Scheme – I

Sample Question Paper

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

Semester : **Third**

22334

Course Title : **Principles of Electronics Communication**

Marks : **70** **Time: 3 Hrs.**

Instructions:

(1)All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

(5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following. **10 Marks**

a) Define the term signal to noise ratio.

b) Define modulation indexof FM.

c) Write any one application of thefollowing frequencyrange:

i. Radio frequency
ii. IR Frequency

d) Draw the labeled circuit diagram of ratio detector.

e) Explain the necessity of de-emphasis circuit used with FM receiver.

f) List any fourcharacteristics of ground wave propagation.

g) Sketch theradiation pattern of Yagi-Udaantenna.

Q.2) Attempt any THREE of the following. **12 Marks**

a) Draw the basic block diagram of electronic communication system. State the function of transmitter.

b) Explain the function of pre-emphasis circuit with justification.

c) Compare narrowband FM with wideband FM w.r.to following point

i. Modulation index

ii. Maximum deviation
iii. Range of modulating frequency
iv. application

d) A 10KWatt carrier is amplitude modulated by two sine to a depth of 0.5 and 0.6 respectively. Calculate total power of modulated carrier**.**

Q.3) Attempt any THREE of the following. 12 Marks

a) Sketch AM Signalin: - 1.Time domain 2. Frequency domain

b) Explain why reception for High frequency band is better during night time.

c) Compare characteristics of asynchronous and synchronous transmission modes. (Any four points)

d) Explain the working of FM demodulator contains phase lock loop with the help of suitable block diagram.

Q.4) Attempt any THREE of the following. 12 Marks

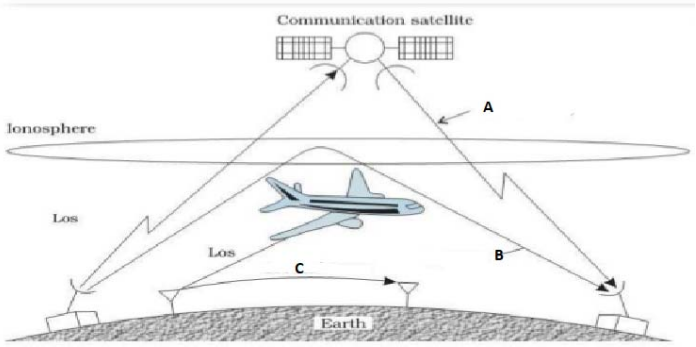
a) Explain the properties of the D, E,F,F_1 layers of ionosphere

b) Justify that all the information of AM wave is contained only in the sidebands, .

c) A super heterodyne radio receiver with an IF of 455 KHz is tuned to thestation operating at frequency 1000 KHz.Calculate the following

i. Image frequency
ii. Local oscillator frequency

d) Identify wave propagation mode for A,B,C shown in the fig.1.and writhe one application of each mode.



e) Sketch structure and radiation pattern of loop antenna.

Q.5) Attempt any TWO of the following. **12 Marks**

a) Explain tropospheric scatter propagation with sketch.

b) i) Derive a mathematical expression for amplitude modulated wave.

ii)A 400watt carrier is amplitude modulated to a depth of 75%.Calculate the total power in AM Wave.

c) i) Draw the radiation patterns of following resonant dipole antenna.

a) $l=\lambda/2$

b) $l=\lambda$

c) $l=3\lambda/2$

d) $l=3\lambda$, where l is length of dipole antenna

ii) List any two advantages of folded dipole antenna.

Q.6) Attempt any TWO of the following. **12 Marks**

a) i) Explain structure of rectangular microstrip patch antenna with its radiation pattern.

ii) List any two applications of rectangular microstrip patch antenna.

b) i) Explain electromagnetic spectrum in brief.

ii) Write the frequency band used for TV broadcasting and mobile communication.

c) i) The equation of FM Wave is given by $10\sin(6\times10^{8}t+5\sin1250t)$.

Calculate

a) Carrier frequency

b) Modulating frequency

c) Modulation index

d) Power dissipated in 10Ω resistor.

(ii) Sketch the FM wave in time and frequency domain.

Scheme – I

Sample Test Paper

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

Semester : **Third**

22334

Course Title : **Principles of Electronics Communication**

Marks : **20** **Time: 1 Hour.**

Instructions:

(1)All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

(5) Preferably, write the answers in sequential order.

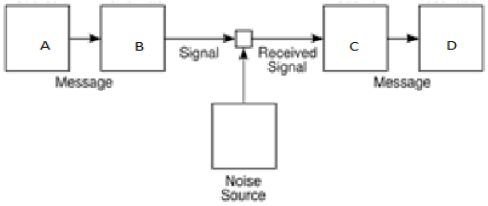
Q.1 Attempt any FOUR. **08 Marks**

a) Define the term signal to noise ratio.

b) Compare simplex and duplex mode of communication.

c) Draw the block diagram of AM Transmitter.

d) Identify the following blocks A, B, C, and D of communication system.



e) Write Carson's rule to calculate bandwidth of FM wave.

f) Write the frequency range for the following

(i) Voice frequency (ii) IR frequency.

Q.2 Attempt any THREE. **12 Marks**

a) Explain electromagnetic spectrum in brief.

b) Compare amplitude modulation and frequency modulation with reference to following points:

(i) Definition (ii) Modulationindex (iii) Bandwidth (iv) Application

c) Draw the block diagram of AM super heterodyne radio receiver and state the function of each block.

d) An audio frequency signal 10sin ($2\pi \times 10^3 t$) is used to modulate amplitude of a carrier of 20sin ($2\pi \times 10^4 t$)Calculate

(i) Modulation index (ii) Side band frequencies

(iii) percentage modulation (iv)Total power delivered to the load of 600Ω

e) In FM, if, maximum deviation is 75 KHZ and the maximum modulating frequency is 10 KHZ, calculate the deviation ratio and bandwidth of FM.

f) Draw the practical AM diode detector circuit. Sketch its input and output waveforms.

Scheme – I

Sample Test Paper

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

Semester : **Third**

22334

Course Title : **Principles of Electronics Communication**

Marks : **20** **Time: 1 Hour**

Instructions:

(1)All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if necessary.
(5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Draw the block diagram of FM super heterodyne radio receiver.
b) List different types of wave propagation modes.
c) Define following terms related to antennas
(i) Antenna resistance (ii) Directivity
d) Write the IF value of (i) MW band AM and (ii) FM radio receiver?
e) Define fading with respect to wave propagation.
f) Draw theradiation pattern of Yagi-Uda antenna.

Q.2 Attempt any THREE. **12 Marks**

a) The superheterodyne receiver withintermediate frequency of 10.7 MHz is tuned to a station operating at 93 MHz. Calculate the local oscillator frequency and image frequency.
b) Explain the working of half dipole antennawith its radiation pattern
c) Write any one application of the following antenna:-
(i) Rectangular antenna (ii) Dish antenna
(iii) Yagi-Uda antenna (iv) Horn antenna

d) Explain the need for AGC in the radio receiver? Explain simple AGC.
e) Explain the concept of De-emphasis with neat diagram.
f) Compare sky wave and spacewave propagation w.r.t. to following points
(i) Frequency range (ii) Effect of fading (iii) Polarization (iv) Application

22334

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE : **10**

(a) Classify types of Noise.

(b) In AM, modulating frequency is 10 kHz and carrier frequency is 1 MHz. Determine the resultant frequency components.

(c) Write mathematical expression representing FM wave.

(d) Draw block diagram of High level AM transmitter.

(e) Draw FM wave for modulating signal of 100 Hz 1 V_{p-p}.

(f) Define electromagnetic polarization and list its types.

(g) Illustrate concept of virtual height with neat labelled diagram with respect to wave propogation.

2. Attempt any THREE : **12**

(a) State frequency range of the following :

(i) Audio frequency

(ii) IR frequency

(iii) Voice frequency

(iv) High frequency

(b) Show that AM wave consists of two side bands and a carrier. Prove that bandwidth of AM is double of modulating frequency.

(c) A superheterodyne radio receiver with an intermediate frequency of 455 kHz is turned to a station operating at 1200 kHz. Find associated image frequency and local oscillator frequency.

(d) Compare sky wave propogation and space wave propogation (Any four points).

3. Attempt any THREE : **12**

(a) State and explain the concept of Transmission bandwidth.

(b) Calculate the percentage power saving of an SSB signal if the AM wave is modulated to a depth of (i) 100% (ii) 50%.

(c) Draw block diagram of superheterodyne AM receiver and explain working of each block.

(d) Draw a neat sketch of Duct propogation and explain its basic principle.

4. Attempt any THREE : **12**

(a) Distinguish between Half duplex and Full duplex communication (Any four points).

(b) Explain effect of modulation index on AM wave with waveforms.

(c) Explain the terms selectivity and sensitivity with respect to radio receiver. Illustrate with respective curves.

(d) Describe Troposphere scatter propogation along with sketch.

(e) Draw radiation pattern of given antennas :

(i) Yagi-Uda antenna

(ii) Loop antenna

(iii) Dish antenna

(iv) Horn antenna

5. Attempt any TWO : **12**

(a) (i) Define modulation index of FM wave.

(ii) The equation of FM wave is

$e_{FM} = 20 \sin (10^8 t + 4 \sin 10^3 t)$. Calculate

(1) Carrier frequency

(2) Modulating frequency

(3) Modulation Index

(4) Power dissipated in 10 Ω resistor

(b) State need of AGC. List types of AGC. Draw and explain AGC characteristics for delayed, ideal and simple AGC.

(c) Define radiation pattern of an antenna. Draw radiation pattern for resonant dipole

(i) $l = \lambda_2$

(ii) $l = \lambda$

(iii) $l = 3\lambda/2$

(iv) $l = 3\lambda$

6. Attempt any TWO : **12**

(a) State relation between the transmitted power and carrier power in AM. Show effect of modulation index on total transmitted power.

(b) Define fading. List major causes of fading and explain them.

(c) Describe Yagi-Uda antenna with a neat sketch. State any two advantages of Yagi-Uda antenna.

22334

12223

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Use of Non-programmable Electronic Pocket Calculator is permissible.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define Signal to Noise Ratio. State the ideal value of Signal to Noise Ratio.

(b) List any four needs of modulation in Electronic Communication.

(c) Sketch neat circuit diagram of Practical Diode Detector.

(d) Define Principle of Superheterodyne Radio Receiver.

(e) State the frequency range for Ground wave propagation and Space wave propagation.

(f) Suggest the types of Propagation for very high microwave frequencies.

(g) Define Radiation Pattern for antenna.

2. Attempt any THREE of the following : **12**

(a) State different transmission modes in communication with suitable diagram and example.

(b) Define the following terms with respect to FM :

(A) Definition of FM

(B) Frequency Deviation Ratio

(C) Modulation Index ()

(D) Wide Band FM

(c) Explain the Generation of FM signal using varactor diode.

(d) Describe AM superheterodyne radio receiver with the help of neat diagram.

3. Attempt any THREE of the following : **12**

(a) Classify and describe the sources of noise in Electronic Communication.

(b) Choose the correct frequency range for the following applications :

(A) Voice or Audio Communication – _____

(B) FM radio Broadcasting – _____

(C) Mobile Phone – _____

(D) Satellite and RADAR – _____

(c) Compare AM and FM with the help of following parameters :

(A) Mathematical Expression

(B) Frequency Spectrum

(C) Number of Sidebands

(D) Effect of Noise

(d) Define the terms with respect to Sky wave propagation :

(A) Critical Frequency

(B) Maximum Utilize Frequency (MUF)

(C) Actual Height

(D) Virtual Height

4. Attempt any THREE of the following : **12**

(a) Interpret the given block diagram and replace A, B and C with correct name of element. Redraw the complete diagram. (Refer diagram 4.1)

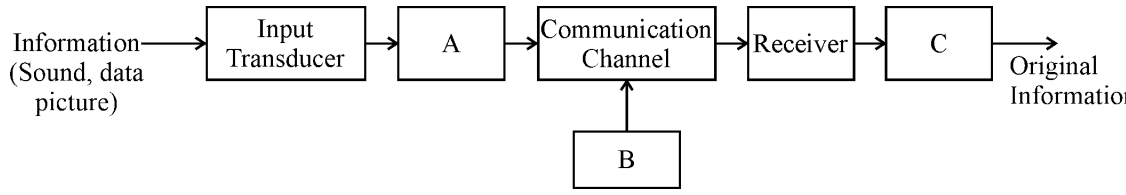


Diagram 4.1

(b) Describe DSB, SSB and VSB modulations with the help of Frequency Spectrums.

(c) Illustrate in detail PLL as a FM Demodulator.

(d) Select the circuit for boosting of higher modulating frequencies at transmitter. Draw its neat diagram. How to nullify the effect of boosting at receiver side ?

(e) Develop radiation patterns of dipole antenna with respect to their length :

(i) $\lambda/2$ (ii) $3\lambda/2$ (iii) λ (iv) 3λ

5. Attempt any TWO of the following : **12**

(a) If there are 3 AM transmitter named A, B and C using following specifications :

A transmitter having Pc = 1000 W and Modulation Index m = 50 %

B transmitter having Pc = 1200 W and Modulation Index m = 60 %

C transmitter having Pc = 800 W and Modulation Index m = 70 %

Solve : (i) Transmitted Power of A, B and C.

(ii) Justify whether A, B or C is better as far as transmitted Power.

(b) Elaborate the concept of Optical Horizon and Radio Horizon is Space wave propagation.

(c) Describe Micro strip antenna with neat diagram. Draw radiation pattern of Micro strip antenna.

6. Attempt any TWO of the following : **12**

(a) A carrier signal with 12 V amplitude and frequency of 15 MHz is applied to AM modulator with 70% modulation. The modulating signal frequency is 1 KHz. State the equation of the AM wave and sketches the waveform in frequency domain.

(b) Describe Ground Wave Propagation with suitable diagram. State its advantages, disadvantages and applications.

(c) Elaborate dish antenna are of parabolic shapes. Sketch suitable diagram of Dish antenna and state its applications.

22334

11920

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define the term signal to noise ratio.

(b) Define modulation index of FM.

(c) Write Carson's rule to calculate BW of FM wave.

(d) Draw the labelled circuit dia. of ratio detector.

(e) Write the IF value of

(i) FM radio receiver.

(ii) MW band AM.

(f) Define fading w.r.t. wave propagation.

(g) Sketch the radiation pattern of Yagi-Uda antenna.

2. Attempt any THREE of the following : **12**

(a) Draw the basic block diagram of Electronic communication system. State the function of transmitter.

(b) A 10 kW carrier is amplitude modulated by two sine to a depth of 0.5 & 0.6 respectively. Calculate total power of modulated carrier.

(c) Compare AM & FM w.r.t. following points.

(i) Definition

(ii) Modulation Index

(iii) Bandwidth

(iv) Application

(d) Explain the concept of Deemphasis with neat diagram.

3. Attempt any THREE of the following : **12**

(a) Compare narrow band FM with wide-band FM w.r.t. following points.

(i) Modulation index

(ii) Maximum deviation

(iii) Range of modulating frequency

(iv) Application.

(b) Sketch AM signal in (i) Time domain (ii) Frequency domain.

(c) Explain why reception for high frequency band is better during night time.

(d) Explain structure of rectangular microstrip patch antenna with its radiation pattern.

4. Attempt any THREE of the following : **12**

(a) Explain Electromagnetic spectrum.

(b) Draw the block diagram of AM. Superheterodyne radio receiver and state the function of each block.

(c) In FM if max. deviation is 75 kHz and the max. modulating frequency is 10 kHz. Calculate the deviation ratio and Bandwidth of FM.

(d) Compare sky wave and space wave propagation w.r.t. following points.

(i) Frequency range (ii) Effect of Fading

(iii) Polarization (iv) Application

(e) Explain the working of half dipole antenna with its radiation pattern.

5. Attempt any TWO of the following : **12**

(a) Derive a mathematical expression for AM wave.

(b) A 400 W carrier is amplitude modulated to a depth of 75%. Calculate the total power in AM wave.

(i) Explain the types of noise in a communication system.

(ii) Compare simplex and duplex mode of communication.

(c) (i) Write any one application of the following range.

(1) Radio frequency

(2) IR frequency

(3) Medium frequency

(ii) Draw and label PLL based FM detector.

6. Attempt any TWO of the following : **12**

(a) (i) List any two advantages of folded dipole antenna.

(ii) Draw the radiation patterns of the following resonant dipole antenna.

(1) $l = \lambda/2$ (2) $l = \lambda$

(3) $l = 3\lambda/2$ (4) $l = 3\lambda$

Where l is the length of dipole antenna.

(b) Explain Tropospheric scatter propagation with sketch.

(c) (i) Draw the practical AM diode detector circuit. Sketch its input and output waveforms.

(ii) Define the terms :

(1) Skip distance

(2) Maximum usable frequency

(3) Virtual height

22334

21819

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define simplex and half duplex system with neat sketch.

(b) Define the term signal to noise ratio.

(c) Represent FM wave in time domain & frequency domain.

(d) State the types of AM with respect to frequency spectrum.

(e) Draw pre-emphasis and de-emphasis circuits used in FM transmission and reception.

(f) Define fading with respect to wave propogation.

(g) Draw sketch of Loop antenna along with its radiation pattern.

2. Attempt any THREE of the following : **12**

(a) Explain the sources of noise in communication system.

(b) Explain power relation in AM wave.

(c) Explain duct propagation with neat sketch.

(d) Explain the term beam width related to antenna with a sketch.

3. Attempt any THREE of the following : **12**

(a) A 500 watts carrier is modulated to depth of 80%.

Calculate :

(i) Total power in AM

(ii) Power in sidebands

(b) A frequency modulated signal is represented by the voltage equation $e_{fm} = 10 \sin (6 \times 10^8 t + 5 \sin 1250 t)$

Calculate :

(i) Carrier frequency f_c

(ii) Modulating frequency f_m

(iii) Maximum deviation

(iv) What power will this FM wave dissipates in 20 Ω resistor ?

(c) Compare between simple AGC and delayed AGC.

(d) Compare resonant & non-resonant antenna on the basis of

(i) Definition

(ii) Circuit

(iii) Reflection co-efficient

(iv) Radiation Pattern

(e) Differentiate between ground wave and sky wave propagation.

4. Attempt any THREE of the following : **12**

(a) Draw the block diagram of basic electronic communication system.

(b) Differentiate between AM & FM on the basis of

(i) Definition

(ii) Bandwidth

(iii) Modulation index

(iv) Application

(c) Draw the circuit diagram of practical AM diode detector. Sketch its input and output waveforms.

(d) Describe the term virtual height with the help of diagram showing ionized layer and path of wave.

(e) Draw the construction of Yagi-Uda antenna. Draw its Radiation Pattern and write two applications.

5. Attempt any TWO of the following : **12**

(a) Write down range of different frequencies in electromagnetic spectrum for following :

(i) Voice frequency

(ii) High frequency

(iii) Infrared frequency

(iv) Visible spectrum (light)

(v) Radio frequency

(vi) UV frequency

Also, write one application area of each frequency.

(b) Explain why the local oscillator frequency should be always greater than signal frequency in radio receiver. A superheterodyne radio receiver with an IF of 455 kHz is turned to 1000 kHz. Find its Image frequency and local oscillator frequency.

(c) Name the different layers of atmosphere which satisfy following conditions :

(i) Reflects LF, absorbs MF and HF waves to some degree.

(ii) Helps surface waves and reflect HF waves.

(iii) Partially absorbs HF waves yet allowing them to reach its upper layer.

(iv) Efficiently reflects HF waves, specially in night.

(v) Exists in Day time only.

(vi) Exists in day time but merges with F2 layer in night time.

6. Attempt any TWO of the following : **12**

(a) Explain the effect of modulation index on AM wave with waveforms for

(i) $m < 1$

(ii) $m = 1$

(iii) $m > 1$

(b) Explain working of AM super heterodyne receiver with the help of neat block diagram and waveforms.

(c) Explain following terms in short related to antennas

(i) Antenna resistance

(ii) Directivity

(iii) Antenna gain

(iv) Power density

(v) Radiation pattern

(vi) Polarization

22334

11819

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main question on a* ***new*** *page.*
(3) Illustrate your answers with neat sketches ***wherever*** *necessary.*
(4) Figures to the ***right*** *indicate* ***full*** *marks*

Marks

1. Attempt **any five** : **(2×5=10)**

a) Define the term electrical noise. List types of noises.

b) State formula to calculate bandwidth of AM signal.

c) State the need of modulation in communication system.

d) List different methods of demodulation of FM signal.

e) Sketch the graph of pre-emphasis and de-emphasis.

f) Sketch neat diagram of duet propagation.

g) Draw sketch of half wave dipole antenna and its radiation pattern.

2. Attempt **any 3** : **(3×4=12)**

a) State the frequency range for the following :

i) Voice frequency

ii) High frequency

iii) IR frequency

iv) Visible frequency.

b) Draw neat block diagram of FM receiver and explain function of each block.

c) Compare AM with FM with respect to following points :

a) Definition.

b) Modulation index.

c) Bandwidth.

d) Side band.

d) A superheterodyne radio receiver with an IF of 455 kHz is tuned to 1000 kHz. Find :

a) Image frequency.

b) Local oscillator frequency.

P.T.O.

Marks

3. Attempt **any three** : **(3×4=12)**

a) Draw AM signal in :

i) Time domain

ii) Frequency domain.

b) Find out type of propagation for following applications :

1) AM radio broadcasting.

2) Ship to shore propagation.

3) Microwave links.

4) Satellite communication.

c) Compare characteristics of asynchronous and synchronous transmission mode (four points).

d) Explain simple AGC and delayed AGC with the help of neat graph.

4. Attempt **any 3** : **(4×3=12)**

a) Define the following terms :

1) Virtual height

2) Actual height

3) Critical frequency.

4) Maximum usable frequency.

b) Compare narrowband FM with wide band FM (four points).

c) Redraw the block diagram by identifying the blank blocks. Explain the role of blocks A and B. .

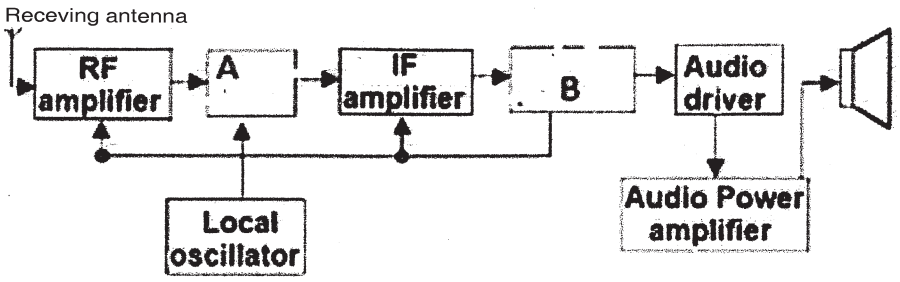


Figure 1

d) Justify electromagnetic wave is said to be transverse wave.

e) Sketch of Yagi-Uda antenna with its radiation pattern. Explain each element of Yagi-Uda antenna.

Marks

5. Solve **any two** : **(6×2=12)**

a) Explain ionospheric propagation with neat sketch. Explain two properties of layers of ionosphere.

b) i) State the significance of modulation index in AM transmission.

ii) Explain the effect of modulation index on AM wave with waveforms.

c) Write the application of the following antennas :

1) Rectangular antenna
2) Dish antenna
3) Horn antenna
4) Loop antenna
5) Yagi-Uda antenna.

6. Solve **any 2** : **(2×6=12)**

a) Describe operating principle of dish antenna. Draw its constructional details and radiation pattern.

b) i) Explain electromagnetic spectrum with neat diagram.

ii) Explain atmospheric noise with example.

c) A 10 kw carrier is amplitude modulated by two sine waves to a depth of 0.5 and 0.6 respectively. Calculate total power of modulated wave.

17440

11819

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) Write down different frequencies for following (frequency ranges)

(1) Voice frequency

(2) High frequency

(3) IR frequency

(4) Visible frequency (light)

(ii) Define modulation index in FM. What is maximum value of deviation ratio.

(iii) Define pulse modulation. State its types.

(iv) What are the different types of FM detector?

(v) Write any two drawbacks of TRF radio receiver.

(vi) Draw general equivalent circuit of transmission line.

(vii) Write two reasons of fading.

(viii) What is electro magnetic polarization?

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

(i) Draw block diagram of basic electronic communication system and state the function of each block.

(ii) Draw Yagi uda antenna with its radiation pattern.

(iii) For a transmission line, the incident voltage Ei = 6V, and Er = 3V. Calculate:

(1) Reflection coefficient

(2) Standing wave ratio

2. Attempt any <u>FOUR</u> of the following: **16**

a) Draw the block diagram of AM superhetrodyene radio receiver and state the function of each block.

b) Draw the circuit diagram of PWM using IC555. State its operation.

c) Draw the AM signal representation in:

(i) Time Domain

(ii) Frequency Domain

d) Explain standing waves with load terminal open circuited and short circuited.

e) Compare ground wave and space wave propagation on the basis of:

(i) Frequency range

(ii) Method of wave propagation.

f) Explain half dipole antenna (Resonant antenna) with its radiation pattern.

Marks

3. Attempt any FOUR of the following: **16**

a) State and explain the types of noise in communication system.

b) Differentiate between AM and FM on the basis of :

(i) Definition

(ii) Bandwidth

(iii) Modulation Index

(iv) Application

c) Describe the term virtual height with the help of diagram showing ionized layer and the path of wave.

d) Draw the circuit diagram of practical diode detector and explain its working.

e) In a broad cast superheterodyne receiver having loaded Q of antenna coupling of 100, if intermediate frequency of 455 KHz, calculate image frequency and its rejection ratio at 1000 KHz.

f) Explain power relations in AM wave.

4. Attempt any FOUR of the following: **16**

a) Define pre-emphasis. State its need. Draw the circuit of pre-emphasis.

b) Compare the bandwidth that would be required to transmit baseband signal with a frequency range from 300 Hz to 3 KHz using.

(i) Narrow band FM with maximum deviation of 5 KHz.

(ii) Wide band FM with maximum deviation of 75 KHz.

c) Draw the structure and radiation pattern of parabolic dish antenna.

d) For a transmission line, if R is the reflection co-efficient what will be its value.

(i) If there is no reflected voltage?

(ii) If reflected and incident voltages are same?

(iii) If reflected voltage = 10V and incident voltage = 20V?

(iv) If reflected voltage = 2V and incident voltage = 2V?

Marks

e) Draw block diagram of tuned radio receiver with waveforms.

f) Explain:

(i) Critical frequency

(ii) Skip distance

5. Attempt any FOUR of the following: **16**

a) Describe the FM generation using IC 566.

b) State the need of AGC. Explain its types.

c) Describe with sketch working principle of dish antenna.

d) State the different losses in transmission line.

e) Describe the application of transmission line as stub. Write the situation where single stub or double stub is used.

f) What is frequency changing and tracking?

6. Attempt any TWO of the following: **16**

a) What are different microwave antenna? Explain horn antenna with neat sketch. Explain loop antenna.

b) Derive the equation for characteristic impedance of transmission line at low frequency and high frequency. State four characteristics of transmission line.

c) Explain Duct propagation. Explain ionosphere layer and the ionospheric propagation.

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21718

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(7) Preferably write the answers in sequential order.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) State and explain concept of bandwidth.

(ii) Define pulse modulation. State its types.

(iii) Give the expression for modulation index for AM and FM.

(iv) Define selectivity and sensitivity of AM Receiver.

(v) Define the term baluns and explain where is it used?

(vi) Define electromagnetic wave and polarization.

(vii) Define fading? List the causes.

Marks

b) **Attempt any TWO of the following:** **8**

(i) Explain any four different frequency bands and give their two applications of each.

(ii) Describe microwave antenna with suitable diagram.

(iii) Explain skip zone and skip distance with neat diagram.

2. Attempt any FOUR of the following: **16**

a) Describe with respect to antenna

(i) radiation pattern

(ii) directive gain

(iii) power gain

(iv) polarization

b) Explain reactance modulator for FM generation.

c) Describe the block diagram of basic communication system.

d) Explain with neat diagram and waveform, generation of PPM using IC 555.

e) Describe different types of losses that affect the transmission line signal.

f) Define modulation index. Derive the expression - $m = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$ using AM waveform.

3. Attempt any FOUR of the following: **16**

a) What will be effect of total AM transmitter power if modulation index changes from 0.5 to 1, for 500 watt carrier power? Conclude the result.

b) State the need of AGC. List the different types of AGC with neat graph.

c) Describe line of sight propagation in brief.

d) Calculate characteristic impedance (Z_0) for parallel and co-axial cables.

Marks

e) Distinguish between resonant and non-resonant antennas.

f) A FM signal is represented by the voltage equation -

$U_{FM} = 10 \sin (6 \times 10^6 \pm 5 \sin 1250\ t)$

Calculate

(i) Fe

(ii) Fm

(iii) δ

(iv) m_f

4. Attempt any <u>FOUR</u> of the following: **16**

a) Explain effect of 'm' on AM with neat waveforms.

b) Derive the expression of total power transmitted Pt in terms of PC and m_a.

c) How quarter wave transformer is used for impedance matching.

d) Describe ionosphere with neat sketch.

e) Dish antenna is parabolic in shape and has meshy structure. Give reasons.

f) Define stub. Explain single and double stub in brief with neat sketch.

5. Attempt any <u>FOUR</u> of the following: **16**

a) Draw and explain PLL as an FM demodulator.

b) With the help of neat diagram, explain the working of phase discriminator.

c) The parameters of transmission line are R = 50 Ω/km, L = 1.6 mH/km, C = 0.2 μf/km, G = 2.25 μ℧/km. Calculate characteristics impedance and propagation constant.

Marks

d) The operating frequency of pyramidal horn antenna is 10 GHz. The horn antenna is 10 cm high and 12 cm wide. Calculate

(i) Beam width of antenna

(ii) Power gain of antenna if k = 0.6

e) Explain with neat block diagram AM superheterodyne receiver.

f) Derive relation between reflection coefficient (k) and VSWR (s).

6. Attempt any <u>FOUR</u> of the following: **16**

a) Explain with block diagram of Armstrong method of FM generation.

b) Draw a practical AM diode detector circuit. Sketch i/p and o/p waveforms.

c) Explain with a neat diagram of ratio detector. Why limiter stage is not used before ratio detector.

d) Describe the block diagram of FM superhetrodyne receiver.

e) Describe the functions of mixer and local oscillator in radio receiver.

f) Explain loop antenna with neat sketch. Draw radiation pattern. State its advantages and applications.

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16117

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) Define half duplex and full duplex type of communication.

(ii) Draw the time domain and frequency domain representation of AM.

(iii) Define modulation index in AM with equation.

(iv) List the different methods of demodulation of FM.

(v) Draw the circuit diagram of phase discriminator.

(vi) Draw the general equivalent circuit of transmission line.

(vii) Define:

(1) Critical frequency

(2) MUF

(viii) List the application of space wave propagation.

Marks

b) **Attempt any TWO of the following:** **8**

(i) Describe the block diagram of basic communication system.

(ii) Describe folded dipole antenna with help of diagram. List any two advantages.

(iii) Distinguish between ground wave and sky wave propagation.

2. Attempt any FOUR of the following: **16**

a) Describe the loop antenna in brief.

b) State the need of modulation.

c) Describe electromagnetic spectrum with diagram.

d) Describe the working of PLL as FM demodulator.

e) Describe single stub and double stub matching.

f) Describe varactor modulator used for FM generation.

3. Attempt any FOUR of the following: **16**

a) A frequency modulated signal is represented by voltage equation as $e_{FM} = 10 \sin (6 \times 10^8 t + 5\sin 1250t)$.
Find out:

(i) Carrier frequency

(ii) Modulating frequency

(iii) Modulation index

(iv) Max. deviation

b) The desired signal frequency is 93 MHz and the intermediate frequency is 10.7 MHz calculate the local oscillator frequency and image frequency.

c) Describe various layers of ionosphere with neat diagram.

d) If R is Reflection co-efficient what will be its value.

(i) If there is no reflected voltage

(ii) If reflected voltage is same as incident voltage

(iii) If reflected voltage = 15V and incident voltage = 25 V.

(iv) If reflected voltage = 20 V and incident voltage = 10 V.

Marks

e) Calculate the directivity for the antennas having following specifications:

(i) Power gain, efficiency 90%

(ii) Power gain 45 dB, efficiency 90%

f) Describe the generation of PPM with waveforms.

4. Attempt any FOUR of the following: **16**

a) Describe the Pre-emphasis with graph.

b) A 10 kW carrier is amplitude modulated by two sine waves to a depth of 0.5 and 0.6 respectively. Calculate total power content of modulated carrier.

c) Derive the relation between reflection co-efficient (K) an VSWR.

d) Describe duct propagation with neat diagram.

e) Why dish antenna is having parabolic shape and meshy surface?

f) Describe resonant and non-resonant type of transmission line.

5. Attempt any FOUR of the following: **16**

a) AM transmitter transmits signals at 50 kW with modulation depth as 85%. Calculate carrier power and total side band power in transmitted signal.

b) Describe operation of AM superheterodyne receiver with block diagram.

c) Derive the equation for characteristic impedance of transmission line at low frequency and high frequency.

d) An antenna has a radiation resistance of 72Ω, a loss resistance of 8Ω and power gain of 16. What is its efficiency and directivity?

e) State and explain types of AGC with its characteristic

f) Describe different types of losses in transmission line.

Marks

6. Attempt any FOUR of the following: **16**

a) Describe with diagram FM signal generation using IC 566.

b) Describe with neat circuit diagram and waveforms of envelope detetctor.

c) Describe with diagram balanced slope detector.

d) Describe the block diagram of FM superheterodyne receiver.

e) Describe the function of mixer and local oscillator in radio receiver.

f) Explain Yagi Uda antenna with its radiation pattern.

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17440

21314

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any <u>SIX</u> of the following:** **12**

i) Define with suitable example: Simplex and Duplex communication system.

ii) Represent AM wave in time domain and frequency domain.

iii) Define pulse modulation and state its types.

iv) State the function of limiter circuit used in FM receiver.

v) State any two advantages and disadvantages of balanced slope detector.

vi) What is single stub transmission line?

vii) Why electromagnetic waves are said to be transverse waves?

viii) Define plane of polarization.

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

i) Draw and explain the block diagram of communication system.

ii) Explain with neat diagram half wave dipole antenna.

iii) Describe any three features of ground wave propagation along with neat sketch.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Draw and explain: Horn antenna.

b) Define modulation and explain need of modulation.

c) Draw and explain the electromagnetic spectrum.

d) Draw and explain block diagram of superheterodyne AM radio receiver.

e) Define characteristic impedance and explain how to calculate it?

f) A 500 watts carrier is modulated to depth of 80%. Calculate:

i) Total power in AM wave

ii) Power in sidebands.

3. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the effect of modulation index on AM wave with waveforms for following values of M:

i) $m < 1$

ii) $m = 1$

b) Explain the function of mixer in AM receiver with neat diagram.

c) Explain space wave propagation with sketch. List its advantage and disadvantage.

Marks

d) How the primary constant R.G.L.C. affect distortionless and minimum attenuation conditions of transmission line?

e) Compare resonant antenna and non-resonant antenna on the basis of:

i) Definition

ii) Circuit

iii) Reflection Pattern

iv) Radiation Pattern

f) Explain with neat diagram and waveform the generation of PPM using IC555.

4. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the concept of De-emphasis with neat circuit diagram.

b) Draw and explain the block diagram of Armstrong method to generate FM wave.

c) Derive the relation between reflection coefficient and VSWR.

d) Explain ionospheric propagation with proper sketch.

e) Explain the following terms related to antenna:

i) Beamwidth

ii) Directivity

f) State four features of the following:

i) Quarter wavelength line and

ii) Half wavelength line

Marks

5. Attempt any <u>FOUR</u> of the following: **16**

a) A frequency modulated signal is represented by the voltage equation $\varrho_{FM} = 10 \sin (6 \times 10^8 t + 5\sin 1250t)$

Calculate:

i) Carrier frequency fc

ii) Modulating frequency fm

iii) Maximum deviation δ

iv) What power will this FM wave dissipates in 20Ω resistor?

b) Draw a neat circuit diagram of two stage if amplifier and explain its working.

c) State and explain any four properties of quarter wave transformer.

d) Explain with neat sketch of Yagi-uda antenna.

e) What is the need of AGC? Explain simple AGC with its characteristics graph.

f) Give the need of stub and explain double stub matching with neat diagram.

6. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the generation of PWM using timer IC555 with neat circuit diagram.

b) Draw the block diagram of FM receiver and explain the function of any three blocks.

c) Draw and explain the balanced slope detector.

d) Draw the circuit diagram and explain the working of phase discriminator.

e) Draw the neat circuit diagram of FET amplitude limiter used in FM receiver.

f) Explain with neat sketch the working of parabolic dish antenna.

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21314

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any <u>SIX</u> of the following:** **12**

i) Define with suitable example: Simplex and Duplex communication system.

ii) Represent AM wave in time domain and frequency domain.

iii) Define pulse modulation and state its types.

iv) State the function of limiter circuit used in FM receiver.

v) State any two advantages and disadvantages of balanced slope detector.

vi) What is single stub transmission line?

vii) Why electromagnetic waves are said to be transverse waves?

viii) Define plane of polarization.

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

i) Draw and explain the block diagram of communication system.

ii) Explain with neat diagram half wave dipole antenna.

iii) Describe any three features of ground wave propagation along with neat sketch.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Draw and explain: Horn antenna.

b) Define modulation and explain need of modulation.

c) Draw and explain the electromagnetic spectrum.

d) Draw and explain block diagram of superheterodyne AM radio receiver.

e) Define characteristic impedance and explain how to calculate it?

f) A 500 watts carrier is modulated to depth of 80%. Calculate:

i) Total power in AM wave

ii) Power in sidebands.

3. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the effect of modulation index on AM wave with waveforms for following values of M:

i) $m < 1$

ii) $m = 1$

b) Explain the function of mixer in AM receiver with neat diagram.

c) Explain space wave propagation with sketch. List its advantage and disadvantage.

Marks

d) How the primary constant R.G.L.C. affect distortionless and minimum attenuation conditions of transmission line?

e) Compare resonant antenna and non-resonant antenna on the basis of:

i) Definition

ii) Circuit

iii) Reflection Pattern

iv) Radiation Pattern

f) Explain with neat diagram and waveform the generation of PPM using IC555.

4. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the concept of De-emphasis with neat circuit diagram.

b) Draw and explain the block diagram of Armstrong method to generate FM wave.

c) Derive the relation between reflection coefficient and VSWR.

d) Explain ionospheric propagation with proper sketch.

e) Explain the following terms related to antenna:

i) Beamwidth

ii) Directivity

f) State four features of the following:

i) Quarter wavelength line and

ii) Half wavelength line

Marks

5. Attempt any <u>FOUR</u> of the following: **16**

a) A frequency modulated signal is represented by the voltage equation $\varrho_{FM} = 10 \sin (6 \times 10^8 t + 5\sin 1250t)$

Calculate:

i) Carrier frequency fc

ii) Modulating frequency fm

iii) Maximum deviation δ

iv) What power will this FM wave dissipates in 20Ω resistor?

b) Draw a neat circuit diagram of two stage if amplifier and explain its working.

c) State and explain any four properties of quarter wave transformer.

d) Explain with neat sketch of Yagi-uda antenna.

e) What is the need of AGC? Explain simple AGC with its characteristics graph.

f) Give the need of stub and explain double stub matching with neat diagram.

6. Attempt any <u>FOUR</u> of the following: **16**

a) Explain the generation of PWM using timer IC555 with neat circuit diagram.

b) Draw the block diagram of FM receiver and explain the function of any three blocks.

c) Draw and explain the balanced slope detector.

d) Draw the circuit diagram and explain the working of phase discriminator.

e) Draw the neat circuit diagram of FET amplitude limiter used in FM receiver.

f) Explain with neat sketch the working of parabolic dish antenna.

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14115

3 Hours / 100 Marks **Seat No.** | | | | | | | | |

Instructions : (1) All Questions are *compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Preferably, write the answers in sequential order.

Marks

1. (A) Attempt any SIX from the following : **12**

(a) Define simplex and Half duplex system with sketch.

(b) Define deviation ratio in FM. What is maximum value of deviation ratio and modulating frequency ?

(c) List the types of Analog pulse modulation. Also state the need of pulse modulation.

(d) What is the tuning range and IF value of (i) MW band AM and (ii) FM radio receiver ?

(e) What is tracking ? List its types.

(f) Draw general equivalent circuit of transmission line.

(g) What is Fading ? Write two reasons of Fading.

(h) What is electromagnetic polarization ? List the types of polarization.

(B) Attempt any TWO from the following : **08**

(a) Draw the block diagram of communication system and state the function of each block.

(b) Draw the construction of Yagi-Uda antenna. Draw its radiation pattern and write two application.

(c) A lossless transmission line for 100 Ω characteristic impedance connects to 100 kHz generator and 140 Ω load. Calculate reflection coefficient and VSWR.

2. Attempt any FOUR from the following : **4 × 4 = 16**

(a) Compare Resonant and Non-resonant antenna on the basis of (i) Definition (ii) Circuit (iii) Reflection co-efficient (iv) Radiation pattern.

(b) Draw the transistorized circuit for generation of PWM and explain its working.

(c) State and explain the types of noise in communication system.

(d) Draw the block diagram of AM superhetrodyene radio receiver and state the function of each block.

(e) What is stub ? Draw and explain single stub matching.

(f) Differentiate between AM and FM on the basis of (i) Definition (ii) Bandwidth (iii) Modulation Index (iv) Application.

3. Attempt any FOUR from the following : **4 × 4 = 16**

(a) A frequency modulated signal is represented by voltage equation as $e_{FM} = 10 \sin (6 \times 10^8 t + 5 \sin 1250 t)$. Find out (i) Carrier frequency (ii) Modulating frequency (iii) Modulation index (iv) Maximum deviation.

(b) Define intermediate frequency (IF). Why local oscillator frequency (fo) is made greater than signal frequency (Fs) in radio receiver ?

(c) Explain with sketch properties of transmission lines for various lengths.

(d) How quarter wave transformer is used for impedance matching ? Explain.

(e) A half-wave dipole antenna is capable of radiating 1 kW and has a 2.15 dB gain over an isotropic antenna. How much power must be delivered to the isotropic antenna to match the field strength of directional antenna.

(f) Represent the FM in time domain and frequency domain with neat labelling.

4. Attempt any FOUR from the following : 4 × 4 = 16

(a) What is pre-emphasis and de-emphasis ? Draw the circuit of pre-emphasis. State where both the circuits are used.

(b) A 10 kW carrier is amplitude modulated by two sine waves to a depth of modulation 0.5 and 0.6 respectively. Calculate total power content of the modulated carrier.

(c) For a transmission line, if R is the reflection co-efficient what will be its value

(i) If there is no reflected voltage ?

(ii) If reflected and incident voltages are same ?

(iii) If reflected voltage = 10 V and incident voltage = 20 V ?

(iv) If reflected voltage = 2V and incident voltage = 2 V ?

(d) Draw voltage and current standing waves of a transmission line terminated in an open circuit. State four characteristics of transmission line.

(e) Explain with neat sketch microstrip patch antenna (any one).

(f) Derive the equation for characteristic impedance of transmission line at low frequency and high frequency.

5. Attempt any FOUR from the following : 4 × 4 = 16

(a) In FM, if maximum deviation is 75 kHz and the maximum modulating frequency is 10 kHz, calculate the deviation ratio and Bandwidth of FM.

(b) State the functions of RF section used in AM radio receiver. State any four advantages of RF amplifier.

(c) The parameters of transmission line are R = 65 Ω/km, L = 1.6 mH/km, C = 0.1 μF/km, G = 2.25 μΩ/km. Calculate characteristic impedance.

(d) Describe with sketch working principle of Dish antenna. List its two advantages.

(e) Define sensitivity and selectivity. Draw the graph of sensitivity and selectivity for radio receiver.

(f) Derive the relation between reflection co-efficient (K) and VSWR(S).

6. Attempt any FOUR from the following : 4 × 4 = 16

(a) Draw block diagram for generation of PAM with waveform at each block. State two disadvantages and one application.

(b) Draw practical AM diode detector circuit. Sketch its input and output waveforms.

(c) Draw circuit of Ratio detector. Why limiter stage is not used before Ratio detector ?

(d) Draw the transistorized circuit of amplitude limiter used in FM receiver.

(e) Draw the delayed AGC circuit. State its two advantages and applications.

(f) Explain Loop antenna with sketch. Draw its radiation pattern. State its advantages and applications.

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21415

3 Hours / 100 Marks **Seat No.** | | | | | | | | |

Instructions : (1) All Questions are *compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

Marks

1. (A) Attempt any SIX from the following : **12**

(a) Write down different frequencies for following (frequency ranges) :

(1) Voice frequency

(2) High frequency

(3) IR frequency

(4) Visible Spectrum (light)

(b) Define modulation index for FM.

(c) Define pulse modulation. State its types.

(d) What are the different types of FM detector ?

(e) What is the purpose of keeping RF section before mixer stage ?

(f) Define stub. State its two advantages.

(g) What are the different types of wave propagation ?

(h) Define antenna resistance and antenna gain.

(B) Attempt any TWO from the following : **08**

(a) Draw Yagi-uda antenna with its radiation pattern.

(b) Compare ground wave and sky wave propagation for four points.

(c) Draw block diagram of basic electronic communication system. Describe its working principle.

2. Attempt any FOUR from the following : **16**

(a) Explain with circuit diagram PWM using IC 555.

(b) Explain half dipole antenna (Resonant antenna) with its radiation pattern.

(c) Differentiate between simplex and duplex mode of communication.

(d) Draw block diagram of AM superheterodyne receiver and explain its working principle.

(e) Write a mathematical expression for amplitude modulated wave.

(f) Draw and explain equivalent circuit of a transmission line.

3. Attempt any FOUR from the following : **16**

(a) Explain the working of varactor diode reactance modulator for FM generation.

(b) A practical antenna has directive gain of 5 dB radiate 1200 watt power. How much power an isotropic antenna should radiate in order to have the same power density at the same distance ?

(c) Explain standing waves with load terminal open circuited and short circuited.

(d) Explain Duct Propagation.

(e) Define Image Frequency. The RF local oscillator frequency, IF frequencies for AM. Receiver are 800 kHz, 1255 kHz and 455 kHz respectively. Determine image frequency.

(f) Explain power relations in AM wave.

4. Attempt any FOUR from the following : **16**

(a) Draw and explain circuit of AM modulators using BJT.

(b) Compare the bandwidth that would be required to transmit baseband signal with a frequency range from 300 Hz to 3 kHz using

(1) Narrow band FM with maximum deviation of 5 kHz

(2) Wideband FM with maximum deviation of 75 kHz.

(c) Explain working of Balun with diagram.

(d) Explain :

(1) Critical Frequency

(2) Skip distance

(e) What are different microwave antenna ? Explain horn antenna.

(f) Explain single and double stub matching.

5. Attempt any FOUR from the following : 16

(a) Explain the working of De-emphasis ckt.

(b) Draw block diagram of FM receiver.

(c) Explain quarter wavelength transformer.

(d) The operating frequency for pyramidal horn antenna is 10 GHz. The horn antenna is 10 cm high and 12 cm wide. Calculate :

(1) Beam width of antenna

(2) Power gain of antenna, if K = 5.

(e) Explain the working of FM demodulator using phase lock loop with the help of circuit diagram.

(f) State the different losses in transmission line.

6. Attempt any FOUR from the following : 16

(a) Draw block diagram of PPM. Draw waveforms to explain the working of PPM.

(b) Explain sensitivity and selectivity for AM radio receiver.

(c) Explain the working of phase discriminator FM.

(d) Explain demodulation of AM signal using practical diode detector.

(e) What is frequency changing and tracking ?

(f) For 2 meter diameter parabolic reflector with 10 watt of power radiated by the feed mechanism operating at 6 GHz with transmit antenna efficiency of 55%. Determine :

(1) Beam width of antenna

(2) Transmit power gain

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15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) Define:

1) Analog signal

2) Digital signal

(ii) State the importance of modulation.

(iii) Write the intermediate frequency value used for:

1) AM

2) FM

(iv) Write any two drawbacks of TRF radio receiver.

(v) State merits of delayed AGC as compared with simple AGC.

Marks

(vi) Define:
1) characteristic impedance
2) standing wave ratio

(vii) Why are electromagnetic waves called as transverse wave?

(viii) List the major causes of fading.

b) **Attempt any TWO of the following:** **8**

(i) Draw the block diagram of basic electronic communication system, and label it. Explain the concept of channel.

(ii) Draw the diagram of half-wave dipole antenna. Show the current and voltage distribution on it. Why is it called as "Half Wave" dipole antenna?

(iii) Compare ground wave and space wave propagation on the basis of frequency range and method of wave propagation.

2. Attempt any FOUR of the following: **16**

a) Draw the diagram of radiation patterns of following resonant dipoles:

(i) $l = \lambda/2$

(ii) $l = \lambda$

(iii) $l = 3\lambda/2$

(iv) $l = 3\lambda$

Where l = length of dipole.

b) Draw the circuit diagram of PWM using IC555. State its operation.

c) List atleast four types of noise. Explain any one of them.

d) Draw the circuit diagram of transistorised RF amplifier. List any two characteristics of RF amplifier.

e) Describe the following transmission losses:

(i) Radiation losses

(ii) Losses due to conductor heating.

f) Draw the AM signal representation in:

(i) Time domain

(ii) Frequency domain

Marks

3. Attempt any FOUR of the following: **16**

a) Compare amplitude modulation with frequency modulation with reference to:
   (i) definition
   (ii) modulation index
   (iii) bandwidth
   (iv) application

b) In a broadcast superhyterodyne receiver having loaded Q of antenna coupling of 100, if intermediate frequency of 455 kHz, calculate image frequency and its rejection ratio at 1000 kHz.

c) Describe the term virtual height with the help of diagram showing ionized layer and the path of wave.

d) A lossless transmission line has a shunt capacitance of 100 pf/m and a series inductance of 4 μH/m. Calculate its characteristic impedance. What will be the value of series inductance if shunt capacitance is changed to 69 pf/m for same characteristic impedance?

e) Describe non-resonant antenna with the help of its radiation pattern.

f) Define pre-emphasis. Why is it used? Sketch a typical pre-emphasis circuit.

4. Attempt any FOUR of the following: **16**

a) Draw a basic circuit of basic reactance modulator and describe its operation.

b) A 400 watt carrier is amplitude modulated to a depth of 75%. Calculate the total power in AM wave.

c) What is the value of SWR for short circuited transmission line? Describe the effect on transmitted wave in this case.

d) Describe the following effects of the environment on electromagnetic waves:
   (i) reflection
   (ii) refraction

e) Describe the operating principle of dish antenna. Also draw its radiation pattern.

f) Describe impedance inversion property of quarter wavelength transmission line.

Marks

5. Attempt any FOUR of the following: **16**

a) Describe the FM generation using IC566.

b) Draw the block diagram of practical diode detector. Describe how it is better than simple diode detector.

c) Describe the application of transmission line as stub. Write the situation where single stub or double stub is used.

d) Draw the diagram of Yagi-uda antenna. Describe it with reference to its radiation pattern.

e) Draw block diagram of superheterodyne AM radio receiver. Describe the principle of superhet.

f) Draw and explain the general equivalent circuit of transmission line.

6. Attempt any TWO of the following: **16**

a) Draw the circuit diagram of balance slope detect and describe its working principle.

b) Draw the block diagram of FM superheterodyne radio receiver and state two function of each block.

c) (i) Draw the block diagram of AM transmitter.

(ii) What factors govern the selection of feed point of dipole antenna? How do current feed and voltage feed antenna differ?

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3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) Define with suitable example :

Simplex and Duplex communication system.

(ii) State the need for modulation.

(iii) What is deviation ratio for frequency modulation.

(iv) Write the intermediate frequency value for.

(1) AM

(2) FM

(v) Why limiter stage is not used before ratio detector.

(vi) Explain why electromagnetic waves are called as transverse waves.

Marks

(vii) Draw general and RF equivalent circuit of transmission line.

(viii) Define an antenna.

b) **Attempt any TWO of the following:** **8**

(i) Draw the block diagram of communication system and state the function of each block.

(ii) The parameters of transmission line are R = 65 Ω/km, L = 1.6 mH/km, C = 0.1 μF/kM, G = 2.25 μΩ/km. Calculate the characteristic impedance.

(iii) Draw a neat sketch of Yagi-Uda antenna and its radiation pattern. State its two applications.

2. Attempt any FOUR of the following: **16**

a) Differentiate between AM and FM on the basis of :

(i) Defination

(ii) Bandwidth

(iii) Modulation Index

(iv) Application

b) Explain the different types of losses in transmission line.

c) Compare ground wave and space wave propagation on the basis of –

(i) Frequency range

(ii) Method of wave propagation

d) Draw the ckt. of balance slope detector and describe its working.

e) A 800 watts carrier is amplitude modulated to a depth of 80%. Calculate –

(i) Total power in modulated wave

(ii) Power in sidebands.

f) Explain the following terms related to antenna.

(i) Beamwidth

(ii) Directivity

Marks

3. Attempt any FOUR of the following: **16**

a) State and explain the types of noise in communication system.

b) Draw the circuit diagram of practical diode detector and explain its working.

c) Draw the diagram of radiation patterns of following resonant dipoles.

(i) $l = \lambda/2$

(ii) $l = \lambda$

(iii) $l = 3\lambda/2$

(iv) $l = 3\lambda$

where λ = length of dipole.

d) Describe with neat diagram and waveform the generation of PPM using IC555.

e) Explain ionosphere layer and the ionospheric propagation.

f) What is the value of SWR for open circuited transmission line ? Describe the effect on transmitted wave in this case.

4. Attempt any FOUR of the following: **16**

a) What is stub ? What do you mean by single stub matching and double stub matching.

b) Define selectivity and sensitivity of radio receiver.

c) Explain the concept of pre-emphasis with neat circuit diagram.

d) Draw the structure and radiation pattern of parabolic dish antenna.

e) For a transmission line, if R is the reflection co-efficient what will be its value

(i) If there is no reflected voltage.

(ii) If reflected and incident voltages are same.

(iii) If reflected voltage = 12V and incident voltage = 24V.

(iv) If reflected voltage = 2V and incident voltage = 2V.

f) Draw a neat sketch of loop antenna with its radiation pattern. Explain how they are used for direction feeding.

Marks

5. Attempt any FOUR of the following: **16**

a) Draw and explain PLL as FM demodulator.

b) Describe electromagnetic polarisation ? Explain types of polarization.

c) Compare resonant and non-resonant antenna on the basis of

(i) Defination

(ii) Reflection co-efficient

(iii) Radiation pattern

(iv) Application

d) State the need of AGC ? Explain its types.

e) Explain quarter wave and half wavelength line.

f) The equation of an angle modulated voltage is e = 10 sin (10^8t + 3 sin10^4t). What form of angle modulation is this ? Calculate the carrier and modulating frequencies, the modulation index, deviation and power dissipated in 100 Ω resistor.

6. Attempt any TWO of the following: **16**

a) Draw the neat block diagram of Armstrong method of FM generation and explain its working in detail.

b) Draw the superheterodyne type FM radio receiver. How it differs from superheterodyne type AM receiver. State two functions of each block.

c) (i) With the help of neat diagram explain the working of phase discriminator.

(ii) In FM, if maximum deviation is 65 KHz. and the maximum modulating frequency is 10 KHz. Calculate the deviation ratio and bandwidth of FM.