



Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

*Subject: - Principles of Electronics Communication
(22334)*



SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Basic of Electronics Communication	16
2	AM and FM modulation	28
3	Transmitters & Receivers	22
4	Wave Propagation	16
5	Antennas	16
Total Marks: -		98



BOARD THEORY PAPER PATTERN FOR PEC (22334)

Q.1		Attempt any FIVE	5*2=10
	a)	Basic of Electronics Communication	
	b)	AM and FM modulation	
	c)	Transmitters & Receivers	
	d)	Wave Propagation	
	e)	Antennas	
	f)	Transmitters & Receivers	
	g)	AM and FM modulation	
Q.2		Attempt any THREE	3*4=12
	a)	Wave Propagation	
	b)	Basic of Electronics Communication	
	c)	AM and FM modulation	
	d)	Transmitters & Receivers	



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Q.3		Attempt any THREE	3*4=12
	a)	Antennas	
	b)	Transmitters & Receivers	
	c)	AM and FM modulation	
	d)	Basic of Electronics Communication	
Q.4		Attempt any THREE	3*4=12
	a)	Wave Propagation	
	b)	Antennas	
	c)	AM and FM modulation	
	d)	Transmitters & Receivers	
	e)	Wave Propagation	
Q.5		Attempt any TWO	2*6=12
	a)	Transmitters & Receivers	
	b)	Antennas	
	c)	Basic of Electronics Communication	
Q.6		Attempt any TWO	2*6=12
	a)	AM and FM modulation	
	b)	Wave Propagation	
	c)	AM and FM modulation	



CLASS TEST - I

PAPER PATTERN

COURSE: - Principles of Electronics Communication (22334)

PROGRAMME: - E & TC Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
1	Basic of Electronics Communication	CO-334.1
2	AM and FM modulation	CO-334.2
3	Transmitters & Receivers	CO-334.3

Q.1	Attempt any FOUR	4*2=8Marks	Course Outcome (CO)
a)	AM and FM modulation		CO-334.2
b)	Basic of Electronics Communication		CO-334.1
c)	AM and FM modulation		CO-334.2
d)	Transmitters & Receivers		CO-334.3
e)	AM and FM modulation		CO-334.2
f)	Basic of Electronics Communication		CO-334.1
Q.2	Attempt any THREE	3*4=12 Marks	
a)	Basic of Electronics Communication		CO-334.1
b)	AM and FM modulation		CO-334.2
c)	Transmitters & Receivers		CO-334.3
d)	AM and FM modulation		CO-334.2



CLASS TEST - II

PAPER PATTERN

COURSE: - Principles of Electronics Communication (22334)

PROGRAMME: - E & TC Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
3	Transmitters & Receivers	CO-334.3
4	Wave Propagation	CO-334.4
5	Antennas	CO-334.5

Q.1	Attempt any FOUR	4*2=8Marks	Course Outcome (CO)
a)	Antennas		CO-334.5
b)	Transmitters & Receivers		CO-334.3
c)	Wave Propagation		CO-334.4
d)	Transmitters & Receivers		CO-334.3
e)	Wave Propagation		CO-334.4
f)	Antennas		CO-334.5
Q.2	Attempt any THREE	3*4=12 Marks	
a)	Antennas		CO-334.5
b)	Wave Propagation		CO-334.4
c)	Antennas		CO-334.5
d)	Wave Propagation		CO-334.4



COURSE OUTCOME

(CO)

COURSE: - Principles of Electronics Communication (22334)

PROGRAMME: - E & TC Engineering

CO. NO.	Course Outcome
CO-334.1	Use relevant frequency range for different communication system
CO-334.2	Use relevant modulation techniques for the specified application.
CO-334.3	Maintain transmitter & Receivers circuits of AM & FM.
CO-334.4	Use relevant media for transmission and reception of signals.
CO-334.5	Use relevant type of antenna for various applications.



1. Basic of Electronics Communication

Position in Question Paper

Total Marks-16

Q.1. a) 2-Marks.

Q.2. b) 4-Marks.

Q.3. d) 4-Marks.

Q.5. c) 6-Marks.

Descriptive Question

1. What is mean by Noise & list the types of Noise.
2. Derive the equation of S/N ratio
3. Draw the electromagnetic spectrum.
4. Explain the transition mode in communication system
5. Draw & explain the basic block diagram of Electronics Communication System
6. Explain half duplex and full duplex system
7. Define Signal to Noise Ratio.
8. Explain the sources of Noise in communication system.



MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**.

- Medium which sends information from source to receiver is called
 - Transmitter
 - Transducer
 - Loudspeaker
 - Channel**
- Telephones send information through wires in form of _____
 - Radio signals**
 - electrical signal
 - electromagnetic waves
 - microwaves
- Cell phones send information in form of _____
 - Microwaves
 - electrical signals
 - infrared Waves
 - radio waves**
- The ability of receivers to select the wanted signals among various incoming signal is called
 - Selectivity**
 - Fidelity
 - Sensitivity
 - Modulation
- _____ Fidelity?
 - Equally amplifies all the signal frequencies at receiver**
 - Ability of receiver to select wanted signal from various incoming signal
 - Minimum magnitude of input signal required to produce a specified output
 - Ability to amplify weak signals
- Sin wave is _____
 - Aperiodic Signal
 - Periodic Signal**
 - Random Signal
 - Deterministic Signal
- _____ is the role of channel in communication system?
 - acts as a medium to send message signals from transmitter to receiver**
 - converts one form of signal to other
 - allows mixing of signals
 - helps to extract original signal from incoming signal
- Noise is added to a signal _____
 - In the channel**
 - At receiving antenna
 - At transmitting antenna
 - During regeneration of information
- Agreement between communication devices are called _____
 - Transmission medium
 - Channel
 - Protocol**
 - Modem
- A term that defines the direction of flow of information between devices.
 - Interconnectivity
 - intra connectivity
 - transmission mode**
 - transmission



11. _____ of the following isn't a type of transmission mode?
- a) **Physical**
 - b) simplex
 - c) full duplex
 - d) half duplex
12. A transmission mode that can transmit data in both the directions but transmits in only one direction at a time.
- a) Simplex
 - b) **half duplex**
 - c) full duplex
 - d) semi-duplex
13. Telephone networks operate in this mode.
- a) Simplex
 - b) half duplex
 - c) **full duplex**
 - d) semi-duplex
14. A walkie-talkie operates in _____
- a) Simplex
 - b) **half duplex**
 - c) full duplex
 - d) semi-duplex
15. _____ is the role of the transmitter in the communication system?
- a) to decode a signal to be transmitted
 - b) to convert one form of energy into other
 - c) to detect and amplify information signal from the carrier
 - d) **to produce radio waves to transmit data**
16. a sinusoidal signal is considered analog?
- a) It moves in both positive and negative direction
 - b) It is positive for one half cycle
 - c) It is negative for one half cycle
 - d) **It has an infinite number of amplitudes in the range of values of the independent variable**
17. If Output can be represented as linear combination of input then _____
- a) **The system is linear**
 - b) the system is causal
 - c) The system is non-causal
 - d) the system is time invariant
18. _____ device is used for tuning the receiver according to incoming signal (especially in TV)?
- a) Low pass filter
 - b) High pass filter
 - c) Zener diode
 - d) **Varactor diode**
19. _____ is the maximum transmission efficiency?
- a) 67.88%
 - b) **33.33%**
 - c) 73%
 - d) 54.03%
20. AVC stands for _____
- a) Abrupt Voltage Control
 - b) Audio Voltage Control
 - c) **Automatic Volume Control**
 - d) Automatic Voltage Control



21. A transmission that generally involves dedicated circuits.
- a) **Simplex**
 - b) half duplex
 - c) full duplex
 - d) semi-duplex
22. Fire alarms are based on this type of transmission:
- a) Direct
 - b) network
 - c) **analog**
 - d) multiple
23. A technique of transmitting data or images or videos (information) using a continuous signal.
- a) Direct
 - b) network
 - c) **analog**
 - d) multiple
24. Demodulation is done in _____
- a) Channel
 - b) **Receiver**
 - c) Receiving antenna
 - d) Transducer
25. Figure of merit is _____
- a) **Ratio of output signal to noise ratio to input signal to noise ratio**
 - b) Ratio of input signal to noise ratio to output signal to noise ratio
 - c) Ratio of output signal to input signal to a system
 - d) Ratio of input signal to output signal to a system
26. Notch is a _____
- a) High pass filter
 - b) Low pass filter
 - c) **Band stop filter**
 - d) Band pass filter
27. ____ is the role of channel in communication system?
- a) **Acts as a medium to send message signals from transmitter to receiver**
 - b) converts one form of signal to other
 - c) allows mixing of signals
 - d) helps to extract original signal from incoming signal
28. ____ is the advantage of super heterodyning?
- a) **High selectivity and sensitivity**
 - b) Low Bandwidth
 - c) Low adjacent channel rejection
 - d) Low fidelity
29. Low frequency noise is _____
- a) **Flicker noise**
 - b) Shot noise
 - c) Thermal noise
 - d) Partition Noise



30. Relationship between amplitude and frequency is represented by _____
- a) Time-domain plot
b) Phase-domain plot
c) **Frequency-domain plot**
d) Amplitude-domain plot
31. A function $f(x)$ is even, when?
- a) $f(x) = -f(x)$
b) **$f(x) = f(-x)$**
c) $f(x) = -f(x)f(-x)$
d) $f(x) = f(x)f(-x)$
32. For a three stage cascade amplifier, calculate the overall noise figure when each stage has a gain of 12 DB and noise figure of 8dB.
- a. 12
b. 24
c. **13.55**
d. 8
33. Transit time noise is
- a. Low frequency noise
b. **High frequency noise**
c. Due to random behavior of carrier charges
d. Due to increase in reverse current in the device
34. Noise factor for a system is defined as the ratio of
- a. Input noise power (P_{ni}) to output noise power (P_{no})
b. **Output noise power (P_{no}) to input noise power (P_{ni})**
c. Output noise power (P_{no}) to input signal power (P_{si})
d. Output signal power (P_{so}) to input noise power (P_{ni})
35. Noise Factor (F) and Noise Figure (NF) are related as
- a. **$NF = 10 \log_{10}(F)$**
b. $F = 10 \log_{10}(NF)$
c. $NF = 10(F)$
d. $F = 10(NF)$
36. The noise temperature at a resistor depends upon
- a. Resistance value
b. **Noise power**
c. Both a and b
d. None of the above



2. AM and FM modulation

Position in Question Paper

Total Marks-28

Q.1. b) 2-Marks.

Q.1. g) 2-Marks.

Q.2.c) 4-Marks

Q.3. c) 4-Marks

Q.4. c) 4-Marks.

Q.6. a) 6-Marks.

Q.6. c) 6-Marks.

Descriptive Question

1. What is mean by modulation?
2. Explain the need of modulation.
3. Classify the modulation.
4. What is mean by phase modulation?
5. Draw the amplitude modulation with time domain representation.
6. Derive the mathematical representation of FM by using time domain.
7. Define modulation Index, frequency deviation of FM signal.
8. Derive the power relation of AM wave.
9. Draw & explain the VSB concept.
10. Explain the types of frequency modulation.
11. Compare AM, FM & PM.



MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**.

1. Modulation is done in _____
a) Receiver receiver
b) Transducer
c) between transmitter and radio
d) **Transmitter**
2. In TV transmission, picture signal is _____ modulated.
a) DSB-SC
b) **VSB** c) SSB-SC
d) Pulse
3. FM stands for _____
a) **Frequency Modulation** c) Frequent Frequent Multiplier
b) Frequency Modulator d) Frequency Mixer
4. Data transmitted for a given amount of time is called _____
a) Noise c) Frequency
b) Power d) **Bandwidth**
5. Amplitude Modulation suffers from _____
a) Side-band Suppression c) **Cross Modulation**
b) Intra Pulse Modulation d) Carrier Suppression
6. Demodulation is done in _____
a) Channel c) Receiving antenna
b) **Receiver** d) Transducer
7. _____ is Amplitude Modulation?
a) **Change in amplitude of carrier according to modulating signal amplitude**
b) Change in frequency of carrier according to modulating signal amplitude
c) Change in amplitude of carrier according to modulating signal frequency
d) Change in amplitude of modulating signal according to carrier signal amplitude
8. In amplitude modulation frequency and phase of carrier _____
a) **varies simultaneously**
b) varies alternately
c) initially varies but become same after sometime
d) remains constant
9. For Amplitude Modulation, Emitter modulator _____
a) Operates in class C mode c) Output power is high
b) **Has a low efficiency** d) Operates in class B mode



10. _____ AM is used for broadcasting?
- a) More immune to noise
 - b) less transmitting power is required
 - c) it has high fidelity
 - d) **Avoids Receivers Complexity**
11. Single tone amplitude modulation _____
- a) **consists of only one frequency component**
 - b) contains a large number of frequency components
 - c) contains no frequency components
 - d) contains infinite number of frequency components
12. AM spectrum consists of _____
- a) Carrier frequency
 - b) Upper sideband
 - c) Lower sideband
 - d) **Carrier frequency with both upper and lower sideband**
13. The minimum channel Bandwidth is used by which modulation technique?
- a) VSB
 - b) **SSB-SC**
 - c) DSB-SC
 - d) AM
14. Amplitude Modulated wave is _____
- a) **Sum of carrier and modulating wave**
 - b) Product of carrier and modulating wave
 - c) Difference of carrier and modulating wave
 - d) Sum of carrier and its product with modulating wave
15. For 100% modulation, total power is?
- a) **same as the power of unmodulated signal**
 - b) twice as the power of unmodulated signal
 - c) four times as the power of unmodulated signal
 - d) one and half times as the power of unmodulated signal
16. AM waves are represented by which equation?
- a) **$[1 + m(t)].c(t)$**
 - b) $[1 - m(t)].c(t)$
 - c) $[1 + m(t)].2c(t)$
 - d) $[1 + 2m(t)].c(t)$
17. _____ do you understand by the term SSB?
- a) Suppressed Side Band
 - b) **Single Side Band**
 - c) Suppressed Single Band
 - d) Selected Single Band
18. _____ is the full form of PPM?
- a) **pulse-position modulation**
 - b) position-pulse modulation
 - c) pulse-pulse modulation
 - d) position-position modulation
19. Pulse communication system that is inherently highly immune to noise is _____
- a) **PCM**
 - b) PPM
 - c) PAM
 - d) PWM



20. Quantization noise occurs in _____
- a) Frequency Division Multiplexing
b) Time Division Multiplexing
c) Delta Modulation
d) **Amplitude Modulation**
21. In AM pilot carrier, transmission has _____
- a) carrier and part of one side band
b) **two side bands and a carrier**
c) two side bands
d) carrier, one side band and part of other side band
22. _____ of the following frequency is not transmitted in AM transmission?
- a) Upper side band frequency
b) Carrier frequency
c) Lower side band frequency
d) **Audio frequency**
23. If peak voltage of a carrier wave is 10V, what is the peak voltage of modulating signal if modulation index is 50%?
- a) 10V
b) 20V
c) 8V
d) **5V**
24. Maximum Amplitude of an amplitude modulated 10V and minimum amplitude is 5V. Find its modulation index?
- a) 0.65
b) 0.9
c) **0.33**
d) 1
25. 24 channels, each band limited to 3.4 KHz, are to be time division multiplexed. Find the bandwidth required for 128 quantization level? (Given that sampling frequency is 8 KHz)
- a) 2436 KHz
b) 1002 KHz
c) **1536 KHz**
d) 1337 KHz
26. Sampling frequency of a signal is 6 KHz and is quantized using 7 bit quantizer. Find its bit rate?
- a) **48kbPs**
b) 64kbPs
c) 16kbPs
d) 8kbPs
27. Calculate power in each sideband, if power of carrier wave is 96W and there is 40% modulation in amplitude modulated signal?
- a) 11.84W
b) 6.84W
c) **3.84W**
d) 15.84W
28. For 50% modulation, power in each sideband is _____ of that of carrier.
- a) 10%
b) 4.32%
c) 5%
d) **6.25%**
29. If each element of signal occupies 70ms, what will its speed?
- a) 11.23 bauds
b) **14.28 bauds**
c) 17.39 bauds
d) 13.33 bauds
30. Power of carrier wave is 300W and modulation index is 0.75. Find its total power?
- a) 465W
b) **384W**
c) 323W
d) 502W



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31. If a wave is modulated by two waves. One of them has modulation index equal to 0.75 and other has 0.2, the total modulation index will be _____
- a) 0.67
b) 0.58
c) **0.77**
d) 0.35
32. Find the power saving for DSB-SC wave with 100% modulation?
- a) **66%**
b) 86%
c) 50%
d) 33%
33. If power transmitted is 45kW, field at a distance of 23km will be _____
- a) 0.02
b) 0.75
c) **0.05**
d) 0.03
34. Find the number of pulses, if the number of level is 128 in PCM?
- a) 3
b) 6
c) **4**
d) 7
35. Neper is _____ decibel.
- a) **20/(ln10)**
b) 20ln10
c) Same as
d) Exactly twice of
36. AM broadcast station transmits modulating frequency up to 6 KHz. If transmitting frequency is 810KHz, then maximum and lower sidebands are _____
- a) **816KHz and 804KHz**
b) 826KHz and 804KHz
c) 916KHz and 904KHz
d) 822KHz and 816KHz
37. Find lower frequency component in AM wave, given that highest frequency component is 900 KHz and bandwidth is 12 KHz?
- a) 832KHz
b) 600KHz
c) 868KHz
d) **888KHz**
38. For attenuation of high frequencies we can use _____
- a) inductor
b) **shunt capacitance**
c) series capacitance
d) combination of inductor and resistor
39. If each element of signal occupies 40ms, determine its speed?
- a) 20 bauds
b) **25 bauds**
c) 40 bauds
d) 0.05 bauds
40. A modem is classified as low if speed of data rate is _____
- a) **up to 600bps**
b) up to 200bps
c) up to 400bps
d) up to 500bps
41. It is suitable to connect woofer from the input through _____
- a) band pass filter
b) band stop filter
c) **low pass filter**
d) high pass filter
42. The radiation at right angles is zero means _____
- a) **$I = \lambda$**
b) $I = \lambda/4$
c) $I = 2\lambda$
d) $I = \lambda/2$



43. Commercial frequency deviation is _____
- a) **75 KHz** c) 85 KHz
b) 80 KHz d) 65 KHz
44. Most commonly used modulation system for telegraphy is _____
- a) Multi-tone modulation c) PCM
b) Single tone modulation d) **FSK**
45. _____ Do you understand by the term “carrier”?
- a) waveform with constant frequency, phase and amplitude
b) **waveform for which frequency, amplitude or phase is varied**
c) waveform with high amplitude, low frequency and constant phase
d) waveform to be transmitted
46. According to Fourier analysis, square wave can be represented as _____
- a) fundamental sine wave and even harmonics
b) **fundamental sine wave and odd harmonics**
c) fundamental sine wave and harmonics
d) fundamental and sub harmonic sine wave
47. PDM is generated by _____
- a) Bistable multivibrator c) astable multivibrator
b) **Monostable multivibrator** d) Schmitt trigger
48. The minimum height of antenna required for transmission in terms of λ is _____
- a) $\frac{3\lambda}{2}$ c) 2λ
b) $\frac{\lambda}{4}$ d) λ
49. _____ Demodulation?
- a) Process of varying one or more properties of a periodic waveform
b) **Recovering information from a modulated signal**
c) Process of mixing a signal with a sinusoid to produce a new signal
d) Involvement of noise
50. Relationship between amplitude and frequency is represented by _____
- a) Time-domain plot c) **Frequency-domain plot**
b) Phase-domain plot d) Amplitude-domain plot
51. A function $f(x)$ is even, when?
- a) $f(x) = -f(x)$ c) $f(x) = -f(x)f(-x)$
b) **$f(x) = f(-x)$** d) $f(x) = f(x)f(-x)$
52. Frequency components of an AM wave are?
- a) **Carrier frequency (ω_c) with amplitude A**
b) Lower side band ($\omega_c + \omega_m$) having amplitude $\frac{mA}{2}$
c) Upper side band ($\omega_c - \omega_m$) having amplitude $\frac{mA}{2}$
d) Carrier frequency ($\omega_c/2$) with amplitude A



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53. _____ Aliasing takes place?
- a) **Sampling signals less than Nyquist Rate**
 - b) Sampling signals more than Nyquist Rate
 - c) Sampling signals equal to Nyquist Rate
 - d) Sampling signals at a rate which is twice of Nyquist Rate
54. _____ Devices did we use for AM Demodulation?
- a) **Envelope detector and Square law demodulator**
 - b) PLL detector and Foster-Seeley discriminator
 - c) Ratio detector and Slope detector
 - d) Only quadrature detector



3. Transmitters & Receivers

Position in Question Paper

Total Marks-22

Q.1. a) 2-Marks.

Q.1. f) 2-Marks.

Q.2.d) 4-Marks

Q.3. b) 4-Marks

Q.4. d) 4-Marks.

Q.5. a) 6-Marks.

Descriptive Question

- Explain the concept of pre-emphasis & e-emphasis.
- Draw AM high level modulator transmitter circuit.
- What is mean by AGC explain need if AGC.
- Draw & explain AM superhetrodyne receiver.
- Describe the working principle of practical diode detector.
- Draw & explain the FM receiver with its waveform.
- Explain the generation of FM signal using reactance modulator circuit.
- Explain the ratio detector circuit for FM detection.
- Explain why the local oscillator frequency should be always greater than Signal frequency in radio receiver. A superhetrodyne radio receiver with an IF of 455 kHz is turned to 1000 kHz. Find its Image frequency and local Oscillator frequency.



MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold**.

- _____ of the following devices is used to generate AM waves?
 - Square-law modulator
 - Reactance modulator**
 - Transmitter
 - Transducer
- _____ AM is used for broadcasting?
 - More immune to noise
 - less transmitting power is required
 - it has high fidelity
 - Avoids Receivers Complexity**
- _____ is the role of Amplitude limiter in the FM receiver?
 - Filteration
 - adjust the gain of receiver
 - Amplify a weaker signal**
 - Demodulate a signal
- Detection is same as _____
 - Modulation
 - Mixing
 - Filtering
 - Demodulation**
- _____ do you understand by the term "carrier"?
 - waveform with constant frequency, phase and amplitude
 - waveform for which frequency, amplitude or phase is varied**
 - waveform with high amplitude, low frequency and constant phase
 - waveform to be transmitted
- Contrast function in TV is done by _____
 - Luminance amplifier
 - Schmitt trigger
 - Band Pass Filter**
 - Chroma amplifier
- Bandwidth of RF amplifier for a color TV receiver is _____
 - Equal to channel width**
 - more than channel width
 - less than channel width
 - twice of channel width
- Envelope Detector is a/an _____
 - Coherent detector
 - Asynchronous Detector
 - Synchronous Detector**
 - Product Demodulator
- A long wave AM broadcast transmitter needs _____
 - Very small carrier power
 - very large carrier power
 - small carrier power
 - large carrier power**
- _____ of the following modulation system is used for video-modulation?
 - DSB-SC
 - SSB-SC
 - VSB**
 - FM



11. The difference between phase and frequency modulation _____
- a) lies in the poorer radio response of phase modulation index
 - b) lies in the different definition of modulation index**
 - c) is too great to make the two systems compatible
 - d) is purely theoretical
12. Pre-emphasis circuit is used _____
- a) Before detection
 - b) after detection
 - c) before encoding**
 - d) after encoding
13. The auto-correlation function is _____
- a) Impulse function
 - b) linear function**
 - c) odd function
 - d) even function
14. _____ is the bandwidth required in SSB signal?
- a) F_M
 - b) $2f_m$
 - c) $> 2f_m$
 - d) $< 2f_m$
15. _____ is the function of RF mixer?
- a) Addition of two signals**
 - b) Multiplication of two signals
 - c) Subtraction of two signals
 - d) To reduce the amount of noise
16. Standard intermediate frequency used for AM receiver is _____
- a) 455 MHz
 - b) 455 KHz**
 - c) 455 Hz
 - d) 20 KHz
17. _____ Device is used in TV receivers for tuning the receiver to the incoming signal?
- a) Varacter diode
 - b) High pass filter
 - c) Low pass filter
 - d) Band pass filter**
18. _____ statement is true about multiplexing?
- a) it is used to reduce the bandwidth
 - b) it is used to combine multiple data streams over a single data channel
 - c) it is used to allow multiple data streams over multiple channels
 - d) it is used to match and pass the same frequency signal**
19. TRF receivers are used for _____
- a) Detection of modulating signal
 - b) Removal of unwanted signal
 - c) Mixing modulating signal with unwanted signal
 - d) Both detection of modulating signal and removal of unwanted signal**
20. In automatic gain control of the AM receiver _____
- a) gain of the receiver is adjusted**
 - b) gain adjustment depends upon the strength of received signal
 - c) is an open-loop system
 - d) gain is received only by stronger signals



21. In synchronous transmission, receiver is able to sync with the transmitter by using
 - a) Clock bits
 - b) Start and Stop bits
 - c) CRC bits
 - d) **Data bits**
22. FEC stands for _____
 - a) **Forward Error Correction**
 - b) Fixed Error Correction
 - c) Forward Error Communication
 - d) Fixed Error Communication
23. Run-length encoding is used to _____
 - a) Correct data
 - b) segregate data
 - c) encrypt data
 - d) **compress data**
24. To maintain synchronization in synchronous transmission _____
 - a) **long strings of 1s and 0s must not be allowed**
 - b) transmission must stop periodically
 - c) clock circuits must be precisely adjusted
 - d) channel must be noise free
25. EIRP stands for _____
 - a) **Effective Isotropic Radiated Power**
 - b) Effective Isotropic Reflected Power
 - c) Effective Isotropic Refracted Power
 - d) Effective Isotropic Regulated Power
26. _____ calculating the maximum number of users, limiting factor in FDM is _____
 - a) **Bandwidth of each signal**
 - b) type of each signal
 - c) amplitude of each signal
 - d) length of the channel
27. _____ is the full form of ATM?
 - a) Asynchronous Transfer Mode
 - b) Asynchronous Transmission Mode
 - c) **Automatic Transmission Mode**
 - d) Automatic Transfer Mode
28. In a frequency modulated signal, the power _____ as the modulation index increases.
 - a) **Remains constant**
 - b) increase
 - c) decrease
 - d) becomes 0
29. _____ of the following statement is true about frequency modulation?
 - a) noise gets decrease if we decrease deviation
 - b) **noise gets decrease if we increase deviation**
 - c) noise gets decrease by maintaining deviation constant
 - d) noise relates parabolically to deviation
30. In a frequency modulated signal, the power _____ as the modulation index increases.
 - a) **Remains constant**
 - b) increase
 - c) decrease
 - d) becomes 0
31. For a periodic function, the spectral density and auto-correlation functions are ____
 - a) Laplace transform pair
 - b) **Fourier transform pair**
 - c) Gauss transform pair
 - d) Z-transform pair



32. Spectral density express _____
- a) Average voltage
 - b) **Average power in a waveform as a function of frequency**
 - c) Average noise voltage
 - d) Average channel capacity
33. For a Gaussian process, auto correlation also implies _____
- a) Statistical dependence
 - b) **Statistical independence**
 - c) Statistical distribution
 - d) Ergodic process
34. _____ will be the value of modulation if we want maximum undistorted transmitted power?
- a) 0
 - b) **1**
 - c) 0.2
 - d) 0.5
35. For providing two or more voice circuits on the same carrier, we can use _____
- a) SSB
 - b) **ISB systems**
 - c) DSB-SC
 - d) VSB
36. For providing two or more voice circuits on the same carrier, we can use _____
- a) **SSB**
 - b) ISB systems
 - c) DSB-SC
 - d) VSB
37. ____ of the following statement is incorrect about modulation?
- a) It is used to allow the use of practical antennas
 - b) It is used to separate different transmissions
 - c) **It is used to reduce the required bandwidth**
 - d) It is used to ensure that the message is transmitted over long distances
38. _____ Amplitude modulation is issued for broadcasting?
- a) It is more immune to noise
 - b) It has more fidelity
 - c) **It avoids receiver complexity**
 - d) It has better selectivity and sensitivity
39. An Ergodic process is present in communication if many random signals have
- a) Identical time averages
 - b) identical ensemble averages
 - c) **identical time and ensemble averages**
 - d) identical bandwidth
40. _____ is the auto-correlation function of a signal (t) at $t_0=0$?
- a) **It is equal to average voltage of the signal**
 - b) It is equal to average power of the signal
 - c) It is equal to zero
 - d) It is equal to infinite
41. The auto-correlation function is _____
- a) Impulse function
 - b) linear function
 - c) odd function
 - d) **even function**
42. In communication system, redundancy _____
- a) Helps to detect error
 - b) Helps to correct error



-
- c) Reduces efficiency of communication
d) Helps to detect and correct error and also reduces efficiency

4. Wave Propagation

Position in Question Paper

Total Marks-16

Q.1. d) 2-Marks.

Q.2.a) 4-Marks

Q.4. a) 4-Marks.

Q.6. b) 6-Marks.

Descriptive Question

1. Define radiation & propagation of radio.
2. Explain the concept of propagation waves.
3. Describe the working principle of ground wave propagation with diagram.
4. Define critical frequency, skip distance, skip zone, MUF of sky wave propagation.
5. Draw the different ionosphere layer of sky wave propagation & explain in brief.
6. Explain the concept of Actual height & Virtual height.
7. Draw & explain the space wave propagation.
8. Draw the duct wave propagation & explain the working of duct wave propagation.
9. Describe the working principle of shadow zone.
10. Draw the tropospheric scatter propagation.
11. Compare the ground wave, sky wave & space wave propagation.



MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold**.

- _____of the following modulation is used for radio navigation?
 - Pulse Modulation**
 - Amplitude Modulation
 - Phase Modulation
 - Frequency Modulation
- Frequency modulated broadcast band generally lies in _____
 - VHF**
 - HF
 - SHF
 - LF
- The velocity required to stay in orbit is _____
 - constant
 - infinite
 - lower close to the earth than far from the earth
 - higher close to the earth than far from the earth**
- Modern EDM uses which among the following waves?
 - Visible rays
 - Thermal infra-red
 - Modulated infra-red**
 - Radio waves
- _____property of an electromagnetic wave, depends on the medium in which it is travelling?
 - Velocity**
 - Frequency
 - Time period
 - Wave length
- The distance in EDM is measured by _____
 - Frequency of the wave
 - Wave length
 - Phase difference**
 - Amplitude
- Tellurometer, a type of EDM uses which of the following waves?
 - Visible rays
 - Infra-red waves
 - Micro waves
 - Radio waves**
- Find the value of D if the wave length of the wave is 40m, $n=2$ m and the angles are given as $\theta_1 = 0^\circ$, $\theta_2 = 180^\circ$.
 - 50m**
 - 40m
 - 20m
 - 10m
- Electromagnetic waves are represented in which of the following format?
 - Longitudinal waves
 - Transverse waves
 - Sinusoidal waves**
 - Surface waves



10. _____ would be the value of length if the distance is given as 30m, $m=3$ and the change in length is 8m.
- a) 7.43m
b) **7.34m**
c) 6.34m
d) 5.43m
11. Phase difference can be expressed in which of the following format?
- a) Meters per second
b) Meters
c) **Cycles**
d) Seconds
12. _____ of the following represents the correct sequence for the basis of EDM propagation?
- a) Propagation, generation, reflection and reception
b) Generation, reception, reflection and propagation
c) Generation, propagation, reception and reflection
d) **Generation, propagation, reflection and reception**
13. Ground wave is always _____ polarized.
- a) **Vertically**
b) horizontally
c) Either vertical or horizontal
d) neither horizontal nor vertical
14. Ground wave propagation is used for signals up to frequency _____
- a) **2MHz**
b) 2GHz
c) 30MHz
d) 30GHz
15. The broadcast signals received at low frequencies during day-time are due to ____
- a) **Ground wave**
b) Space wave
c) Sky wave
d) Tropospheric waves
16. Ground wave propagation is also known as _____
- a) **Surface wave**
b) Tropospheric wave
c) Ionospheric wave
d) stratospheric waves
17. _____ of the following is particularly used for VLF?
- a) **Surface wave**
b) Tropospheric wave
c) Ionospheric wave
d) stratospheric waves
18. Ground wave field strength is given by $E=$ _____
- a) **AE_0/d**
b) $A(E_0)^2/d$
c) dE_0
d) AE_0/d^2
19. _____ of the following propagates by gliding over the surface of earth?
- a) **Surface wave**
b) Tropospheric wave
c) Ionospheric wave
d) Stratospheric waves
20. How the ground wave losses vary with high frequencies?
- a) **Increases**
b) Decreases
c) Does not depend on frequency
d) Increase or decrease



21. Up to which frequency the ground wave propagation is used?
 - a) **2MHz**
 - b) 2GHz
 - c) 30MHz
 - d) 30GHz
22. In a ground wave propagation, which component of electric field is short circuited when it's in contact by earth?
 - a) **Horizontal**
 - b) Vertical
 - c) Both horizontal and vertical
 - d) neither horizontal nor vertical
23. During ground wave propagation earth behaves like a _____
 - a) **Leaky capacitor**
 - b) Leaky Inductor
 - c) Series combination of capacitor and inductor
 - d) Parallel combination of capacitor and inductor
24. Sky wave propagation reflects the frequencies _____
 - a) 2MHz
 - b) **2 MHz to 30MHz**
 - c) 2 GHz to 30 GHz
 - d) 30 GHz to 50GHz
25. At what distance the sky wave propagation is present from the earth surface?
 - a) **50 to 400km**
 - b) Below 50 km
 - c) 600 to 750km
 - d) 50 to 400 m
26. Space wave propagation reflects the waves with frequencies _____
 - a) Below 2 GHz
 - b) 2 to 30MHz
 - c) Above 30GHz
 - d) **Above 30MHz**
27. Space wave propagates at which frequency band?
 - a) **VHF**
 - b) HF
 - c) MF
 - d) EHF
28. In which of the following mode of propagation the waves are guided along the surface of the earth?
 - a) **Ground wave**
 - b) Sky wave
 - c) LOS
 - d) Space wave
29. In which of the following modes of propagation the ionosphere acts as the reflecting surface for the waves?
 - a) Ground wave
 - b) **Sky wave**
 - c) Space wave
 - d) LOS
30. Find the skip distance when the angle of incidence is 200 and virtual height is 50km?
 - a) 13.22m
 - b) 13.22km
 - c) **36.33km**
 - d) 36.33m
31. Find the virtual height h when the angle of incidence is 600 and distance of separation 120km.
 - a) 60km
 - b) 64.34km
 - c) **34.64km**
 - d) 72.42km



32. The height at a point above the earth's surface at which the wave bends down to the earth is called
- Actual height**
 - Virtual height
 - Skip distance
 - Distance of separation between transmitter and antenna
33. ____ a wave is incident normally then the acceptable highest frequency at which signal can be returned is the
- Critical frequency**
 - LUF
 - optimum frequency
 - dominating frequency
34. For a regular layer, the critical frequency is proportional to the _____ of electron density.
- Square
 - Inverse
 - Square root**
 - Inverse square root
35. The value of refractive index when the MUF is equal to the critical frequency is _____
- 1
 - 0**
 - 0.5
 - 0.29
36. _____ of the following frequency is greater than the critical frequency?
- MUF**
 - LUF
 - Optimum frequency
 - VLF
37. The frequency below which the entire power gets absorbed is called as _____
- MUF
 - LUF**
 - Critical frequency
 - Optimum frequency
38. Skip distance is the _____
- Minimum distance at which wave returns back at the lowest possible frequency
 - Maximum distance at which wave returns back at the critical frequency
 - Minimum distance at which wave returns back at the critical angle**
 - Maximum distance at which wave returns back at the lowest possible frequency
39. _____ is the value of maximum usable frequency when the incident angle is 60° and the critical frequency is 4.5MHz?
- 4.5MHz
 - 2.25MHz
 - 9MHz**
 - 18MHz
40. _____ of the following is true when a ray is incident normally in an Ionosphere region?
- MUF is equal to critical frequency**
 - MUF is greater than critical frequency
 - MUF is less than critical frequency
 - MUF is zero
41. The propagation of wave from transmitter to receiver without touching the ground is called as _____
- Single hop distance**
 - Virtual height
 - Actual height
 - Multi-hop



Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

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42. The propagation of wave from transmitter to receiver by touching ground in between them and goes through different layers is called _____
- a) Multi-hop single layer
 - b) Single hop multi-layer
 - c) **Multi hop multi-layer**
 - d) Single hop single layer



5. Antennas

Position in Question Paper

Total Marks-16

Q.1. e) 2-Marks.

Q.3. a) 4-Marks

Q.4. b) 4-Marks.

Q.5. b) 6-Marks.

Descriptive Question

1. Define the concept of resonant & non-resonant antenna.
2. Draw & explain the half wave dipole antenna with its radiation pattern.
3. Explain the working of folded dipole antenna with its radiation pattern.
4. Define the parameter of antenna 1) radiation pattern.2) polarization.3) antenna bandwidth.4) power gain.
5. Draw the sketch of Yagi-uda antenna. Explain the working of yagi-uda antenna with its radiation pattern.
6. Explain the concept of microwave antenna.
7. Draw & explain the half wave dipole antenna with its radiation pattern.



MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**.

- _____ of the following is called an ideal antenna?
 - Dipole antenna
 - Directional antenna**
 - Isotropic antenna
 - Loop antenna
- The induction and radiation fields are equal at a distance of _____.
 - $\lambda/4$
 - $\lambda/6$
 - $\lambda/8$
 - $\lambda/2$
- The ratio of radiation intensity in a given direction from antenna to the radiation intensity over all directions is called as _____.
 - Directivity**
 - Radiation power density
 - Gain of antenna
 - Array Factor
- What is the overall efficiency of a lossless antenna with reflection coefficient 0.15?
 - 0.997
 - 0.779
 - 0.669
 - 0.977**
- Equivalent circuit representation of an antenna is _____.
 - Series R, L, C**
 - Parallel R, L, C
 - Series R, L parallel to C
 - Parallel R, C series to L
- Radiation resistance of a Hertzian dipole of length $\lambda/8$ is _____.
 - 12.33 Ω**
 - 8.54 Ω
 - 10.56 Ω
 - 13.22 Ω
- Radiation resistance of a half-wave dipole is _____.
 - 36.56 Ω
 - 18.28 Ω
 - 73.12 Ω**
 - 40.24 Ω
- The radiation efficiency for antenna having radiation resistance 36.15 Ω and loss resistance 0.85 Ω is given by _____.
 - 0.977**
 - 0.799
 - 0.997
 - 0.779
- A linear antenna having length less than $\lambda/8$ is called as _____.
 - Short monopole**
 - Short dipole
 - Half-wave dipole
 - Quarter-wave monopole
- Which of the following option is false?
 - Omni-directional antenna is a special case of directional antenna
 - Directional antenna radiates power effectively in particular directions compared to other directions
 - Isotropic antenna radiates power in all directions
 - End-fire array antenna has its main beam normal to the axis containing antenna**



23. Directive gain of antenna when radiation intensity is $5\text{W}/\text{Steradian}$ and radiated power 5W is ____
- a) 4π c) 25
b) $1/4\pi$ d) 1
24. The Directive gain is _____ on input power to antenna and _____ on power due to ohmic losses.
- a) **Independent, independent** c) Independent, dependent
b) Dependent, independent d) Dependent, dependent
25. _____ is the Bandwidth of the antenna operating at resonant frequency 200MHz with Quality factor 20?
- a) 10Hz c) **10MHz**
b) 5MHz d) 0.1MHz
26. _____ of the following antenna is mainly used for broadband signals?
- a) Marconi antenna c) Wire antenna
b) **Horn antenna** d) Yagi-Uda antenna
27. In a horn antenna, with increase in aperture, the directivity is _____ and diffraction is _____
- a) **Increased, decreased** c) increased, increased
b) decreased, increased d) decreased, decreased
28. _____ of the following refers to the pattern of reflector in the reflector antenna?
- a) Primary pattern c) Reflector pattern
b) **Secondary pattern** d) Feed pattern
29. _____ of the following is a dual reflector antenna?
- a) **Cass grain antenna** c) Offset reflector antenna
b) parabolic antenna d) Wire antenna
30. _____ of the following is not a reflector antenna?
- a) **Convex-convex** c) Gregorian
b) Corner d) Cass grain
31. _____ of the following is used as a secondary antenna in the reflector antenna?
- a) Horn c) **Parabolic**
b) Feed antenna d) Dipole
32. _____ of the following is false regarding Antenna array?
- a) Directivity increases c) Beam width decreases
b) **Directivity decreases** d) Gain increases
33. Electrical size of antenna is increased by which of the following?
- a) **Antenna Array** c) Increasing the coverage area
b) Decreasing the coverage area d) Using a single antenna
34. For long distance communication, which of the property is mainly necessary for the antenna?
- a) **High directivity**
b) Low directivity
c) Low gain
d) Broad beam width
35. In which of the following the power is radiated through a complete spherical surface?
- a) **Half-wave dipole**



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- b) Quarter-wave Monopole
c) Both Half-wave dipole & Quarter-wave Monopole
d) Neither Half-wave dipole nor Quarter-wave Monopole
36. If the progressive shift in antenna array is equal to zero then it is called
a) **Broad side** c) Yagi-uda
b) End-fire d) Fishbone antenna
37. A dipole antenna is also called as?
a) Marconi antenna c) Bidirectional antenna
b) Yagi antenna d) **Hertz antenna**
38. The impedance at the center of the antenna is known as?
a) Characteristic impedance c) Transmission impedance
b) **Radiation resistance** d) Recovery resistance
39. The type of dipole antenna that has a higher band width is called as?
a) **Conical antenna** c) Helical antenna
b) Yagi antenna d) Marconi antenna
40. The radiation pattern of a half-wave dipole has the shape of a _____
a) **Doughnut** c) Hemisphere
b) Sphere d) Circular