First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Basic Electronics and Communication Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

a. With a neat circuit diagram and waveforms, explain the working of Bridge rectifier without filter. **(08 Marks)**

b. A 6V Zener diode has a maximum rated power dissipation of 500 mw. If the diode is to be used in a simple regulator circuit to supply a regulated 6V to a load of 500Ω. Determine a suitable value of series resistor for a supply of 12V. **(06 Marks)**

c. With a neat block diagram, derive the expression for overall gain of a negative feedback amplifier. **(06 Marks)**

OR

a. Define the following with respect to Operational Amplifiers and write their typical values : i) Open loop voltage gain ii) Input offset voltage iii) Full power bandwidth and iv) Slew rate. **(08 Marks)**

b. With a neat circuit diagram, explain the working of Integrator using Op-Amp. **(06 Marks)**

c. With a neat circuit diagram, explain the working of Wein bridge Oscillator using Op-Amp. **(06 Marks)**

Module-2

a. With the help of truth table, explain full adder using logic gates. **(08 Marks)**

b. Realize 8 - to - 1 multiplexer using basic gates. **(06 Marks)**

c. With the help of logic diagram, explain the working of R - S bistable circuit. **(06 Marks)**

OR

a. With the help of neat block diagram, explain the working of Microcontroller System. **(08 Marks)**

b. With a neat block diagram, explain the 4 - bit shift register using JK Flip flop. **(06 Marks)**

c. With a neat block diagram, waveforms and truth table, explain 3 bit Asynchronous counter using JK Flip - flop. **(06 Marks)**

Module-3

a. What is an Embedded System? List any 7 comparison between Embedded system and General purpose computing system. **(08 Marks)**

b. Explain the classification of Embedded system, based on Generation. **(06 Marks)**

c. List the comparison between Microprocessor and Microcontroller. **(06 Marks)**

OR

a. With a neat block diagram, explain an Instrumentation System. **(08 Marks)**

b. With a neat circuit diagram, explain Common Cathode and Common Anode display. **(06 Marks)**

c. Write short notes on : i) I²C Bus and ii) SPI Bus. **(06 Marks)**

Module-4

7 a. Describe the blocks of the Basic Communication System. (08 Marks)
b. Explain the types of Communication System. (06 Marks)
c. Define Amplitude Modulation. With the help of waveforms, explain Amplitude Modulation. (06 Marks)

OR

8 a. Explain three different modes of propagation of Electromagnetic waves, with a neat diagram. (08 Marks)
b. With a neat block diagram, explain Transmitter and Receiver using Automatic Repeat Request. (06 Marks)
c. Define an Antenna. Explain Yagi Antenna model with 3D Radiation pattern. (06 Marks)

Module-5

9 a. With a neat block diagram, explain Cellular Telephone System. (08 Marks)
b. With a neat block diagram, explain GSM System Architecture. (06 Marks)
c. Write a short note on WLAN. (06 Marks)

OR

10 a. With a neat block diagram, explain Satellite Communication. (08 Marks)
b. With a neat block diagram, explain Analog link of an Optical Fiber Communication System. (06 Marks)
c. Write a short note on Frequency Bands of Microwave Communication. (06 Marks)

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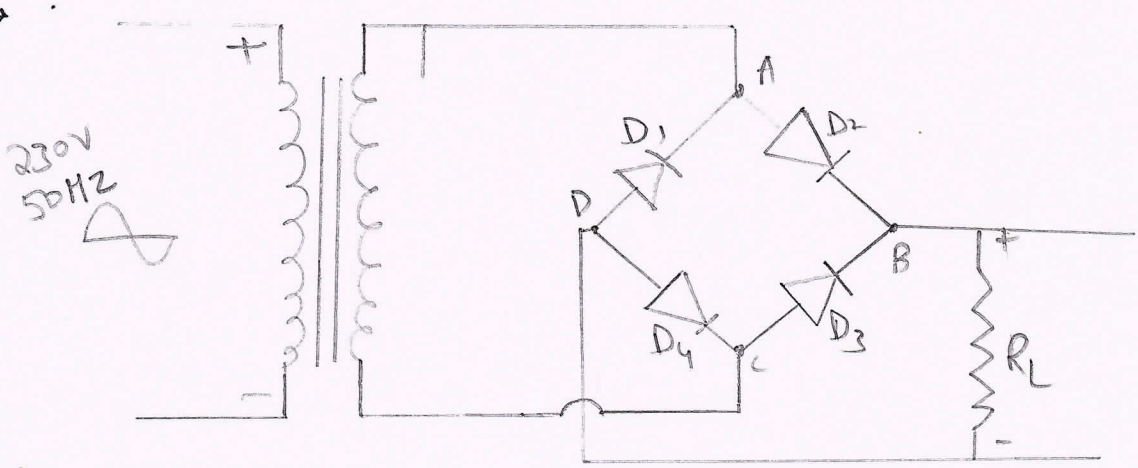
First Semister B.E / B.Tech Degree Examination

Feb / Mar 2022 . subject code: 21ELN14

Module-1

1. a) With a neat circuit diagram and waveforms, explain the working of Bridge rectifier without filter.

→



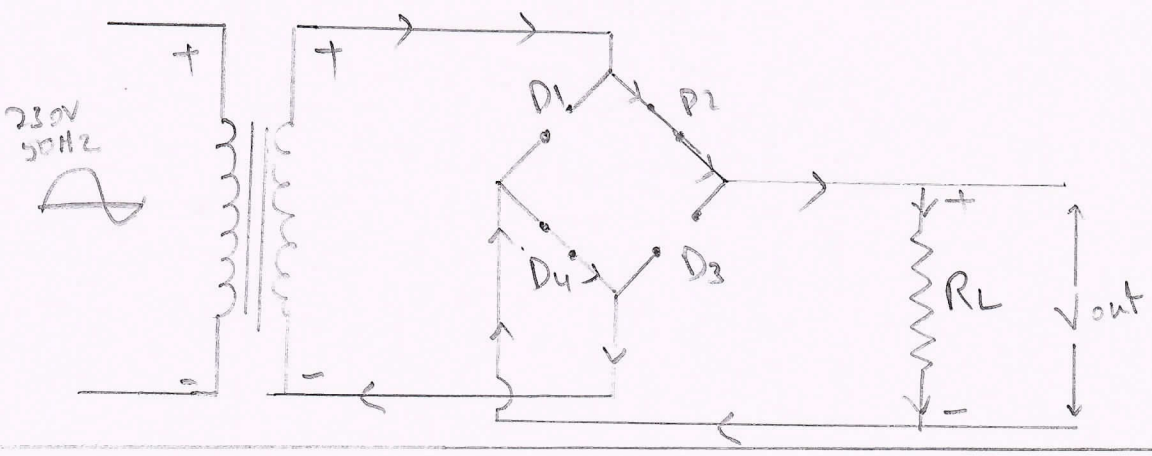
→ During positive half cycle, all the secondary of transformer point A is w.r.t point B and as a result at which, D_2 and D_4 are forward biased and D_1, D_3 are reversed biased & hence current flows from

$D_2 \rightarrow R_L \rightarrow D_4 \rightarrow D_2$

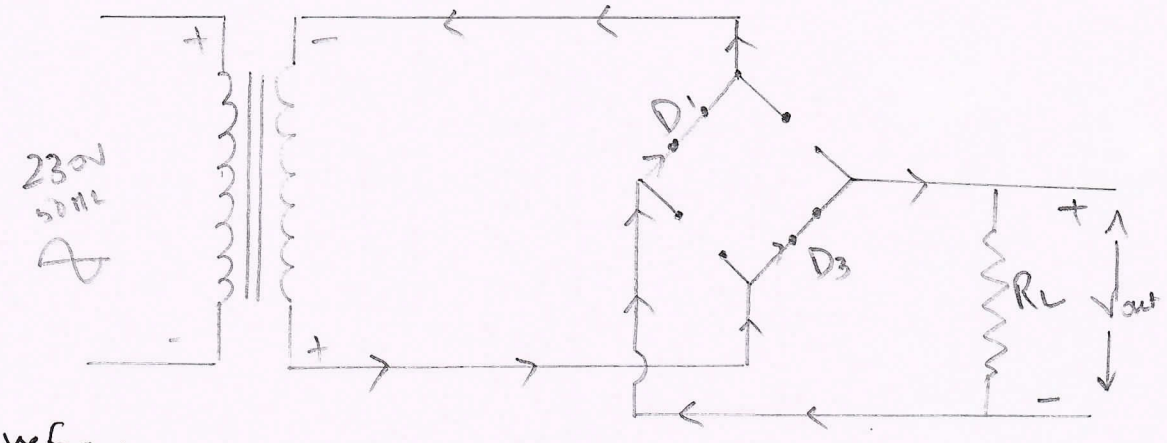
→ During -ve half cycle, all the secondary of T, point A is A is w.r.t point B, hence D_1 & D_3 are forward biased, and D_2 and D_4 are reversed biased, hence current flows from $D_3 \rightarrow R_L \rightarrow D_1 \rightarrow D_3$

4M

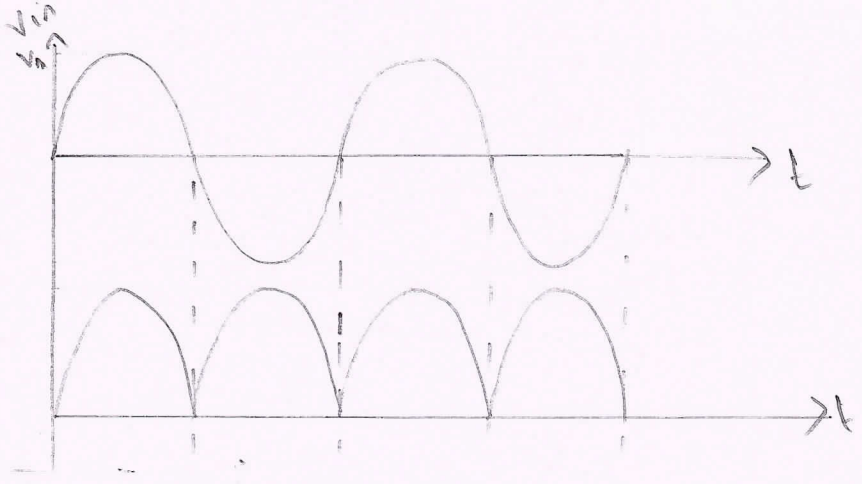
→ During +ve half cycle



→ During -ve half cycle



Waveform:



4M

15) A 6V Zener diode has maximum rated power dissipation of 500 mW. If the diode is to be used in a simple regulator circuit to supply a regulated 6V to a load of 500Ω. Determine a suitable value of series resistor for a supply of 12V.

→ $V_z = 6V$

$V_{in} = 12V$

$R_L = 500\Omega$

$P_{zmax} = 500mW = 500 \times 10^{-3} W$

(1) + (2) + (2)

i) $R_{smax} = ?$ ii) $R_{smin} = ?$

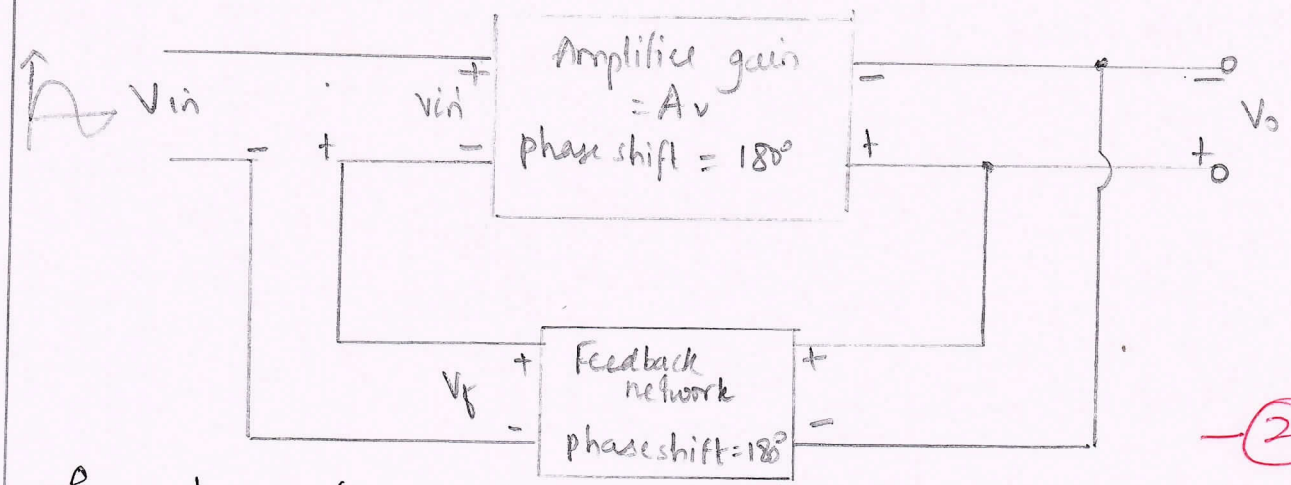
i) $R_{smax} = R_L \times \left(\frac{V_{in}}{V_z} - 1\right)$

$= 500 \times \left(\frac{12}{6} - 1\right) = 500\Omega$

ii) $R_{s\min} = \dfrac{V_{in}V_z - V_z^2}{P_{z\max}}$

$= \dfrac{12\times 6 - 36}{500\times 10^{-3}} = \dfrac{36}{500\times 10^{-3}} = 72\ \Omega$ //

1C) With a neat block diagram, derive the expression for overall gain of a negative feedback amplifier.



—(2)

The above figure shows a block diagram of an negative feedback.

$A_v = \dfrac{V_{out}}{V_{in}'}$ —(1)

is voltage gain —(2)

→ The gain of feedback is given by

$\beta = \dfrac{V_f}{V_{out}}$ —(2)

Applying KVL to input side,

$-V_{in} + V_{in}' + \beta V_{out} = 0$ —(2)

$V_{in}' = V_{in} - \beta V_{out}$

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

$V_{out} = A_v V_{in}'$

Overall gain of the amplifier

$$G = \frac{V_{out}}{V_{in}} = \frac{A_v V_{in}'}{V_{in}' + \beta V_{out}}$$

$$= \frac{A_v V_{in}'}{V_{in}' + \beta A_v V_{in}'}$$

$$= \frac{A_v V_{in}'}{V_{in}'(1+\beta A_v)}$$

$$\boxed{G = \frac{A_v}{1 + A_v\beta}}$$

OR

2a) Define the following with respect to Operational Amplifiers and write their typical values.

i) Open loop voltage gain ii) Input offset voltage

iii) Full power band width iv) slew rate

→ i) Open loop voltage gain :-

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

- Ideally the open loop voltage gain of an OpAmp is infinity
- Typically for 741 opAmp it is @ 1,00,000

(3)

It is given by

$$\boxed{A_{V(OL)} = \frac{V_{out}}{V_{in}}} \Rightarrow \boxed{A_{V(OL)} = 20 \log_{10} \frac{V_{out}}{V_{in}}}$$

→ Input offset voltage:

Ideally, opAmp would provide 0V at the output side when some voltage is applied to inverting input voltage and non-inverting input voltage

(2)

But practically some small voltage at the output side will be present in mV.
The voltage that must be applied differentiating to the opAmp i/p to make o/p of the OpAmp exactly zero is called input offset voltage

→ For 741 OpAmp the i/p and o/p voltage is less than 5mV
→ For ideally OpAmp the i/p and o/p voltage is zero.

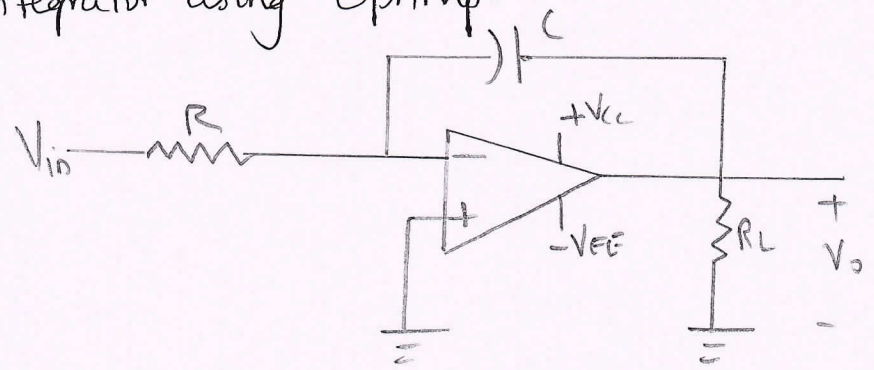
iii) Full power bandwidth:
full power bandwidth of OpAmp is the frequency of which maximum undistorted peak o/p voltage swing falls to 0.707 of its lower frequency.
→ Ideally the full power bandwidth is infinity
→ Typically the full power bandwidth for 741 OpAmp is 1kHz to 100MHz

iv) Slew rate:
The rate of change of o/p voltage w.r.t time.
it is given by $\text{slewrate} = \frac{\Delta V_{out}}{\Delta t}$ V/μs (3M)

→ Ideally, slewrate should be infinity
→ Typically, for 741 OpAmp the slewrate is given 0.5 V/μs

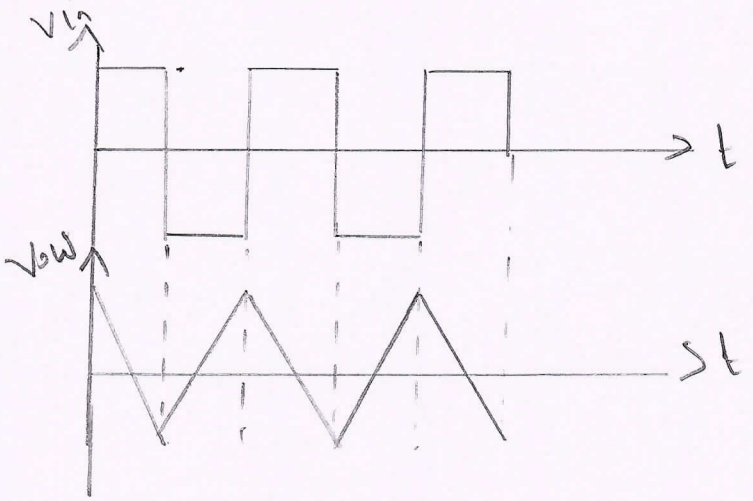
2b) With a neat circuit diagram, explain the working of integrator using OpAmp.

→



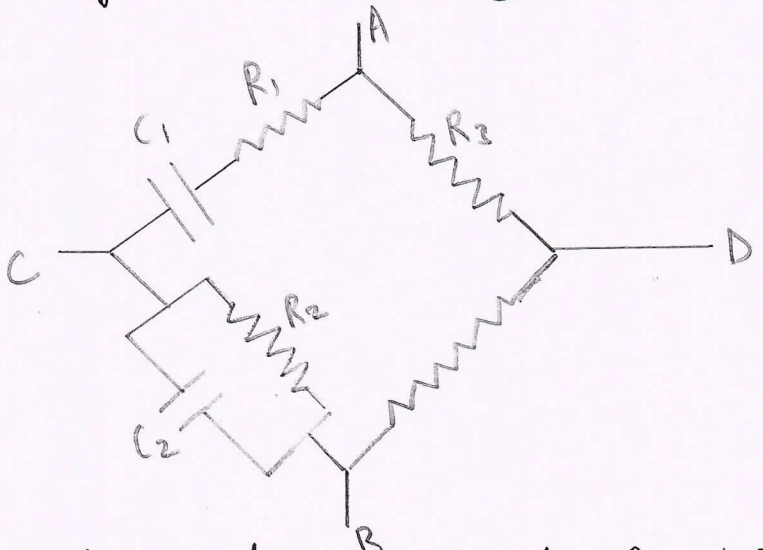
(2M)

the circuit provides opposite function to that of differentiator, here the o/p is equivalent to area under the graph (i/p function). If i/p remains constant (other than 0) o/p voltage will be ramp up or ramp down depending on polarity of input.



4M

2(c) With a neat circuit diagram, explain the working of wein bridge Oscillator using Op-Amp.



3M

→ The input signal is applied to A and B while O/p is taken from C and D

→ At one particular frequency, the phase shift produced by the new will be exactly zero.

→ The minimum amplifier gain request to sustain oscillation is given by $A_V = 1 + \frac{C_1}{C_2} + \frac{R_2}{R_1}$

→ the most cases, $C_1 = C_2$ and $R_1 = R_2$
hence, the minimum amplifier gain will be 3

→ The frequency at which the phase shift will be zero is given by,

$$f = \frac{1}{\sqrt{C_1 C_2 R_1 R_2} \times 2\pi}$$

when, $R_1 = R_2$ and $C_1 = C_2$ the frequency at which the phaseshift will be zero and is given by

$$f = \frac{1}{2\pi\sqrt{C^2R^2}} = \frac{1}{2\pi CR}$$

3 M

where, $R = R_1 = R_2$ & $C_1 = C_2 = C$ //

module 2

3a) With the help of truth table, explain full adder using logic gates

→ Sum $= \bar{A}BC + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$

$= \bar{A}(\bar{B}C + B\bar{C}) + A(\bar{B}\bar{C} + BC)$

$= \bar{A}(B \oplus C) + A(B \odot C)$

Let $\bar{B}C + B\bar{C} \Rightarrow B \oplus C = X$

$BC + B\bar{C} \Rightarrow B \odot C = \bar{X}$

$= A \oplus X$

$= A \oplus B \oplus C$ // ——— (1)

A	B	C	S	Cy
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

4M

Carry $= \bar{A}BC + A\bar{B}C + AB\bar{C} + ABC$

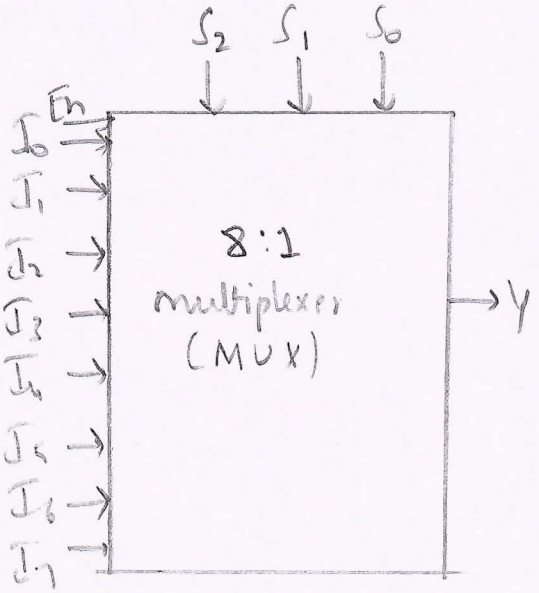
$= C(\bar{A}B + A\bar{B}) + AB(\bar{C} + C)$

$= C(A \oplus B) + AB$ ——— (2)

4M

3b) Realize 8 to 1 multiplexer using basic gates

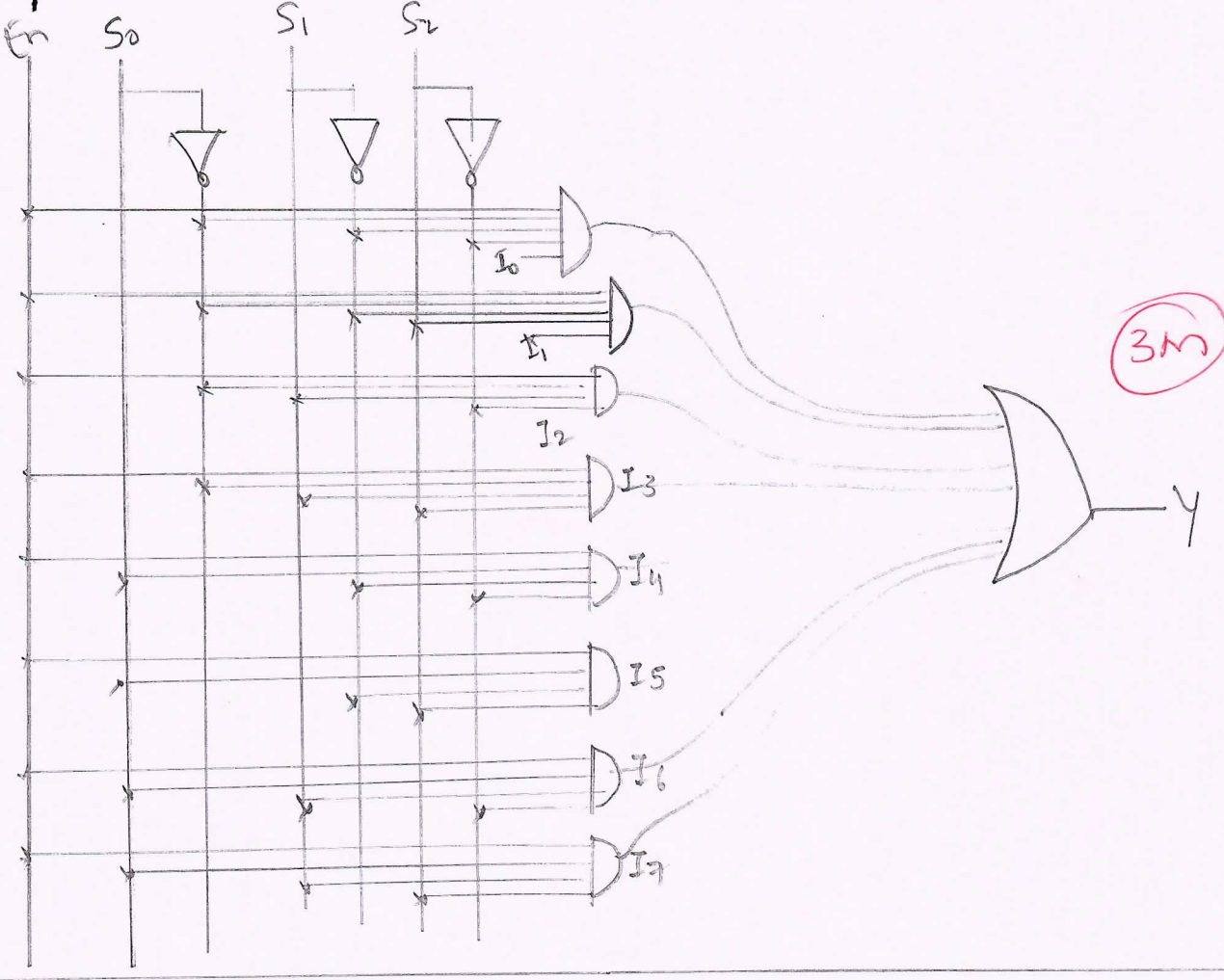
→ In 8:1 multiplexer, select lines $N = 3$ (S_0, S_1 and S_2) input lines $2^3 = 8$ and single output Y. based on the combination of the input at the selection lines.



En	S_0	S_1	S_2	Y
0	X	X	X	0
1	0	0	0	I_0
1	0	0	1	I_1
1	0	1	0	I_2
1	0	1	1	I_3
1	1	0	0	I_4
1	1	0	1	I_5
1	1	1	0	I_6
1	1	1	1	I_7

3M

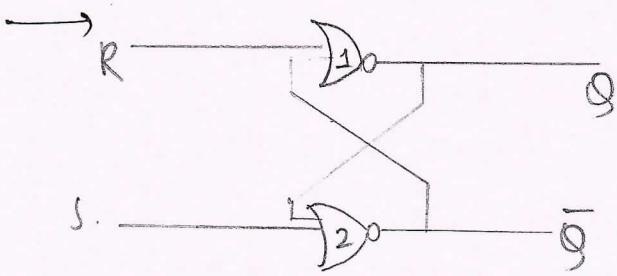
Implementation :



3M

From the truth table; $Y = \overline{En}\, I_0 \bar{S}_0 \bar{S}_1 \bar{S}_2 + I_1 \overline{En}\, \bar{S}_0 \bar{S}_1 S_2$
$+ \overline{En} I_2 \bar{S}_0 S_1 \bar{S}_2 + I_3 \overline{En}\, \bar{S}_0 S_1 S_2$
$+ \overline{En} I_4 S_0 \bar{S}_1 \bar{S}_2 + I_5 \overline{En}\, S_0 \bar{S}_1 S_2$
$+ I_6 \overline{En} S_0 S_1 \bar{S}_2 + I_7 \overline{En}\, S_0 S_1 S_2$

3C) With the help of logic diagram, explain the working of R-S bistable circuit.



Truth table (3M)

	S	R	Q^+	$\bar{Q}^+$
Case 0	0	0	Q^-	$\bar{Q}$
Case 1	0	1	0	1
Case 2	1	0	1	0
Case 3	1	1	Invalid state	

Case 1: Let $S=0$ & $R=1$
the output of I NOR gate is 0 i.e $Q^+=0$, hence output of 2nd NOR gate $\bar{Q}^+ = 1$

Case 2: let $S=1$ and $R=0$
the output of I NOR gate $Q^+ = 1$ and output of II NOR Gate $\bar{Q}^+ = 0$ i.e Zero

Case 3: $S=1$, $R=1$ we get output of both NOR gate $Q^+ = 0$ $\bar{Q}^+ = 0$ hence, it is invalid state. (3M)

Case 0: Let $S=0$, $R=0$, since we cannot predict the output, let $Q=0$ $\bar{Q}=1$, we get $Q^+ = 0$ $\bar{Q}^+ = 1$
Hence, this state is called as memory state

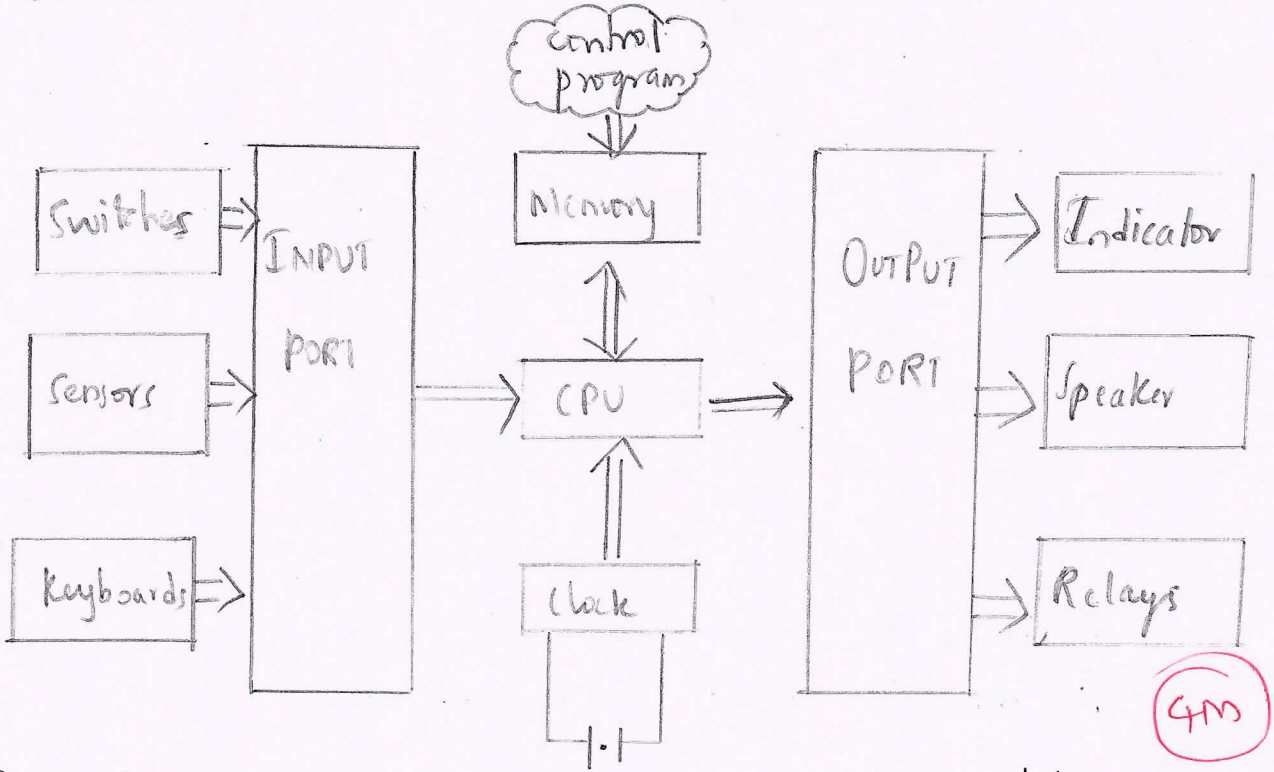
OR

4a.) With the help of neat block diagram, explain the working of Microcontroller system

→ Microcontroller is a programmable device consists of a central processing unit (CPU), memory, peripherals, and support circuit -ry on a single chip. The block diagram of microcontroller system is shown in figure.

CPU: It control and manages all processes that are carried out in the microcontroller unit. It also communicates device like memory, input, ports, output ports and clock unit.
It is the main component of the processor that contains arithmatic logic unit (ALU) and control unit (CU)

Control program: The operation of the microcontroller is controlle -d by a sequence of software instructions known as a control program that examining inputs from input devices and output devices sent to controlled devices. (4M)



(4M)

Input devices: Input devices are mainly used to communicate with various input devices such as switches, sensors and keyboards, sensors convert physical quantities into correspo -nding electrical signal.

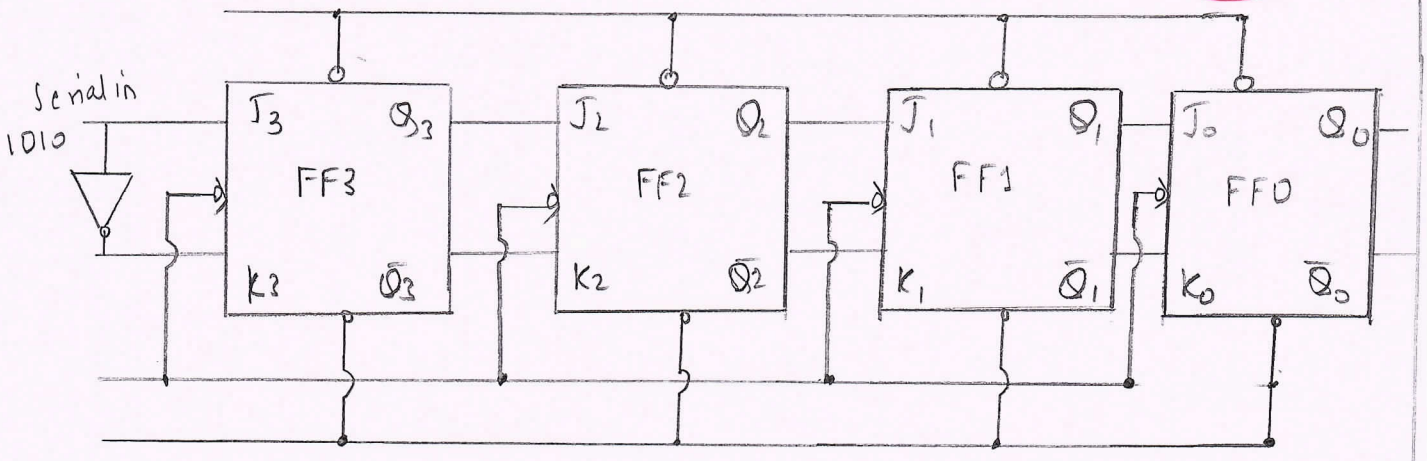
Output devices: Output ports are mainly used to communicate with various output devices, such as LED indicators, pointers, relays, used to convey information to the outside world.

4b) With a neat block diagram, explain 4-bit shift register using JK Flip-flop.

→ Shift register :- It is a sequential circuit is used to store and transfer of binary data.

From the figure, all flip-flops are cleared, by making clear (CLR=0), turning normal operation CLR=1. Also, make preset Pr=0, to avoid interference between normal operation. All flip-flops are triggered by common clock pulse (CK). During each clock pulse, one bit of input data is transmitted from FF3 to FF0.

3M



For example, input data (1010) has to be shifted through the register from FF3 to FF0. LSB (0) is passed first MSB (1) is passed last to FF3.

→ After first clock pulse : $Q_3=0$, $Q_2=0$, $Q_1=0$, $Q_0=0$

LSB (0) is entered into FF3 (as given function table) hence the output of FF3 is $Q_3=0$.

→ After 2 clock pulses :- $Q_3=1$, $Q_2=0$, $Q_1=0$, $Q_0=0$

Data 0 from Q_3 is shifted to FF2, and its output $Q_2=0$, while 1 from input data is entered into FF3, and its output $Q_3=1$

Similarly, when we apply clock pulse after 4 clock pulses
$Q_3 = 1$, $Q_2 = 0$, $Q_1 = 1$, $Q_0 = 0$.

Data 0 from Q_1 is shifted to FF1, and its output $Q_1 = 1$ and data 0 from Q_3 is shifted to FF2, and its output $Q_2 = 0$, while 1 from input data is entered into FF3, and its output $Q_3 = 1$.

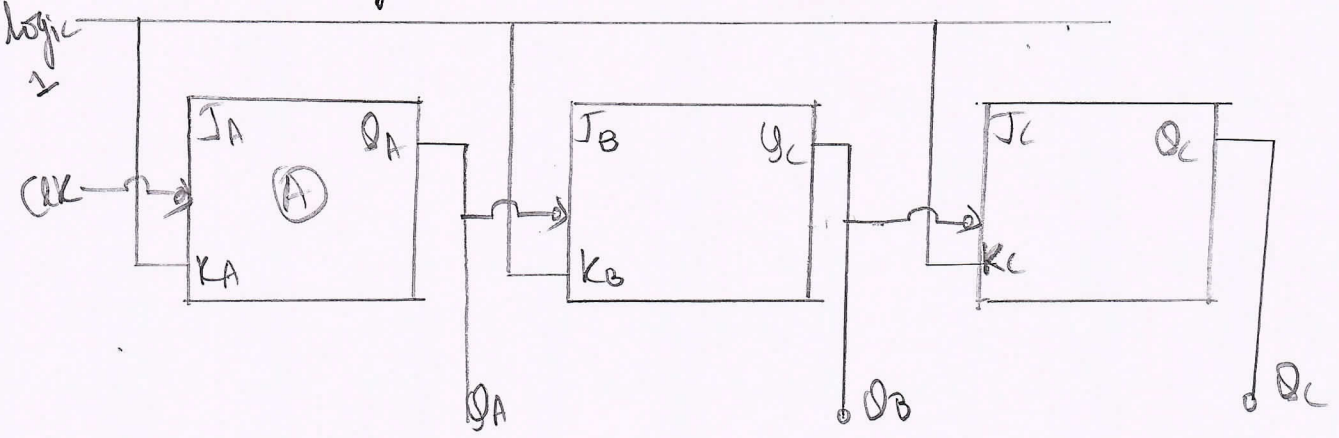
3M

Clock pulse	serial In	Q_3	Q_2	Q_1	Q_0 serial out
↑	1010	0	0	0	0
↑	101	1	0	0	0
↑	10	0	1	0	0
↑	1	1	0	1	0
↑	0	0	1	0	1
↑	0	0	0	1	0
↑	0	0	0	0	1
↑	0	0	0	0	0

4c) With a neat block diagram, waveforms and truth table explain 3 bit Asynchronous counter using JK Flip-Flop.

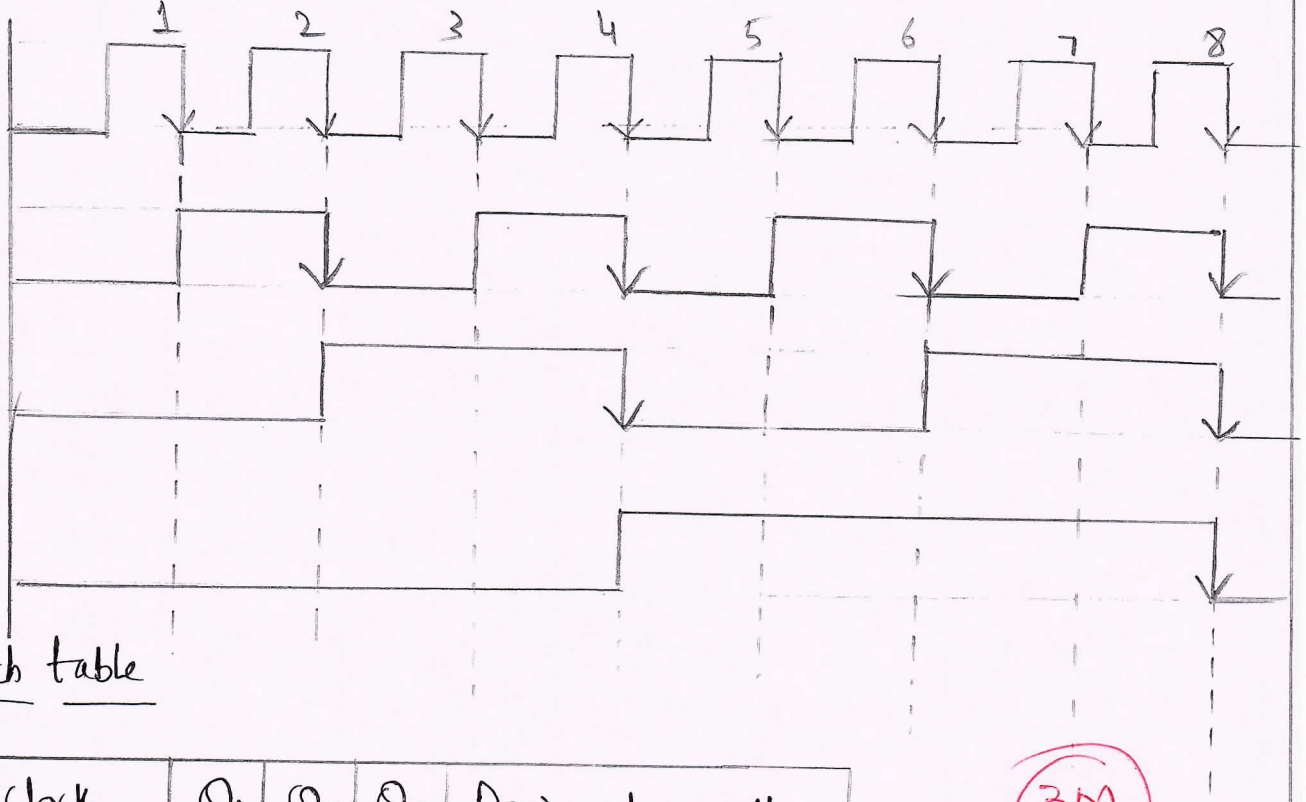
→ It consists of 3 JK flip-flops with preset & clear
→ All the flip flops are initially cleared.
→ logic 1 is given to achieve toggling state.

3M



12

Timing diagram:



Truth table

Clock	Q_A	Q_B	Q_C	Decimal equation
Initially	0	0	0	(0)
I	0	0	1	1
II	0	1	0	2
III	0	1	1	3
IV	1	0	0	4
V	1	0	1	5
VI	1	1	0	6
VII	1	1	1	7
VIII	0	0	0	(0)

3M

8 states

$2^n = 2^3 = 8$

maximum count

$2^n - 1 = 8 - 1 = 7$ //

Module-3

5a) What is an Embedded system? List any 7 comparision between Embedded system and general purpose computing system.

→ An embedded system is a microcontroller or microprocessor based system which is designed to perform a specific task in combination of both hardware and software (2M)

General computing systems	Embedded Systems.
✱ It is designed using a microprocessor as main processing unit	✱ It is designed using a microcontroller as main processing unit.
✱ A computer needs human interaction to perform tasks.	✱ It does not need human interaction to perform tasks.
✱ It consists of Hardware and Software	✱ It consists of Hardware, firmware and software.
✱ It has large memory semiconductor memories like cache and RAM. Also contains secondary storage like hard disks etc	✱ It uses semiconductor memories, but does not require secondary memory. → sometimes has special memory called flash memory.
✱ It can perform many tasks	✱ It performs specific tasks.
✱ Can be reprogrammed to for new purpose	✱ only for specific set of purposes
✱ Power consumption is high	✱ Power consumption is Less

(6M)

5b) Explain the classification of Embedded system, based on Generation.

→ Based on Generation

• First Generation: Earlier first generation embedded system were built around 8-bit microprocessor and 4-bit microcontrollers. Such embedded system possesses simple hardware and firmware, developed using assembly code. (2M)

Ex: Digital telephone keypads

• Second generation:

→ 8-bit processor and 4-bit controllers are replaced by 16-bit microprocessors and 8-bit microcontrollers.

→ More powerful and complex compared to previous generation processors.

Ex: Data acquisition systems, SCADA systems. (2M)

• Third Generation:

→ 32 bit-microprocessor and 16-bit microcontrollers are used

→ Much more powerful and complex than 2nd generation system

→ Ex: Robotics, industrial process control. (2M)

• Fourth Generation:

→ built around System on Chips (SoCs), Reconfigurable processors and multi-core processors, coprocessors also emerged into embedded market

→ Also make use of the high-performance real-time operating system for their operation

Ex: Smart devices, cameras, etc.

5c) List the comparision between Microprocessor and microcontroller.

→

Microcontroller	Microprocessor
→ Acts as heart of embedded systems.	→ Acts as heart of computer systems
→ microcontroller are used in automatically controlled devices	→ Are mainly used in designing general-purpose system from small to large and complex system like supercomputers.
→ Microcontroller are generally used in embedded system	→ microprocessor are basic components of personal computers
→ less computation capability	→ Computational capacity of the microprocessor is very high
→ A microcontroller based system can perform single or very few tasks	→ A microprocessor based system can perform numerous task
→ Power consumption is less	→ Power consumption is very high

1×6 = 6M

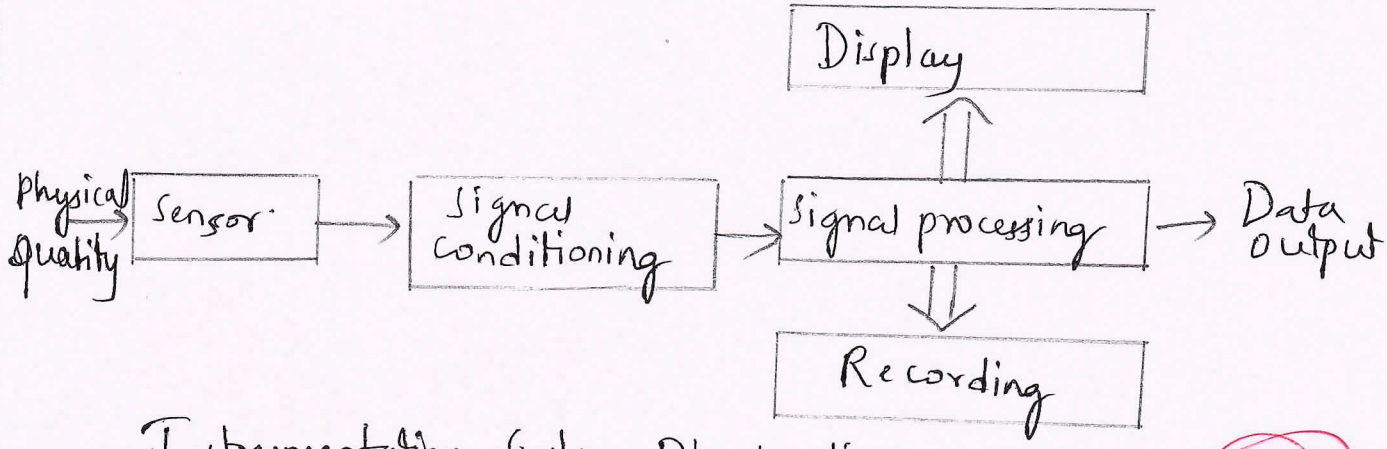
OR

6a) With a neat block diagram, explain an Instrumentation system.

→ Instrumentation: Technology of measurement, an instrument is a device that measures or manipulates process physical variables such as flow, temperature, level, or, pressure, etc. (4M)

→ The physical quantity to be measured acts upon a sensor that produces an electrical output signal.

→ This signal is an electrical analogue (equivalent) of the physical input but there may not be a linear relationship between the physical quantity and its electrical equivalent



Instrumentation System Block diagram (4M)

→ Also, the output produced by the sensor may be small or may suffer from the presence of noise.

→ Therefore, further signal conditioning will be required before the signal will be at an acceptable level and in an acceptable form for signal processing, displaying and recording

→ The signal processing may use digital rather than analog signals for this purpose ADC may be required.

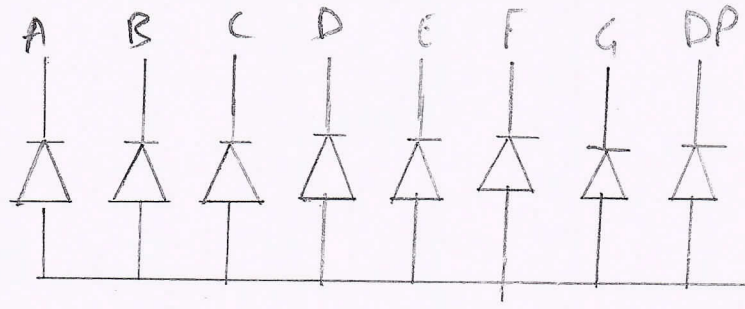
6b) With a neat circuit diagram, explain Common Cathode and Common Anode 7 segment LED display (3M)

→ The 7-segment LED Display is an output device for displaying alpha-numeric (0-9 and A-F) characters.

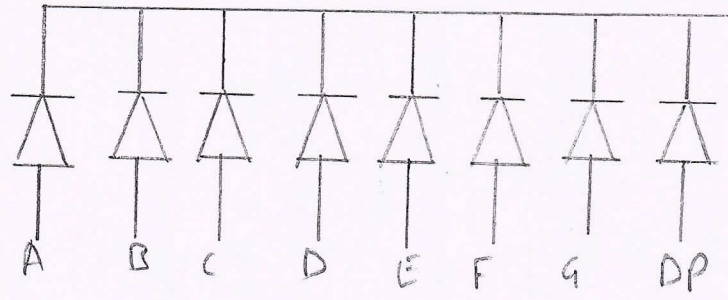
* It consists of eight LED segments arranged in shown form. Out of 8 LED segments, 7 are used for displaying alpha numeric characters.
* The 7-segmented LED Displays are available in two different configurations

i] Common Anode
ii] Common Cathode

* In the common anode configuration, the anode of all LED's connected together to +Vcc for forward biasing.
* And in common cathode configuration, the cathode of all LED's connected together to ground as for forward biasing



Common Anode



3M

Common cathode

6c) Write a short note on

i] I2C Bus: is a powerful bus used for communication between a master and single or multiple slave devices.

→ It supports multiple data speeds: standard-mode, fast-mode

→ For each physical I2C bus controller, the system vendor may assign a physical number to each controller.

→ I2C is a true multi-master bus providing arbitration and collision detection.

3M

ii) SPI Bus: Serial Peripheral Interface

→ Is a synchronous serial communication interface specification used for short distance communication, primarily in embed-ded systems.

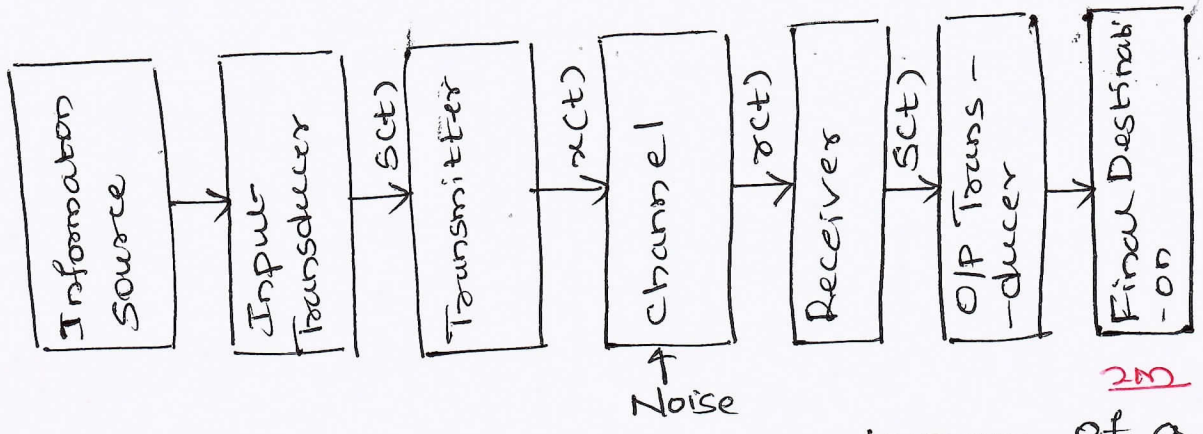
→ Typ for SPI master to control two or three slaves and not more. There is also no formal standard for the SPI protocol, so there is no benchmark for validating protocol conformance.

→ I2C is half duplex communication and SPI is full duplex communication.

3M

Module - 4

7a) Blocks of Basic Communication System — 8M



Above Figure shows the Blocks diagram of a Typical communication system.

Let us understand these blocks with an example of a sharing a live picture of an event or a person, over a satellite

Information Source: It represents the raw data, which will be in analog form such as audio, video or a picture — 1M

Input Transducer: It is a device/stage where raw/analog data is converted in to required form (electrical), here we may consider the camera unit which will convert picture in to electrical parameter — 1M

Transmitter: It is a ckt, which will carry the converted data by the i/p transducer over a suitable medium, here it is done by TV station [Dish antenna] — 1M

Channel: It is the medium through which information is carried from transmitter side to the receiver side, usually it can be a wired or wireless way, like coaxial cable, bluetooth, Radiowaves etc — 1M

Receiver: It is a device which can detect the required electrical signal and further transmits it to the receiver transducer — 1M
Typical example is receiver antenna

Output Transducer: It is a device which can convert the electrical signal in to original format like picture etc, example is set-top box [optical to picture form]. 1M

Final Destination: It is the device which is connected to their particulars set-top box.

7b) Types of communication systems: — 6M

Following are the types of communication systems:

1) Based on Physical Infrastructure: — 1M

under this we have

a) Line communication system: There will be a medium (Landline Telephone system) where it will be in line with transmitter and receiver

2) Based on signal specification

a) Based on Nature of Baseband or information signal

i) Analog communication system: The information exchange takes place in the form of analog [Audio, video etc] — 3M

ii) Digital communication system: Information exchanged in the form of digital [HDTV]

b) Based on Nature of the transmitted signal

Baseband communication system: Signals are transmitted without translating to higher frequencies. — 2M

Carrier communication system: Here baseband signal is mixed with high frequency carrier signal. Ex: Radio, voice messages.

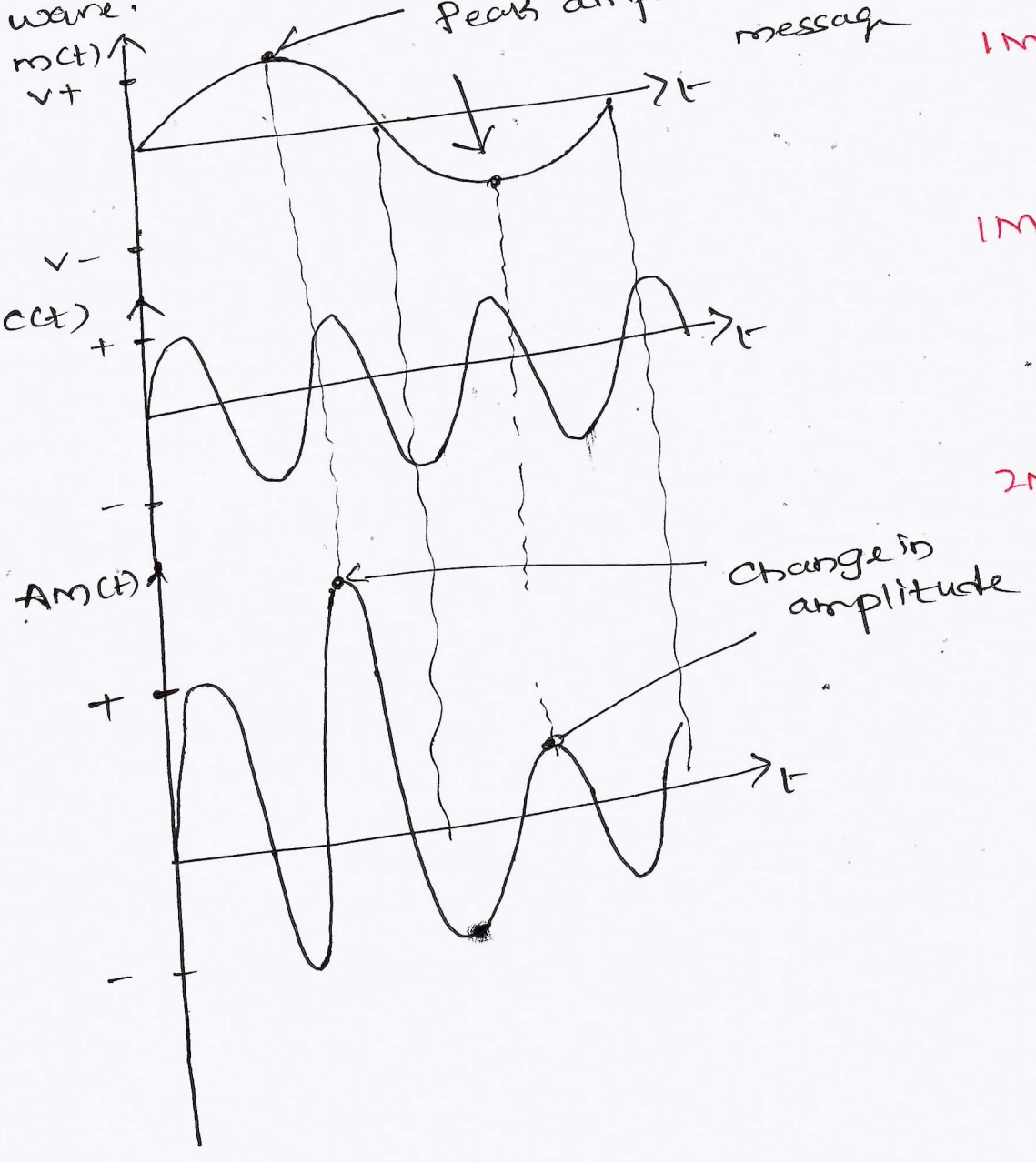
7c) Amplitude modulation : It is a scheme of modulation, in which the carrier signal amplitude varies in accordance with the peak amplitude values of the message signal, where as the frequency and phase of the carrier remains the same

6M

1M

Let- m(t), c(t) and A(t) represent the message, carrier and Amplitude modulated wave.

1M



1M

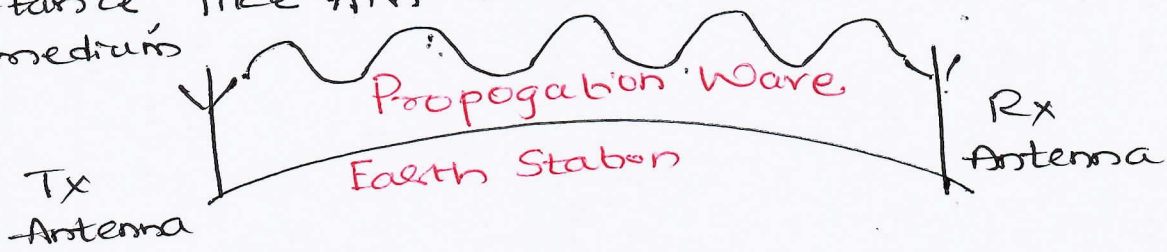
2M

8a) Different modes of propogation Electromagnetic waves with a neat diagram — 8M

Em / Radio wave can be propogated in the following ways

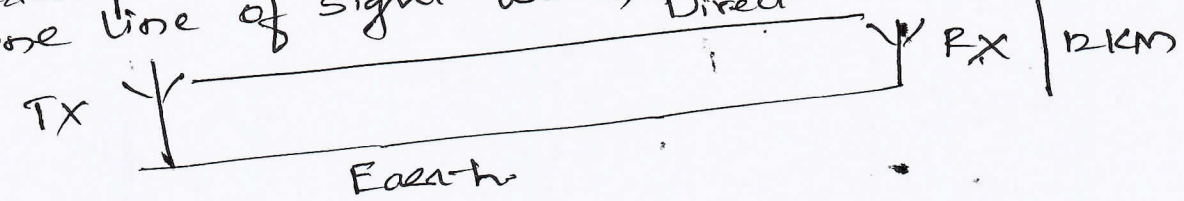
1) Ground or surface wave — 2M

It is very reliable irrespective of the atmospheric conditions, it supports frequency range from 30KHz to 3MHz, 100 to 1Km distance like AM radio broadcast in the medium



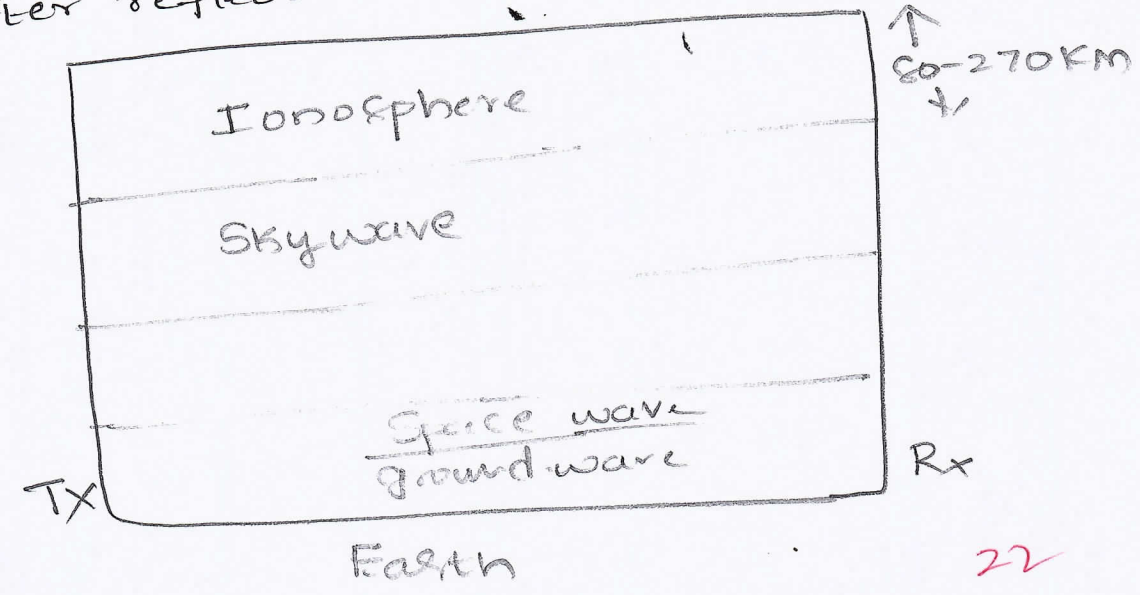
2) Space or Tropospheric Ware! — 3M

In this earths troposphere is considered as a medium within abbut- 12KM over the surface of the earth., with 3MHz to 30MHz frequency, Example! TV Transmission, It requires one to one line of sight- ware, Direct-

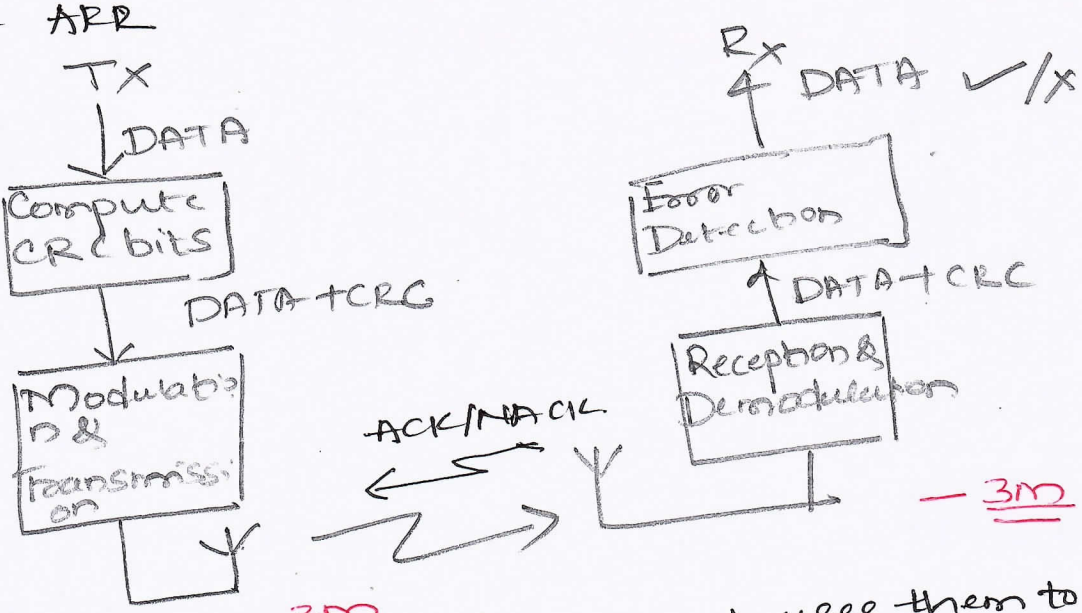


3) Sky wave

Radio waves transmitted from the transmitting antenna reach the receiving antenna — 3M after reflection from ionosphere



8b) Blocks Diagram & Explanation of TX & RX of ARR — 6M



Explanation — 3M

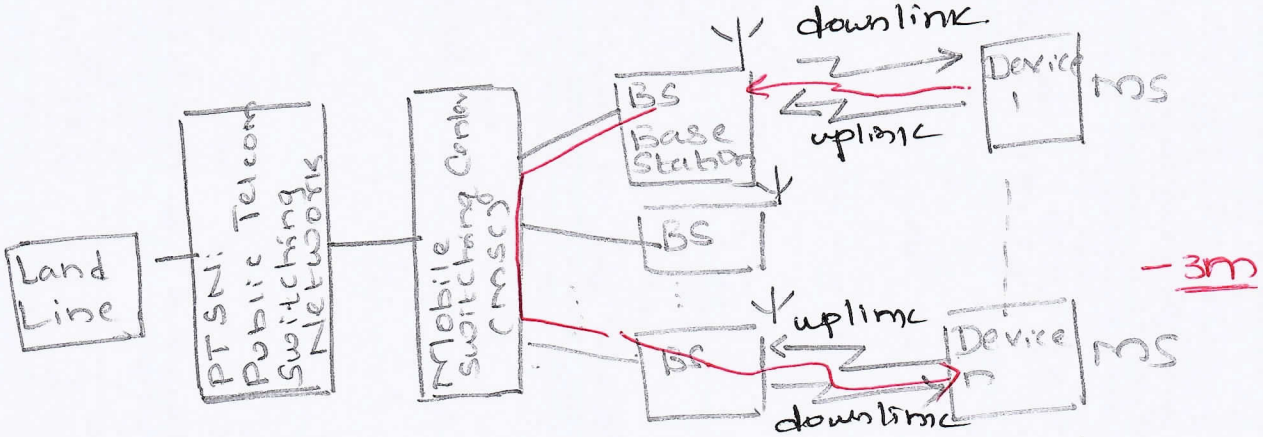
Tx takes a Block of data bits and uses them to compute some extra bits, these are known as CRC. These are further appended to data block and transmitts the two set of data in normal way. , Rx seperates these bits in to DATA and CRC, if CRC bit values are as expected, then there will not be any errors otherwise it will send a NACK [Negative acknowledgement to TX for correction]

8c) Define Antenna. Explain yagi antenna 3D radiation patteren (6M)

NOTE: Radiation patteren is not for syllabus expected cans are def's of antenna and brief explanation of yagi antenna.

Antenna: It is a device used for converting EM radiation in space into electrical currents in conductors & vice-versa,

9a) With a neat block diagram, explain the Cellular Telephone System — 8M



— 3M

Cellular Telephone System Block diagram

It mainly consists of 4 parts, PSTN, MSC, BS and MS, where

→ MS is the Mobile station which is nothing but the user mobile device only.

→ BS is the Base station, which indicates the mobile tower (networks)

→ MSC is the mobile switching center which is responsible for connecting call, sms and other tele services

→ PSTN: Public Switching Telecommunication Network is the path of cellular system, which provides and maintains the connections for wired line and wireless lines seperately. It acts like as router for the entire call process.

3M

Working: Let us understand with an example of making a call,

When a call is initiated from say device1 MS it is read as uplink frequency, which gets communicates with the near by base station (say BS1), which will be further transfered to -wards MSC, which will route the call to the required device (say device n) via the nearby BS of device n, through dowlink frequency, In this way a call is connected For land line calls through PSNT it will be connected to Land line.

2M

9b) With a neat block Diagram Explain GSM System architecture — 6M

The GSM Architecture consists of three main subsystem Mobile Station (MS), Base Subsystem (BSS) and Networks Subsystem (NSS)

MS: It is the combination of Mobile device, user SIM and connected Base station Network.

BSS: It is the bridge between BS and NSS, it consists of BTS (Base Transceiver Station) and it contains the devices which provides communication with mobile phones and BSC (Base station Controller) is responsible for allocating necessary time slots between BTS and MSC.

NSS: It includes five functional units

1) MSC: It performs call setup, call release, call tracing, call forward etc

2) HLR: Home location register, it records the functions of subscriber ID, plan, caller tune and authenticated via SIM cards

3) VLR: Visitor Location Register: It contains the excel- location of all the Mobile subscribers currently present under MSC

4) EIR: Equipment Identity Register, it contains the list of valid mobile equipment on the network.

5) AuC: It contains the necessary programs to perform subscribers authentication

1M

2M

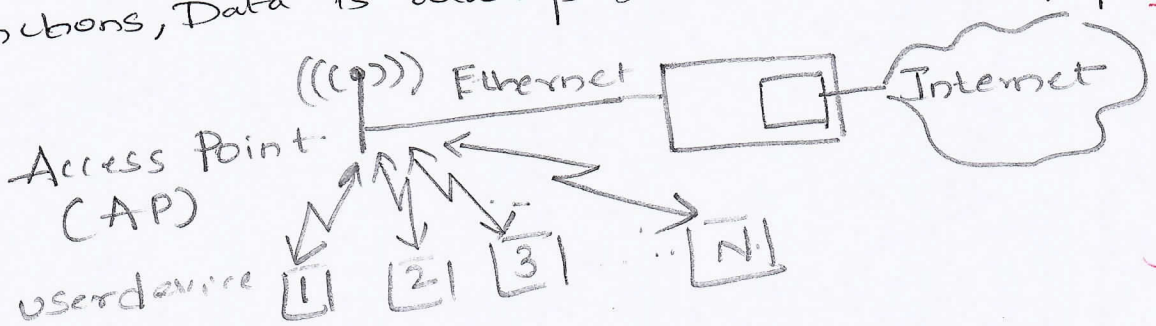
9c) Write a note on WLAN - 6M

→WLAN is the method of connecting two or more devices togeather using a wireless method

→It uses an Access Point (AP) to the wider Internet

→AP sends and receives radio frequency signal to the connected devices, these ase the router functions, Data is always shared in terms of packets.

2M



2M

WLAN Specifications

The major IEEE (802.11) WLAN standards include, 802.11, 802.11a, 802.11b and 802.11g. Details in brief ase mentioned below

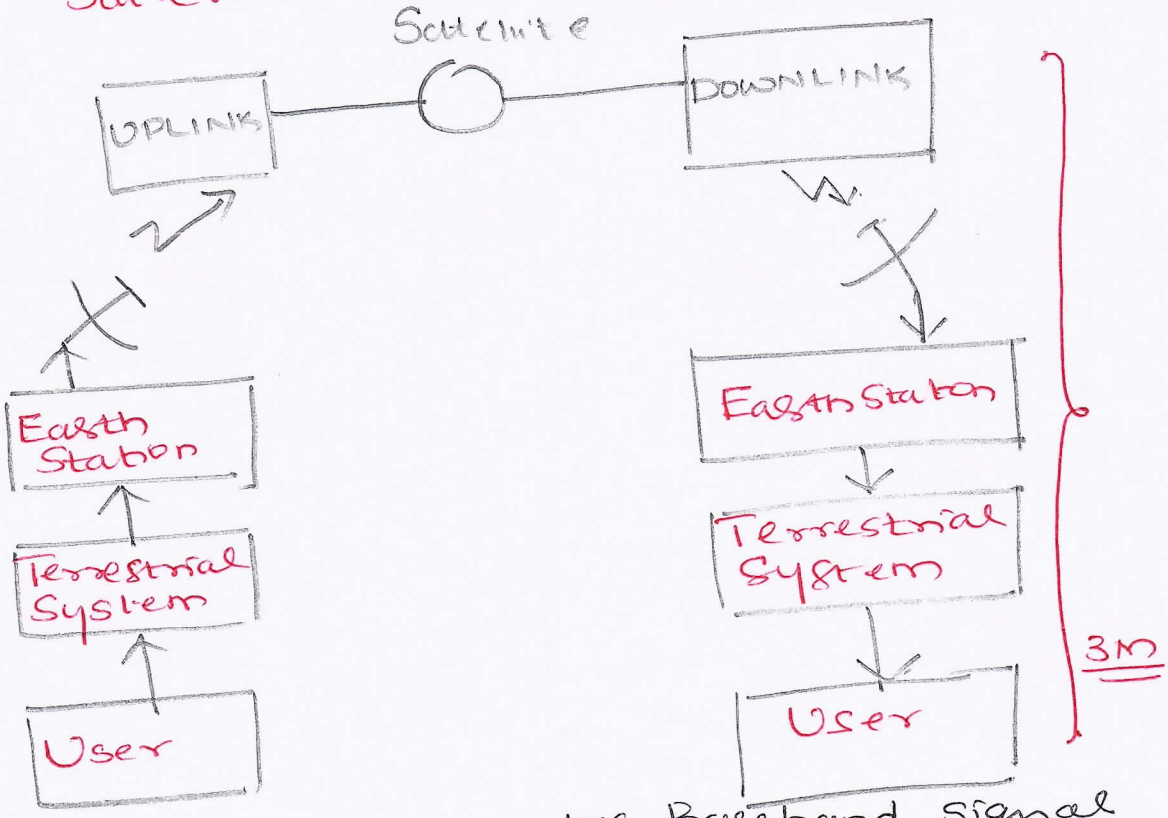
IEEE Standard 802	Frequency Band (GHz)	Bandwidth MHz	Type of Modulation	Data Rate Mbps
.11	2.4	20	PSK	2
.11a	5 to 6	20	OFDM	54
.11b	2.4	20	CCK	11
.11g	2.4	20	DSSS, OFDM	54

2M

Advantages

- No physical wires
- High data rates
- Low cost

10a) With a neat Blocks Diagram, Explain Satellite Communication. } 8M



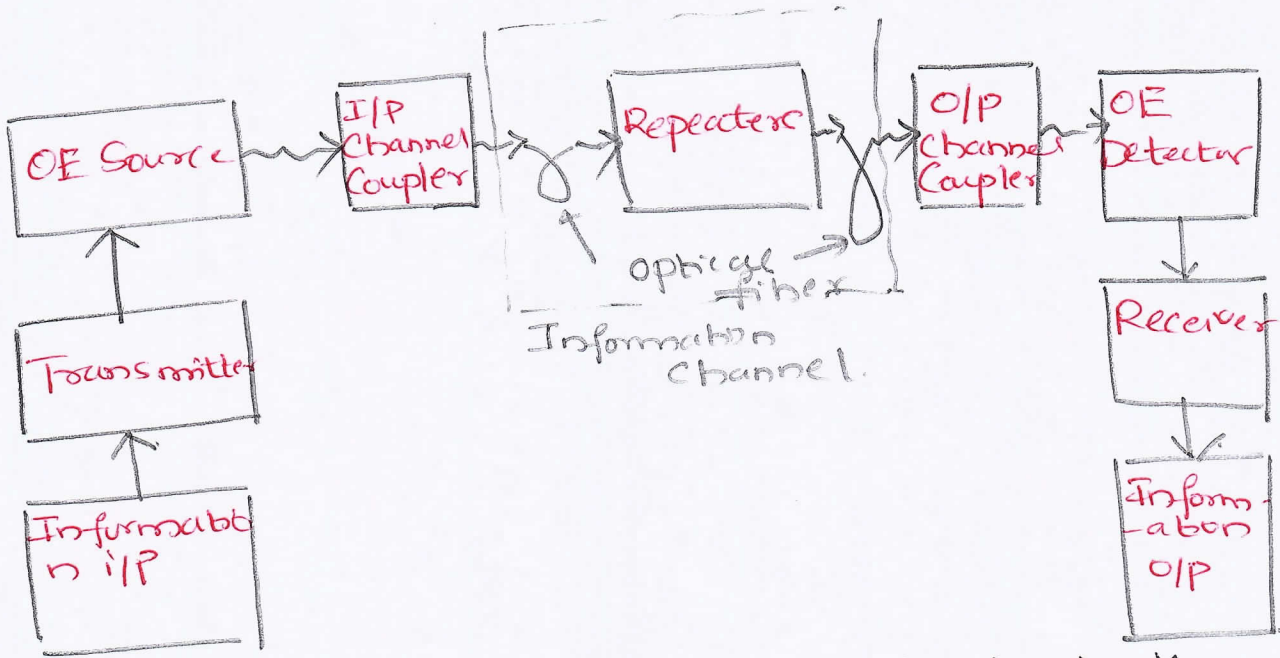
User: The user generates Baseband signal that propogates through a terrestrial network and transmitted to the satellite from earth station. The frequency with which the signal is sent into the space is called as uplink frequency (5.9 to 6.4 GHz), Similarly frequency with which the signal is sent by transponder is called as Downlink frequency (3.7 to 4.2 GHz) 2M

Satellite: It is the repeater in space, receives the RF modulated carrier from all earth stations in the uplink and amplifies before sending in the downlink 1M

Terrestrial Network: This is a network on ground which carries from all earth stations 1M

Earth Station: It is a radio station located on earth, that sends/receives the signals from satellites. The earth station is responsible for controlling the satellite if it drifts from its orbit when it is subjected to any kind of drag from the external forces 1M

1@b> With a neat Block Diagram, Explain Analog Link of an OFC System.



3M

Information i/p and o/p: at i/p side it is the source of information, which can be in the form of audio, video etc; and same will be transmitted at transmitter towards receiver by converting it to appropriate optical value, and at the receiver the same optical data value is converted back to it orginal audio, video etc form

1M

Transmitter: The role of the transmitter is to convert electrical signal into optical form.

OE Source: Optical Energy Sources are the devices which can accept electrical signals and convert it in to optical valued signal, examples like LED which are used at remote controller side (

I/P Channel Coupler: It is the medium/platforms which couples (maintains the optical wave length, intensity) at the required levels.

1M

Repeaters: It is used to maintain the signal level to the required strength till it reaches the receiver

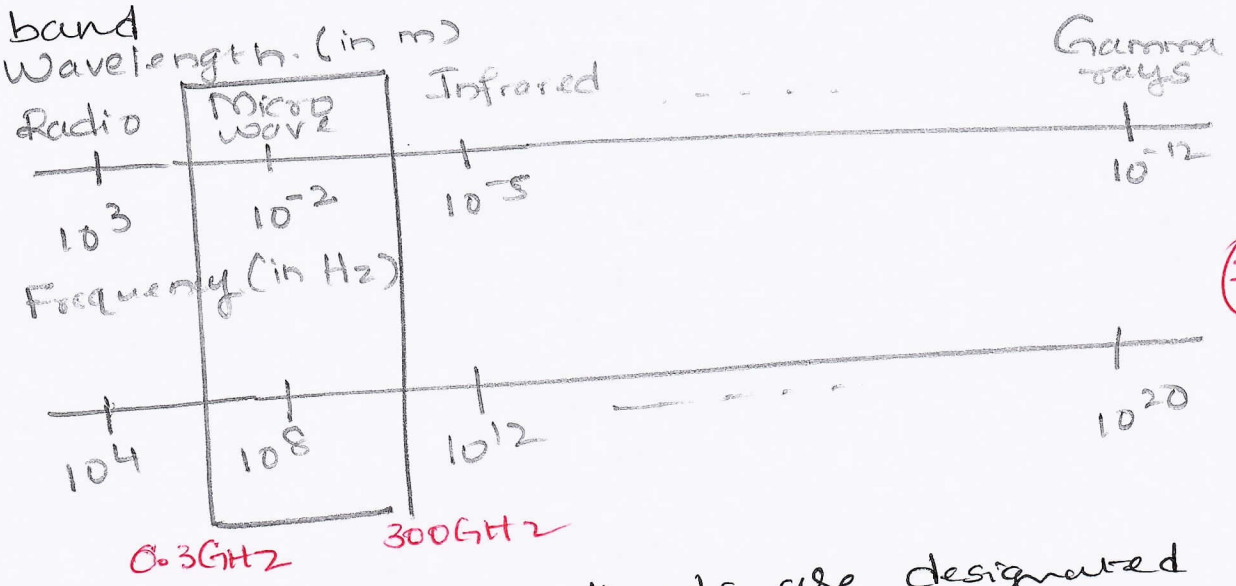
OE Detector: The job of OE detector is to convert the optical energy signal into electrical signal ex) PIN diode

Receiver: It removes the unwanted DC level in the converted electrical signal and transfer it to the receiver side

2M

10c) Short note on Frequency Bands of Microwave Communication 6M

Microwave signals are often divided into three categories: Ultra High Frequency (UHF). (0.3 to 3 GHz), Super High frequency (SHF) (3-30 GHz), and extreem high frequency (EHF). (30 - 300 GHz). Refer the following frequency band 1M



2M

Microwave Frequency bands are designated by Specific

Band	Frequency Range in GHz	Applications
L	1-2	GPS Carriers, Satellite Phones
S	2-4	RADAR
C	4-8	TV Satellite networks
X	8-12	In Military, X-band RADAR
Ku	12-18	DTH Services
Ka	26-40	DTH Services
V	40-100	Satellite

3M