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VALLIAMMAI ENGINEERING COLLEGE
SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

QUESTION BANK

SUBJECT: EC6651 – COMMUNICATION ENGINEERING SEM / YEAR: VI / III year B.E.

EC6651 COMMUNICATION ENGINEERING

Unit I - ANALOG COMMUNICATION			
AM – Frequency spectrum – vector representation – power relations – generation of AM – DSB, DSB/SC, SSB, VSB AM Transmitter & Receiver; FM and PM – frequency spectrum – power relations : NBFM & WBFM, Generation of FM and DM, Amstrong method & Reactance modulations : FM & PM frequency.			
Part A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	What is amplitude Modulation and draw the frequency spectrum of Amplitude modulated signal	BTL 1	Remember
2.	A 500W carrier is AM modulated to a depth of 75%. Solve for the total power of the modulated wave	BTL 3	Apply
3.	How would you justify VSB ideal for TV video transmission?	BTL 5	Evaluate
4.	How would you describe frequency modulation	BTL 1	Remember
5.	A 500W carrier is AM modulated to a depth of 70%. Calculate the total power of the modulated form DSBSC of AM	BTL 3	
6.	State in you own words about modulation index and percent modulation for an AM wave	BTL 2	Understand
7.	Compare Low level Modulation and High level Modulation	BTL 2	Understand
8.	What is AM wave envelope?	BTL 1	Remember
9.	Is it better to use conventional or double side band full carrier system?	BTL 4	Analyze
10.	AM transmitter radiates 9 kW with the unmodulated carrier and 10.125 kW when the carrier is modulated. Calculate the modulation index.	BTL 3	Apply
11.	What is AM Vestigial sideband	BTL 1	Remember
12.	How would you justify single sideband modulation is better than Double sideband modulation?	BTL 5	Evaluate
13.	What is the motivation behind Double sideband suppressed carrier AM?	BTL 4	Analyze
14.	Define frequency deviation.	BTL 1	Remember
15.	State Carson rule	BTL 1	Remember

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16.	What would happen if Single sideband modulation is used for transmitting data	BTL 6	Create
17.	How could you determine the modulation index of FM?	BTL 2	Understand
18.	What would result to the bandwidth of the signal when the highest audio frequency modulating the carrier is 15 KHZ and the carrier frequency of an FM broadcast transmission is 100 MHZ and maximum frequency deviation is 75 KHZ	BTL 3	Apply
19.	Write down the basic principle used in superheterdyne receivers?	BTL 1	Remember
20.	Draw a pre-emphasis circuit.	BTL 1	Remember
1.	(i)Explain the generation of frequency modulated signal using reactance modulation scheme with neat diagram (ii)Describe the relationship between FM and PM.	BTL 1 BTL 2	Remember Understand
2.	(i)How would you compare wideband and narrow band FM system. (ii)How does the phase shift method efficiently suppress the unwanted side band? explain with diagram	BTL 5 BTL 1	Evaluate Remember
3.	(i)With a neat sketch diagram, explain the operation of Armstrong frequency modulation system. (ii) Illustrate the operation of VSB transmission	BTL 1 BTL 1	Remember Remember
4.	(i)Derive an expression for AM wave and its power relation. (ii) What are the advantages of single sideband modulation technique? Explain any one method of SSB generation.	BTL 3 BTL 1	Apply Remember
5.	(i)Derive an expression for the narroband FM wave. (ii)Explain the Armstrong method of FM generation.	BTL 1 BTL 2	Remember Understand
6.	The anode dissipation of a class C power amplifier is 944 Watta when modulation depth is 60% , the efficiency of a power amplifiers is 60%,while that the modulator is 25%.find (i) The Carrier power and modulator tube dissipation when modulation depth is 100% (ii) The AF output and rating of the modulation value to affect 100% modulation (iii)Overall efficiency at 60% modulation depth	BTL 3	Apply
7.	1. Explain in detail Armstrong method of FM generation and compare NBFM and WBFM. Discuss the coherent detection of DSB – sc modulated wave with a block diagram of detector and explain	BTL 2 BTL 2	Understand Understand
8.	(i) Explain the principle of indirect method of frequency modulation with neat sketch. (8) (ii) A carrier wave of 10 MHZ is amplitude modulated to 50% level with a tone of 5000 HZ. Sketch the waveform and amplitude distribution in time and frequency domain. Assume	BTL1 BTL3	Remember Apply

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	carrier amplitude as 10 V.		
9.	(i)Draw the block diagram for generation and demodulation of a VSB signal and explain the principle of operation. (ii)With suitable sketch discuss about square law detector.	BTL 3 BTL 2	Apply Understand
10.	What could be done to suppress unwanted sideband in AM transmission? Discuss the working of any one of them	BTL 6	Create

UNIT II DIGITAL COMMUNICATION

Pulse modulations – concepts of sampling and sampling theormes, PAM, PWM, PPM, PTM, quantization and coding : DCM, DM, slope overload error. ADM, DPCM, OOK systems – ASK, FSK, PSK, BSK, QPSK, QAM, MSK, GMSK, applications of Data communication.

PART A

Q.No	Questions	BT Level	Competence
1.	What are the elements of Digital Communication systems?	BTL 4	Analyze
2.	What is Pulse Width modulation?	BTL 1	Remember
3.	How does the phase of the carrier vary for the message m(n) = {1,0,1,1,0,1)	BTL 3	Apply
4.	Define Slope overload noise. How it is reduced	BTL 1	Remember
5.	How will you choose the nyquist rate for signal f(t) = sin (200t)	BTL 3	
6.	Draw a pulse position modulated wave	BTL 1	Remember
7.	How will you obtain PPM from PWM	BTL 6	Create
8.	How would you compare QPSK and MSK systems	BTL 2	
9.	What are the different pulse modulation techniques? Discuss their advantages	BTL 1	Remember
10.	What is meant by aliasing?	BTL 2	Understand
11.	State the applications of FSK	BTL 1	Remember
12.	What could be done to minimize quantization error?	BTL 6	Create
13.	What would result if delta modulation has variable step size	BTL 3	Apply
14.	What is the motive behind preferring a large dynamic range	BTL 4	Analyze
15.	Compare the performance of ASK, PSK and FSK	BTL 2	Understand
16.	Can you elaborate on the reason for striving for less granular noise	BTL 6	
17.	What is OOK?	BTL 1	Remember
18.	What is the main idea of sampling above Nyquist sampling rate?	BTL 2	Understand
19.	What facts would you select to prove PCM is more reliable than PPM	BTL 5	Evaluate
20.	Can you distinguish between QAM and PAM	BTL 4	

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PART – B			
1.	With a neat block diagram explain the PAM modulation and demodulation process and derive an expression for PAM wave and depth of modulation	BTL 1	Remember
2.	(i)Explain working principle of ASK modulator and detector with neat diagram. (ii)Draw ASK,FSK,PSK signal to transmit the data stream 1111000111.	BTL 1 BTL 3	Remember Apply
3.	(i)With neat sketch explain the generation of delta modulated sinal and derive the expression for SNR. (ii)State the drawbacks of DM and suggest a method to overcome it.	BTL 1 BTL 1	Remember Remember
4.	Explain the QPSK modulation scheme with its constellation diagram	BTL 1	Remember
5.	Briefly describe the concept of QAM and draw the constellation diagram of 16 QAM.	BTL 2	Understand
6.	How does ADM differ from DM? Support from your answer with block diagram and waveforms	BTL 4	Analyze
7.	(i)What is DPSK?discuss its operation with the required diagrams. (ii)Compare PCM and DPCM techniques	BTL 1 BTL 4	Remember
8.	(i)State and prove sampling theorem. (ii)Explain the generation of PWM and PPM waves.	BTL 1 BTL 1	Remember Remember
9.	(i)Compare PCM and DM. (ii)Explain the concept of BPSK and QPSK techniques in data communication.	BTL 4 BTL 4	Analyze Analyze
10.	Discuss the advantages of digital communications and explain QPSK and QAM techniques with neat diagram	BTL 2	Understand

UNIT III SOURCE CODES, LINE CODES & ERROR CONTROL

Primary communication – entropy, properties, BSC, BEC, source coding : Shaum, Fao, Huffman coding : noiseless coding theorum, BW – SNR trade off codes: NRZ, RZ, AMI, HDBP, ABQ, MBnB codes : Efficiency of transmissions, error control codes and applications: convolutions & block codes.

PART A

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Q.No	Questions	BT Level	Competence
1.	What is the main idea of Huffman Coding? =	BTL 2	Understand
2.	What are the features of Huffman Coding=	BTL 1	Remember
3.	How channel capacity is related to bandwidth =	BTL 4	Analyze
4.	How will you disprove mathematically than entropy decreases with uncertainty in information	BTL 5	
5.	Compare between NRZ and RZ ?	BTL 2	Understand
6.	Draw the RZ signaling format of given binary sequence 1101001	BTL 3	Apply
7.	What are the features of convolutional codes?	BTL 1	Remember
8.	What can you say about information rate?	BTL 2	Understand
9.	Mention the significance of AMI code?	BTL 4	Analyze
10.	An event has six possible outcomes with probabilities {1/2, 1/4, 1/8, 1/16, 1/32,1/32}. Solve for the entropy of the system.	BTL 3	Apply
11.	What is prefix code?	BTL 1	Remember
12.	Define linear block codes and Error control coding	BTL 1	Remember
13.	How would you estimate information rate	BTL 6	Create
14.	Solve for channel capacity of binary synchronous channel with error probability of 0.2?	BTL 3	Apply
15.	State channel coding theorem.	BTL 1	Remember
16.	What would happen to entropy if all symbols are equiprobable	BTL 6	Create
17.	What is channel redundancy	BTL 1	Remember
18.	How could you determine mutual information from entropy	BTL 2	Understand
19.	List some of the error control codes	BTL 1	Remember
20.	Name the source coding techniques	BTL 1	Remember
	PART – B		
1.	(i)Brief the properties of entropy. (ii)Five symbols of the alphabet of discrete memory less source and their probabilities are given below. S={S0 s1 s2 s3 s4} P(S)={0.4,0.2,0.2,0.1,0.1} Code the symbols using Huffman coding	BTL 1 BTL 3	Remember Apply
2.	(i)Briefly discuss on various error control codes and explain in	BTL 2	Understand

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	detail with one example for convolution code. (ii)Draw the polar,unipolar and Manchester NRZ line code format for an information {1 0 1 1 0 1}	BTL 3	Apply
3.	(i)Write in detail the procedure of Shannon – fano coding scheme. (ii)Apply the above Shannon – fano algorithm to a source which generates symbols x1,x2,x3,x4 with the probabilities 1/8,1/2,1/4 and 1/8 respectively and determine the coding efficiency.	BTL 1 BTL 3	Remember Apply
4.	(i)Compare the coding schemes HDBP and MBNP codes in terms of bandwidth, SNR and transmission efficiency. (ii)Describe bandwidth trade off.	BTL 4 BTL 2	Analyze Understand
5.	(i)Describe bandwidth- SNR trade off problem of coding. (ii)Discuss any one of the decoding methods of convolutional coding precisely.	BTL 2 BTL 2	Understand Understand
6.	Explain the coding and decoding process of block codes.	BTL 1	Remember
7.	(i)With suitable examples ,explain Shannon fano encoding scheme. (ii)Explain Huffman coding with suitable example.	BTL 1 BTL 1	Remember Remember
8.	With suitable examples,explain the various line coding techniques	BTL 1	Remember
9.	(i)Discuss in detail binary symmetric channel and binary erasure channel. (ii)Propose a solusion for encoding the following seven messages with probabilities indicated to achieve data compression Symbol: S_0 S_1 S_2 S_3 S_4 S_5 S_6 Probability: 0.25 0.25 0.125 0.125 0.125 0.0625 0.0625	BTL 3 BTL 6	Apply Create
10.	(i)Explain the concept of block codes and coding efficiency. (ii)Find the Huffman code for the following seven messages with probabilities as indicated. Symbol: S_0 S_1 S_2 S_3 S_4 S_5 S_6 Probability: 0.25 0.25 0.125 0.125 0.125 0.0625 0.0625	BTL 1 BTL 3	Remember Apply

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UNIT IV MULTIPLE ACCESS TECHNIQUES
UNIT IV MULTIPLE ACCESS TECHNIQUES SS&MA techniques : FDMA, TDMA, CDMA, SDMA application in wire and wireless communication :Advantages (merits)

PART A

Q. No	Questions	BT Level	Competence
1.	What are the loss producing mechanisms in a wireless channel	BTL 1	Remember
2.	List the merits and demerits of CDMA?	BTL 1	Remember
3.	Give out the merits of TDMA system.	BTL 2	Understand
4.	Define FDMA.	BTL 1	Remember
5.	Distinguish between FDMA and TDMA?	BTL 4	Analyze
6.	What is SDMA. What are the advantages of SDMA?	BTL 1	Remember
7.	Can you identify Near-far problem?	BTL 3	Apply
8.	Draw the block diagram of typical FDMA system?	BTL 1	Remember
9.	What is meant by multiple access and mention a few MA techniques?	BTL 2	Understand
10.	Compare the advantages of FDMA over TDMA?	BTL 4	Analyze
11.	List the applications of SDMA in wire and wireless	BTL 1	Remember

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	communication.		
12.	Demonstrate the advantages of CDMA.	BTL 2	Understand
13.	Discuss the applications of CDMA	BTL 2	Understand
14.	Analyze the applications of multiple access technique in wired communication.	BTL 3	Apply
15.	How would you use multiple access technique in satellite link.	BTL 3	Apply
16.	Categorize multiple access techniques.	BTL 4	Analyze
17.	Compare CDMA and SDMA.	BTL 5	Evaluate
18.	Explain the drawbacks of TDMA	BTL 5	Evaluate
19.	Formulate the popular coding sequences of CDMA	BTL 6	Create
20.	Estimate multiplexing.	BTL 6	Create
	PART – B		
1.	a. Consider that a source is transmitting equiprobable 1/0 at the rate of 1063 b/s and the probability of error is Pe = 1/16.Determine the rate of transmission. b. Discuss the BSC and BEC with their channel diagram and transition matrix.	BTL 6 BTL 2	Create Understand
2.	Explain the BSC and BEC with their channel diagram and transition matrix.	BTL 5	Evaluate
3.	Draw and explain the block diagram of transmitter and receiver of CDMA.	BTL 1	Remember
4.	What is SDMA? Explain the transmitter and receiver of SDMA.	BTL 1	Remember
5.	Evaluate the various multiple access accesss techniques used in wireless communication with their merits and demerits.	BTL 5	Evaluate
6.	With neat block diagram explain the frequency division multiple access technique. Discuss its application in communication.	BTL 4	Analyze
7.	(i)Describe the application of FDMA in wireless communication.	BTL 3	Apply
8.	(ii)Compare the performance of CDMA with FDMA and TDMA.	BTL 4	Analyze
9.	(i) Demonstrate the operation of a typical TDMA system with neat block diagram. (ii) Compare TDMA with FDMA.	BTL 2 BTL 3	Understand Apply
10.	Discuss the concept of CDMA techniques and mention its merits and demerits.	BTL 2	Understand

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UNIT V SATELLITE, OPTICAL FIBER – POWERLINE, SCADA

Orbits : types of satellites : frequency used link establishment, MA techniques used in satellite communication, earth station; aperture actuators used in satellite – Intelsat and Insat: fibers – types: sources, detectors used, digital filters, optical link: power line carrier communications: SCADA

PART A

Q.No	Questions	BT Level	Competence
1.	Define azimuth angle.	BTL 1	Remember
2.	What is the necessity of cladding for an optical fibre?	BTL 1	Remember
3.	Classify the types of sources and detectors used in optical fiber communication systems	BTL 2	Understand
4.	What is meant by power line carrier communication?	BTL 2	Understand
5.	What are the major categories of satellite?	BTL 4	Analyze
6.	What are types of optical fiber cable available?	BTL 1	Remember
7.	List the essential components of satellite systems?	BTL 4	Analyze
8.	Define line of nodes.	BTL 1	Remember
9.	Illustrate geo-synchronous orbit and geo- synchronous satellite	BTL 3	Apply
10.	Estimate the uplink and downlink frequencies used in satellite communication.	BTL 5	Evaluate
11.	Evaluate the merits and de-merits of geosynchronous satellite.	BTL 5	Evaluate
12.	How would you classify optical fiber mode structure?	BTL 4	Analyze
13.	Define a fiber optic system.	BTL 1	Remember
14.	What is refractive index.	BTL 1	Remember
15.	Compare single mode and multi-mode propagation.	BTL2	Understand
16.	What is meant by acceptance angle.	BTL 2	Understand
17.	Discuss numerical aperture and Snell's law.	BTL 6	Create
18.	Elaborate modal dispersion.	BTL 6	Create
19.	Summarize the principle function of an earth station transmitter of a satellite?	BTL2	Understand
20.	Identify the advantages of laser optical source over LED?	BTL 3	Apply

PART-B

1.	i)Compare optical fiber with RF cable.	BTL 2	Understand

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	(ii)What is the relationship among single mode step index, multimode step index and multimode graded index optical fibers.	BTL 4	Analyze
2.	Explain in detail about Satellite Sub system: Construct power line carrier systems.	BTL 4 BTL 3	Remember Apply
3.	i) Explain the block diagram of satellite link and explain. ii) Analyze the concept of INSAT.	BTL1 BTL 4	Remember Analyze
4.	(i)Describe the principle of operation of power line carrier communication. (ii)Draw the block diagram of optical fiber communication link and explain.	BTL 2 BTL 2	Understand Understand
5.	Explain the characteristics of sources and detectors used in optical fiber link with the following parameters:	BTL 1	Remember
6.	Classify the multiple access techniques in satellite communication.	BTL 2	Understand
7.	(i)Develop the concept of satellite link budget. (ii)Estimate the uplink and downlink model of satellite communication system.	BTL 3 BTL 5	Apply Evaluate
8.	Identify the various blocks and its functionalities of a fiber optic communication system.	BTL 4	Analyze
9.	Elaborate the concept of satellite communication system and its applications.	BTL 6	Create
10.	a. How would you explain the concept of Optical sources and detectors b. Define and explain SCADA	BTL 1 BTL 1	Remember Remember

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