Subject: -Wireless and mobile networks (22622)

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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SYLLABUS

Chapter No.	Name of chapter	Marks
1	Basics of PCS and GSM	12
2	GPRS and Mobile data communication	12
3	Wireless application on protocol and 3G mobile services	20
4	WLL signal encoding technique and spread spectrum modulation	10
5	Mobile Ad-hoc networks and wireless sensor networks	16
6		
7		
8		
9		
10		
Total Marks: -		**70**

BOARD THEORY
PAPER PATTERN
FOR WMN (22622)

Q.1		Attempt any FIVE 5*2=10
	a)	Basics of PCS and GSM
	b)	Basics of PCS and GSM
	c)	GPRS and Mobile data communication
	d)	GPRS and Mobile data communication
	e)	Wireless application on protocol and 3G mobile services
	f)	WLL signal encoding technique and spread spectrum modulation
	g)	Mobile Ad-hoc networks and wireless sensor networks
Q.2		Attempt any THREE 3*4=12
	a)	Basics of PCS and GSM
	b)	GPRS and Mobile data communication
	c)	Wireless application on protocol and 3G mobile services
	d)	WLL signal encoding technique and spread spectrum modulation
Q.3		Attempt any THREE 3*4=12
	a)	Basics of PCS and GSM

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	b)	GPRS and Mobile data communication
	c)	Wireless application on protocol and 3G mobile services
	d)	WLL signal encoding technique and spread spectrum modulation
	e)	Mobile Ad-hoc networks and wireless sensor networks
Q.4		**Attempt any TWO 2*6=12**
	a)	Basics of PCS and GSM
	b)	Wireless application on protocol and 3G mobile services
	c)	Mobile Ad-hoc networks and wireless sensor networks
Q.5		**Attempt any TWO 2*6=12**
	a)	WLL signal encoding technique and spread spectrum modulation
	b)	GPRS and Mobile data communication
	c)	Mobile Ad-hoc networks and wireless sensor networks
Q.6		**Attempt any TWO 2*6=12**
	a)	Basics of PCS and GSM
	b)	Wireless application on protocol and 3G mobile services
	c)	Mobile Ad-hoc networks and wireless sensor networks

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CLASS TEST - I

PAPER PATTERN

COURSE: -Wireless and mobile network (22622)

PROGRAMME: -Information technology

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
1	**Basics of PCS and GSM**	**CO-622.01**
2	**GPRS and Mobile data communication**	**CO-622.02**
3	**Wireless application on protocol and 3G mobile services**	**CO-622.03**

		Course Outcome (CO)
Q.1	**Attempt any FOUR4*2=8Marks**	
a)	Basics of PCS and GSM	CO-622.1
b)	Basics of PCS and GSM	CO-622.1
c)	GPRS And Mobile data communication	CO-622.2
d)	GPRS And Mobile data communication	CO-622.2
e)	Wireless application protocol and 3G mobile services	CO-622.3
f)	Wireless application protocol and 3G mobile services	CO-622.3
Q.2	**Attempt any THREE3*4=12 Marks**	
a)	Basics of PCS and GSM	CO-622.1
b)	GPRS And Mobile data communication	CO-622.2
c)	Wireless application protocol and 3G mobile services	CO-622.3

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CLASS TEST - II

PAPER PATTERN

COURSE: -Wireless and mobile network (22622)

PROGRAMME: -Information technology

Unit No.	Name of the Unit	Course Outcome (CO)
3	Wireless application protocol and 3G mobile services	CO-622.03
4	WLL signal Encoding techniques and spread spectrum modulation	CO-622.04
5	Mobile Ad-hoc networks and wireless sensor networks	CO-622.05

		Course Outcome (CO)
Q.1	**Attempt any FOUR** 4*2=8Marks	
a)	Wireless application protocol and 3G mobile services	(CO-622.3)
b)	WLL signal Encoding techniques and spread spectrum modulation	(CO-622.4)
c)	WLL signal Encoding techniques and spread spectrum modulation	(CO-622.4)
d)	Mobile Ad-hoc networks and wireless sensor networks	(CO-622.5)
e)	Mobile Ad-hoc networks and wireless sensor networks	(CO-622.5)
f)	Mobile Ad-hoc networks and wireless sensor networks	(CO-622.5)
Q.2	**Attempt any THREE** 3*4=12 Marks	
a)	Wireless application protocol and 3G mobile services	(CO-622.3)
b)	WLL signal Encoding techniques and spread spectrum modulation	(CO-622.4)
c)	Mobile Ad-hoc networks and wireless sensor networks	(CO-622.5)

COURSE OUTCOME
(CO)

COURSE: -Wireless and mobile network (22622)

PROGRAMME: -Information technology

CO.NO.	Course Outcome
CO-622.01	Select cellular mobile system standard.
CO-622.02	Maintain Wireless network technologies.
CO-622.03	Maintain wireless mobile application.
CO-622.04	Interpret the components of WLL application.
CO-622.05	Maintain ad hoc and sensor networks.

1. Basics of PCS and GSM

Position in Question Paper   **Total Marks-12**

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

Descriptive Question

1. Explain the concept of PCS.
2. Describe the architecture of GSM.
3. Explain the different services of GSM.
4. Explain the features of GSM.
5. Give the specification of GSM
6. State and explain GSM channel types.
7. Explain the frame structure of GSM.
8. Explain the signal processing in GSM.
9. Define roaming.
10. Explain the teleservices of GSM.
11. Explain GSM frequency band allocation.
12. Explain the security services of GSM.
13. List out the specification of GSM.
14. Which are the different types of areas in GSM.
15. Explain international call setup in GSM.
16. Explain mobility management in GSM.
17. List out different identifier used in GSM.

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MCQ Question

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

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

1. Which of the following is the world's first cellular system to specify digital modulation and network level architecture?
   a) GSM
   b) AMPS
   c) CDMA
   d) IS-54

2. Previously in 1980s, GSM stands for _____
   a) Global system for mobile
   b) Group special mobile
   c) Global special mobile
   d) Group system mobile

3. Who sets the standards of GSM?
   a)ITU
   b) AT & T
   c) ETSI
   d) USDC

4. Which of the following does not come under the teleservices of GSM?
   a)Standard mobile telephony
   b) Mobile originated traffic
   c) Base originated traffic
   d) Packet switched traffic

5. Which of the following comes under supplementary ISDN services?
   a)Emergency calling
   b) Packet switched protocols
   c) Call diversion
   d) Standard mobile telephony

6. Which of the following memory device stores information such as subscriber's identification number in GSM?
   a) Register
   b) Flip flop
   c) SIM
   d) SMS

7. Which of the following feature makes impossible to eavesdrop on GSM radio transmission?
   a)SIM
   b) On the air privacy
   c) SMS
   d) Packet switched traffic

8. Which of the following does not come under subsystem of GSM architecture?
   a)BSS
   b) NSS
   c) OSS
   d) Channel

9. Which of the following subsystem provides radio transmission between mobile station and MSC?
   a) BSS
   b) **NSS**

c) OSS   d) BSC

10. _____ manages the switching function in GSM.

    a)BSS   c) OSS

    b) NSS   d) MSC

11. _____ supports the operation and maintenance of GSM.

    a) BSS   **c) OSS**

    b) NSS   d) MSC

12. Paging system uses which mode of transmission?

    a) Full duplex   c) Half Duplex

    b) Simplex   d) Duplex

13. The information sent by paging system is known as a _____

    a) Note   **c) Message**

    b) Line   d) Page

14. Which type of message cannot be sent with the help of paging system?

    a) Alphanumeric message   c) Voice message

    b) Video message   d) Numeric message

15. What is a paging access number?

    a) An e mail id   c) A toll free telephone number

    b) A username   **d) A registration number**

16. Which type of transmission technique is employed by paging system?

    a) Simulating   c) Uncasing

    b) Multicasting   d) Hybrid

17. Which of the following is not the property of paging system?

    a) Asymmetric communication   c) High cost

    b) Light weight   **d) Wide area coverage**

18. Which of the following properties describes the transmitters and receivers in paging system?

    a) High complexity and high power transmitter, high complexity and high power receivers

    b) Low complexity and low power transmitter, low complexity and low power receivers

    c) Low complexity and low power transmitter, high complexity and high power receivers

    d) High complexity and high power transmitter, low complexity and low power receivers

19. What is a pager in the paging system?

a) A transmitter   **c) A transceiver**

b) A receiver   d) An equalizer

20. Who introduced the paging system for the first time?

a) Al Gross   **c) Alexander Graham Bell**

b) Teri Pall   d) Martin Cooper

21. Which of the following is not a characteristic of cellular telephone system?

a) Accommodate a large number of users

b) Large geographic area

c) Limited frequency spectrum

d) Large frequency spectrum

22. What is the responsibility of MSC in cellular telephone system?

a) Connection of mobile to base stations

b) Connection of mobile to PSTN

c) Connection of base station to PSTN

d) Connection of base station to MSC

23. Who has the responsibility of billing and system maintenance function in cellular system?

a) Base Station   **c) MSC**

b) PSTN   d) Mobile system

24. What is the function of FVC (Forward Voice Channel)?

a) Voice transmission from base station to mobiles

b) Voice transmission from mobile to base station

c) Initiating mobile calls

d) Broadcast all traffic request for all mobile

25. Which two channels are responsible for initiating mobile calls?

a) FVC and FCC   **c) FCC and RCC**

b) FVC and RVC   d) FCC and RVC

26. Of the total channels present in the cellular system, what is the percentage of voice and control channels?

a) 95% voice channels, 5% control channels

b) 5% voice channels, 95% control channels

c) 50% voice channels, 50% control channels

d) 25% voice channels, 75% control channels

27. What is MIN?

a) Subscriber's telephone number

b) Paging message

c) Traffic request number

d) Mobile Internet

28. What is transmitted along with the call initiation request during the origin of call by a mobile?

a) MIN

b) ESN

c) ESN and SCM

d) **MIN, ESN and SCM**

29. What does SCM indicates?

a) Maximum receiver power level for a particular user

b) Maximum transmitter power level for a particular user

c) Minimum receiver power level for a particular user

d) Minimum transmitter power level for a particular user

30. What is the shape of the cell present in the cellular system?

a) Circular

b) Square

c) Hexagonal

d) Triangular

31. Why the size of the cell is kept small in cellular network?

a) Increase capacity

b) Decrease capacity

c) Increased size of base station electronics

d) Slow process of handoffs

32. What is handoff?

a) Forward channel

b) Switching technique

c) Roamer

d) Guard channel

33. Which one is not an advantage of using frequency reuse?

a) Increased capacity

b) Limited spectrum is required

c) Same spectrum may be allocated to other network

d) Number of base stations is reduced

34. The process of transferring a mobile station from one base station to another is _____

a) MSC

b) Roamer

c) Handoff

d) Forward channel

35. The interference between the neighboring base stations is avoided by _____

a) Assigning different group of channels

b) Using transmitters with different power level

c) Using different antennas

d) Using different base stations

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36. Which one is not an advantage of using frequency reuse?
    a) Increased capacity
    b) Limited spectrum is required
    c) Same spectrum may be allocated to other network
    d) Number of base stations is reduced

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2. GPRS And Mobile data communication

Position in Question Paper   **Total Marks-12**

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

Descriptive Question

1. Explain the architecture of GPRS.
2. Describe the GPRS protocol stack.
3. Explain the different characteristic of GPRS.
4. State the advantages, disadvantages and application of GPRS.
5. Give the logical channels in GPRS.
6. Compare GSM And GPRS.
7. Explain WLAN in detail.
8. Explain the block diagram of RFID.
9. Explain IEEE 802.11.
10. Explain Bluetooth technology.
11. Explain the concept of Wi-Max.
12. Explain Wi-fi.
13. Write a note on Mobile IP.
14. Which are the different operation principle of Mobile IP.
15. Explain home and foreign agent.

MCQ Question

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

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

1. GPRS stands for?
   a) General Packet Repair Service
   b) General Packet Radio Service
   c) Graphics Packet Radio Service
   d) None

2. What is the data rate or speed offered by a GPRS connection?
   a) 56-115kbps
   b) 9-256kbps
   c) 64-128kbps
   d) None

3. GPRS services belong to which generation?
   a) 1G
   b) 2G
   c) 3G
   d) 4G

4. Choose a correct abbreviation below.
   a) SGSN - Serving GPRS Support Node
   b) GGSN - Gateway GPRS Support Node
   c) IP - Internet Protocol
   d) All

5. Choose a correct Abbreviation below.
   a) PCU - Packet Control Unit
   b) CG - Charging Gateway
   c) BG - Border Gateway
   d) All

6. Choose a correct Abbreviation below.
   a) PCU - Packet Control Unit
   b) CCU - Channel Codec Unit
   c) GTP - GPRS Tunneling Protocol
   d) All

7. GPRS is a Connection Oriented service. True/False?
   a) False
   b) True

8. GPRS uses which unused channels for transportation of Data in general?
   a) SDCCH
   b) BCCH
   c) TCH
   d) SCH

9. Type-A Mobile Station supports _____.
   a) Only Speech
   b) Only Data
   c) Speech and Data Simultaneously
   d) Speech or Data one at a time.

10. Type-B Mobile Station supports _____.
    a) Speech only
    b) GPRS only
    c) GPRS or Speech One at a time
    d) GPRS and Speech simultaneously

11. Type-C Mobile Station supports _____.
    a) Speech only
    b) Data only

   c) Speech and Data simultaneously   d) Speech or Data automatically

12. What is the abbreviation of EDGE?
   a) Enhanced Digital Generation Gap
   b) Enhanced Data rate for GSM Evolution
   c) Encryption Data rate for GSM Evolution
   d) None

13. What is the maximum speed offered by an EDGE connection?
   a) 64kbps   c) 256kbps
   b) 128kbps   **d) 236 kbps**

14. An EDGE connection is _____?
   a) CS data   **c) CS and PS data**
   b) PS data   d) None

15. A PCU separates Packet Switched and Circuit Switched traffic and passes PSD to _____?
   a) MSS   c) GGSN
   b) SGSN   d) None

16. In a GPRS network, SGSN is the equivalent of _____ system in GSM.
   a) BSC   c) VLR
   b) MSC   d) GMSC

17. What are the functions of a CCU?
   a) Power Control   c) Coding algorithms
   b) Timing Advance   **d) All**

18. GPRS Roaming from one SGSN to another SGSN is offered by ?
   a) GMSC   c) HLR
   b) GGSN   d) VLR

19. Which is the system in GPRS that connects to External Networks using GTP?
   a) SGSN   **c) GGSN**
   b) HLR   d) GMSC

20. What are the functions of SGSN in a GPRS Architecture?
   a) Authentication, Authorization, Ciphering
   b) GTP tunneling to GGSN, Charging (Billing), Session management
   c) Mobility manage, interaction with HLR, MSC/VLR, NMS interface
   d) All

21. What are the functions of GGSN of a GPRS network?
   a) Charging (Billing), Filter user traffic
   b) Routing mobile originated traffic, GTP Tunneling to SGSN
   c) Interface external networks
   d) All

22. A DNS (Domain Name Server) converts Host Name or Website name to _____?
   a) Packets   **c) IP address**
   b) Bytes   d) None

23. A BG(Border Gateway) connects to _____ using Tunneling.
   a) Same operator's GPRS network
   b) Different operator's GPRS network
   c) Same or different operator GPRS N/W
   d) None

24. Which system in a GPRS architecture collects all Charging (Billing) records for final processing?
   a) SGSN
   b) GGSN
   c) **CH (Charging Gateway)**
   d) None

25. A GPRS network contains Firewalls to _____?
   a) Hack phones
   b) Intercept phones
   c) **Protection from Virus**
   d) None

26. An LIG(Legal Interception Gateway) in a GPRS network provides _____ .
   a) Parallel access to law agencies
   b) Eavesdrop user sessions
   c) Sample packets to get information
   d) **All**

27. A GPRS Network is a part of ____ in GSM network.
   a) BTS
   b) BSS
   c) **NSS**
   d) VLR

28. Which is the organization providing standards for GPRS network?
   a) ANSI
   b) ETSI
   c) **3GPP**
   d) UMTS

29. Which is the main protocol that transfers packets in a GPRS Core network?
   a) GTP
   b) SSTP
   c) SCTP
   d) None

30. A GPRS Network works same in _____.
   a) 2G
   b) 3G
   c) **2G and /or 3G**
   d) 4G

31. What is the interface between BSC and SGSN in a GPRS Network Structure?
   a) Ga
   b) Gb
   c) Gc
   d) Gd

32. What is the interface betalen SGSN and GGSN in a GPRS network?
   a) Gs
   b) Gn
   c) Ga
   d) Gb

33. What is the interface between GGSN and Inter-PLMN GPRS network?
   a) Ga
   b) Gs
   c) Gi
   d) Gp

34. What is the interface between GGSN and External Packet Network(Internet) in a GPRS structure?
   a) Gs
   b) Gn
   c) **Gi**
   d) Gp

35. What is the interface between SGSN and MSC/VLR in a GPRS network?
   a) Gs   c) Ga
   b) Gn   d) Gb

36. What is the interface between SGSN and HLR in a GPRS network structure?
   a) Gs   **c) Gr**
   b) Gn   d) Gf

37. What is the interface between SGSN and EIR in a GPRS network?
   a) Gr   c) Gd
   b) Gf   d) Ga

38. What is the interface between SGSN and SMS-GMSC in a GPRS network?
   a) Gf   **c) Gd**
   b) Gr   d) Gs

3. Wireless application on protocol and 3G mobile services

Position in Question Paper   **Total Marks-20**

   Q.1. a) 2-Marks.
   Q.1. b) 2-Marks.
   Q.3. d) 4-Marks.
   Q.5. d) 6-Marks.
   Q.6. d) 6-Marks.

Descriptive Question

1. Explain mobile internet standard.
2. Describe the WAP protocol.
3. Explain the WAP gateway.
4. Explain WAP protocols .
5. Explain WML in detail.
6. Write a note on IMT 2000.
7. Explain specification in IMT 2000.
8. Explain the W-CDMA.
9. Explain CDMA 2000.
10. Explain Quality services in 3G network.
11. Explain the features of UMTS technology.
12. Draw the UMTS spectrum.
13. Explain the UMTS architecture.
14. Which are the different advantages and disadvantages of UMTS.
15. Explain the features of 4G technology.
16. Explain the features of 4G LTE.
17. Explain the features of VoLTE technology.
18. Explain the features of 4.5G technology.
19. Explain the features of 5G technology.
20. Draw 4G architecture and state its applications.

MCQ Question

(Total number of Question=Marks*3=20*3=60)

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

1. Which of the following multiple access techniques are used by second generation cellular systems?
   a) FDMA/FDD and TDMA/FDD
   b) TDMA/FDD and CDMA/FDD
   c) FDMA/FDD and CDMA/FDD
   d) FDMA/FDD only

2. Which one is not a TDMA standard of second generation networks?
   a) GSM
   b) IS-136
   c) AMPS
   d) PDC

3. Which of the following is a CDMA standard of second generation network?
   a) IS-95
   b) IS-136
   c) ETACS
   d) EDGE

4. How many users or voice channels are supported for each 200 KHz channel in GSM?
   a) Eight
   b) Three
   c) Sixty four
   d) Twelve

5. How many voice channels are supported for each 30 KHz radio channel in IS-136?
   a) Eight
   b) Thirty
   c) Three
   d) Sixteen

6. How many users are supported in IS-95 for each 1.25 MHz?
   a) Eight
   b) Sixty four
   c) Sixteen
   d) Twenty five

7. Which modulation technique is used by GSM?
   a) GMSK
   b) BPSK
   c) QPSK
   d) GFSK

8. IS-95 uses which modulation technique?
   a) GMSK
   b) BPSK
   c) QAM
   d) AFSK

9. IS-136 uses which modulation technique?
   a) π/4 DQPSK
   b) BPSK
   c) GMSK
   d) AFSK

10. Which is one of the disadvantages of 2G standards?
    a) Short Messaging Service (SMS)
    b) Digital modulation
    c) Limited capacity
    d) Limited Internet Browsing

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11. GSM (Global System for Mobile) was earlier also known as _____
    a) Group System Mobile **c) Group Special Mobile**
    b) Global Special Meaning d) Global Special Mobile

12. 2G CDMA standard, IS-95, was proposed by which company?
    a) Nippon Telephone and Telegraph (NTT) c) Bellcore and Motorola
    d) AT&T Bell Laboratories
    b) Qualcomm

13. Which one of the following 2G standard is used in Japan?
    a) IS-136 **c) PDC**
    b) GSM d) AMPS

14. The 2G GSM technology uses a carrier separation of _____
    a) 1.25 MHz c) 30 KHz
    b) 200 KHz d) 300 KHz

15. Which of the following is not a characteristic of 3G network?
    a) Communication over VoIP c) Multi-megabit Internet access
    b) Unparalleled network capacity **d) LTE based network**

16. 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

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

18. 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

19. What is 3GPP?
    a) Project based on W-CDMA c) Project based on 2G standards
    b) Project based on cdma2000 d) Project based on 2.5G standards

20. What is 3GPP2?
    a) Project based on W-CDMA c) Project based on 2G standards
    b) Project based on cdma2000 d) Project based on 2.5G standards

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

22. Which of the following 3G standard is used in Japan?

a) Cdma2000

c) UMTS

b) TD-SCDMA

d) UTRA

23. What does the number 2000 in IMT-2000 signifies?

a) Year

c) Number of cells

b) Number of subscribers per cell

d) Area (Km)

24. Which of the following is not an application of third generation network?

a) Global Positioning System (GPS)

c) Mobile TV

b) Video conferencing

d) Downloading rate upto 1 Gbps

25. What is the full form of UMTS?

a) Universal Mobile Telephone System

c) Ubiquitous Mobile Telemetry System

b) Ubiquitous Mobile Telephone System

d) Universal Machine Telemedicine System

26. UMTS use which multiple access technique?

a) CDMA

c) FDMA

b) TDMA

d) SDMA

27. UMTS does not has backward compatibility with _____

a) GSM

c) IS-95

b) IS-136

d) GPRS

28. UMTS is also known as _____

a) IS-95

c) CdmaOne

b) GPRS

d) W-CDMA

29. What is the chip rate of W-CDMA?

a) 1.2288 Mcps

c) 270.833 Ksps

b) 3.84 Mcps

d) 100 Mcps

30. W-CDMA works in FDD mode only.

a) True

b) false

31. How much packet data rate per user is supported by W-CDMA if the user is stationary?

a) 2.048 Kbps

c) 2.048 Mbps

b) 100 Mbps

d) 1 Gbps

32. What is the minimum spectrum allocation required by W-CDMA?

a) 5 MHz

c) 1.25 MHz

b) 20MHz

d) 200 KHz

33. W-CDMA requires a complete change of RF equipment at each base station.

a) True

b)False

34. How much increase in spectral efficiency is provided by W-CDMA in comparison to GSM?
    a) Two times
    b) Three times
    c) No increase
    d) Six times

35. Which of the following has no backward compatibility with 3G Cdma2000?
    a) IS-95
    b) GPRS
    c) IS-95A
    d) IS-95B

36. 2G and 2.5G CDMA operators may selectively introduce 3G capabilities at each cell without changing entire base stations and reallocate spectrums.
    a) True
    b) false

37. Which of the following the first 3G CDMA air interface?
    a) IS-95
    b) IS-95B
    c) Cdma2000 1xRTT
    d) CdmaOne

38. Within ITU IMT-2000 body, Cdma2000 1xRTT is also known as _____
    a) Cdma2000 1xEV-DO
    b) Cdma2000 1xEV-DV
    c) IS-95B
    d) G3G-MC-CDMA-1X

39. How many users are supported by Cdma2000 1X in comparison to 2G CDMA standard?
    a) Half
    b) Twice
    c) Six times
    d) Ten times

40. Cdma2000 works in TDD mode only.
    a) True
    b) false

41. Which of the following is not a characteristic of Cdma2000?
    a) Adaptable baseband signalling rates
    b) Adaptable baseband chipping
    c) Multicarrier technologies
    d) OFDMA

42. Cdma2000 1xEV was developed by _____
    a) Motorola
    b) AT&T Laboratories
    c) Qualcomm
    d) NTT

43. How is bandwidth increased in Cdma2000?
    a) Clubbing adjacent radio channels
    b) Changing the hardware of base stations
    c) Change of spectrum
    d) Change of RF equipment

44. What are the two options provided by Cdma2000 1xEV?
    a) Cdma2000 1xRTT. Cdma2000 3xRTT
    b) Cdma2000 1xEV-DO, Cdma2000 1xEV-DV

    c) Cdma2000 1xEV-DT, Cdma2000 1xEV-DO

    d) Cdma2000 1xRTT, Cdma2000 1xEV-DV

45. Which of the following is not backward compatible with Cdma2000?

    a) Cdma2000 1xRTT   **c) Cdma2000 1xEV-DO**

    b) Cdma2000 3xRTT   d) Cdma2000 1xEV-DT

46. 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

47. WLANs use high power levels and generally require a license for spectrum use.

    a) True   **b) false**

48. 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

49. 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

50. Which of the following is not a standard of WLAN?

    a) HIPER-LAN   c) IEEE 802.11b

    b) HIPERLAN/2   **d) AMPS**

51. 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**

52. 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

53. 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

54. 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**

55. What is the data rate of HomeRF 2.0?

    a) 10 Mbps   c) 200 Mbps

    b) 54 Mbps   d) 1 Mbps

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56. 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

57. 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

58. 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**

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

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

61. Which of the following is not an open standard?
    a) Bluetooth   c) HTML
    b) WWW   **d) VPN**

62. What is the nominal range of Bluetooth?
    a) 1 Km   c) 1 m
    b) 10 m   d) 10 Km

63. Bluetooth standard is named after _____
    a) King Ronaldo Bluetooth   **c) King Herald Bluetooth**
    b) Pope Vincent Bluetooth   d) Pope Francis Bluetooth

64. Bluetooth operates in which band?
    a) Ka Band   c) Ku Band
    b) L Band   **d) 2.4 GHz ISM Band**

65. Which of the following scheme is used by Bluetooth?
    a) Frequency hopping TDD   c) DSSS TDD scheme
    scheme   d) DSSS FDD scheme
    b) Frequency hopping FDD scheme

66. What is the range of time slot in Bluetooth?
   a) 120 milliseconds
   c) 577 microseconds
   b) 625 microseconds
   d) 5.7 seconds

67. Which modulation scheme is used by Bluetooth?
   a) DQPSK
   c) GFSK
   b) MSK
   d) BPSK

68. What is the channel symbol rate in Bluetooth for each user?
   a) 270.833 Kbps
   c) 100 Mbps
   b) 1 Gbps
   d) 1 Mbps

69. What is the raw channel bit error rate of Bluetooth?
   a) 10^{-3}
   c) 10^{3}
   b) 10^{-10}
   d) 10^{-1}

70. Which of the following standard committee specifies Bluetooth and other Personal Area Networks (PAN)?
   a) IEEE 802.11b
   c) IEEE 802.11g
   b) IEEE 802.15
   d) IEEE 802.16

4. WLL signal encoding technique and spread spectrum modulation

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Position in Question Paper   **Total Marks-10**

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

Descriptive Question

1. Explain bit rate and baud rate.
2. Describe the line code.
3. Explain the disadvantages of RZ code.
4. Explain the requirements of line code.
5. Explain Manchester coding.
6. Write a note on Nyquist rate and its interval.
7. Explain Quantizing noise.
8. Explain the application of PCM signal.
9. Explain granular noise.
10. Explain the information transmission in PCM system.
11. Explain the quantization error and maximum value.
12. How to reduce quantization errors.
13. Draw and explain the block diagram of PCM signal .
14. Which are the different advantages and disadvantages of PCM.
15. Explain the expression of modulation index.
16. Explain CW modulation system.
17. Explain ASK mathematically.
18. Explain the concept of BASK.
19. Explain the concept of BFSK.
20. Explain the classification of AM modulation.
21. Compare ASK and FSK.

22. How SS signal is different from normal one .
23. Explain various types of SS system.
24. Explain DS-SS system with diagram.
25. Explain FH-SS system with diagram.
26. Compare DS-SS AND FH-SS.
27. Explain the WLL architecture.
28. State the application of WLL .
29. Explain FWT.
30. Explain WT.
31. Explain the concept of LEC networks
32. Draw 4G architecture and state its applications.

MCQ Question

(Total number of Question=Marks*3=10*3=30)

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

1. The transmission bandwidth of spread spectrum techniques is equal to the minimum required signal bandwidth.
   a) True   **b) False**
2. Why spread spectrum technique is inefficient for a single user?
   a) Large transmission bandwidth   c) Fixed transmission bandwidth
   b) Small transmission bandwidth   d) Fixed null bandwidth
3. 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
4. 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
5. PN sequence can be generated using sequential logic circuits.
   a) True   b) False
6. 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**
7. DSSS system spreads the baseband signal by _____ the baseband pulses with a pseudo noise sequence.
   a) Adding   **c) Multiplying**
   b) Subtracting   d) Dividing
8. Frequency hopping involves a periodic change of transmission _____
   a) Signal   c) Phase
   b) Frequency   d) Amplitude
9. What is the set of possible carrier frequencies in FH-SS?

a) **Hopset**   c) Chips

b) Hop   d) Symbols

10. The bandwidth of the channel used in the hopset is called _____

11. a) Hopping bandwidth   **c) Instantaneous bandwidth**

    b) Total hopping bandwidth   d) 3 dB bandwidth

12. FH systems do not have collisions.

    a) True   **b) False**

13. In fast frequency hopping, hopping rate is less than the information symbol rate.

    a) True   **b) False**

14. Bit error rate provides the information about the type of error.

    a) True   **b) False**

15. Which of the following is specified by a specific number of bit errors occurring in a given transmission?

    a) Bit error rate   **c) Outage event**

    b) Equally likely event   d) Exhaustive events

16. Irreducible BER floor is created in frequency selective channels due to _____

    a) Intersymbol interference   c) Time varying Doppler spread

    b) Random spectral spreading   d) Blind speed

17. Irreducible BER floor is created in non frequency selective channels due to

    _____

    a) Intersymbol interference   **c) Time varying Doppler spread**

    b) Multipath time delay   d) Blind speed

18. The performance of BPSK is best is term of BER because _____

    a) Symbol offset interference does   interference

    not exist   c) No multipath delay

    b) Existence of cross rail   d) Doppler spread

19. High capacity mobile systems are interference limited.

    a) True   b) False

20. Which of the following do not impact bit error rate in mobile communication systems?

    a) Mobile velocity   c) Modulation format

    b) Channel delay spread   **d) Base station**

21. Coherence time refers to _____

    a) Time required attaining a call with the busy base station

    b) Time required for synchronization between the transmitter and the receiver

    c) Minimum time for change in magnitude and phase of the channel

    d) None of the mentioned

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22. Doppler spread refers to _____
   a) Signal fading due to Doppler shift in the channel
   b) Temporary failure of message transfer
   c) Large coherence time of the channel as compared to the delay constraints
   d) All of the mentioned

23. A rake receiver uses multiple _____
   a) Delay circuits   c) Detectors
   b) Correlators   d) Flip flops

24. Which of the following is not used to improve received signal quality over small scale times and distance?
   a) Modulation   c) Diversity
   b) Equalization   d) Channel coding

25. Equalization is used to compensate _____
   a) Peak signal to noise ratio   c) Channel fading
   b) Intersymbol interference   d) Noises present in the signal

26. Training and tracking are the operating modes of _____
   a) Diversity techniques   **c) Equalization techniques**
   b) Channel coding techniques   d) Demodulation techniques

27. An equalizer is said to be converged when it is properly _____
   a) Trained   c) Installed
   b) Tracked   d) Used

28. Time for convergence of an equalizer is not a function of _____
   a) Equalizer algorithm
   b) Equalizer structure
   c) Time rate of change of multipath radio channel
   d) Transmitter characteristics

29. Equalizer is usually implemented in _____
   a) Transmitter   c) Radio channel
   b) Baseband or at IF in a receiver   d) Modulator stage

30. Equalizer is _____ of the channel.
   a) Opposite   **c) Inverse filter**
   b) Same characteristics   d) Add on

31. _____ controls the adaptive algorithm in an equalizer.
   a) Error signal   c) Received signal
   b) Transmitted signal   d) Channel impulse response

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32. The adaptive algorithms in equalizer that do not require training sequence are called _____

    a) Linear adaptive algorithms   c) Non-linear adaptive algorithms

    b) Blind algorithms   d) Spatially adaptive algorithms

33. Which of the following is a blind algorithm?

    a) Linear adaptive algorithms   c) Non-linear adaptive algorithms

    b) Constant modulus algorithm   d) Spatially adaptive algorithms

5. Mobile Ad-hoc networks and wireless sensor networks

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

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

Descriptive Question

   1. Explain the issues and challenges in designing sensor network.
   2. State the characteristic of WSN and requirement mechanisms.
   3. Explain Wireless sensor model.
   4. Explain Wireless sensor network communication model.
   5. Explain WSN characteristic.
   6. Write down advantages and disadvantages of sensor network.
   7. Explain application of Wireless sensor network.
   8. Explain ad-hoc network.
   9. Explain characteristic of ad-hoc network
   10. Explain application of ad-hoc network.
   11. Explain limitation of ad-hoc network.
   12. Compare WSN and ad-hoc .
   13. State the type of controllers .
   14. State the type of sensors.
   15. Explain the power supply of sensor mode.
   16. Define sink and source node.
   17. List and explain types of mobility.
   18. Explain IOT.
   19. Explain the trends in IOT.
   20. Explain characteristics of IOT.
   21. Explain the advantages and disadvantages of IOT.

22. Explain MANET Topologies.
23. Explain Mesh networking.
24. Explain clustering of WSN.
25. Explain energy efficiency in WSN.

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MCQ Question

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

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

1. What is the access point (AP) in a wireless LAN?
   a) device that allows wireless devices to connect to a wired network
   b) wireless devices itself
   c) both device that allows wireless devices to connect to a wired network and wireless devices itself
   d) all the nodes in the network

2. In wireless ad-hoc network _____
   a) access point is not required   c) nodes are not required
   b) access point is must   d) all nodes are access points

3. Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?
   a) CDMA   c) ALOHA
   b) CSMA/CA   d) CSMA/CD

4. In wireless distribution system _____
   a) multiple access point are inter-connected with each other
   b) there is no access point
   c) only one access point exists
   d) access points are not required

5. A wireless network interface controller can work in _____
   a) infrastructure mode
   b) ad-hoc mode
   c) both infrastructure mode and ad-hoc mode
   d) WDS mode

6. In wireless network an extended service set is a set of _____
   a) connected basic service sets   c) all access points
   b) all stations   d) connected access points

7. Mostly _____ is used in wireless LAN.
   a) time division multiplexing
   b) orthogonal frequency division multiplexing
   c) space division multiplexing
   d) channel division multiplexing

8. Which one of the following event is not possible in wireless LAN?

a) collision detection   c) multi-mode data transmission

b) acknowledgement of data frames   d) connection to wired networks

9. What is Wired Equivalent Privacy (WEP)?

   a) security algorithm for ethernet

   b) security algorithm for wireless networks

   c) security algorithm for usb communication

   d) security algorithm for emails

10. What is WPA?

   a) wi-fi protected access   c) wired process access

   b) wired protected access   d) wi-fi process access

11. _____ is responsible for tunneling multicast packets to the MS's currently subscribed FA.

   a) Multicast home agent   c) Mobile station

   b) Mobile multicast   d) Base station

12. _____ provides a fast and efficient handoff for MSs in foreign networks.

   a) MHA   c) CBT

   b) MMP   d) MS

13. MMP combines the concepts of _____ and _____

   a) Mobile IPs, GSM   **c) Mobile IPs, core based trees**

   b) Core based trees, GSM   d) Core based trees, LTE

14. _____ designed for an Internet work environment with small wireless cells.

   a) MMP   c) RM2

   b) RMDP   **d) Mobicast**

15. _____ serve as multicast forwarding agents and are meant to isolate the mobility of the mobile host from the main multicast delivery tree.

   a) DFA   c) FA

   b) MHA   d) MMP

16. Mobicast is based on a method proposed by the IETF to support multicast over Mobile-IP.

   a) True   b) False

17. _____ is meant to be implemented for use on the MBONE.

   a) MMP   **c) RM2**

   b) RMDP   d) Mobicast

18. _____ is a reliable multicast protocol and is used for both wired and wireless environments.

a) MMP
c) RM2

b) RMDP
d) Mobicast

19. _____ relies on IGMP.

a) MMP
c) RM2

b) RMDP
d) Mobicast

20. A helical antenna is used for satellite tracking because of _____

a) Circular polarization
c) Beamwidth

b) Maneuverability
d) Gain

21. Repeaters inside communications satellites are known as _____

a) Transceivers
c) Transducers

b) Transponders
d) TWT

22. The mechanism behind electromagnetic wave propagation cannot be attributed to _____

a) Reflection
c) Scattering

b) Diffraction
d) Sectoring

23. The propagation model that estimates radio coverage of a transmitter is called _____

a) Large scale propagation model
c) Fading model

b) Small scale propagation model
d) Okumura model

24. Propagation model that characterize rapid fluctuation is called _____

a) Hata model
c) Large scale propagation model

b) Fading model
d) Okumura model

25. Free space propagation model is to predict _____

a) **Received signal strength**
c) Gain of transmitter

b) Transmitted power
d) Gain of receiver

26. US cellular standard CDPD stands for _____

a) Cellular Digital Packet Data
c) Cellular Digital Pocket Data

b) Cellular Digital Packet Data
d) Cellular Discrete Pocket Data

27. What type of handovers is supported by LTE?

a) Hard handover only
c) Hard and soft handover

b) Soft handover only
d) Hard, soft and softest handover

28. _____ allows us to control electronic components

a) RETful API
c) HTTP

b) RESTful API
d) MQTT

29. MQTT stands for _____

a) MQ Telemetry Things   c) MQ Transport Things

b) MQ Transport Telemetry   **d) MQ Telemetry Transport**

30. MQTT is _____ protocol.

    a) Machine to Machine

    b) Internet of Things

    c) Machine to Machine and Internet of Things

    d) Machine Things

31. Which protocol is lightweight?

    a) MQTT   c) CoAP

    b) HTTP   d) SPI

32. PubNub publishes and subscribes _____ in order to send and receive messages.

    a) Network   c) Portal

    b) Account   **d) Keys**

33. By clicking which key the PubNub will display public, subscribe, and secret keys.

    a) Pane   c) Portal

    b) Demo Keyset   d) Network

34. The messageChannel class declares the _____ class attribute that defines the key string.

    a) command_key   c) commandkey

    b) command-key   d) Key_command

35. _____ method saves the received arguments in three attributes.

    a) __Init   **c) __Init__**

    b) Init__   d) _init_

36. Physical or logical arrangement of network is _____

    a) Topology   c) Networking

    b) Routing   d) Control

37. Which network topology requires a central controller or hub?

    a) Star   c) Ring

    b) Mesh   d) Bus

38. _____ topology requires a multipoint connection.

    a) Star   c) Ring

    b) Mesh   **d) Bus**

39. Data communication system spanning states, countries, or the whole world is _____

    a) LAN   c) MAN

    b) WAN   d) PAN

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40. WAN stands for _____
    a) World area network   c) Web area network
    b) Wide area network   d) Web access network

41. In TDM, slots are further divided into _____
    a) Seconds   c) Packets
    b) Frames   d) Bits

42. _____ is the multiplexing technique that shifts each signal to a different carrier frequency.
    a) FDM   c) Both FDM & TDM
    b) TDM   d) PDM

43. Which of this is not a constituent of residential telephone line?
    a) A high-speed downstream channel
    b) A medium-speed downstream channel
    c) A low-speed downstream channel
    d) An ultra-high speed downstream channel

44. DSL telcos provide which of the following services?
    a) Wired phone access   **c) Wired phone access and ISP**
    b) ISP   d) Network routing and ISP

45. The function of DSLAM is to _____
    a) Convert analog signals into digital signals
    b) Convert digital signals into analog signals
    c) Amplify digital signals
    d) De-amplify digital signals

46. HFC contains _____
    a) Fibre cable
    b) Coaxial cable
    c) A combination of Fibre cable and Coaxial cable
    d) Twisted Pair Cable

47. WiMAX stands for _____
    a) wireless maximum communication
    b) worldwide interoperability for microwave access
    c) worldwide international standard for microwave access
    d) wireless internet maximum communication

48. WiMAX uses the _____
    a) orthogonal frequency division multiplexing
    b) time division multiplexing

    c) space division multiplexing

    d) channel division multiplexing

49. Which of the following modulation schemes is supported by WiMAX?

    a) binary phase shift keying modulation

    b) quadrature phase shift keying modulation

    c) quadrature amplitude modulation

    d) all of the mentioned

50. WiMAX MAC layer provides an interface between _____

    a) higher transport layers and physical layer

    b) application layer and network layer

    c) data link layer and network layer

    d) session layer and application layer