International Islamic University Chittagong (IIUC)
Department of Computer & Communication Engineering
Final examination

Program: B.Sc. Engineering | **Semester-** Autumn 2021
Course Code: - CCE-3611 | **Course Title:-** Digital Communications Engineering
Full Marks: 50 | **Time-** 2.30 Hours

[Answer any two questions from section-A & any three questions from section-B]
[The figures in the right margin indicate full marks]

SECTION-A

Q1.	**(a)**	Deduce the expression of normalized signal to quantization noise ratio in dB for any message signal is $(SNR)_{dB} = 4.8 + 6N$.	**5**	**An**	**CLO1**
	(b)	Explain why quantization saturation and timing jitter occur and how it can be reduce.	**2**	**An, E**	**CLO1**
	(c)	A PCM system uses a uniform quantizer with 6-bit encoder. If the bit rate of the system is 50Mbps identify the message signal bandwidth and estimate output SNR when a 1MHz sinusoidal signal is applied to the input.	**3**	**E**	**CLO2**
Q2.	**(a)**	Explain the companding? Briefly describe the μ-law and A-law companding characteristics.	**3**	**An**	**CLO1**
	(b)	Briefly explain the ADM transmitter and receiver with proper diagram.	**5**	**An**	**CLO1**
	(c)	Generate the Binary sequence for the following staircase information of fig: 1.	**2**	**C**	**CLO2**

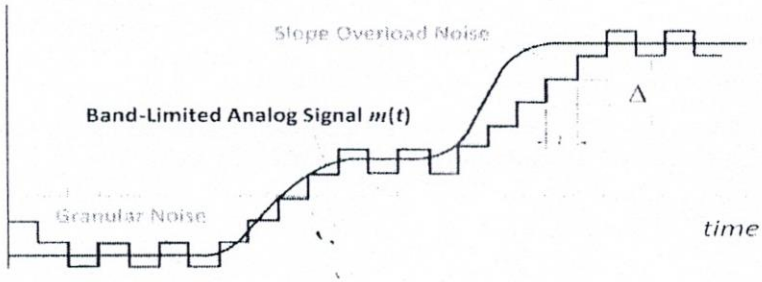

Fig:1

Q3.	**(a)**	Describe the properties of line coding.	**2**	**U**	**CLO2**
	(b)	Construct the following line coding for the given binary sequence 1011000110. i) Unipolar –RZ ii) Polar iii) Bipolar-RZ iv) Manchester	**6**	**C**	**CLO2**
	(c)	Let us consider a message signal is input to the DM v(t)=5sin (12000πt)+ 10sin (18000πt) volt. Evaluate the minimum sampling rate to avoid slop overload distortion if the step size is 0.564 volts.	**2**	**E**	**CLO2**

SECTION-B

Q4.	**(a)**	Develop the waveform from the following constellation diagram mention in figure of binary sequence 011110001100. **i) 4-PSK ii) 8-QAM iii) BFSK iv) DPSK**	**10**	**C**	**CLO2**

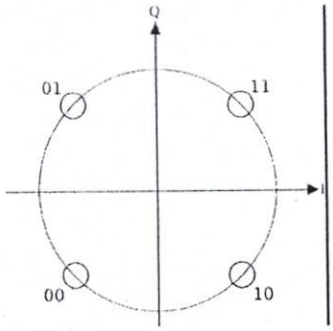

Fig:2 for i

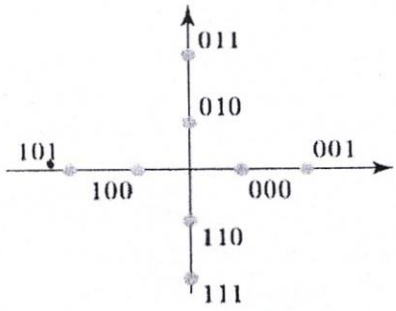

Fig:3 for ii

Q5.	**(a)**	Express the equation of BER for ASK, FSK and PSK.	**5**	**An**	**CLO1**
	(b)	Distinguish between coherent and non-coherent demodulation.	**3**	**An**	**CLO1**
	(c)	Consider two FSK signal with different frequency are given by $S_1(t)=4\cos 200t$ and $S_2(t)=2\cos 300t$. Estimate the bit error energy of the FSK signal.	**2**	**E**	**CLO2**
Q6.	**(a)**	Distinguish between TDMA, FDMA and CDMA.	**4**	**An**	**CLO1**
	(b)	Explain the necessity of rake receiver in cellular communication-Bangladesh perspective.	**3**	**An, E**	**CLO1**
	(c)	Explain the handoff and handover process in cellular communication system.	**3**	**An**	**CLO1**
Q7.	**(a)**	Explain the importance of spread spectrum.	**2**	**An**	**CLO1**
	(b)	Describe the operation of PSEUDO-noise sequence generator.	**3**	**An**	**CLO1**
	(c)	Figure out the transmitted and received signal for DS-SS modulation technique for the following data shown in figure 4 with spreading code 0111001.	**5**	**C**	**CLO2**

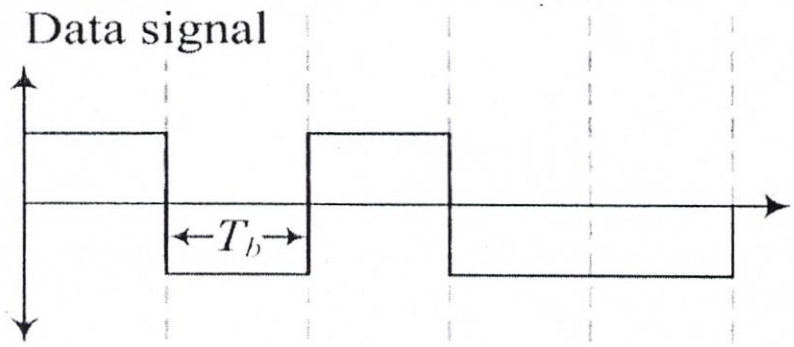

Fig:4