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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous) 

B.Tech IV SEMESTER CIE - II EXAMINATIONS JUNE - 2022<br>Regulation: UG20<br>ANALOG AND DIGITAL COMMUNICATIONS<br>(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 2 Hours
Max Marks: 20

## Answer any FOUR questions

All parts of the question must be answered in one place only

1. (a) Explain the generation of pulse code modulation (PCM) with a neat diagram. List the applications of PCM.
[BL: Understand| CO: 4|Marks: 2]
(b) A compact disk record audio signals digitally using PCM. The audio signal BW is 15 kHz . What is Nyquist rate? If $\mathrm{M}=65536$, determine the number of binary digits required to encode a audio signal? Determine the bit rate and SNR required?
[BL: Apply| CO: 4|Marks: 3]
2. (a) Compare phase shift keying, quadrature phase shift keying, differential phase shift keying (DPSK).
[BL: Understand| CO: 5|Marks: 2]
(b) The bit stream 11011100101 is to be transmitted using DPSK. Determine the encoded sequence and the transmitted phase sequence.
[BL: Apply| CO: 5|Marks: 3]
3. (a) Explain in detail about modulation of frequency shift keying (FSK) with waveforms.
[BL: Understand| CO: 5|Marks: 2]
(b) A voice signal is sampled at the rate of 5000 samples/sec and each sample is encoded into 5 -bits using PCM system. The binary data is transmitted into free space after modulation. Determine the bandwidth of the modulated signal, if the modulation used is i) ASK ii) PSK iii) FSK where $f_{1}=8 \mathrm{MHz}$ and $f_{2}=6 \mathrm{MHz}$.
[BL: Apply| CO: 5|Marks: 3]
4. (a) Explain the following i)Code rate ii) Hamming bound iii) Error detection capabilities iv)Error correction capabilities v) Parity check matrix
[BL: Understand| CO: 6|Marks: 2]
(b) In a (7,4) Hamming code the generator matrix is $[G]=\left[\begin{array}{lllllll}1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1\end{array}\right]$ Determine the
i) Parity check matrix ii) All possible codes iii) Error correction and detection capabilities.
[BL: Apply| CO: 6|Marks: 3]
5. (a) Describe briefly about direct sequence spread spectrum. Discuss the difference between systematic and non systematic cyclic code
[BL: Understand| CO: 6|Marks: 2 ]
(b) The parity check bits of $(8,4)$ block code are
$\mathrm{C} 5=\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 4 \mathrm{C} 6=\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3 \mathrm{C} 7=\mathrm{d} 1+\mathrm{d} 3+\mathrm{d} 4$
$\mathrm{C} 8=\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4$ where $\mathrm{d} 1, \mathrm{~d} 2, \mathrm{~d} 3, \mathrm{~d} 4$ are message bits.
Calculate i) Generator matrix ii) Parity matrix
[BL: Apply| CO: 6|Marks: 3]

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