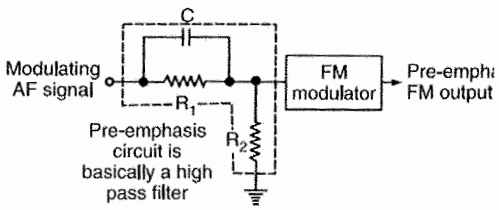
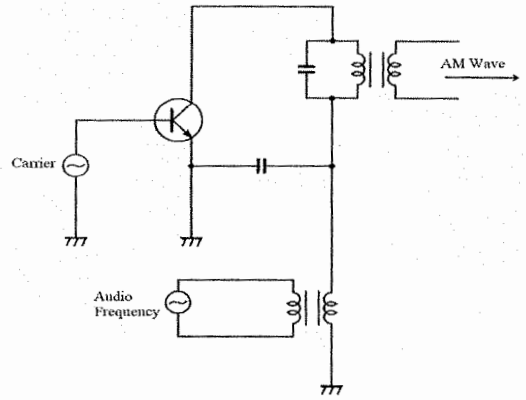
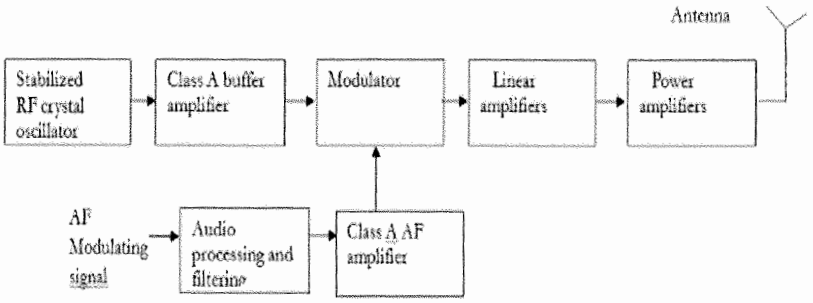
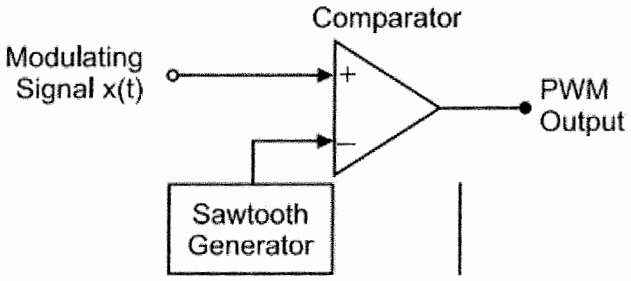
SCORING INDICATORS

COURSE NAME:-PRINCIPLES OF ELECTRONIC COMMUNICATION

COURSE CODE:-3042 **QID:-**

QNo	ScoringIndicators	Split Score	Sub Total	Total Score
	PART A			**9**
I.1	amplitude of the wave is varied in proportion to that of the message signal	1	1	
I.2	$f_m(t) = f_c + k A_m$	1	1	
I.3	the modulation index refers to the amplitude ratio of the modulating signal to the carrier signal.	1	1	
I.4	$f_s = 1/T$	1	1	
I.5	digital representation of an analog signal that takes samples of the amplitude of the analog signal at regular intervals	1	1	
I.6	pre-emphasis circuit	1	1	
I.7	attenuating those frequencies by the amount by which they are boosted	1	1	
I.8	Diode detector	1	1	
I.9	ability to accept the wanted signal and reject the unwanted signals.	1	1	
	PART B			**24**
II.1	Derivation Let the modulating signal be, $m(t)=A_m\cos(2\pi f_m t)$ and the carrier signal be, $c(t)=A_c\cos(2\pi f_c t)$ Then, the equation of Amplitude Modulated wave will be $s(t)=[A_c+A_m\cos(2\pi f_m t)]\cos(2\pi f_c t)$ $s(t)=A_c\cos(2\pi f_c t)+A_m 2\cos[2\pi(f_c+f_m)t]+A_m 2\cos[2\pi(f_c-f_m)t]$ $f_{max}=f_c+f_m$ and $f_{min}=f_c-f_m$ BW=fmax−fmin Final Equation BW=2fm	3	3	
II.2	Amplitude Modulation,Frequency Modulation and Phase Modulation	3	3	
II.3	energy radiated by an antenna is represented by the Radiation pattern of the antenna. Radiation Patterns are diagrammatical representations of the distribution of radiated energy into space, as a function of direction.	3	3	

II.4	A continuous time signal can be represented in its samples and can be recovered back when sampling frequency is greater than or equal to the twice the highest frequency component of message signal.	3	3	
II.5	Broadcasting,radar,radio astronomy etc.	3	3	
II.6		3	3	
II.7	sensitivity is the minimum power level at which the receiving node is able to clearly receive the bits being transmitted. Fidelity of a receiver is its ability to reproduce the exact replica of the transmitted signals at the receiver output	1.5 1.5	3	
II.8		3	3	
II.9		3	3	
II.10	intermediate frequency (IF) is a frequency to which a carrier wave is shifted as an intermediate step in transmission or reception.	3	3	
	PART C			**42**

III.1	According to definition of AM, we change the amplitude of the carrier $AM(t) = [A_c + m(t)]cos\omega_c t$ $= [A_c + A_m cos\omega_m t]\, cos\omega_c t$ $= A_c cos\omega_c t + A_m cos\omega_m t\, cos\omega_c t$ By rearranging $AM(t) = A_c cos\omega_c t + \frac{1}{2}.2\, A_m cos\omega_m t\, cos\omega_c t$ $= A_c cos\omega_c t + \frac{A_m}{2}\, 2\, cos\omega_m t\, cos\omega_c t$ $\quad 2\cos A\cos B = \cos(A+B) + \cos(A-B)$ $= A_c cos\omega_c t + \frac{A_m}{2}[\cos(\omega_c + \omega_m)t + \cos(\omega_c - \omega_m)t]$ $= A_c cos\omega_c t + \frac{A_m}{2}\frac{A_c}{A_c}[\cos(\omega_c + \omega_m)t + \cos(\omega_c - \omega_m)t]$ $= A_c cos\omega_c t + \frac{A_c}{2}\frac{A_m}{A_c}[\cos(\omega_c + \omega_m)t + \cos(\omega_c - \omega_m)t]$ $= A_c cos\omega_c t + \frac{A_c m_a}{2}\cos(\omega_c + \omega_m)t + \frac{A_c m_a}{2}\cos(\omega_c - \omega_m)t$ $= A_c cos\omega_c t + \frac{A_c m_a}{2}\cos 2\pi(f_c + f_m)t + \frac{A_c m_a}{2}\cos\, 2\pi(f_c - f_m)t$ carrier USB LSB $where\ m_a = modulation\ index = \frac{A_m}{A_c}$	5 2	7	
III.2		7	7	
III.3	 *Explanation	4 3	7	

Parameter	SSB	DSB	VSB
Power	less	Medium	High but less than ISB
Bandwidth	f_m	$2f_m$	$f_m < Bw < 2f_m$
Modulating inputs	1	1	1
Use for	Radio communication	Radio communication	Television
Carrier suppression	Complete	Complete	No
Sideband suppression	One sideband completely	No	One sideband suppressed partially
Transmission efficiency	Maximum	Moderate	Moderate

III.4

S.No.	FM	AM
1.	Amplitude of FM wave is constant. It is independent of the modulation index.	Amplitude of AM wave will change with the modulating voltage.
2.	Hence, transmitted power remains constant. It is independent of m_f.	Transmitted power is dependent on the modulation index.
3.	All the transmitted power is useful.	Carrier power and one sideband power are useless.
4.	FM receivers are immune to noise.	AM receivers are not immune to noise.
5.	It is possible to decrease noise further by increasing deviation.	This feature is absent in AM.
6.	Bandwidth = $2[\Delta f + f_m]$. The bandwidth depends on modulation index.	BW = $2 f_m$. It is not dependent on the modulation index.
7.	BW is large. Hence, wide channel is required.	BW is much less than FM.

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III.5

S.No	Pulse Amplitude Modulation (PAM)	Pulse Duration/Width Modulation (PDM/PWM)	Pulse Position Modulation (PPM)
1	Amplitude of the pulse proportional to amplitude of modulating signal	Width of the pulse is proportional to amplitude of modulating signal	The relative position of the pulse is proportional to amplitude of modulating signal
2	Bandwidth of the transmission channel depends on the pulse width	Bandwidth of the transmission channel depends on the rise time of the pulse	Bandwidth of the transmission channel depends on the rising time of the pulse
3	Instantaneous power of the transmitter varies	Instantaneous power of the transmitter varies	Instantaneous power of the transmitter remains constant
4	Noise interference is high	Noise interference is minimum	Noise interference is minimum
5	System is complex to implement	System is simple to implement	System is simple to implement
6	Similar to amplitude modulation	Similar to frequency modulation	Similar to phase modulation

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III.6

Gain of an antenna is the ratio of the radiation intensity in a given direction to the radiation intensity that would be obtained if the power accepted by the antenna were radiated isotropically.

Bandwidth -The range of frequencies within which the performance of the antenna, with respect to some characteristic, conforms to a specified standard

The radiation pattern is a graphical depiction of the relative field strength transmitted from or received by the antenna, and shows sidelobes and backlobes

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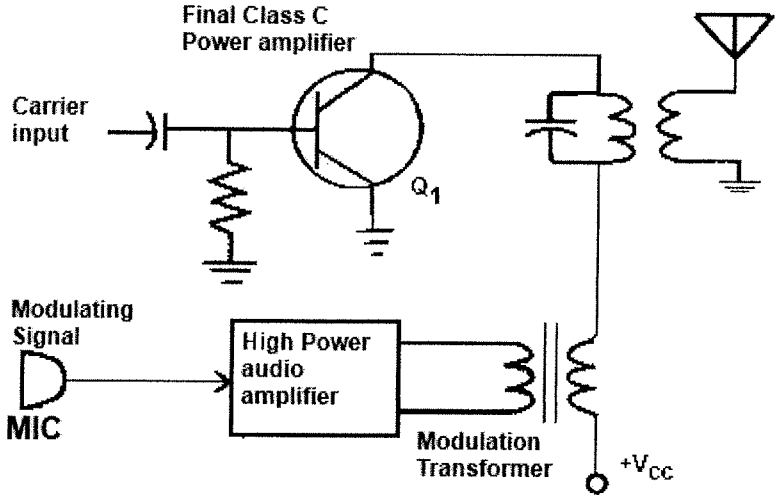
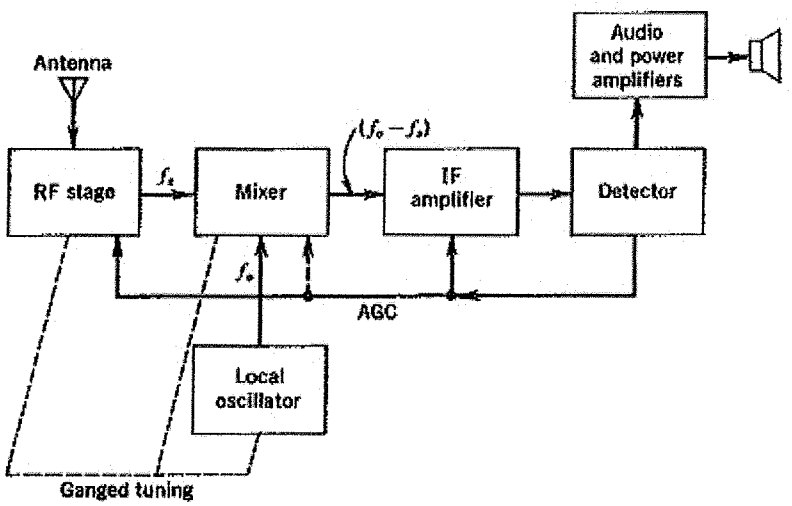
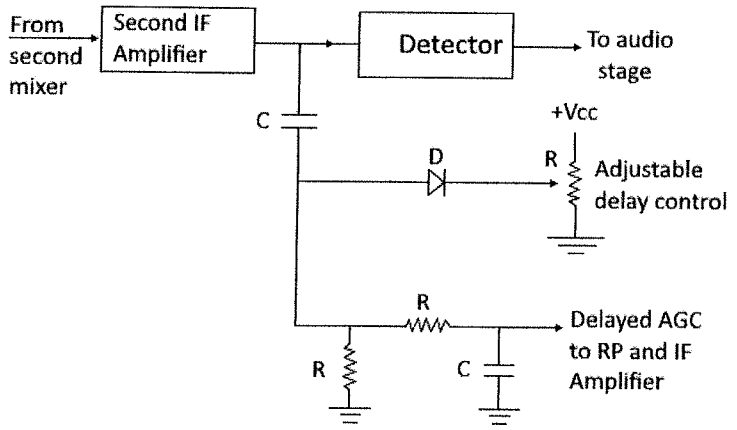
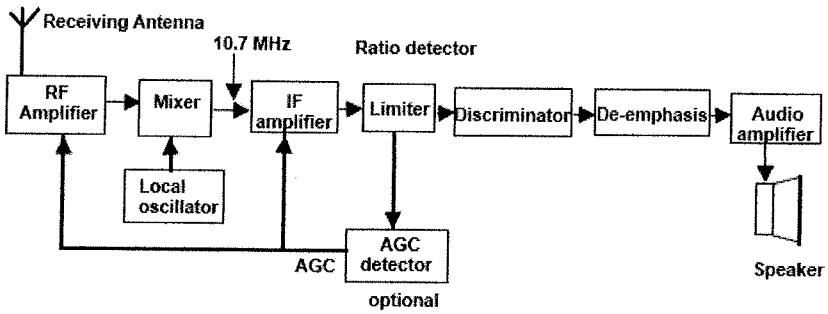
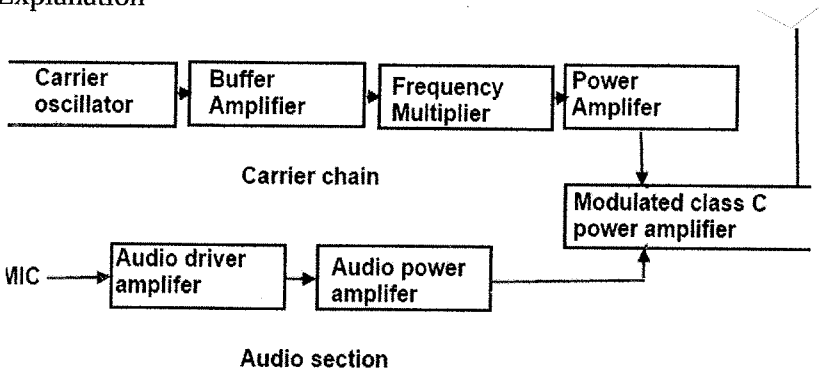
III.7	 *Figure *Explanation	 4 3	7	
III.8	External Noise may be defined as that type of noise that is generated external to a communication system. i.e. whose sources are external to the communication system. Internal Noise is that type of noise that is generated internally or within the communication system or receiver. Signal to noise ratio is defined as the ratio of signal power to the noise power, often expressed in decibels	7	7	
III.9	 *Figure *Explanation	 4 3	7	
III.10	*Figure *Explanation	4 3	7	



III.11	*Figure *Explanation  	4 3	7	
III.12	*Figure *Explanation  	4 3	7	