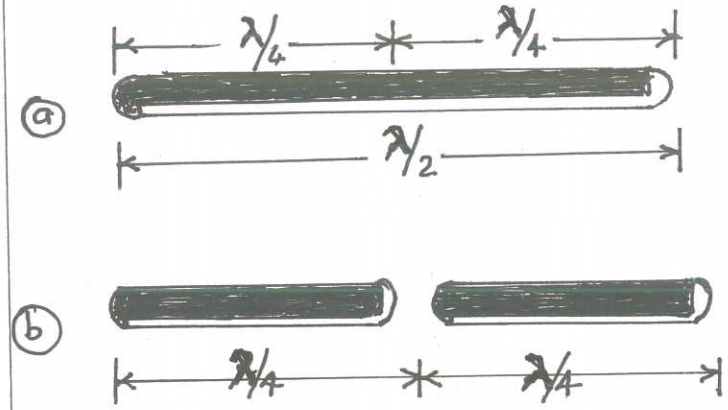
SCHEME OF VALUATION				
Rev:2015	Sub: Communication Engineering	Sub code:3041		
Qst no:	Scoring Indicators	split up score	subtotal	Total
1	PART-A 1. MANET is a collection of independent mobile nodes that can communicate to each other via radio waves	2		5x2 10
	2. The waves are vertically polarized if the antenna is vertical with respect to the earth	2		
	3. Modulation index or Modulation factor $m_a = \frac{E_m}{E_c}$ or $\frac{E_{cmax} - E_{cmin}}{E_{cmax} + E_{cmin}}$	2		
	4. SNR (dB) = $10 \log_{10}(S/N)$ S/N ratio is defined as the power ratio between a signal and the unwanted signal	2		
	5. The purpose of the limiter is to provide a constant level of signal to the FM demodulator thus reducing the effect of signal level changes in the output	2		

II

1.



3

A dipole antenna is defined as a symmetrical antenna in which the two ends are equal potential relative to the mid point. A half wave dipole is usually positioned horizontally relative to the earth's surface. It is also known as the Hertz antenna. Some times the half wave dipole is called a half wave doublet

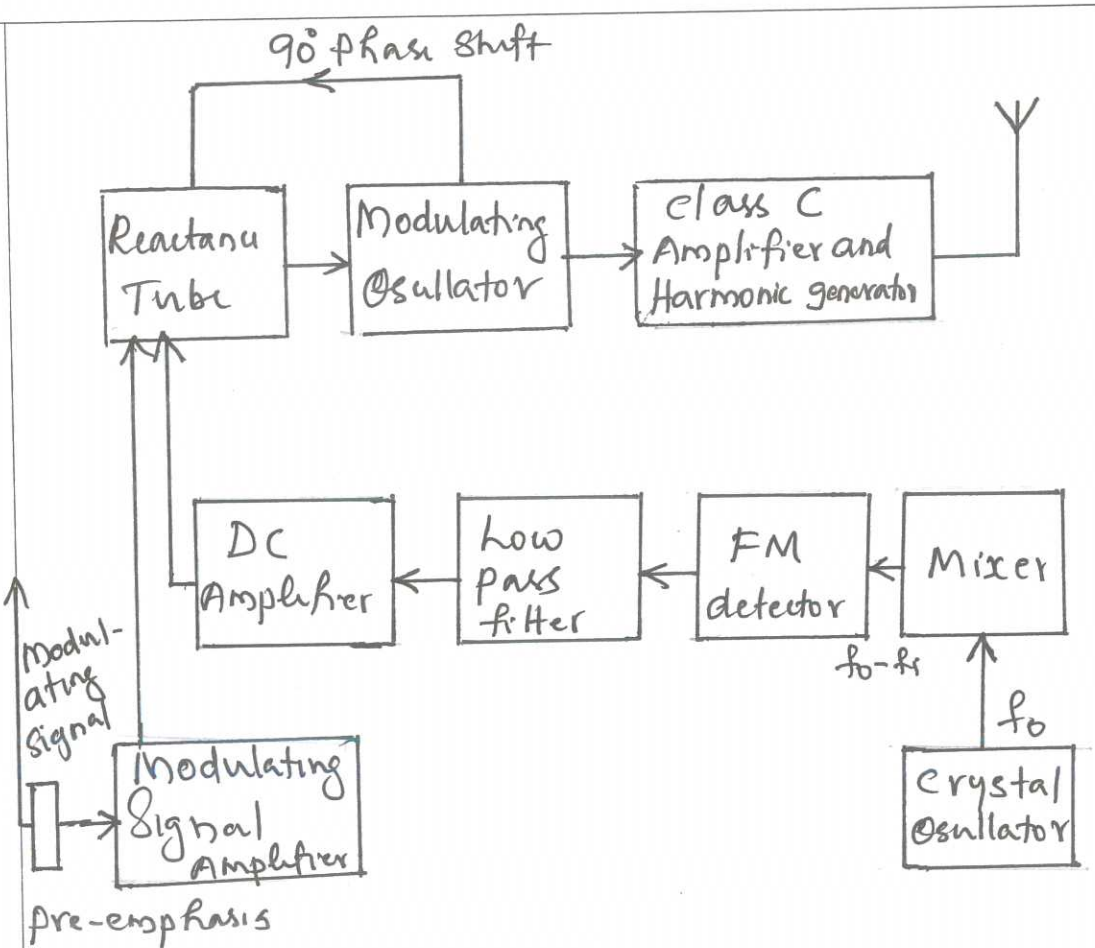
3 6

II	2. AM	FM			
	• It is the oldest method and is still used popularly	• Considerable amount of FM transmission exists but only a small part of the total radio transmission			
	• The equipment required for AM transmission is less costly	• The equipment required is complex and also expensive			
	• S/N ratio is poor in AM	• S/N ratio is more in FM		6X1	6
	• No possibility of improving the S/N ratio	• S/N ratio can be improved by increasing the deviation			
	• Narrow bandwidth per signal of the order of 10KHz to 15KHz is required	• A much wider bandwidth per channel is required by FM which is 7 to 15 times larger than AM			
	• Transmission is possible using MW and global transmission is possible using short waves	• Transmission is in the range of 88MHz to 108MHz			

II	3. PAM • Amplitude of the pulse is Varied • instaneous transmitter power Varies • Simple System • SNR is low • Suitable for TDM with maximum no: of channels • Additive noise affects the re constructed Sample Values	PWM • width of the pulse is Varied • instaneous transmitting power remains constant • Complese implementation • SNR is medium • Decreased number channels for TDM • Additive noise effects are less Severe.		6×1	6

II

4.



3

Here the output of a crystal oscillator is applied to mixer. Mixer output $f_d = f_o - f_i$. when the transmitter has exactly the correct carrier frequency, the discriminator will develop zero dc output. This dc output voltage after suitable DC amplification is applied to the control grid of the reactance tube, the frequency of the osc^r in a direction that tends to correct the error in the average frequency of the transmitter

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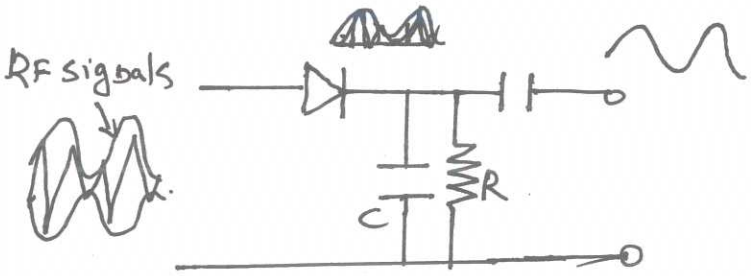
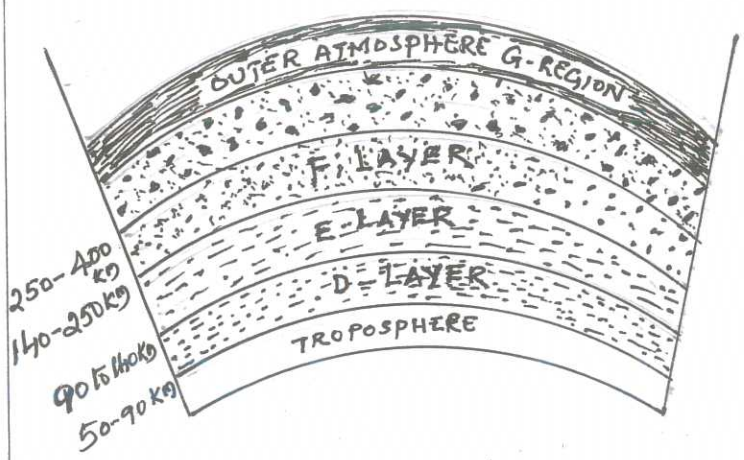
6

II 5.	The AFC circuit is used in transmitters and employs a discriminator circuit which biases the reactance tube circuit thereby adjusting the Local osc^{r} frequency, correctly tuning the receiver to the station. AFC also used in superheterodyne receiver		6	
II 6.		3		
	The modulated output signal is rectified by the diode		6	
	The capacitor has Low reactance for carrier frequency	3		
	The final output is AF			

11/	7. • If the IF is too high, poor selectivity and poor adjacent-channel rejection result • A high value of IF increases tracking difficulties • As the IF is lowered image-frequency rejection becomes poorer • A very low IF makes the selectivity too sharp cutting off sidebands • If the IF is very low, the frequency stability of the local osc^{r} must be made correspondingly higher because any freq drift is now a large proportion of the low IF than a higher IF • The IF must not fall within the tuning range of the receiver Otherwise instability will occur and heterodyne whistles will be heard		6x1	6

III

(a)



4

8

ionosphere means the upper part of the Atmosphere. ionospheric layers. D, E, F, F_1, F_2 regions within the ionosphere there are several different ionospheric regions which affect the propagation of radio signals in different ways - F layer which splits into F_1 and F_2 layers all affect radio signals different

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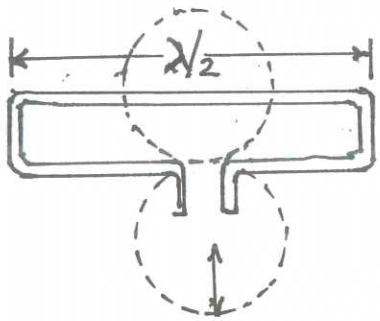
III

6.



3

The Folded dipole is two. λ/2 dipoles - one a continous rod and the other split in the centre connected in parallel. The transmission line is connected to the split dipole. The directivity - bidirectional. Input impedance is very high. it forms an excellent match for 300 ohms twin-lead transmission line

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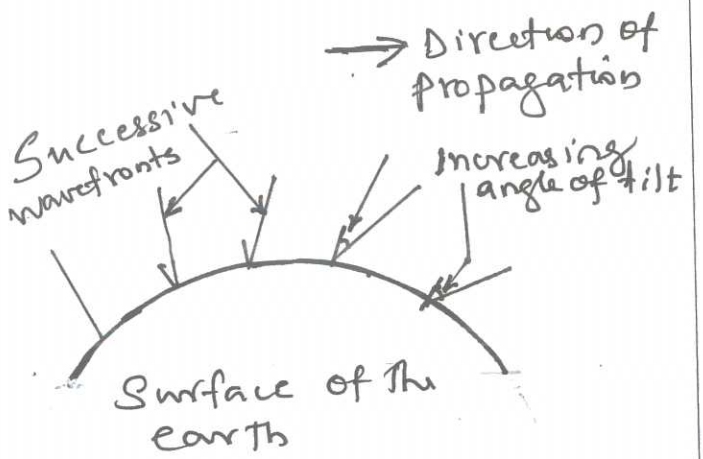
4

$$Z = 72\left(1+\frac{d_1}{d_2}\right)$$

IV (a)



4

The Surface wave is a radio wave that travels over the Surface of the earth. The ground wave can propagate a Considerable distance over the earth's Surface particularly in the Low frequency and medium frequency portion of the radio Spectrum.

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Field Strength for Surface wave propagation for a flat earth is given by the eq:

$$E_s = \frac{E_0}{d} A$$

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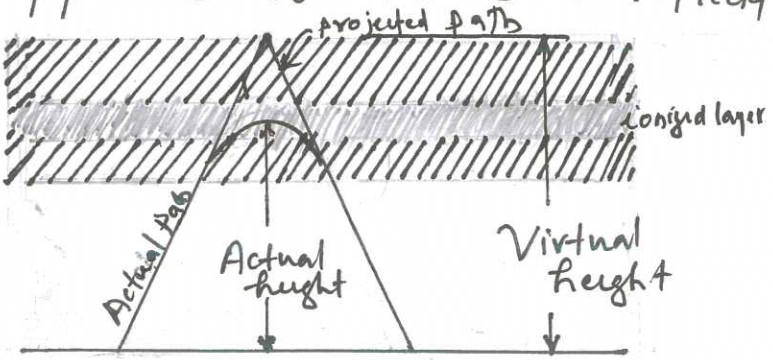
IV

(b) Skip distance :- The minimum distance from the transmitting antenna at which the sky wave of a given frequency is returned to earth by the ionosphere is called the Skip distance — 2

MUF is the highest frequency that can be used to receive the sky wave signals at the receiving point — 2

$$MUF = \frac{\text{critical freq}}{\cos\phi_0} = f_c \sec\phi_0$$

Virtual height :- is the height above earth's surface from which a refracted wave appears to have been reflected — 2



1

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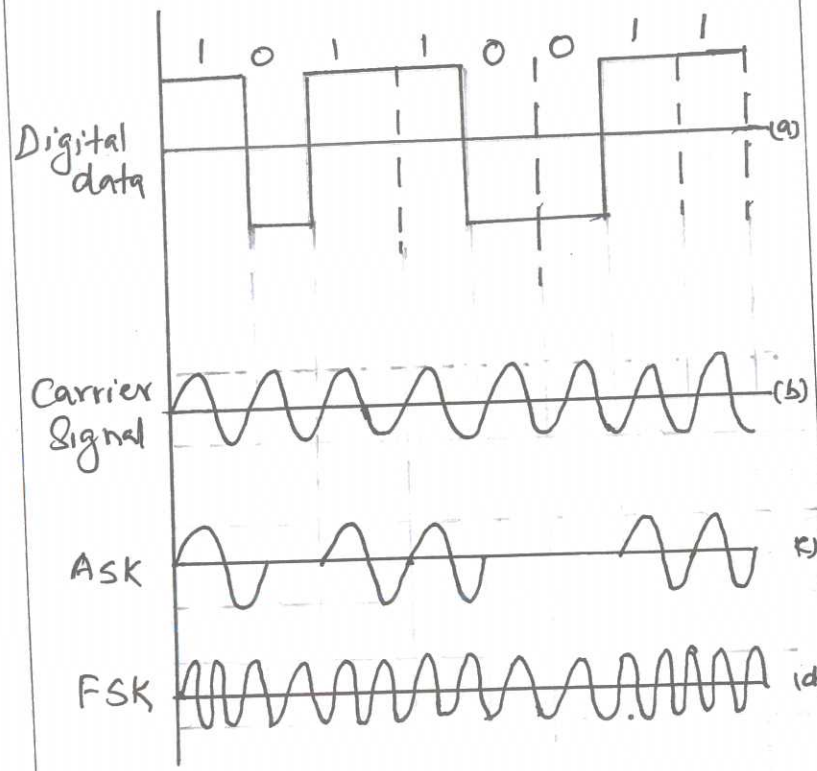
V

1(a)

	Parameter	DSBSC	SSB	VSB
1	Bandwidth	2f	f	Between f and 2f
2	Power Saving (Sinusoidal)	66.5%	83.25%	Between 66.5% and 83.25%
3	Power Saving (Non Sinusoidal)	52%	74%	Between 52% To 74%
4	Carrier Suppression	Fully	Fully	No
5	Sideband Suppressed	No	One SB Completely Suppressed	One SB partially Suppressed
6	Transmission efficiency	Moderate	Maximum	moderate
7	Applications	Radio broadcasting	Point to point mobile communicating	Television broadcasting

8×1 8

V (b)



4

In ASK, the amplitude of the carrier is switched between two levels. ON and OFF. The resultant waveform consists of ON pulse representing binary '1' and OFF pulse representing binary '0'

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In FSK, the frequency of the carrier is switched between two frequencies. The resultant waveform consists of high frequency carrier representing binary '1' and low frequency carrier representing binary '0'

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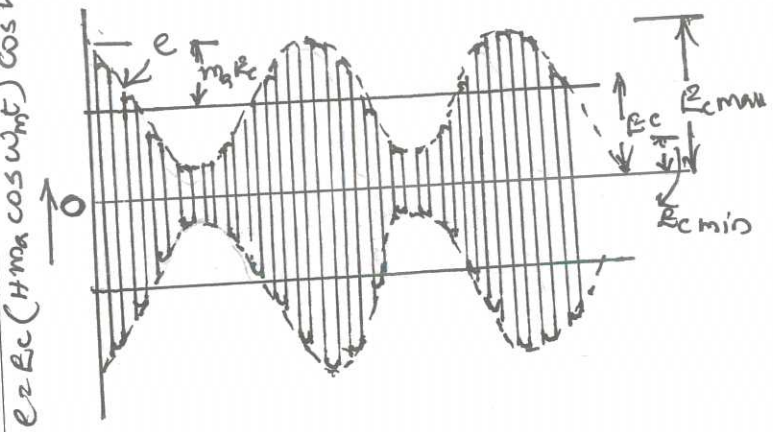
VI (a)



3

$e_m = E_m \cos \omega_m t$

$e_c = E_c \cos \omega_c t$

$e = (E_c + K_a E_m \cos \omega_m t)\cos \omega_c t$

$e = E_c\left(1 + K_a \frac{E_m}{E_c} \cos \omega_m t\right)\cos \omega_c t$

$= E_c(1 + m_a \cos \omega_m t)\cos \omega_c t$

Modulation factor $m_a = \frac{K_a E_m}{E_c}$

8

It is further seen that

$m_a = \frac{E_{cmax} - E_c}{E_c}$ Also

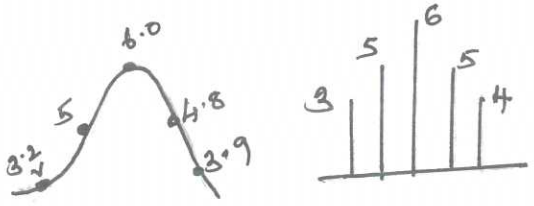
$m_a = \frac{E_c - E_{cmin}}{E_c}$

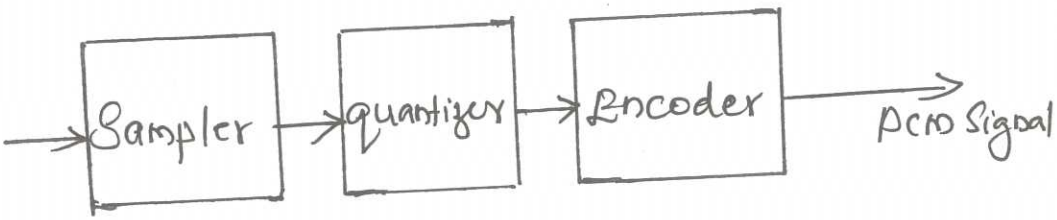
5

$m_a = \frac{E_{cmax} - E_{cmin}}{2E_c}$

$\therefore m_a = \frac{E_{cmax} - E_{cmin}}{E_{cmax} + E_{cmin}}$

VI
b.





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The Signal is continuously Sampled. It is quantized, coded and then transmitted. Quantizing is done to the nearest Standard amplitude. The Code is binary no: when Sufficient quantizing levels are used the Signal will resemble the same as is from an analg System.

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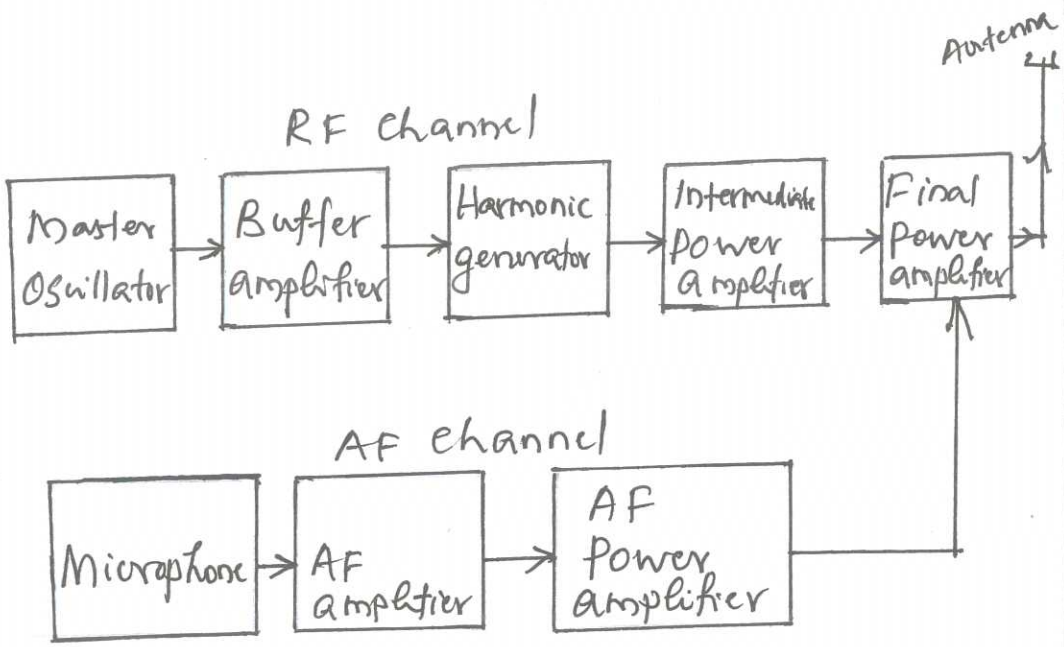
VII a.



4

Master Oscr generates oscillations of desired frequency with high degree of stability. Buffer amplifier to isolate the oscillator from succeeding stages. Harmonic generator multiply the desired frequency. Carrier signal is amplitude modulated by collector modulation. The Final amplifier is class C or class B. The AF section of the transmitter generates the modulating wave. The conversion of sound energy into electrical energy is performed by the Microphone. The electrical energy available from the microphone is very low, so it is amplified through an ampr until having an appropriate gain.

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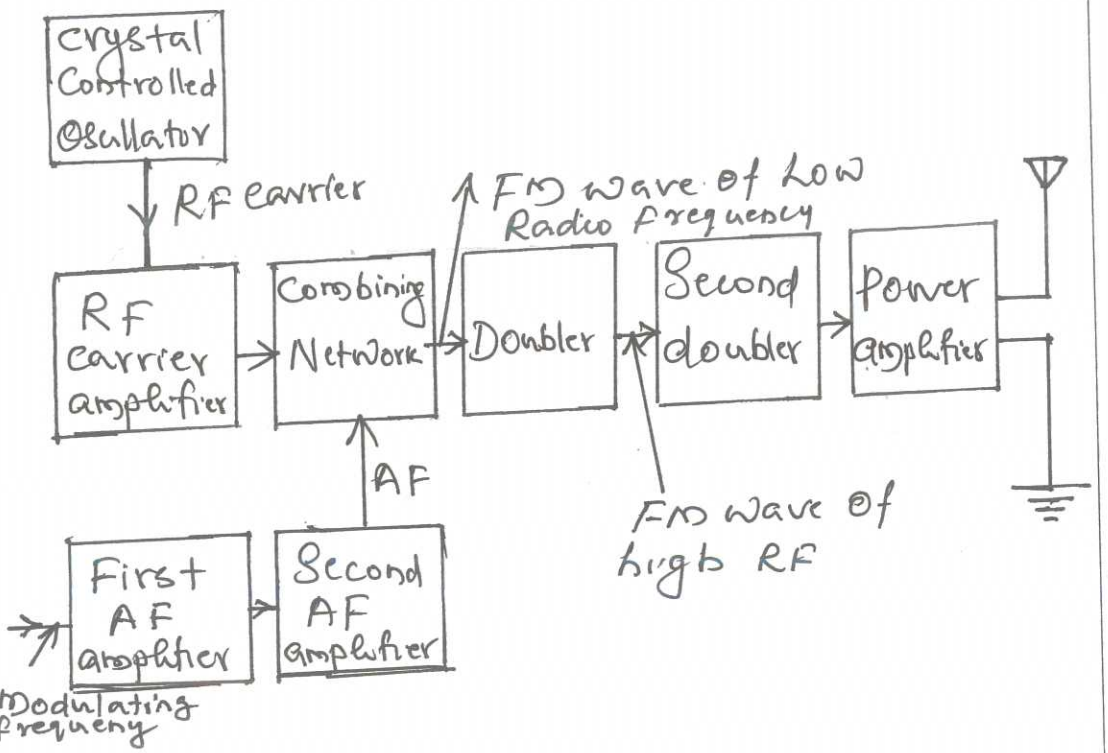
4

VII	(b) Noise may be classified in two broad group External Noise, Internal Noise External Noise may be defined as that type of noise which is generated external to a Communication System. External Noise may be classified as (a) Atmospheric noise, Extraterrestrial Noise, Industrial Noise. Extraterrestrial Noise may be divided in to two groups. • Solar Noise and Cosmic Noise. Internal Noise may be classified as • Shot Noise • partition Noise • Flicker noise • transit-time Noise • Thermal Noise		7	

VIII
a.



4

The transmitter osc^{r} is maintained at a constant frequency by the quartz crystal. The RF carrier amplifier that increases the amplitude or energy level of the wave. The audio signal is applied to the RF carrier by means of a combining network. The output from the combining network is fed into a series of class C amplifiers, which are tuned to a multiple frequency. The output from these frequency multipliers is fed to a power-amplifier that couple the FM signal to the antenna.

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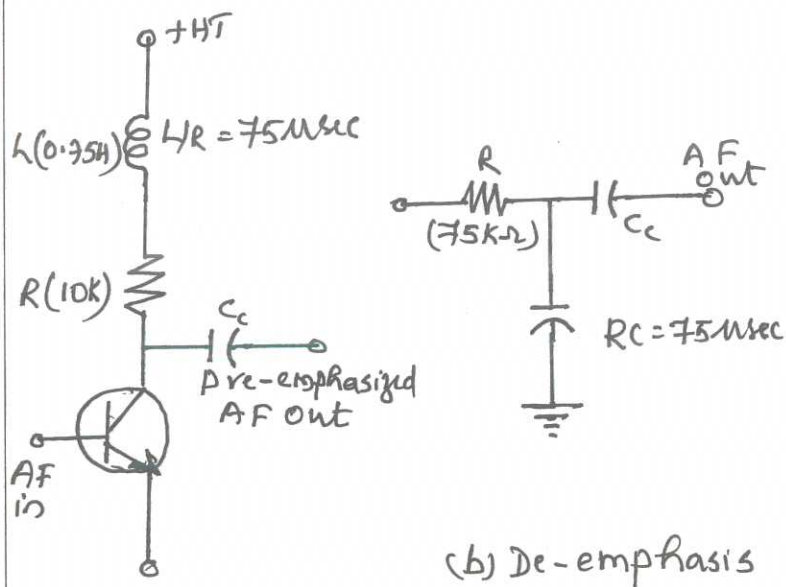
VIII b.



(a) Pre-emphasis

(b) De-emphasis

Fig 2+2 = 4

In FM modulation factor

$$m_f = \frac{f_d}{f_m}$$

Pre emphasis :- Improving S/N ratio by increasing the magnitude of higher frequency signals with respect to lower frequency signals. - Transmitter FM

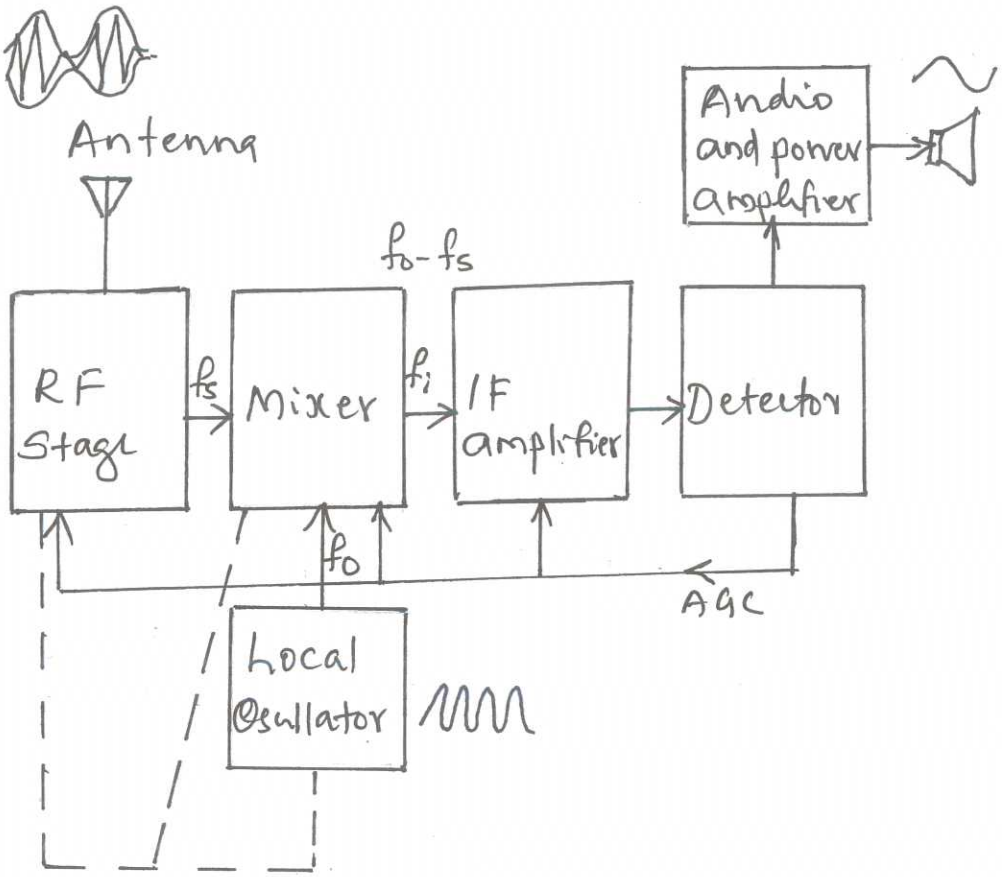
1½+1½ = 3

De-emphasis Improving the S/N ratio by decreasing the magnitude of higher frequency signals with respect to lower frequency signals. - FM Receiver

3

7

Tx (a)



4

RF amplifier Selects tuned frequency. Improved image frequency rejection. Improved S/N ratio at the input of the receiver. The O/p of the mixer stage is difference of RF Signal and Local osc^r Signal called IF (455KHz) The output of the detector stage is fed to a multistage amplifier. The signal is amplified until it is Sufficiently strong to drive the speaker. The Speaker converts electrical Signal into Sound waves corresponding to the orginal Sound at the broadcasting station

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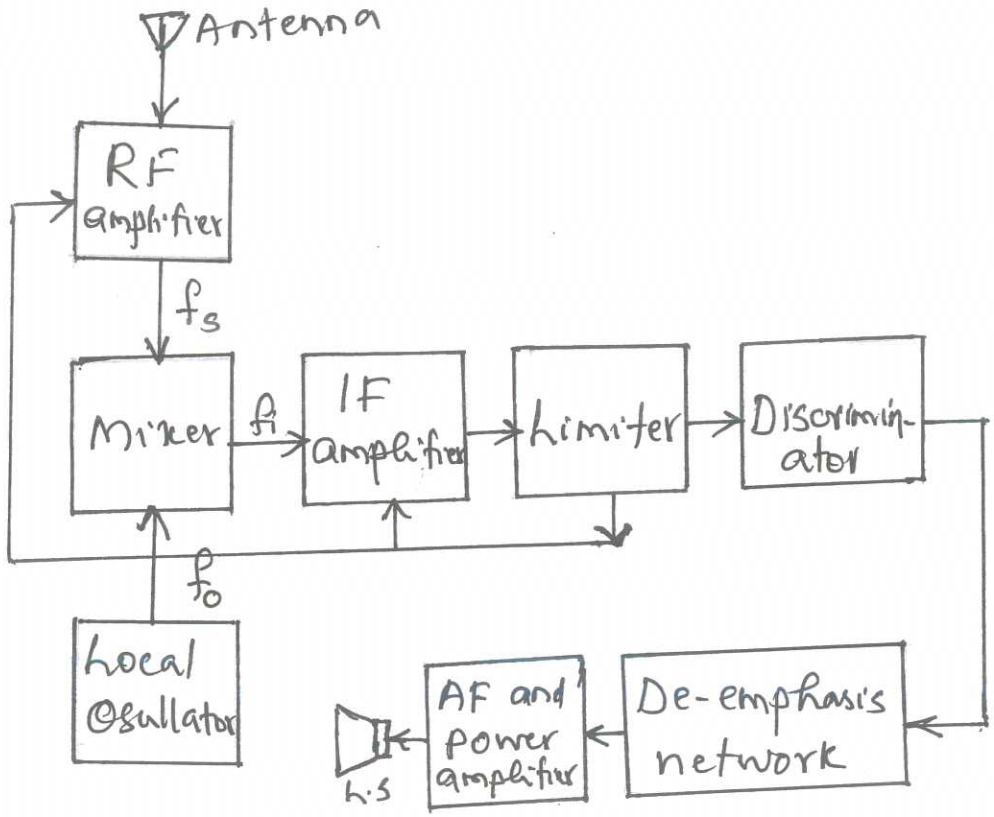
IX b	Sensitivity :- The Sensitivity of radio receiver is that characteristic which determines the minimum strength of signal input capable of causing a desired value of output Selectivity of a radio receiver is that characteristic which determines the extent to which it is capable of differentiating between the desired signal and signals of other frequencies Fidelity :- of receiver is the ability of a radio receiver to reprodue correctly different modulating frequency components is an input signal Noise figure determines the smallest power that may be received without being drowned out by the noise		4×13/4	7

X

a.



4

The block diagram is similar to an AM receiver. The basic differences are

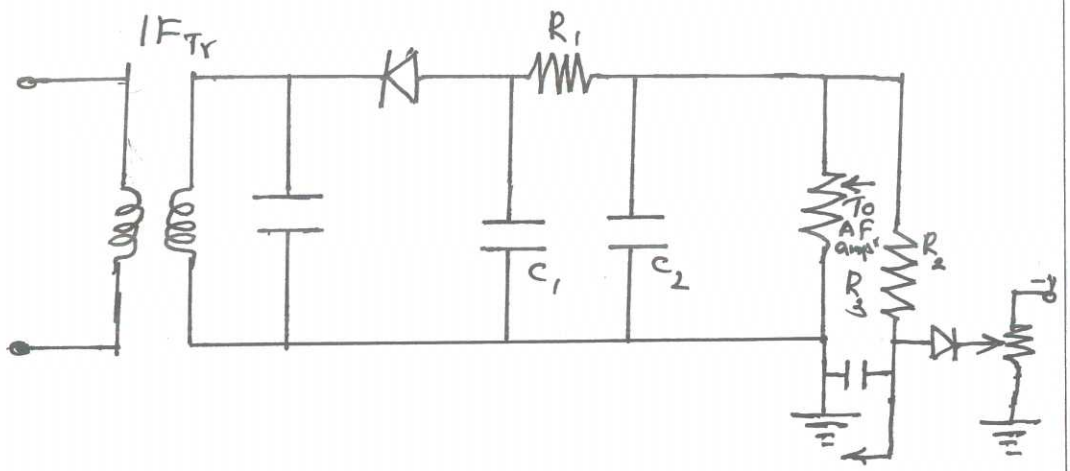
1. Much higher operating frequencies in FM
2. Need for limiting and de-emphasis in FM
3. Totally different methods of demodulation
4. Different methods of obtaining AGC

4

The RF amplifier select the desired signal. The Mixer output is IF (10.7MHz) The limiter circuit removes amplitude variations and help to improve S/N ratio The discriminator recovers the audio signal. De-emphasis network is required to bring the high freq signal back to the proper amplitude relation ship with lower freq's

8

X b.



4

The delayed AVC circuit is an improvement over the simple AVC circuit. The AVC voltage will be applied to the IF and mixer stages only when the incoming signal amplitude is greater than a pre-determined value. There are two diodes in this circuit. diode D_1 is used for normal detection, and D_2 is used for generating the Delayed AVC Bias. If the signal strength is large enough to produe a DC in the output of the detector which is more than the delay bias, The delay diode ceases to conduct and the AVC bias is developed across the Capacitor C_3.

7

3