Subject: Data Communication (22322)

SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Introduction to Data Communication	22
2	Transmission media	12
3	Multiplexing and switching	24
4	Error Detection and correction	10
5	Wireless communication	14
	Total Marks :-	106

BOARD THEORY PAPER PATTERN FOR DCO (22322)

Q.1		**Attempt any FIVE**	**5*2=10**
	a)	Introduction to Data Communication	
	b)	Transmission media	
	c)	Transmission media	
	d)	Multiplexing and switching	
	e)	Multiplexing and switching	
	f)	Error Detection and correction	
	g)	Wireless communication	
Q.2		**Attempt any THREE**	**3*4=12**
	a)	Introduction to Data Communication	
	b)	Wireless communication	
	c)	Transmission media	

	d)	Multiplexing and switching	
Q.3		**Attempt any THREE**	**3*4=12**
	a)	Introduction to Data Communication	
	b)	Transmission media	
	c)	Multiplexing and switching	
	d)	Error Detection and correction	
Q.4		**Attempt any TWO**	**2*6=12**
	a)	Introduction to Data Communication	
	b)	Transmission media	
	c)	Multiplexing and switching	
	d)	Error Detection and correction	
	e)	Wireless communication	
Q.5		**Attempt any TWO**	**2*6=12**
	a)	Transmission media	
	b)	Error Detection and correction	
	c)	Wireless communication	
Q.6		**Attempt any TWO**	**2*6=12**
	a)	Multiplexing and switching	
	b)	Error Detection and correction	
	c)	Wireless communication	

CLASS TEST - I

PAPER PATTERN

COURSE: - Data Communication (22322)

PROGRAMME: - Information Technology

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
1	Introduction to Data Communication	CO-316-1
2	Transmission media	CO-316-2

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Introduction to Data Communication	CO-322.1
b)	Transmission media	CO-322.2
c)	Transmission media	CO-322.2
d)	Transmission media	CO-322.2
e)	Introduction to Data Communication	CO-322.1
f)	Introduction to Data Communication	CO-322.1

Q.2	**Attempt any TWO 2*6=12Marks**	
a)	Introduction to Data Communication	CO-322.1
b)	Transmission media	CO-322.2
c)	Introduction to Data Communication	CO-322.1

CLASS TEST - II

PAPER PATTERN

COURSE: - Data Communication (22322)

PROGRAMME: - Information Technology

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
3	Multiplexing and switching	**CO-322-3**
4	Error Detection and correction	**CO-322-4**
5	Wireless communication	**CO-322-5**

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Multiplexing and switching	(CO-322.3)
b)	Multiplexing and switching	(CO-322.4)
c)	Error Detection and correction	(CO-322.4)
d)	Error Detection and correction	(CO-322.4)
e)	Wireless communication	(CO-322.5)
f)	Wireless communication	(CO-322.5)

Q.2	**Attempt any TWO** **2*6=12Marks**	
a)	Wireless communication	(CO-316.3)
b)	Error Detection and correction	(CO-316.4)
c)	Multiplexing and switching	(CO-316.4)
d)	Error Detection and correction	(CO-316.5)

COURSE OUTCOME

(CO)

COURSE: - Data Communication (22322)

PROGRAMME: - Information Technology

CO.NO	Course Outcome
CO-322.01	Identify Process of data communication.
CO-322.02	Select relevant types of transmission media depending upon requirements.
CO-322.03	Identify various multiplexing and switching technique use in digital communication.
CO-322.04	Identify types of transmission error and error correction technique.
CO-322.05	Select components of relevant IEEE standard for wireless communication.

1. Introduction to Data Communication

Position in Question Paper **Total Marks=14**

Q.1. a) 2-Marks.
Q.1. c) 2-Marks.
Q.2. a) 4-Marks.
Q.3. b) 4-Marks.
Q.4. b) 4-Marks.
Q.6. a) 6-Marks.

Descriptive Question

1. Define the term Standard.
2. State its two categories.
3. List any two advantages of Unguided Media
4. Compare Amplitude modulation, Frequency modulation and Phase modulation.(Any four a points)
5. Explain process of ASK modulation with diagram
6. Calculate the Baud rate for the given Bit rate and type of modulation. i) 2000 bps, FSK ii) 4000 bps, ASK
7. Draw the Constellation diagram for the following i) ASK with Peak amplitude value of 1 and 3 ii) PSK with Peak amplitude value 2
8. Two channels one with a bit rate of 190Kbps and another with a bit rate of 180 Kbps are to be multiplexed with Pulse-Stuffing TDM with no synchronization bits. Answer the following questions.
   i) Calculate size of Frames in bits. ii) Calculate the Frame rate. iii) Calculate the duration of Frame
9. Describe the process of Data Communication
10. State any two advantages of Fiber Optic cable over Twisted pair and Co-axial Cable
11. Compare Half Duplex and Full Duplex modes of communication based

on following points. i) Direction of communication ii) Send/receive iii) Performance iv) Example

12. Draw the Constellation diagram for the following i) ASK with Peak amplitude value of 1 and 3. ii) PSK with Peak amplitude value 2.
13. Define Multiplexing. Enlist its types.
14. Explain Routing Table in Datagram network. c) Define: i) Single-Bit Error ii) Burst Error

MCQ Question

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

1. Average energy per bit is given by
   a) **average energy symbol/log2 M**
   b) average energy symbol * log2M
   c) log2 M/ Average energy symbol
   d) none of the mentioned
2. Which FSK has no phase discontinuity?
   a) Continuous FSK
   b) Discrete FSK
   c) Uniform FSK
   d) None of the mentioned
3. FSK reception is
   a) Phase Coherent
   b) Phase non coherent
   c) Phase Coherent & non coherent
   d) None of the mentioned
4. FSK reception uses
   a) Correlation receiver
   b) PLL
   c) Correlation receiver & PLL
   d) None of the mentioned
5. In non coherent reception _____ is measured.
   a) Phase
   b) Energy
   c) Power
   d) None of the mentioned
6. Every frequency has ____ orthogonal functions.
   a) One
   b) Two
   c) Four
   d) Six
7. If we correlate the received signal with any one of the two orthogonal function, the obtained inner product will be
   a) In phase
   b) Quadrature
   c) Zero
   d) Cannot be determined
8. If we correlate the received signal with both orthogonal function the inner product will be

a) In phase
b) Quadrature
c) In phase and quadrature
d) Unity

9. Simulation is used to determine
a) Bit error rate
b) Symbol error rate
c) Bit error
d) Symbol error

10. Matched filter is a _____ technique.
a) Modulation
b) Demodulation
c) Modulation & Demodulation
d) None of the mentioned

11. Which is called as on-off keying?
a) Amplitude shift keying
b) Uni-polar PAM
c) Amplitude shift keying & Uni-polar PAM
d) None of the mentioned

12. QAM uses _____ as the dimensions.
a) In phase
b) Quadrature
c) In phase & Quadrature
d) None of the mentioned

13. Which has same probability of error?
a) BPSK and QPSK
b) BPSK and ASK
c) BPSK and PAM
d) BPSK and QAM

14. Which system uses QAM?
a) Digital microwave relay
b) Dial up modem
c) Digital microwave relay & Dial up modem
d) None of the mentioned

15. In Amplitude Modulation, the instantaneous values of the carrier amplitude changes in accordance with the amplitude and frequency variations of the modulating signal.
a) True
b) False

16. What is the line connecting the positive and negative peaks of the carrier waveform called?
a) Peak line
b) Maximum amplitude ceiling
c) Modulation index
d) Envelope

17. What is the reference line for the modulating signal?
a) Zero line
b) Carrier peak line
c) Modulated peak line
d) Un-modulated peak line

18. What happens when the amplitude of the modulating signal is greater than the amplitude of the carrier?

a) Decay
b) Distortion
c) Amplification
d) Attenuation

19. What is the effect of distortion?
a) Total information loss
b) Error information
c) Attenuated information
d) Amplified information

20. What is the circuit used for producing AM called?
a) Modulator
b) Transmitter
c) Receiver
d) Duplexer

21. The ratio between the modulating signal voltage and the carrier voltage is called?
a) Amplitude modulation
b) Modulation frequency
c) Modulation index
d) Ratio of modulation

22. What is the percentage of modulation if the modulating signal is of 7.5V and carrier is of 9V?
a) 100
b) 91
c) 83.33
d) 0

23. What is the condition for greatest output power at the transmitter without distortion?
a) Modulating signal voltage > Carrier voltage
b) Modulating signal voltage < Carrier voltage
c) Modulating signal voltage = Carrier voltage
d) Modulating signal voltage = 0

24. What is the modulation index value if V_{max}=5.9v and V_{min}=1.2v?
a) 0.5
b) 0.662
c) 0.425
d) 0.14

25. Which of the following modulating signal voltage would cause over-modulation on a carrier voltage of 10v?
a) 9.5
b) 9.99
c) 10
d) 12

26. What is the modulating signal voltage if the maximum and the minimum voltages on the wave was observed to be 5.9v and 1.2v respectively?
a) 2.35v
b) 2.12v
c) 1.85v
d) 3.21v

27. Wavelength and antenna size are related as
a) λ/2
b) λ/4
c) 2λ
d) 4λ

28. The detection method where carrier's phase is given importance is called as
a) Coherent detection
b) Non coherent detection
c) Coherent detection & Non coherent detection
d) None of the mentioned

29. The coherent modulation techniques are
a) PSK
b) FSK
c) ASK
d) All of the mentioned

30. The real part of a sinusoid carrier wave is called as
a) Inphase
b) Quadrature
c) Inphase & Quadrature
d) None of the mentioned

31. Antipodal signal sets are those vectors that can be illustrated as
a) Two 180 opposing vector
b) Two 90 opposing vector
c) Two 360 opposing vector
d) None of the mentioned

32. The FSK signal which has a gentle shift from one frequency level to another is called as
a) Differential PSK
b) Continuous PSK
c) Differential & Continuous PSK
d) None of the mentioned

33. Which modulation scheme is also called as on-off keying method?
a) ASK
b) FSK
c) PSK
d) GMSK

34. In amplitude phase keying each phase vector is separated by
a) 90
b) 0
c) 45
d) 180

35. The term heterodyning refers to
a) Frequency conversion
b) Frequency mixing
c) Frequency conversion & mixing
d) None of the mentioned

36. The transformation of the waveform into a single point in signal space is called as
a) Vector point
b) Predetection point
c) Preamplification point
d) Transformation point

37. Modulation is used for _____
a) Reducing loss in transmission
b) Amplification of signal
c) Conversion of signal
d) None of the mentioned

38. In line code transmission, signal is represented by _____

a) Impulses
b) Train of pulses
c) DC signal
d) Continuously varying signal\

39. Which of the following process is explained as detection?
a) Modulation
b) Demodulation
c) Amplification
d) None of the mentioned

40. Which of the following is represented as digital transmission?
a) Baseband bit stream transfer
b) Passband bit stream transfer
c) All of the mentioned
d) None of the mentioned

41. PCM stands for _____
a) Pulse create message
b) Pulse carry modulation
c) Pulse code modulation
d) None of the mentioned

42. TCP stands for _____
a) Tele Call Protocol
c) Transmission Carry Protocol
b) Transmission Control Protocol
d) Transmission Control Parity

2. TRANSMISSION MEDIA

Position in Question Paper **Total Marks=14**

Q.1. a) 2-Marks.
Q.1. c) 2-Marks.
Q.2. a) 4-Marks.
Q.3. b) 4-Marks.
Q.4. b) 4-Marks.

Descriptive Question

1. Explain the process to avoid interference in frequency division multiplexing
2. Explain Guided media?
3. Explain unguided media
4. Explain Coaxial cable.
5. Explain Fiber Optic cable.
6. Explain Twisted Pair Cable
7. Explain Radio Waves
8. Explain Microwaves
9. Explain Infrared
10. Explain Satellite
11. Explain Line of Sight.

MCQ Questions

(Total number of Question=Marks*3=14*3=56)

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

1. What are the main features of a receiver?
   a) Synchronization
   b) Multiple parallel receiver chain
   c) Synchronization & Multiple parallel receiver chain
   d) None of the mentioned
2. What conditions must be fulfilled in a good digital communication system?
   a) High data rate
   b) High fidelity
   c) Low transmit power
   d) All of the mentioned
3. Wired channels are
   a) Lossy
   b) Lossless
   c) Lossy & Lossless
   d) None of the mentioned
4. The **equivalent** temperature in a receiver design must be kept
   a) Low
   b) High
   c) Does not affect the receiver
   d) None of the mentioned
5. Which corrects the sampling time problem in a digital system?
   a) Interpolator
   b) Decimator
   c) Equalizer
   d) Filter
6. What are the main features of a transmitter?
   a) Higher clock speed
   b) Linear power amplifier
   c) Directional antennas
   d) All of the mentioned
7. Transmission media used in low frequency band are
   a) Air
   b) Water
   c) Copper cable
   d) All of the mentioned
8. Transmission media used for medium frequency band are
   a) Coaxial cable
   b) Copper cable
   c) Optical fiber
   d) All of the mentioned
9. Matched filter technique is used to

a) Increase SNR c) SNR is not affected
b) Decrease SNR d) None of the mentioned

10. Matched filter can also be used as least squares estimator.
a) True b) False

11.Digital communication system can handle
a) Analog signals c) 2D signals
b) 1D signals **d) All of the mentioned**

12.The information source of a digital communication system can be
a) Packetized **c) Packetized & Continuous**
b) Continuous d) None of the mentioned

13. Which of this is not a guided media?
a) Fiber optical cable **c) Wireless LAN**
b) Coaxial cable d) Copper wire

14. UTP is commonly used in _____
a) DSL c) HTTP
b) FTTP d) None of the mentioned

15.Coaxial cable consists of _____ concentric copper conductors.
a) 1 c) 3
b) 2 d) 4

16.Fiber optics posses following properties _____
a) Immune electromagnetic interference
b) Very less signal attenuation
c) Very hard to tap
d) All of the mentioned

17. If an Optical Carrier is represented as OC-n, generally the link speed equals(in Mbps) _____
a) n*39.8 c) 2n*51.8
b) n*51.8 d) None of the mentioned

18.Terrestrial radio channels are broadly classifed into _____ groups.
a) 2 c) 4
b) 3 d) 1

19.Radio channels are attractive medium because _____

a) Can penetrate walls
b) Connectivity can be given to mobile user
c) Can carry signals for long distance
d) All of the mentioned

20. Geostationary satellites _____
a) Are placed at a fixed point above the earth
b) Rotate the earth about a fixed axis
c) Rotate the earth about a varying axis
d) All of the mentioned

21. Energy of the discrete particles can be given by_____
a) Photons c) Electrons
b) Protoplasm d) Neutrons

22. Which among the following is having more wavelengths?
a) X-rays **c) Radio waves**
b) Cosmic waves d) Gamma rays

23. Which among the following wave is not employed in case of remote sensing?
a) X-ray c) Thermal IR
b) Visible ray d) Radio waves

24. Optical mechanical scanner is used in which type of electromagnetic waves?
a) X-rays c) Radio waves
b) Cosmic waves **d) Thermal IR**

25. Radio waves are having the longest wavelength among all the electromagnetic waves.
a) False **b) True**

26. Gamma rays are having a wavelength of _____
a) Zero **c) Less than 0.03nm**
b) Greater than 0.03nm d) Equal to 0.03nm

27. Which of the following waves can be used in case of remote sensing?
a) UV rays c) Gamma rays
b) X-rays **d) Visible rays**

28. Which of the following indicates the correct set of combination in radio waves?

a) Shorter wavelength – high frequency

b) Longer wavelength – less frequency

c) Shorter wavelength – less frequency

d) Longer wavelength – high frequency

29. How much wave length is reflected back by the earth surface from the absorbed sun radiation?

a) 0.5meter

c) 0.5 centimeter

b) 0.5 micrometer

d) 0.5 decimeter

30. EM waves varies from _____ to _____

a) Meters to nano-meters

c) Nano to micro-meters

b) Meters to micro-meters

d) Centimeters to nano-meters

31. The formula of energy produced from the body can be given as _____

a) $Q = h- c / \lambda$

c) $Q = h+ c / \lambda$

b) $Q = h*c * \lambda$

d) $Q = h*c / \lambda$

32. Which of the following statement is defined as line of sight distance?

a) Distance covered by a direct space wave from transmitting to receiving antenna

b) Distance covered by an indirect space wave from transmitting to receiving antenna

c) Distance covered by a direct sky wave from transmitting to receiving antenna

d) Distance covered by an indirect sky wave from transmitting to receiving antenna

33. On which of the following factors does the LOS distance depends?

a) Height of receiving antenna alone

b) Height of transmitting antenna alone

c) Only on height of transmitting and receiving antenna

d) On height of transmitting and receiving antenna and effective earths radius factor k

34. Which of the following order is correct?

a) LOS > Radio horizon > Optical horizon

b) Radio horizon < LOS < Optical horizon

c) Radio horizon > Optical horizon > LOS
d) Optical horizon > Radio horizon > LOS

35. Expression for the LOS distance is _____ (km)

a) 4.12(ht−−√+hr−−√)
c) 3.56(ht−−√+hr−−√)
b) 4.12(ht−−√−hr−−√)
d) 3.56(ht−−√−hr−−√)

36. Expression for radio horizon in km is ____

a) 4.12(ht−−√+hr−−√)
c) 3.56(ht−−√+hr−−√)
b) 4.12(ht−−√−hr−−√)
d) 3.56(ht−−√−hr−−√)

37. The value of k at which LOS equals to the radio horizon is ___

a) 1
c) 3/4
b) 0
d) -3/4

38. If the heights of transmitting and receiving antenna are equal then LOS distance is ___ in km.

a) 8.24√h
c) 4.12√h
b) 4.82√h
d) 2.06√h

39. Radio horizon is less than LOS distance.

a) True
b) False

40. The radio horizon can be equal to the LOS distance if same height antennas are used.

a) True
b) False

41. What is the value of the effective radius factor k of earth if the radius of curvature and the earth radius equals?

a) 1
c) Infinity
b) 0
d) 4/3

42. Which of this is not a guided media?

a) Fiber optical cable
c) Wireless LAN
b) Coaxial cable
d) Copper wire

43. UTP is commonly used in _____

a) DSL
c) HTTP
b) FTTP
d) None of the mentioned

44. Coaxial cable consists of _____ concentric copper conductors.

a) 1
c) 3
b) 2
d) 4

45.Fiber optics posses following properties _____
a) Immune electromagnetic interference
b) Very less signal attenuation
c) Very hard to tap
d) All of the mentioned

46.If an Optical Carrier is represented as OC-n, generally the link speed equals(in Mbps) _____
a) n*39.8
c) 2n*51.8
b) n*51.8
d) None of the mentioned

47.Terrestrial radio channels are broadly classifed into _____ groups.
a) 2
c) 4
b) 3
d) 1

48. Radio channels are attractive medium because _____
a) Can penetrate walls
b) Connectivity can be given to mobile user
c) Can carry signals for long distance
d) All of the mentioned

49. Geostationary satellites _____
a) Are placed at a fixed point above the earth
b) Rotate the earth about a fixed axis
c) Rotate the earth about a varying axis
d) All of the mentioned

50.Point to point communication systems use low gain antennas for communication.
a) True
b) False

51. In this method of wireless communication, communication happens only in one direction:
a) Simplex
c) Half duplex
b) Duplex
d) None of the mentioned

52. If the distance between a transmitting station and receiving station is 1 Km and if the antennas are operating at a wavelength of 5 cm, then the path loss is:
a) 108 dB
c) 45 dB
b) 12 dB
d) 48 dB

3 MULTIPLEXING AND SWITICHING

Position in Question Paper **Total Marks=16**

Q.1. a) 2-Marks.
Q.2. b) 4-Marks.
Q.3. a) 4-Marks.
Q.6. c) 6-Marks.

Descriptive Question

1 Explain the process to avoid interference in frequency division multiplexing
2. Calculate the Bit rate for 1000 baud and type of modulation in FSK.
3. Define Multiplexing
4. Compare cirecuit switching and packet switching
5. Differentiate between FDM and TDM.
6. Draw neat diagram of circuit switching. Explain in brief.
7. Explain phases of circuit switching
8. Explain FDM transmitter and receiver
9. Explain DSSS system.
10. Explain slow and fast FHSS
11. List types of Multiplexing.
12. List Applications of spread spectrum technologies.
13. Define the following terms: i) FHSS ii) DSSS

MCQ Question

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

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

1. Which of the following is correct for multiplexer?
   a) Several inputs and single output
   b) Single input and several outputs
   c) Single input and single output
   d) Several inputs and several outputs
2. Multiplexers work with _____
   a) Analog signal
   c) Both analog and digital signal
   b) Digital signal
   d) None of the mentioned
3. TDM stands for _____
   a) Time direct measurement
   c) Time direct multiplexing
   b) Time division multiplexing
   d) Time division measurement
4. Which of the following is analogous to multiplexer?
   a) Data selector
   c) Data filter
   b) Data multiplexer
   d) None of the mentioned
5. Which of the following represent multiple input single output switch?
   a) Multiplexer
   c) Both multiplexer and demultiplexer
   b) De multiplexer
   d) None of the mentioned
6. Schematic symbol of multiplexer is _____
   a) Isosceles triangle
   c) Equilateral triangle
   b) Isosceles trapezoid
   d) Rectangle
7. In digital multiplexer selector line is _____
   a) Analog value
   c) Unpredictable
   b) Digital value
   d) None of the mentioned
8. Which of the following is not a multiplexer?
   a) 8-to-1 line
   c) 4-to-1 line
   b) 16-to-1 line
   d) 1-to-4 line
9. Demultiplexer act as an encoder.
   a) True
   b) False

10. Multiplexer can be used as PLD.

a) True b) False

11. Multiplexing increases the number of communication channels for transmission.

a) True b) False

12. In which of the following systems multiplexing is not necessary?

a) Telemetry c) Satellites

b) TV broadcasting **d) Continuous wave transmission**

13. Time division multiplexing: Digital signal:: Frequency division multiplexing:?

a) Pulse code modulated signal **c) Analog signal**

b) Continuous wave signals d) Pulse position modulated signal

14. What type of multiplexing is widely used in cellphones?

a) Time division multiplexing

b) Frequency division multiplexing

c) Code division multiplexing

d) Spatial multiplexing

15. The transmission of multiple signals in a common frequency without interference is called _____

a) Time division multiplexing

b) Frequency division multiplexing

c) Code division multiplexing

d) Spatial multiplexing

16. For frequency division multiplexing who defines the channel bandwidth?

a) FCC c) FAA

b) ARNIC d) CCA

17. What is the individual carrier frequency of each signal called?

a) Subcarrier c) Modulated carrier

b) Frequency carrier d) Coded carrier

18. Which circuit does the actual multiplexing process in frequency division multiplexing?

a) Linear mixer c) RF amplifier

b) Oscillator d) Duplexer

19. Which of the following device is used to demultiplex the received signal?
a) Allpass filters
c) Bandstop filters
b) Bandpass filters
d) Differential filters

20. The system which uses FM for the subcarriers is called _____
a) FM II system
c) FM/AM system
b) FM/FM system
d) 2 stage FM system

21. A cable TV service uses a single coaxial cable with a bandwidth of 860 MHz to transmit multiple TV signals to subscribers. Each TV signal is 6 MHz wide. How many channels can be carried?
a) 143
c) 100
b) 123
d) 150

22. Time division multiplexing includes _____
a) Wired link
c) Radio or wire link
b) Radio link
d) None of the mentioned

23. Which of the following data is correct for TDM?
a) Analog data is transmitted
b) Digital data is transmitted
c) Both analog and digital data transmitted
d) None of the mentioned

24. PAM stands for _____
a) Pulse Amplitude Modulation
c) Pulse Additive Modulation
b) Power Amplitude Modulation
d) Pulse Amplitude Masking

25. Commutators are mechanical switches in operation.
a) True
b) False

26. Which of the following represents a number of samples per second?
a) Product of frame rate and number of samples per frame
b) Frame rate
c) Ratio of samples per frame and frame rate
d) None of the mentioned

27. What will be the general number of samples per frame?
a) 18
c) 18 or 30
b) 30
d) None of the mentioned

28. Maximum rate of commutation will be _____

a) 800 sample per second
c) 1200 sample per second
b) 900 sample per second
d) 1000 sample per minute

29. Amplitude of each pulse of PAM train conveys the amplitude of particular channel sampled.

a) True
b) False

30. PTM stand for _____

a) Pulse train modulation
c) Power train modulation
b) Pulse time modulation
d) None of the mentioned

31. Which of the following can be generated from the PDM signal?

a) PPM
c) PAM
b) PTM
d) PFM

32. The transmission bandwidth of spread spectrum techniques is equal to the minimum required signal bandwidth.

a) True
b) False

33. Why spread spectrum technique is inefficient for a single user?

a) Large transmission bandwidth
b) Small transmission bandwidth
c) Fixed transmission bandwidth
d) Fixed null bandwidth

34. Which of the following is not a property of spread spectrum techniques?

a) Interference rejection capability
b) Multipath fading
c) Frequency planning elimination
d) Multiple user, multiple access interface

35. Which of the following is not a characteristic of PN sequence?

a) Nearly equal number of 0s and1s
b) Low correlation between shifted version of sequence
c) Non deterministic
d) Low cross-correlation between any two sequences

36. PN sequence can be generated using sequential logic circuits.

a) True
b) False

37. The period of a PN sequence produced by a linear m stage shift register cannot exceed _____ symbols.

a) 2m
c) 2^m
b) m
d) 2^m-1

38. DSSS system spreads the baseband signal by _____ the baseband pulses with a pseudo noise sequence.
a) Adding
c) Multiplying
b) Subtracting
d) Dividing

39. Frequency hopping involves a periodic change of transmission _____
a) Signal
c) Phase
b) Frequency
d) Amplitude

40. What is the set of possible carrier frequencies in FH-SS?
a) Hopset
c) Chips
b) Hop
d) Symbols

41. The bandwidth of the channel used in the hopset is called _____
a) Hopping bandwidth
c) Instantaneous bandwidth
b) Total hopping bandwidth
d) 3 dB bandwidth

42. The processing gain of FH systems is given by ratio of _____
a) Hopping bandwidth and hopping period
b) Instantaneous bandwidth and hopping duration
c) 3 dB bandwidth and bit rate
d) Total hopping bandwidth and instantaneous bandwidth

43. FH systems do not have collisions.
a) True
b) False

44. In fast frequency hopping, hopping rate is less than the information symbol rate.
a) True
b) False

45. A local telephone network is an example of a _____ network.
a) Packet switched
c) Bit switched
b) Circuit switched
d) Line switched

46. Most packet switches use this principle _____
a) Stop and wait
c) Store and wait
b) Store and forward
d) Stop and forward

47. If there are N routers from source to destination, the total end to end delay in sending packet P(L-> number of bits in the packet R-> transmission rate) is

equal to _____

a) N
c) (2N*L)/R
b) (N*L)/R
d) L/R

48. What are the Methods to move data through a network of links and switches?

a) Packet switching and Line switching
b) Circuit switching and Line switching
c) Line switching and bit switching
d) Packet switching and Circuit switching

49. The required resources for communication between end systems are reserved for the duration of the session between end systems in _____ method.

a) Packet switching
c) Line switching
b) Circuit switching
d) Frequency switching

4. Error Detection and Correction

Position in Question Paper **Total Marks=16**

Q.2. c) 4-Marks.
Q.4. c) 6-Marks.
Q.6. c) 6-Marks.

Descriptive Question

1. Explain Virtual communications between layers.
2.Give Functions of transport Layer.
3.Expalin CRC with example.
4.Explain functions of Applications Layer.
5.What is connection oriented and connectionless service.
6.Draw OSI reference model and explain the working of each layer.
7.Expalin ARQ system with block diagram.
8.Explain go-back-n method of error correction.
9.Explain Checksum method of error detection with example.
10.Explain sliding window method.
11.Explain stop and wait method of error correction.

MCQ Question

(Total number of Question=Marks*3=16*3=48)

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

1. The _____ model is 7-layer architecture where each layer is having some specific functionality to perform.

a) TCP/IP
c) OSI
b) Cloud
d) OIS

2. The full form of OSI is OSI model is _____
a) Open Systems Interconnection
Interconnection
b) Open Software
c) Open Systems Internet
d) Open Software Internet

3. Which of the following is not physical layer vulnerability?
a) Physical theft of data & hardware
b) Physical damage or destruction of data & hardware
c) Unauthorized network access
d) Keystroke & Other Input Logging

4. In _____ layer, vulnerabilities are directly associated with physical access to networks and hardware.
a) physical
c) network
b) data-link
d) application

5. Loss of power and unauthorized change in the functional unit of hardware comes under problems and issues of the physical layer.
a) True
b) False

6. Which of the following is not a vulnerability of the data-link layer?
a) MAC Address Spoofing
b) VLAN circumvention
c) Switches may be forced for flooding traffic to all VLAN ports
d) Overloading of transport-layer mechanisms

7. _____ is data-link layer vulnerability where stations are forced to make direct communication with another station by evading logical controls.
a) VLAN attack
b) VLAN Circumvention
c) VLAN compromisation method
d) Data-link evading

8. _____may be forced for flooding traffic to all VLAN ports allowing interception of data through any device that is connected to a VLAN.

a) Switches
c) Hubs
b) Routers
d) Repeaters

9. Which of the following is not a vulnerability of the network layer?
   a) Route spoofing
   b) Identity & Resource ID Vulnerability
   c) IP Address Spoofing
   d) Weak or non-existent authentication
10. Which of the following is an example of physical layer vulnerability?
   a) MAC Address Spoofing
   b) Physical Theft of Data
   c) Route spoofing
   d) Weak or non-existent authentication
11. Which of the following is an example of data-link layer vulnerability?
   a) MAC Address Spoofing
   b) Physical Theft of Data
   c) Route spoofing
   d) Weak or non-existent authentication
12. Which of the following is an example of network layer vulnerability?
   a) MAC Address Spoofing
   b) Physical Theft of Data
   c) Route spoofing
   d) Weak or non-existent authentication
13. Which of the following is an example of physical layer vulnerability?
   a) MAC Address Spoofing
   b) Route spoofing
   c) Weak or non-existent authentication
   d) Keystroke & Other Input Logging
14. Which of the following is an example of data-link layer vulnerability?
   a) Physical Theft of Data
   b) VLAN circumvention
   c) Route spoofing
   d) Weak or non-existent authentication
15. In layering, n layers provide service to

a) n layer
c) n+1 layer
b) n-1 layer
d) none of the mentioned

16. Which can be used as an intermediate device in between transmitter entity and receiver entity?
a) IP router
c) Telephone switch
b) Microwave router
d) All of the mentioned

17. Which has comparatively high frequency component?
a) Sine wave
c) Square wave
b) Cosine wave
d) None of the mentioned

18. Which has continuous transmission?
a) Asynchronous
b) Synchronous
c) Asynchronous & Synchronous
d) None of the mentioned

19. Which requires bit transitions?
a) Asynchronous
b) Synchronous
c) Asynchronous & Synchronous
d) None of the mentioned

20. In synchronous transmission, receiver must stay synchronous for
a) 4 bits
c) 9 bits
b) 8 bits
d) 16 bits

21. How error detection and correction is done?
a) By passing it through equalizer
b) By passing it through filter
c) By amplifying it
d) By adding redundancy bits

22. Which is more efficient?
a) Parity check
b) Cyclic redundancy check
c) Parity & Cyclic redundancy check
d) None of the mentioned

23.Which can detect two bit errors?
a) Parity check
b) Cyclic redundancy check
c) Parity & Cyclic redundancy check
d) None of the mentioned

24.CRC uses
a) Multiplication
b) Binary division
c) Multiplication & Binary division
d) None of the mentioned

25.Frame Relay is cheaper than other _____
a) LANs
b) WANs
c) MANs
d) Multipoint Networks

26.Frame Relay networks offer an option called _____
a) Voice Over For Relay
b) Voice Over Fine Relay
c) Voice On Frame Relay
d) Voice Over Frame Relay

27.There are _____ total features of Frame Relay.
a) Five
b) Seven
c) Nine
d) Ten

28.Frame Relay does not provide flow or error control, they must be provided by the _____
a) Lower Level Protocol
b) Highest Level Protocol
c) Upper Level Protocol
d) Lowest Level Protocol

29.Frame Relay deploys physical layer carriers such as _____
a) ADMs
b) UPSR
c) BLSR
d) SONET

30.Frame relay provides error detection at the _____
a) physical layer
b) data link layer
c) network layer
d) transport layer

31. Virtual circuit identifier in frame relay is called _____
a) data link connection identifier
b) frame relay identifier

c) cell relay identifier
d) circuit connection identifier

32.Frame relay has only _____
a) physical layer
b) data link layer
c) physical layer and data link layer
d) network layer and data link layer

33. In frame relay networks, extended address is used _____
a) to increase the range of data link connection identifiers
b) for error detection
c) for encryption
d) for error recovery

34. What is FRAD in frame relay network?
a) FRAD assembles and disassembles the frames coming from other protocols
b) FRAD is used for modulation and demodulation
c) FRAD is used for error detection
d) FRAD is used for error recovery

35. The data link layer takes the packets from _____ and encapsulates them into frames for transmission.
a) network layer
b) physical layer
c) transport layer
d) application layer

36.Which of the following tasks is not done by data link layer?
a) framing
b) error control
c) flow control
d) channel coding

37. Which sublayer of the data link layer performs data link functions that depend upon the type of medium?
a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) error control sublayer

38.Header of a frame generally contains _____

a) synchronization bytes
c) frame identifier
b) addresses
d) all of the mentioned

39. Automatic repeat request error management mechanism is provided by _____

a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) application access control sublayer

40. When 2 or more bits in a data unit has been changed during the transmission, the error is called _____

a) random error
c) inverted error
b) burst error
d) double error

41. CRC stands for _____

a) cyclic redundancy check
c) code redundancy check
b) code repeat check
d) cyclic repeat check

42. Which of the following is a data link protocol?

a) ethernet
c) hdlc
b) point to point protocol
d) all of the mentioned

43. Which of the following is the multiple access protocol for channel access control?

a) CSMA/CD
b) CSMA/CA
c) Both CSMA/CD & CSMA/CA
d) HDLC

44. The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____

a) piggybacking
c) fletcher's checksum
b) cyclic redundancy check
d) parity check

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    b) Synchronous
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    d) None of the mentioned

5 WIRELESS COMMUNICATIONS

Position in Question Paper **Total Marks=16**

Q.1. c) 2-Marks.
Q.2. c) 4-Marks.
Q.4. d) 6-Marks.
Q.6. d) 6-Marks.

Descriptive Question

1. Explain piconet.
2. Explain Scatternet.
3. Explain BSSS and ESS.
4. Compare NFC and Bluetooth
5. Explain Advantages and disadvantages of 2G.
6. Explain DCF and PCF.
7. Explain VOLTE.
8. Explain VOLTE Specifications.
9. Compare 1G, 2G, 3G, and 4G mobile generations.
10. Explain Expectations from 5G.
11. Describe the wi-fi.
12. Draw diagram of piconet.

MCQ Question

(Total number of Question=Marks*3=16*3=48)

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

1. What is the full form of WLAN?

a) Wide Local Area Network
c) Wireless Land Access Network
b) Wireless Local Area Network
d) Wireless Local Area Node

2. WLANs use high power levels and generally require a license for spectrum use.
a) True
b) False

3. What is the name of 300 MHz of unlicensed spectrum allocated by FCC in ISM band?
a) UNII
c) Millimetre wave
b) Unlicensed PCS
d) Bluetooth

4. Which of the following specifies a set of media access control (MAC) and physical layer specifications for implementing WLANs?
a) IEEE 802.16
c) IEEE 802.11
b) IEEE 802.3
d) IEEE 802.15

5. Which of the following is not a standard of WLAN?
a) HIPER-LAN
c) IEEE 802.11b
b) HIPERLAN/2
d) AMPS

6. Which of the following is the 802.11 High Rate Standard?
a) IEEE 802.15
c) IEEE 802.11g
b) IEEE 802.15.4
d) IEEE 802.11b

7. Which of the following spread spectrum techniques were used in the original IEEE 802.11 standard?
a) FHSS and DSSS
c) THSS and DSSS
b) THSS and FHSS
d) Hybrid technique

8. Which of the following WLAN standard has been named Wi-Fi?
a) IEEE 802.6
c) DSSS IEEE 802.11b
b) IEEE 802.15.4
d) IEEE 802.11g

9. Which of the following is developing CCK-OFDM?
a) IEEE 802.11a
c) IEEE 802.15.4
b) IEEE 802.11b
d) IEEE 802.11g

10. What is the data rate of HomeRF 2.0?
a) 10 Mbps
c) 200 Mbps
b) 54 Mbps
d) 1 Mbps

11.HIPER-LAN stands for _____

a) High Precision Radio Local Area Network
b) High Performance Radio Local Area Network
c) High Precision Radio Land Area Network
d) Huge Performance Radio Link Access Node

12. What is the range of asynchronous user data rates provided by HIPER-LAN?
a) 1-100 Mbps
c) 1-20 Mbps
b) 50-100 Mbps
d) 500 Mbps to 1 Gbps

13. What is the name of the European WLAN standard that provides user data rate upto 54 Mbps?
a) UNII
c) MMAC
b) WISP
d) HIPERLAN/2

14. What is WISP?
a) Wideband Internet Service Protocol
b) Wireless Internet Service Provider
c) Wireless Instantaneous Source Provider
d) Wideband Internet Source Protocol

15. The price of WLAN hardware is more than 3G telephones and fixed wireless equipment.
a) True
b) False

16. An interconnected collection of piconet is called _____
a) scatternet
c) mininet
b) micronet
d) multinet

17. In a piconet, there can be up to _____ parked nodes in the network.
a) 63
c) 255
b) 127
d) 511

18. Bluetooth is the wireless technology for _____
a) local area network
c) metropolitan area network
b) personal area network
d) wide area network

19. Bluetooth uses _____
a) frequency hopping spread spectrum
b) orthogonal frequency division multiplexing
c) time division multiplexing
d) channel division multiplexing

20. Unauthorised access of information from a wireless device through a bluetooth connection is called _____

a) bluemaking
c) bluestring
b) bluesnarfing
d) bluescoping

21. What is A2DP (advanced audio distribution profile)?

a) a bluetooth profile for streaming audio
b) a bluetooth profile for streaming video
c) a bluetooth profile for security
d) a bluetooth profile for file management

22. In a piconet, one master device _____

a) can not be slave
b) can be slave in another piconet
c) can be slave in the same piconet
d) can be master in another piconet

23. Bluetooth transceiver devices operate in _____ band.

a) 2.4 GHz ISM
c) 2.6 GHz ISM
b) 2.5 GHz ISM
d) 2.7 GHz ISM

24. Bluetooth supports _____

a) point-to-point connections
b) point-to-multipoint connection
c) both point-to-point connections and point-to-multipoint connection
d) multipoint to point connection

25. A scatternet can have maximum _____

a) 10 piconets
c) 30 piconets
b) 20 piconets
d) 40 piconets

26.Which of the following is not a characteristic of 3G network?

a) Communication over VoIP
b) Unparalleled network capacity
c) Multi-megabit Internet access
d) LTE based network

27. What is the term used by ITU for a set of global standards of 3G systems?

a) IMT 2000
c) CDMA
b) GSM
d) EDGE

28. Which of the following leads to evolution of 3G networks in CDMA systems?
a) IS-95
c) CdmaOne
b) IS-95B
d) Cdma2000

29. Which of the following leads to the 3G evolution of GSM, IS-136 and PDC systems?
a) W-CDMA
c) EDGE
b) GPRS
d) HSCSD

30. Which of the following is not a standard of 3G?
a) UMTS
c) TD-SCDMA
b) Cdma2000
d) LTE

31. Which of the following 3G standard is used in Japan?
a) Cdma2000
c) UMTS
b) TD-SCDMA
d) UTRA