|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Roll No |  |  |  |  |  |  |  |  |  |  |  |  |

 ****

**Presidency University**

**Bengaluru**

 **SCHOOL OF ENGINEERING**

**Summer Term End Term Examinations, August 2024**

**Date**: 05/08/2024

**Time**: 9-30 AM to 12-30 PM

**Max Marks**: 100

**Weightage**: 50%

**Even Semester**: 2023-24

**Course Code**: ECE 3011

**Course Name**: Digital Communication

**Department:** ECE

 **Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Do not write any matter on the question paper other than roll number.*

**PART A**

**Answer any SIX Questions. Each question carries 10 marks. (6Q × 10M= 60M)**

1. Compare and state at least ten differences between analog and digital communication system.

 (CO: 01 BL: Knowledge)

1. Explain the working of a regenerative repeater in a PCM system with a suitable block diagram. (CO: 01 BL: Knowledge)
2. (a) An analog signal is expressed by the equation $x\left(t\right)=3Cos1500πt+10Sin700πt-Cos600πt$. Determine the minimum sampling frequency.

(b) Find the Nyquist rate and Nyquist interval for the signal:

$x\left(t\right)=\frac{1}{2π}Cos\left(6000πt\right).Cos(8000πt)$ (CO: 01 BL: Application)

1.  A signal has the power spectrum as shown in the figure below. Determine the minimum sampling rate needed to completely represent signal is in discrete-time domain. (CO: 02 BL: Comprehension)
2. In an experiment, a signal of bandwidth 5 kHz is sampled and coded by a uniform PCM system. The coded signal is then transmitted over a channel at a bit rate of 60 kbps. Determine the maximum SNR of quantization error in dB for this PCM system. (CO:02 BL: Application)
3. With the help of a neat diagram, explain the scheme of TDM for N number of signals. Also, show the schematic of two discrete-time signals being time division multiplexed. (CO:03 BL: Comprehension)

1. (a) Explain the basic principles of BASK and On-Off Keying (OOK) with suitable diagrams of waveforms. (b) Depict a block diagram of BASK transmitter and a non-coherent BASK detector. (CO:03 BL: Knowledge)
2. Derive an expression of signal to noise ratio (SNR) in dB for a sinusoidal signal x, passed through a uniform quantizer, and encoded by n bits. (CO:04 BL: Knowledge)

**PART B**

**Answer any TWO Questions. Each question carries 20 marks. (2Q × 20M= 40M)**

1. (a) List the basic elements of a PCM system. (b) Draw a neat block diagram of a PCM system and briefly describe the functions of each block. (CO:02 BL: Comprehension)
2. A PCM system, employing uniform quantization, produces a binary output, with an input signal of 4V p-p. The signal is having a power of 40 mW. Determine the number of bits required to encode the quantized sample if the SNR is 20 dB. (CO:03 BL: Application)
3. (a) Explain the concept and characteristics of spread spectrum modulation with a suitable schematic diagram. (b) List the types of techniques used for spread spectrum modulation. (c) With an appropriate illustration, enumerate the model of Frequency Hopping Spread Spectrum (FHSS). (CO:04 BL: Comprehension)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*