

സമയം.11.00

വദേ: ജോയിൻറ് കൺട്രോളറുടെ ചേമ്പർ

പങ്കെടുത്തവർ

1. ഡോ.സീമ.കെ.എൻ, ജോയിൻറ് കൺട്രോളർ
2. ശ്രീ.മുഹമ്മദ് അസീർ.എ.കെ, ഡെപ്യൂട്ടി കൺട്രോളർ
3. ശ്രീ.സനൽകുമാർ.എ,അസിസ്റ്റൻറ് കൺട്രോളർ
4. ശ്രീ.അൻസാർ.എ,ടെക്നിക്കൽ ഓഫീസർ
5. ശ്രീ.സന്തോഷ്കുമാർപി.സി, ടെക്നിക്കൽ ഓഫീസർ
6. ശ്രീ.ഉൽക്കർഷ്.എസ്.ആർ ടെക്നിക്കൽ ഓഫീസർ
7. ശ്രീമതി.പദ്മജ.ജെ,അക്കൗണ്ട്സ് ഓഫീസർ
- 8 ശ്രീ.ഷറഫുദീൻ.എ,സിസ്റ്റം അനലിസ്റ്റ്

1.Decision taken by the JCTE office on 23/01/24, based on the complaints received from students from various Polytechnic colleges in connection with the Diploma Examination November 2023 and the recommendations of expert committee from different departments.

OUT OF SYLLABUS QUESTION GUIDELINES

R.21	5043D	Part.B	3 mark
		Question -8	
		Part C	7 mark
		Question V	

R.21	3042	Part.C	4 mark
		Question No.IV	
		Part C	2 mark
		Question VII	
		Part C	2 mark
		Question X	

R.21	3051	Part.C	7 mark
		Question VI	

R.21	5021	Part B	3 mark
		Question 9	

R.21 3055 Question III 25 marks

R.21 3044 Part.B Question 8 3 mark

R.21 3033 Part C Question 13 7 mark

R.15 5182 part B question II Students who have drawn the site plan in the 1:200, 1:400 and 1:800 scales can be considered eligible for getting the marks they deserve .

The above mentioned questions are out of syllabus as recommended by the expert committee. Hence, following guidelines shall be used to calculate the mark/grade of the students who had tried to attend the above specific questions.

- a) Calculate the percentage of marks obtained by the student considering the total marks excluding the marks of out of syllabus questions.
- b) Then, the proportionate marks of out of syllabus questions shall be calculated based on the above obtained percentage.
- c) Marks obtained in the above cases shall be added to get actual marks admissible to the student.

2. 25.01.2024 -ന് ആരംഭിക്കുന്ന ഡിപ്ലോമ പരീക്ഷ മൂല്യനിർണ്ണ ക്യാമ്പിൻറെ പ്രവർത്തനം സംബന്ധിച്ച് കമ്മിറ്റി ചർച്ച ചെയ്യുകയും ക്യാമ്പ് ആഫീസർമാർക്ക് നിർദ്ദേശങ്ങൾ നൽകുന്നതിന് സർക്കുലർ അയയ്ക്കുവാൻ D2 സെക്ഷൻ സീനിയർ ക്ലർക്ക് ശ്രീ.അനൂപിനെ ചുമതലപ്പെടുത്തുകയും ചെയ്തു.

3. ക്യാമ്പുകളുടെ സുഗമമായ നടത്തിപ്പിനായി വിവിധ മൂല്യനിർണ്ണയ ക്യാമ്പുകൾ സന്ദർശിക്കുവാൻ JCTE, DCTE, ACTE, TECHNICAL OFFICER എന്നിവരെ നിയോഗിക്കുവാൻ തീരുമാനിച്ചു.

4.SBTE സോഫ്റ്റ്‌വെയറിൻറെ സെക്യൂരിറ്റി ആഡിറ്റ് ചെയ്യുന്നതിന് JCTE ആഫീസിൽ ലഭിച്ചിട്ടുള്ള പ്രപ്പോസലുകൾ പരിശോധിച്ച് തീരുമാനം എടുക്കുന്നതിന് NIC യ്ക്ക് കത്ത് അയ്ക്കുവാൻ തീരുമാനിച്ചു.




ജോയിൻ്റ് കൺട്രോളർ

83
10/11/23

12
Nov-23

Scoring Indicators

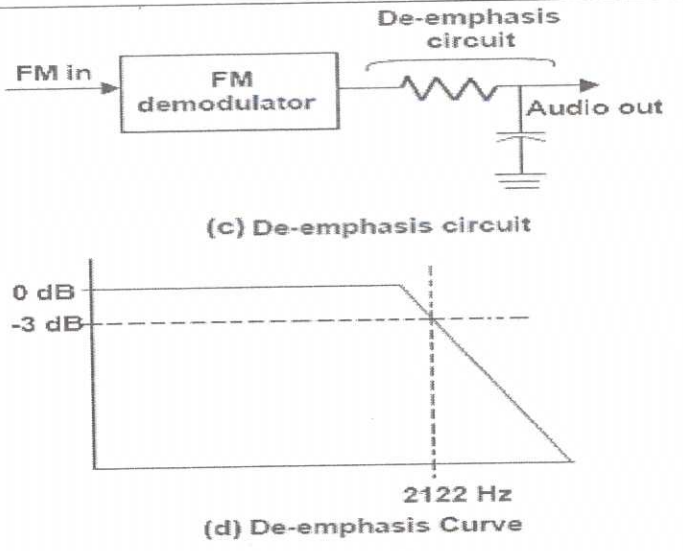
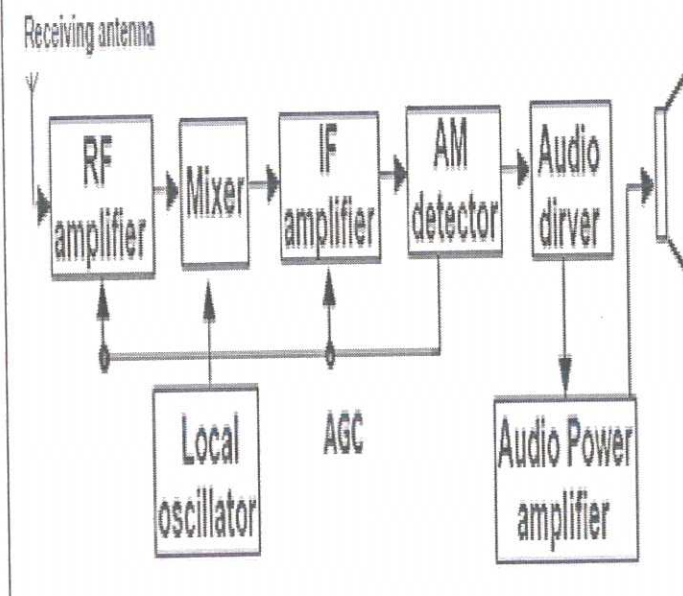
COURSE NAME: PRINCIPLES OF ELECTRONIC COMMUNICATION

COURSE CODE: 3042

QID: 2110220233

Q. No.	Scoring Indicators	Split Score	Sub Total	Total Score
PART A				9
I. 1	Modulation	1	1	1
I. 2	VSB	1	1	1
I. 3	PAM,PWM,PPM,PCM (Any two)	0.5*2 = 1	1	1
I. 4	The power radiated by an antenna in a given direction per unit solid angle is radiation intensity. Unit:Watt/Steradian or Watt per square radian (W/Sr)	1	1	1
I. 5	88MHz – 108MHz	1	1	1
I. 6	DSB-SC wave	1	1	1
I. 7	SNR is the signal to noise ratio and is defined as the ratio of signal power to the noise power. Expressed in dB.	1	1	1
I. 8	Selectivity, sensitivity, fidelity, noise figure, double spotting, tracking, image frequency rejection. (Any two)	0.5*2 = 1	1	1
I. 9	Envelope detector.	1	1	1
PART B				24
II. 01	1. Used in radio broadcasting to broadcast music over the radio. 2. Used in radar, telemetry, seismic prospecting. 3. Used for monitoring newborns for seizures via EEG, 4. Used in different radio systems(two way). 5. Used in music synthesis & magnetic tape-recording systems	3*1 = 3	3	3

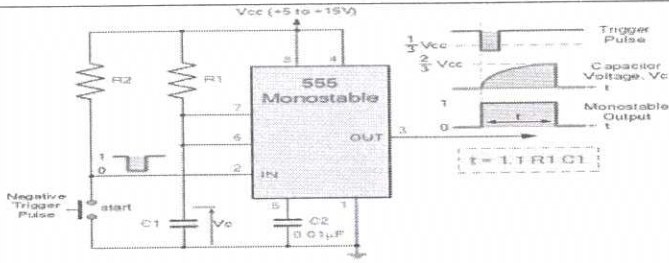
	<p>6. Used in video-transmission instruments.</p> <p>7. Some satellites use FM to broadcast video signals on the receiver's station.</p> <p>8. Used in walkie talkie, police communication system.</p> <p>(Any three)</p>			
II. 02	<p>A continuous time signal or Analogue signal can be represented in its samples and can be recovered back when sampling frequency f_s is greater than or equal to the twice the highest frequency component of message signal f_m.</p> <p>$f_s \geq 2 f_m$</p>	2	3	3
II. 03	<p>The artificial boosting of higher modulating frequencies is called as pre-emphasis. The boosting should be done before modulation. Hence the pre-emphasis is carried out at the transmitter. The pre-emphasis circuit provides a constant gain for low frequencies and at higher frequencies it should have frequency characteristics of $k f$. $k f$ is the frequency of a differentiator circuit or high-pass filter circuit. Hence the pre-emphasis circuit is basically a high-pass RC filter.</p>	3	3	3
II. 04		3	3	3
II. 05	<p>An unwanted signal which interferes with the original message signal and corrupts the parameters of the message signal.</p> <p>Noise arise from a variety of sources and can be classified as :</p> <ol style="list-style-type: none"> 1. External noise: Eg. Manmade (Interference), 	1	3	3
		1		

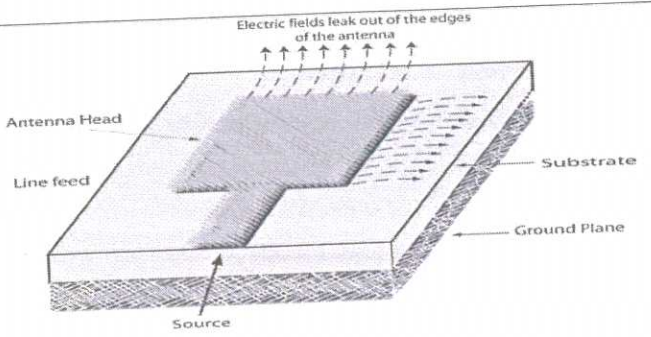
	<p>Naturally occurring: Atmospheric noise, Extraterrestrial noise.</p> <p>2. Internal noise: Eg. Shot noise, Partition noise, Low frequency noise, High-frequency noise, thermal noise.</p>	1		
II. 06	 <p>(c) De-emphasis circuit</p> <p>(d) De-emphasis Curve</p>	1.5	3	3
II. 07	<p>1. The ability to reproduce the exact replica of the transmitted signals at the receiver output is called as fidelity.</p> <p>2. Noise figure is a measure of how much a device degrades the SNR. It is the ratio of input SNR to the output SNR of the device.</p>	$2 * 1.5 = 3$	3	3
II. 08		3	3	3

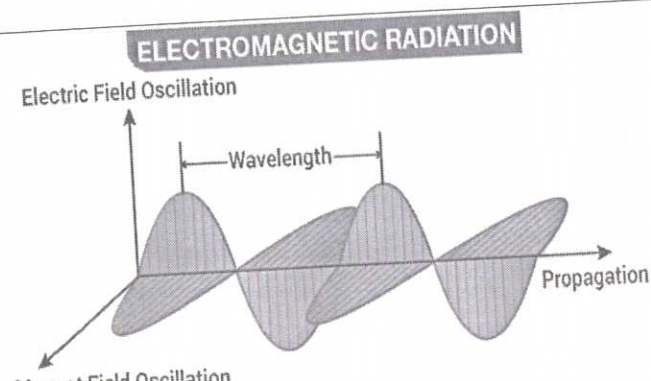
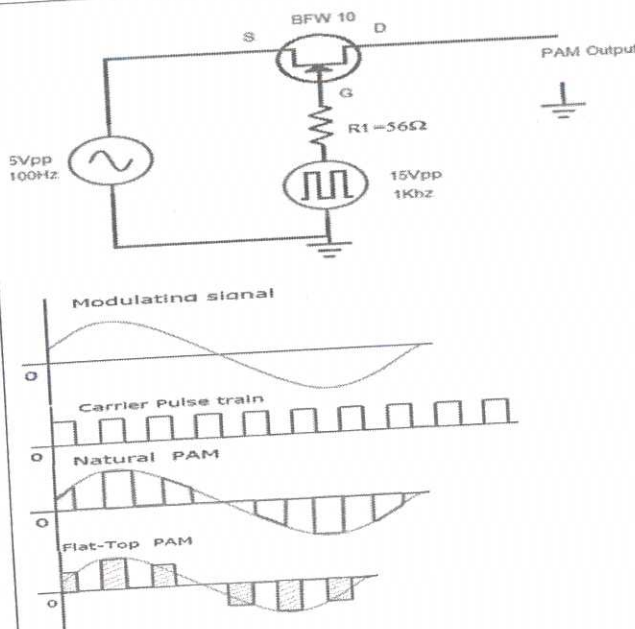
II. 09	<p>In simple AGC, AGC voltage is proportional to the signal strength. For weak RF signals, it will produce some control voltage. Thus for the weak RF signals too, there will be a reduction in the gain of the receiver. But in delayed AGC, control voltage is not fed to RF amplifier till the signal strength attains a predetermined level. So in delayed AGC no reduction in gain for weak RF signals, but reduction in gain for strong RF signals</p>	3	3
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	Sl. No.	AM RXR	FM RXR		
II. 10	1.	RF spectrum of received signal in AM ranges from 540kHz – 1600kHz.	RF spectrum of received signal in FM ranges from 88MHz – 108MHz.	3*1 = 3	3
	2.	IF frequency used in AM is 455kHz.	IF frequency used in FM is 10.7MHz		3
	3.	Demodulator used is envelope detector.	Demodulator used is Frequency discriminator.		
	4.	No amplitude limiter and de-emphasis circuits are used.	Amplitude limiter and de-emphasis circuits are used.		
	5.	AGC is used in AM receivers.	AGC is not often used in FM receivers(no information contained in the amplitude of the received signal).		
	6.	AM receiver is a voltage to voltage converter.	FM receiver is a frequency to voltage converter.		
	(Any three)				3

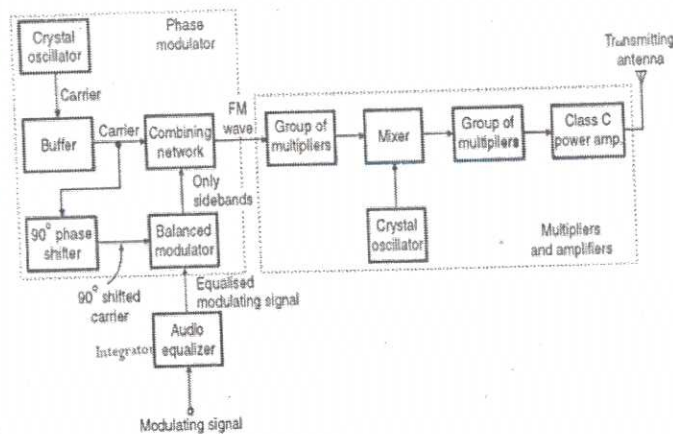
PART C			42	
III. 01	1. Modulation index, $m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}} = \frac{10 - 2}{10 + 2} = 0.667$	2	7	7
	2. Carrier amplitude, $A_c = \frac{V_{\max} + V_{\min}}{2} = 6V$	2		
	Carrier power = $\frac{A_c^2}{2} = 18W$	2		
	3. Total side band power = $\frac{m^2 A_c^2}{4} = 4W$; USB = LSB = 2W	1		
4. Total power = 22W				
III. 02	$S(t) = A_c \cos[2\pi f_c t + \beta \sin 2\pi f_m t]$	1	7	7
	1. $A_c = 10V$; $f_c = 10^6 \text{ Hz}$; modulation index, $\beta = 8$; $f_m = 2 \times 10^3 \text{ Hz}$.	2		
	2. Frequency deviation, $\Delta f = \beta f_m = 16 \text{ kHz}$.	2		
	3. Bandwidth = $2(\beta + 1) f_m = 36 \text{ kHz}$.	2		
4. Power = $\frac{A_c^2}{2} = 50W$.	2			
III. 03	Before modulation, the carrier is $A_c \cos \omega_c t$.	1	7	7
	After modulation, the carrier is $A' \cos \omega_c t$.	1		
	The amplitude of carrier after modulation, A' is $A_c + A_m \cos \omega_m t$	1		
	AM wave = $A' \cos \omega_c t = (A_c + A_m \cos \omega_m t) \cos \omega_c t$ $= A_c \left(1 + \frac{A_m}{A_c} \cos \omega_m t\right) \cos \omega_c t$			
AM wave = $A_c (1 + m \cos \omega_m t) \cos \omega_c t$				
Where m is modulation index; $m = \frac{A_m}{A_c}$				
AM wave = $A_c \cos \omega_c t + m A_c \cos \omega_m t \cos \omega_c t$ $= A_c \cos \omega_c t + \frac{m A_c}{2} [\cos(\omega_c + \omega_m)t + \cos(\omega_c - \omega_m)t]$	4			
III. 04	1. Reduction in length of antenna: Most of the antennas used are half-wave dipole (length = $\lambda/2$) or quarter-wave monopole (length = $\lambda/4$), where λ is the wavelength of transmitted or received wave. For low frequencies antenna length will be higher.	3*2+1 = 7	7	7
	2. Increases the range of communication: To			

	<p>increase the range of communication, radiated power from antenna has to be increased which is inversely proportional to the square of the wavelength transmitted.</p> <p>3. Multiplexing is possible and thereby avoids mixing of signals(Interference): Different audio signals can be modulated to different carrier frequency and is send to channel</p> <p>4. Bandwidth adjustments: Modulation translates low frequency to high frequency. Data rate is directly proportional to the frequency of signal transmitted</p> <p>5. Improves quality of reception: modulation reduces the effect of noise and interference. Hence $S/N \gg 1$. This improves the quality of reception.</p> <p>(Any four with justification)</p>			
<p>III. 05</p>	 <p>When a negative pulse is applied to the trigger input (pin 2), the internal comparator, (comparator No1) detects this input and sets the state of the flip-flop, changing the output from a LOW state to a HIGH state. This turns OFF the discharge transistor connected to pin 7, thereby removing the short circuit across the external timing capacitor, C1. The timing capacitor to start to charge up through resistor, R1 until the voltage across the capacitor reaches the threshold (pin 6) voltage of $\frac{2}{3}V_{cc}$ set up by the internal voltage divider network. At this point the comparators output goes HIGH and resets the flip-flop back to its original state which in turn turns ON the transistor and discharges the capacitor to ground through pin 7. Thus the output to change its state back to the original stable LOW value awaiting another trigger pulse to start the timing process over again. The Monostable Multivibrator has only ONE stable state.</p>	<p>3 (Ckt diag.)</p> <p>1 (waveform)</p> <p>3 (working)</p>	<p>7</p>	<p>7</p>

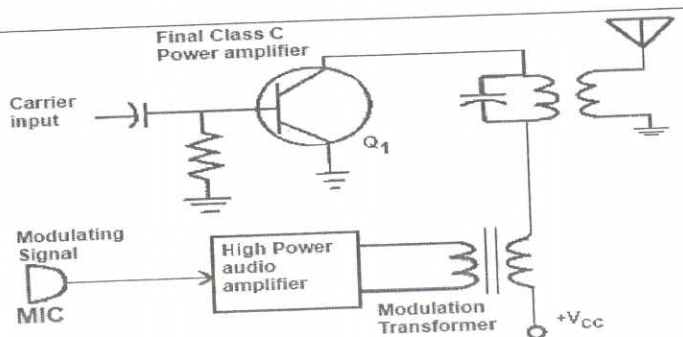
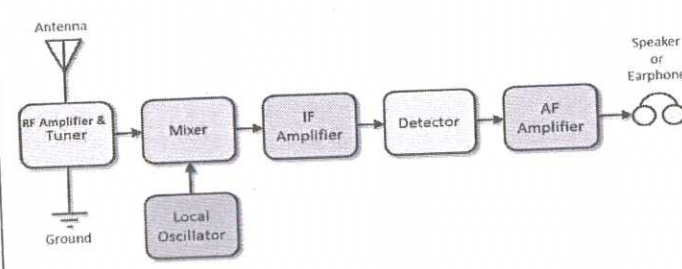
<p>III. 06</p>	 <p>It consists of a radiating patch that is bonded to a dielectric substrate on one side and has a ground plane on the other side. The patch or micro-strip is chosen to be square, circular or rectangular in shape for the ease of analysis and fabrication. The patch is generally composed of conducting materials like copper or gold. The operational frequency of these antennas range between 100 MHz and 100 GHz</p>	<p>4 (Fig.)</p> <p>3 (Explain)</p>	<p>7</p>	<p>7</p>
<p>III. 07</p>	<p>When the electrically charged particles travelling through a matter or vacuum gets accelerated or decelerated, it exerts a force in its near field region. It can be either magnetic or electric force. Thus the movement of charged particles creates an oscillating magnetic and electric disturbance and an energy is produced which is electromagnetic radiation. In EM wave (radiation) the magnetic and the electric fields come at 90° to each other, and the direction of disturbance of the wave moves perpendicular to both electric and magnetic oscillating fields. The energy from electromagnetic radiation can produce an oscillating motion of charge in the matter. So any system which emits electromagnetic radiation of a given frequency can absorb radiation of the same frequency.</p>	<p>4 (Concept)</p>	<p>7</p>	<p>7</p>

<p style="text-align: center;">ELECTROMAGNETIC RADIATION</p> 	3 (Fig)			
<p>III. 08</p>  <p>The high frequency pulses (sampling pulses) applied to the gate of FET will turn on and off the FET. Negative going pulses turn off the FET; while positive going pulses turn on the FET. The input signal is sent to the output only when the transistor is ON. Thus the output of the FET is a sampled form of the input signal.</p>	3 (Ckt) 2 (waveform) 2 (working)	7	7	7
<p>III. 09</p> <p>A narrow band Phase modulated signal is generated by a DSB-SC signal and a 90° phase shifted sub carrier signal from crystal oscillator. The crystal oscillator generates the carrier at low frequency typically at 1MHz. This is applied to the combining network and a 90° phase shifter. The modulating signal is passed through an audio equalizer to boost the low modulating frequencies. The modulating signal is then</p>	3 (working)	7	7	7

applied to a balanced modulator. The balanced modulator produced two side bands such that their resultant is 90° phase shifted with respect to the unmodulated carrier. The unmodulated carrier and 90° phase shifted sidebands are added in the combining network. At the output of the combining network we get NBFM wave. This wave has a low carrier frequency and low modulation index. The carrier frequency and the modulation index are then raised by passing the FM wave through the first group of multipliers. The carrier frequency is then raised by using a mixer and then the carrier frequency and modulation index both are raised to required high values using the second group of multipliers. The FM signal with high carrier frequency and high modulation index is then passed through a class C power amplifier to raise the power level of the FM signal.



4
(diagram)

<p>III. 10</p>	 <p>When no modulating signal, no modulation voltage across the secondary of transformer. The collector supply voltage V_{CC} will be applied directly to the Class C. The output from the antenna is a steady sinusoidal carrier wave. When the modulation voltage occurs, the signal voltage (AF signal) will be added to and subtracted from V_{CC} at the secondary of modulation transformer. Thus Class C gets varying signal voltage. Hence the amplitude of the current pulses through transistor Q_1 varies. Therefore the amplitude of carrier sine wave varies in accordance with the modulating signal. When modulating signal goes positive, it adds to V_{CC} and voltage at the secondary increases causing high current pulses and a high carrier amplitude. When modulating signal goes negative, it subtracts from the V_{CC} and voltage at the secondary decreases causing low current pulses and a low carrier amplitude. Thus an AM wave is obtained and is transmitted through antenna.</p>	<p>4 (diagram)</p>	<p>7</p>	<p>7</p>
<p>III. 11</p>	 <p>1. <u>RF section</u> It consists of a receiving antenna, a tuning circuit and an amplifier circuit. The receiving antenna intercepts</p>	<p>4 (Block diagram)</p>	<p>7</p>	<p>7</p>

the EM wave and convert it into high frequency (RF) electric signals (Voltage or current). A broad tuned bandpass filter with adjustable frequency is tuned to the carrier frequency. The filter provides initial tuning to remove the unwanted RF signal called as image signal from entering into the receiver. Also called as the preselector stage. RF amplifier provides amplification

2. Mixer/Converter section

It consists of a mixer and a local oscillator.

Heterodyning takes place in this stage. The output of the mixer may have the original RF signal (f_{RF}), the local oscillator signal (f_{LO}), and two new heterodyne frequencies ($f_{RF} + f_{LO}$, $f_{RF} - f_{LO}$). An IF bandpass filter removes all the frequencies except the intermediate frequency $f_{IF} = f_{RF} - f_{LO}$. Thus radio frequencies are down converted to intermediate frequency, f_{IF} .

3. IF amplifier section

This stage is tuned to a fixed frequency (IF) that does not change as the receiving frequency changes. The centre frequency of IF amplifier is f_{IF} . The IF stages have a filter and multiple tuned circuits to achieve the desired selectivity.

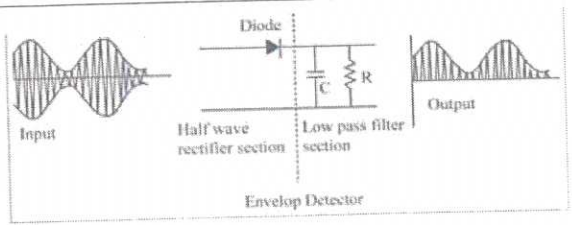
4. Audio detector section

The stage consists of detector and AGC or AVC. The audio signal is recovered from the IF signal by the detector and then it is further amplified. AGC is Automatic Gain Control. It is also called as Automatic Volume Control (AVC). AVC is to reduce the gain for strong signals so that the audio level is maintained for amplitude sensitive forms of modulation, and also to prevent overloading.

5. Audio amplifier section

After demodulation, the recovered audio is applied to

3
(explain)

	<p>an audio amplifier block for amplification to the required level for loudspeakers or headphones.</p>				
<p>III. 12</p>	 <p>The AM wave is applied as input to the detector. During the positive half cycle of the AM wave; the diode conducts and the capacitor charges to the peak value of the AM wave. When the value of AM wave is less than peak value; the diode will be reverse biased. Thus the capacitor will discharge through resistor 'R' till the next positive cycle. When the value of AM wave is greater than the capacitor voltage, the diode conducts and the process is repeated. The capacitor voltage waveform is same as that of the envelope of AM wave, which is almost similar to the modulating signal.</p>	<p>4 (diagram)</p>	<p>3 (working)</p>	<p>7</p>	<p>7</p>