

frequency Modulation :

It is defined as a process in which the frequency of the cassier is varied in accordance with the instantaneous value of the message signal, where as the amplitude and phase are kept constant.

2m

Rahul C^

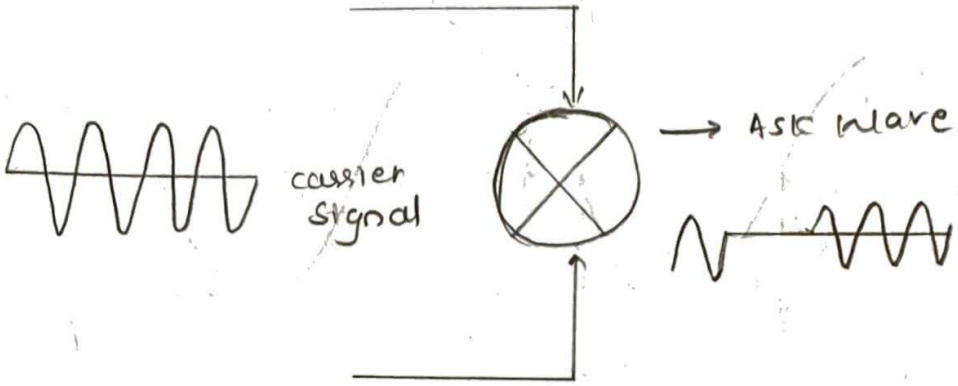


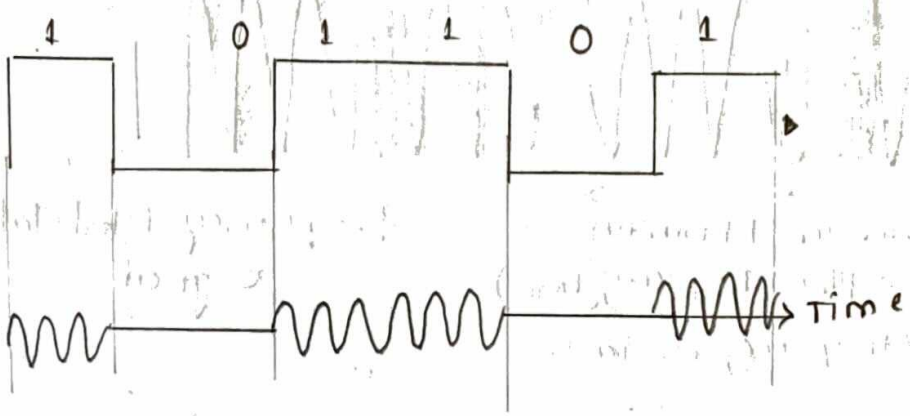
3m

10)b] Write a short note on : Amplitude shift Keying Modulator and demodulator. 10M

→ (Ask) represents digital data as variations in the amplitude of cassier wave. ASK signal can be generated when the incoming binary data and the sinusoidal cassier are applied to product modulator as inputs.

Roll. C. M





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