	Reg.	No.										
	Question Paper Code		1297	8								
B.E. /	B.Tech DEGREE EXAMI	NATI	ONS,	NO	V/I	DEC	202	24				
	Fourth Sem	ester										
	Electronics and Instrumen	tation	Engi	nee	ring							
	(Common to Instrumentation ar	d Con	trol E	ngir	neerin	ng)						
20EIPC40	2 - PRINCIPLES OF COMM	UNIC	CATI	ON I	ENG	INF	EF	RIN	G			
	Regulations -	2020										
Duration: 3 Hours									Max	k. Ma	rks: 1	00
	PART - A (MCQ) (20 ×	1 = 20	Mar	ks)							<i>K</i> –	60

	$PART - A (MCQ) (20 \times 1 = 20 Marks)$	Marks	K –	co
	Answer ALL Questions	NUT	Level	ιυ
1.	State the main advantage of Single Sideband Suppressed Carrier (SSBSC) over DSBSC:	1	K1	<i>CO1</i>
	(a) Increased bandwidth (b) Reduced power consumption			
	(c) Reduced bandwidth and power (d) Increased complexity			
2.	Recall which types of modulation Vestigial Sideband (VSB) is a compromise between:	1	K1	COI
	(a) AM and FM (b) DSBSC and SSBSC			
	(c) PAM and PCM (d) Frequency modulation and phase modulation			
3.	Contrast FM and PM in terms of their modulation indices:	1	K2	<i>CO1</i>
	(a) FM has a fixed modulation index			
	(b) PM has a fixed modulation index			
	(c) FM's modulation index is varied by the frequency of the modulating signal, while			
	PM's is determined by the amplitude			
	(d) Both have the same modulation index	1		001
4.	Illustrate the difference between phase modulation (PM) and frequency modulation (FM):	Ι	K2	COI
	(a) PM varies the frequency, while FM varies the phase			
	(b) PM varies the amplitude, while FM varies the phase			
	(c) FM involves the frequency deviation, while PM involves phase deviation			
~	(d) FM and PM are identical techniques	1	va	cor
5.	Classify the pulse modulation techniques based on how the pulse characteristics are	Ι	K2	02
	Varied:			
	(a) PAM, PWM, PCM (b) AM, FM, PM (c) DSDSC SSDSC VSD (d) Name of the showe			
6	(c) DSBSC, SSBSC, VSB (d) None of the above	1	K1	CO^{2}
0.	(a) Pulse Code Modulation (DCM) (b) Pulse Amplitude Modulation (DAM)	1	IX I	002
	(a) Pulse Code Modulation (PCM) (b) Pulse Amplitude Modulation (PAM)			
7	(c) Fulse width Modulation (F w M) (d) Frequency Modulation (FM)	1	K1	CO2
1.	Multiplexing (TDM).	•		002
	(a) Higher handwidth efficiency (b) Less complex hardware requirements			
	(c) Lower cost (d) Less prone to synchronization issues			
8	Identify the modulation technique that uses a variable pulse width for encoding	1	K1	CO2
0.	information:			
	(a) Pulse Amplitude Modulation (PAM) (b) Pulse Code Modulation (PCM)			
	(c) Pulse Width Modulation (PWM) (d) Frequency Modulation (FM)			
9.	Recall which modulation technique OPSK is more bandwidth-efficient than:	1	K1	CO3
	(a) BPSK (b) DPSK (c) FSK (d) ASK			
10.	State the primary use of equalizers:	1	K1	СО3
	(a) Remove ISI (b) Increase signal power (c) Encode signals (d) Reduce bandwidth			

11.	 Compare the bandwidth requirements of QPSK and BPSK: (a) QPSK requires less bandwidth than BPSK (b) QPSK and BPSK require the same bandwidth 		K2	СО3
	(c) OPSK requires more bandwidth than BPSK			
	(d) None of the above			
12.	Rephrase the advantage of M-ary QAM in a communication system:	1	K2	СОЗ
	(a) Improves error correction capability			
	(b) Increases data rates by combining amplitude and phase modulation			
	(c) Decreases signal complexity			
10	(d) Simplifies transmitter design	1	1/1	<i>co</i> (
13.	Define what entropy measures in information theory:	Ι	K1	<i>CO</i> 4
	(a) Signal power (b) Uncertainty or randomness of information			
14	(c) Bandwidth (d) Error rate	1	K I	CO4
14.	(a) Linear block addes (b) Convolutional addes	1	IX I	004
	(a) Huffman codes (b) Convolutional codes			
15	State what Shannon-Hartley law determines:	1	K1	CO4
15.	(a) Channel canacity in a noisy channel (b) Bandwidth requirement for modulation			
	(c) Power efficiency of a system (d) Error rates in data transmission			
16.	Classify the types of source coding techniques:	1	K2	<i>CO4</i>
-	(a) Lossless and lossy (b) Huffman and cyclic			
	(c) Convolutional and linear (d) Predictive and block			
17.	Recall what is used to spread the signal in Direct Sequence Spread Spectrum (DSSS):	1	K1	<i>CO5</i>
	(a) Frequency hopping (b) Pseudo-noise (PN) sequence			
	(c) Amplitude modulation (d) Pulse coding			
18.	Identify the technique used in CDMA for multiple access:	1	K1	CO5
	(a) Frequency hopping (b) Code assignment (c) Time slots (d) Signal compression			
19.	Define the function of synchronization in spread spectrum systems:	1	K1	<i>CO5</i>
	(a) Compress the signal (b) Align the PN sequences of the transmitter and receiver			
• •	(c) Increase signal bandwidth (d) Filter the noise		17.1	<i>a</i>
20.	State the processing gain of a spread spectrum system as the ratio of:	Ι	KI	cos
	(a) Message bandwidth to signal bandwidth (b) Spread bandwidth to message bandwidth			
	(c) Signal power to noise power (d) Frequency to time			
	$\mathbf{D} \wedge \mathbf{D} \mathbf{T} = \mathbf{D} \left(10 \times 2 - 20 \mathbf{M}_{\text{culler}} \right)$			
	$PAKI - B (10 \times 2 = 20 \text{ Marks})$			
21	Define Modulation Index	2	K1	CO1
∠1. 22	Draw the greater of DSD SC & SSD SC	2	K I	CO1
<i>22</i> .		2		001
73	How can aliasing be avoided?	2	ΛI	CO_2

K123. How can aliasing be avoided? 2 K2 CO2 2 24. Discuss the applications of PCM. K1 CO3 25. State the necessity of equalizers. 2 26. Draw the block diagram of the QPSK demodulator. 2 KlK1 CO4 2 27. Define entropy and its property. 2 K2 CO4 28. Differentiate between lossless and lossy coding. 2 K1 CO5

29. Enumerate the applications of FHSS. 30. Mention the uses of spread spectrum.

PART - C ($6 \times 10 = 60$ Marks)

Answer ALL Questions

31.	a)	Discuss any two methods of generation of SSB-SC signals.	10	K2	<i>CO1</i>
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OR

2

2

CO3

K1 CO5

	b)) Explain the Principle of Super heterodyne receiver with neat block diagram.					
32.	a)	With the neat block diagram of Delta Modulator (DM) in detail.	10	K2	<i>CO2</i>		
		OR					
	b)	Draw the block diagram of the DPCM system and elaborate the working principle of DPCM transmitter and receiver.	10	K2	<i>CO2</i>		
33.	a)	Discuss the operation of a QPSK modulator and demodulator with a neat diagram. Draw its phasor and constellation diagram. OR	10	K2	CO3		
	b)	With a neat diagram, explain in detail the Transmitter of 16-QAM along with a truth table, phasor diagram and constellation diagram.	10	K2	CO3		
34.	a)	Consider a discrete memoryless source with seven possible symbols $Xi=\{1,2,3,4,5,6,7\}$ with associated probabilities $Pr=\{0.37,0.33,0.16,0.04,0.02,0.01\}$. Show the Huffman's code and Shannon-fano code and determine the coding efficiency and redundancy OR	10	K2	<i>CO4</i>		
	b)	Explain how encoding is done by convolutional codes with an example.	10	K2	<i>CO4</i>		
35.	a)	Describe the Code division multiple access technique in detail. OR	10	K2	CO5		
	b)	Illustrate the concept of the FHSS and DSSS communication system with suitable diagrams.	10	К2	CO5		
36.	a) i)	Discuss error control codes with suitable examples.	5	K2	<i>CO4</i>		
	ii)	Explain the properties of PN sequences.	5	K2	CO5		
	OR						
	b) i)	Show the advantages of Error control codes.	5	K2	<i>CO</i> 4		
	ii)	Summarize the advantages of spread spectrum.	5	K2	<i>CO5</i>		