

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	: COMMUNICATION AND COMPUTER NETWORKS	Course Code	: 15EE43T
Semester	: IV	Course Group	: Core
Teaching Scheme (L:T:P)	: 4:0:0(in Hours)	Credits	: 4 Credits
Type of course	: Lecture + Assignments	Total Contact Hours	: 52
CIE	: 25 Marks	SEE	: 100 Marks

Pre-requisites :Analog electronics, digital electronics theory and labs, BCS working knowledge.

Course Objectives :To understand the concept of analog communication, data communication, satellite communication, mobile communication and the basic concept of computer networks.

Course Topics:

Unit No	Unit Name	Hours
1	Radio Communication	14
2	Fiber Optic Communication	5
3	Microwave Techniques	6
4	Satellite Communication	8
5	Mobile and Data Communication	12
6	Basics of Computer Networks	7
	Total	52

Course Outcomes:

On successful completion of the course, the students will be able to,

1. Understand different components of radio communication.
2. Explain fiber optic communication system.
3. Understand microwaves concept and techniques.
4. Explain the importance of satellite communication system.
5. Understand mobile and data communication.
6. Explain basic concepts of computer network.

Composition of Educational Components

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 145)
1	Remembering	20	30
2	Understanding	45	65
3	Application/ Analysis	35	50
Total		100	145

Course Outcome linkage to Cognitive Level

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Understand different components of radio communication.	<i>R/U/A</i>	2, 10	14
CO2	Explain fiber optic communication system.	<i>U/A</i>	2,10	5
CO3	Understand microwaves concept and techniques.	<i>R/U</i>	2,10	6
CO4	Explain the importance of satellite communication system.	<i>U/A</i>	2,10	8
CO5	Understand mobile and data communication.	<i>R/U/A</i>	2, 5, 10	12
CO6	Explain basic concepts of computer network.	<i>R/U/A</i>	2, 5, 10	7
		Total sessions		52

Course Content and Blue Print of Marks for SEE:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for (5marks) PART - A			Questions to be set for (10marks) PART - B			Marks weightage (%)
				R	U	A	R	U	A	
1	Radio Communication	14	40	1	1		1	1	1	28
2	Fiber Optic Communication	05	15		1				1	10
3	Microwave Techniques	06	15	1				1		10
4	Satellite Communication	08	25		1	1		0.5	1	17
5	Mobile and Data Communication	12	30	1	1			1	1	21
6	Basics of Computer Networks	07	20	1				1	0.5	14
Total		52	145	9 (45 Marks)			10 (100 Marks)			100

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Communication and Computer Networks	-	3	-	-	2	-	-	-	-	3

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
 IF $\geq 40\%$ OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
 IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
 IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Contents:

Unit 1

14hrs

Radio Communication:

Communication Basics: Communication, Elements of communication system - block diagram, explanation, Forms -audio, video and data, Types-simplex, half duplex, full duplex, analog signals, digital signals, baseband transmission, modulation, carrier. Modulation methods -AM, FM, PM.

Electromagnetic spectrum: Relationship between frequency (f) and wavelength (λ), Need for modulation, Electromagnetic spectrum-major segments, Bandwidth – definition as applied to radio communication, illustration .

Modulation and demodulation circuits: -Diode amplitude modulator-circuit, explanation, Demodulation-definition, AM Diode detector-circuit, explanation.

Radio transmitter and Receiver-Transmitter-definition, functions, Atypical FM transmitter using indirect FM with phase modulator - circuit, explanation, Receiver - Super heterodyne receiver- block diagram, working.

Multiplexing: Definition, Concept, FDM- definition, FDM - block diagram(transmitting end), explanation, FDM- block diagram (receiving end), explanation, TDM-definition, basic concept.

Transmission line and Radio wave propagation:

Transmission lines–types, Co-axial cable-construction, characteristic impedance, characteristic impedance of co-axial cable, Standing Waves, Standing wave ratio, importance of SWR.

Radio wave propagation: ground wave, sky wave, space wave.

Unit 2

05Hrs

Fiber Optic Communication:

Basic elements of fiber-optic communication system- diagram, explanation, Applications of fiber optic cables, Benefits of fiber optic cables over conventional electric cables, Light rays in a fiber optic cable, Basic construction of fiber optic cable – diagram, explanation, Mode-definition, classification based on mode, Single mode-definition, Multimode-definition, ILD optical transmitter - circuit, working, Photodiode optical receiver- circuit, working.

Unit 3

06 Hrs

Microwave Techniques:

Concept of microwave communication, Advantages of Microwave, Problems faced in microwave communication, Wave guides - construction, working, cutoff frequency, wave paths in a waveguide at different frequencies, Cavity resonators – types, construction, working, applications, Microwave semiconductors –problems faced by conventional semiconductor components and their remedies, Microwave tubes –types, their applications, Two cavity klystron amplifier - construction, working, Microwave antennas - Horn antenna - diagram, working, Parabolic antenna -diagram, working.

Unit 4

08Hrs

Satellite Communication:

Concept of Satellite Communication system, Satellite orbits- geo synchronous orbit, Transponder- block diagram, working, Satellite sub system- block diagram, explanation of each block, Satellite Earth Station- block diagram, explanation of each block, Applications of satellite communication.

GPS - GPS architecture, GPS receiver, Differential GPS –diagram, explanation, Applications of GPS, GIS –concept, applications.

(GPS- Reference 2 Page 483-488)

Unit 5

12Hrs

Mobile and Data Communication:

Mobile communication - Multicell system, frequency reuse, Salient features of GSM, GSM services, GSM system architecture - block diagram, working of each part, GSM network area –definitions- cell, location area, MSC/VLR service area, PLMN, GSM operation-call from mobile station, call to a mobile station, Concept of GPRS, Compare 2G with 3G. (GSM – Reference 2 Page 459 -476)(GPRS –Reference 2 Page 510-516)

Data Communication - Concept, Applications, Modes of Transmission - serial, parallel, synchronous, asynchronous transmission, Definitions - channel capacity, bandwidth, baud rate, bit rate, Modem - definition, need for modem, FSK-concept, FSK Modem- diagram, working, PSK - concept, BPSK–concept. BPSK modulator – circuit diagram, working, BPSK demodulator – circuit diagram, working.

Unit 6

07Hrs

Basics of Computer Networks:

Computer Network- Definition, Types -LAN, WAN, MAN.

Network topology-Bus, Star, Ring, Mesh–advantages, disadvantages.

Transmission Media - Twisted Pair cable - Cat 5e, Cat 6.

Protocol-OSI model- Layer diagram, TCP/IP- Layer diagram.

Ethernet- Definition, types, Gigabit Ethernet.

Wireless AN-Wireless access point, wireless LAN card.

Network connectivity-Switch, Repeater, Router, Gateway.

Reference Books:

1. Communication Electronics - Louis E Frenzel - Tata Mc-Graw Hill
2. Principles of digital communication systems and computer networks - Dr. K. V. K. K. Prasad - Dreamtech press
2. Data Communication. - WilliamL.Schweber - Mc-Graw Hill
3. Local Area Networks-II Edition - Gerd Keiser - Tata-McGraw Hill
4. Local Area Networks- I Edition - BehrouzA.Forouzan -Tata-McGraw Hill

e-Resources:

1. http://www.tutorialspoint.com/wi-fi/wifi_working_concepts.htm
2. <http://www.gps.gov/systems/gps>
3. http://www.tutorialspoint.com/wi-fi/wifi_working_concepts.htm
4. <http://www.wirelessnetworkproducts.com/wifitechfundamentals.aspx>
5. <http://www.networkworld.com/article/2272293/lan-wan/chapter-1--introduction-to-wireless-networking-concepts.html>
6. <http://www.slideshare.net/Videoguy/video-conferencing-fundamentals-and-application>
7. http://www.slideshare.net/aGISGuy/what-is-gis-1655272?qid=74d03662-e3a6-460d-85af-faf585a71853&v=default&b=&from_search=1

Suggested Student Activity:

Student has to submit minimum 3 pages self handwritten report on any one of the activities listed below:

1. Collect different communication tools and equipment.
2. Report on advanced/ present day communication using Wifi, Hotspot, Bluetooth etc.
3. Implement a LAN of two computers using switch, Cat 5e or cat 6 straight cable and test.
4. Pairing of two computers using Cat 5e or Cat 6 A to B (cross connection) cable.
5. Visit nearby radio station/microwave repeater station, understand the equipment and working.
6. Visit nearby telephone exchange, understand the equipment, features and operation

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students						14/4				
Grand Average/Total						=3.5				
						≈4				

**Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing**

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1. Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3. Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4. Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
Total marks						14/4=3.5 ≈4				

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th week of sem 10-11 Am	I/II SEM		20			
	Year:					
Name of Course coordinator : CO's: _____			Units: __			
Question no	Question		MARKS	CL	CO	PO
1						
2						
3						
4						

Note: Internal Choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
1 st Test/ 6 th week, 9 Feb 16, 10-11 AM	IV SEM, E & E Engg	Communication and Computer Network	20		
	Year: 2015-16	Course code:			
Name of Course coordinator :					
Units Covered : 1 and 2					
Course Outcomes : 1 and 2					
Instruction : (1). Answer all questions (2). Each question carries five marks					
Question No.	Question	CL	CO	PO	
1	Define TDM. Explain the basic concept.	R	1	2, 10	
2	Explain the concept of Phase Modulation. OR Explain, with, general block diagram, receiving end of FDM system.	U A	1	2, 10	
3	Define Mode as applied to optical fiber cable. Classify the optical fiber cable based on mode.	U	2	2, 10	
4	Explain Single mode and Multimode optical fiber cable. OR Explain the working of Photodiode optical receiver with diagram.	U A	2	2, 10	

CL: Cognitive Level, R-Remember, U-Understand, A-Application, PO: Program Outcomes

Course Delivery:

The Course will be delivered through Lectures, Classroom Interaction, PPT, Animations, Group Discussion, Exercises and Assignments.

Course Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Book	1 to 6
		Student Activity		Student Activity	05	Hand written Report	1 to 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback Form		1 to 3
	End Of Course Survey			End Of The Course	Questionnaire		1 to 6

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination.

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Course Contents with Lecture Schedule:

Lesson No./ Session No.	Contents	Duration
	Unit I - Radio Communication	14 Hours
1.	Communication Basics: Communication, Elements of communication system - block diagram, explanation.	01 Hour
2.	Forms -audio, video and data, Types-simplex, half duplex, full duplex, analog signals, digital signals, baseband transmission, modulation, carrier. Modulation methods –AM, FM, PM.	01 Hour
3.	Electromagnetic spectrum: Relationship between frequency (f) and wavelength (λ), Need for modulation,	01 Hour
4.	Electromagnetic spectrum-major segments, Bandwidth – definition as applied to radio communication, illustration.	01 Hour
5.	Modulation and demodulation circuits: - Diode amplitude modulator-circuit, explanation.	01 Hour
6.	Demodulation-definition, AM Diode detector-circuit, explanation.	01 Hour
7.	Radio transmitter and receiver- Transmitter-definition, functions.	01 Hour
8.	A typical FM transmitter using indirect FM with phase modulator - circuit, explanation.	01 Hour
9.	Receiver -Super heterodyne receiver- block diagram, working.	01 Hour
10.	Multiplexing: Definition, Concept, FDM- block diagram (transmitting end), explanation.	01 Hour
11.	FDM- block diagram (receiving end), explanation, TDM- definition, basic concept.	01 Hour
12.	Transmission line and Radio wave propagation: Transmission lines: Types, Co-axial cable-construction, characteristic impedance, characteristic impedance of co-axial cable.	01 Hour
13.	Standing Waves, Standing wave ratio, importance of SWR.	01 Hour
14.	Radio wave propagation: ground wave, sky wave, space wave.	01 Hour

Lesson No./ Session No.	Contents	Duration
	Unit II - Fiber Optic Communication	05 Hours
15.	Basic elements of fiber-optic communication system- diagram, explanation	01 Hour
16.	Applications of fiber optic cables, Benefits of fiber optic cables over conventional electric cables, Light rays in a fiber optic cable.	01 Hour
17.	Basic construction of fiber optic cable – diagram, explanation, Mode-definition, classification based on mode, Single mode-definition, Multimode-definition,	01 Hour
18.	ILD optical transmitter - circuit, working,	01 hour
19.	Photodiode optical receiver - circuit, working.	01 Hour
	Unit III - Microwave Techniques:	06 Hours
20.	Concept of microwave communication, Advantages of Microwave, Problems faced in microwave communication.	01 Hour
21.	Microstrip, Stripline, Wave guides - construction, working, cutoff frequency, wave paths in a waveguide at different	01 Hour
22.	Cavity resonators – types, construction, working, applications.	01 Hour
23.	Microwave semiconductors –problems faced by conventional semiconductor components and their remedies.	01 Hour
24.	Microwave tubes - types, their applications, Two cavity klystron amplifier- construction, working.	01 Hour
25.	Microwave antennas - Horn antenna - diagram, working, Parabolic antenna - diagram, working.	01 Hour
	Unit IV - Satellite Communication	08 Hours
26.	Concept of Satellite Communication system.	01 Hour
27.	Satellite orbits- geo synchronous orbit.	01 Hour
28.	Transponder - block diagram, working.	01 Hour
29.	Satellite sub system- block diagram, explanation of each block.	01 Hour
30.	Satellite Earth Station- block diagram, explanation of each block	01 Hour
31.	Applications of satellite communication.	01 Hour

Lesson No./ Session No.	Contents	Duration
32.	GPS - GPS architecture, GPS receiver	01 Hour
33.	Differential GPS- diagram, explanation, Applications of GPS, GIS-concept, applications.	01 Hour
	Unit V - Mobile and Data Communication	12 Hours
34.	Mobile communication - Multicell system, frequency reuse, Salient features of GSM.	01 Hour
35.	GSM services, GSM system architecture - block diagram.	01 Hour
36.	GSM system architecture - working of each part.	01 Hour
37.	GSM network area –definition of cell, location area, MSC/VLR service area, PLMN.	01 Hour
38.	GSM operation-call from mobile station, call to a mobile station	01 Hour
39.	Concept of GPRS, Compare 2G with 3G	01 Hour
40.	Data Communication: Concept, Applications, Modes of Transmission - serial, parallel, synchronous, asynchronous transmission	01 Hour
41.	Definitions - channel capacity, bandwidth, baud rate, bit rate	01 Hour
42.	Modem - definition, need for modem, FSK - concept, FSK Modem - diagram, working.	01 Hour
43.	PSK - Concept, BPSK - concept.	01 Hour
44.	BPSK modulator – circuit diagram, working,	01 Hour
45.	BPSK demodulator – circuit diagram, working.	01 Hour
	Unit VI - Basics of Computer Networks	07 Hours
46.	Computer Network- Definition, Types - LAN, WAN, MAN. Network topology- Bus, Star, Ring, Mesh – advantages, disadvantages.	01 Hour
47.	Transmission Media- Twisted Pair cable-Cat 5e, Cat 6.	01 Hour
48.	Protocol – OSI model-Layer diagram	01 Hour

Lesson No./ Session No.	Contents	Duration
49.	Protocol - TCP/IP-Layer diagram	01 Hour
50.	Ethernet - Definition, types, Gigabit Ethernet. Wireless LAN -Wireless access point, wireless LAN card.	01 Hour
51.	Hardware required to set up a structured LAN in any room/Lab with provision for internet.	01 Hour
52.	Network connectivity -Switch, Repeater, Router, Gateway.	01 Hour

**III Semester Diploma in Electrical and Electronics Engineering Examination.
COMMUNICATION AND COMPUTER NETWORKS****Time: 3 Hours]****[Max. Marks: 100**

- Note:** (i) Answer any **SIX** questions from Part - A. *(Each question carries 5 marks)*
(ii) Answer any **SEVEN** questions from Part - B. *(Each question carries 10 marks)*

PART - A**(Each Question carrying 5 marks)**

1. Differentiate half duplex and full duplex communication. Write one example each.
2. Explain the diode demodulator or detector with a neat circuit diagram and waveforms.
3. Illustrate fiber optic communication system.
4. Explain the working of horn antenna with a diagram.
5. Explain the working of a satellite transponder with a block diagram.
6. Explain multicell system.
7. Sketch the block diagram of FSK modem.
8. Compare OSI reference model with TCP/IP model.
9. List the functions of Router.

PART - B**(Each question carrying 10 marks)**

10. a) Define wavelength and Noise.
b) Illustrate diode amplitude modulator with a circuit diagram and waveforms
11. Explain the working of super heterodyne receiver with the help of block diagram.
12. a) Explain the production of standing waves in a transmission line.
b) Explain the concept of Ground wave and Sky wave propagation.
13. Explain the concept of FDM with diagram.
14. a) Explain the working of optical transmitter with diagram.
b) Explain the working of optical receiver.
15. Explain two cavity klystron with a neat diagram.
16. Explain the working of Satellite Earth Station with a neat block diagram.
17. Explain GSM system architecture.
18. a) Explain serial and parallel transmission.
b) Illustrate synchronous and asynchronous transmission.
19. a) Define LAN, MAN, WAN. Give one example to each.
b) Explain bus and star topology with sketch.
20. a) List the types of Ethernet.
b) Explain the working of Wireless Access Point (WAP) with a neat diagram.

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**III Semester Diploma Examination.
COMMUNICATION AND COMPUTER NETWORKS****Unit I - Radio Communication****Cognitive Level: REMEMBER**

1. Define communication. Explain the various forms of communication with examples.
2. List the two categories of electronic communications based on type of intelligence the signals transmitted. Explain.
3. Define baseband transmission. Give examples.
4. Define modulation and carrier.
5. Define Bandwidth as applied to radio communication. Illustrate.
6. Define demodulation. Justify the need for demodulation.
7. Define radio transmitter. List the functions of radio transmitter.
8. Define TDM. Explain the basic concept.
9. Define standing wave ratio. Explain standing wave production in a communication transmission line.
10. Define multiplexing. Explain the concept of multiplexing.

Cognitive Level: UNDERSTAND

11. Explain basic communication system with the help of block diagram.
12. Explain simple, half duplex and full duplex communication with example.
13. Express the relationship between frequency and wavelength.
14. Justify the need for modulation.
15. Sketch the electromagnetic spectrum and mark the major segments.
16. Explain the concept of Phase Modulation
17. Illustrate diode amplitude modulator with a circuit diagram and waveforms.
18. Explain the diode detector with a circuit diagram and waveforms.

Cognitive Level: APPLICATION

19. Differentiate half duplex and full duplex communication. Write one example each.
20. Explain analog signal and digital signal with examples.
21. List the different modulation methods. Explain any one with sketch.
22. Explain AM and FM with waveforms.
23. Explain a typical FM transmitter using indirect FM with phase modulator with a sketch.
24. Draw the block diagram of super heterodyne receiver and explain.
25. Explain, with general block diagram, transmitting end of FDM system.
26. Explain, with, general block diagram, receiving end of FDM system.
27. Explain transmission line. List the different types of transmission lines.
28. Explain co-axial cable used for communication, with sketch.

29. Explain characteristic impedance.
30. Write the expression for characteristic impedance of co-axial cable.
31. Explain the production of standing waves in a transmission line.
32. Explain the importance of standing wave ratio.
33. Explain, with sketch, ground wave propagation.
34. Explain, with sketch, sky wave propagation.
35. Explain, with sketch, space wave propagation.
36. Explain, with sketch, three radio wave propagation methods.

Unit II - Fiber Optic Communication

Cognitive Level: UNDERSTAND

37. List the applications of fiber optic cables.
38. List the benefits of fiber optic cables over conventional electric cables.
39. Define Mode as applied to optical fiber cable. Classify the optical fiber cable based on mode.

Cognitive Level: APPLICATION

40. Explain the basic elements of fiber-optic communication system with diagram.
41. Explain the propagation of light rays in a fiber optic cable.
42. Explain the basic construction of fiber optic cable with diagram.
43. Explain Single mode and Multimode optical fiber cable.
44. Explain the working of ILD optical transmitter with diagram.
45. Explain the working of Photodiode optical receiver with diagram.

Unit III - Microwave Techniques

Cognitive Level: REMEMBER

46. List the problems faced in microwave communication.
47. Write the cut-off frequency equation of the waveguide.
48. List the types of cavity resonators. Mention the application of cavity resonator.
49. List the different types of microwave tubes.
50. List the applications of different microwave tubes.

Cognitive Level: UNDERSTAND

51. Explain the concept of microwave communication.
52. Explain the advantages of microwaves.
53. Explain microstrip with the help of sketch.
54. Sketch and explain stripline.
55. Explain the working of waveguide with a diagram.
56. Illustrate the wave paths in a waveguide at different frequencies.

57. Explain the working of circular resonant cavity resonator with a diagram.
58. Explain the working of adjustable or tuneable cavity resonator with a diagram.
59. Explain the problems faced by conventional semiconductor components in microwave frequencies and write the remedies overcome them.
60. Explain, with a diagram, two cavity klystron.
61. Explain the working of horn antenna with a diagram.
62. Explain the working of parabolic antenna with a diagram.

Unit IV - Satellite Communication

Cognitive Level: UNDERSTAND

63. Explain the basic concept of satellite communication.
64. Explain geo-synchronous orbit.
65. Explain the working of a satellite transponder with a block diagram.
66. Sketch the block diagram of satellite earth station.
67. List the applications of satellite communication.

Cognitive Level: APPLICATION

68. Illustrate satellite sub system with a block diagram.
69. Explain the working of Satellite Earth Station with a block diagram.
70. Explain the concept of GPS.
71. Explain the GPS architecture.
72. Explain GPS receiver with a sketch.
73. Explain differential GPS with a diagram.
74. Explain the concept of GIS. List the applications.

Unit V - Mobile and Data Communication

Cognitive Level: REMEMBER

75. Write the salient features of GSM.
76. List the components of base station subsystem (BSS). Explain Base station controller (BSC).
77. Define CELL, location area, MSC/VLR service area and PLMN.
78. List the sequence of events that takes place when a PSTN subscriber calls a mobile station.
79. Define channel capacity, channel capacity, bandwidth, baud rate and bit rate.
80. Define modem. Explain the need for modem.

Cognitive Level: UNDERSTAND

81. Explain multicell system
82. Explain frequency reuse.
83. Explain the different GSM services.
84. Sketch the block diagram of GSM system architecture.
85. Enumerate the sequence of events that takes place when a call is initiated.
86. Explain serial and parallel transmission.
87. Differentiate serial and parallel transmission.
88. Illustrate synchronous transmission.
89. Explain the working of Mobile Station (MS).
90. Illustrate TDMA frame format

Cognitive Level: APPLICATION

91. Explain the working of Base Transceiver Subsystem (BTS).
92. Explain, with diagram, frequency allocation for GSM.
93. Explain Home Location Register (HLR)
94. Explain Authentication Centre (AuC)
95. Explain Equipment Identity Register (EIR).
96. Explain Mobile Switching Centre (MSC).
97. Explain operation and Maintenance Center (OMC).
98. Explain Message Center and Gateway MSC.
99. Explain the concept of GPRS, with the help of GPRS architecture block diagram.
100. Compare 2G with 3G.
101. Illustrate asynchronous transmission.
102. Compare synchronous transmission with asynchronous transmission.
103. Differentiate baud rate and bit rate.
104. Sketch the block diagram of FSK modem.
105. Explain the working of FSK modem with diagram.
106. Explain the concept of PSK.
107. Explain the concept of BPSK.
108. Explain BPSK modulator with diagram.
109. Explain BPSK demodulator with diagram.
- 110.

Unit VI - Basics of Computer Networks

Cognitive Level: REMEMBER

111. Define computer network. Highlight its advantages.
112. Define LAN, MAN, WAN. Give one example to each.
113. List the types of twisted pair cable. Explain Cat 5e cable.
114. List the characteristics of twisted pair cable for networking.
115. List the types of Ethernet.

Cognitive Level: UNDERSTAND

116. Tabulate the advantages and disadvantages of star topology.
117. Tabulate the advantages and disadvantages of mesh topology.
118. Tabulate the advantages and disadvantages of bus topology.
119. Tabulate the advantages and disadvantages of ring topology.
120. Tabulate the differences between Cat 5e cable and Cat 6 cable.
121. State the features of wireless LAN card.
122. State the functions of switch, repeater.
123. List the functions of Router.
124. List the functions of Gateway.

Cognitive Level: APPLICATION

125. Explain ring topology with diagram.
126. Explain mesh topology with diagram.
127. Explain bus topology with sketch.
128. Explain star topology with sketch.
129. Illustrate the construction of twisted pair cable.
130. Explain OSI reference model with a diagram.
131. Explain TCP/IP model with a diagram.
132. Explain the working of Wireless Access Point (WAP) with a diagram.
133. Compare OSI reference model with TCP/IP model.
134. Explain gigabit Ethernet.
135. Specify the hardware required to establish Structured LAN in any room/Lab with provision for internet.
136. Illustrate the position of switch, repeater, router and Gateway in a network.

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