

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024****Subject Code:3162414****Date:12-12-2024****Subject Name: Digital signal Processing for Power Electronics****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define continuous time and discrete time signals. Give one example of each. **03**
 (b) State difference between continuous time and discrete time signals. **04**
 (c) Write mathematical equation and draw waveforms of following. (1) Unit Impulse Signal **07**
 (2) Unit Step Signal (3) Unit Step Sequence (4) Unit Ramp Signal (5) Unit Ramp
 Sequence (6) Unit Impulse Sequence
- Q.2** (a) What is Nyquist rate? Compute Nyquist rate for signal described by $x_a(t) = 5\cos(20\pi t) + 3\sin(10\pi t) + \cos(50\pi t)$ **03**
 (b) What is aliasing? State its effects. **04**
 (c) Derive relation between Laplace and Z transformation. **07**
- OR**
- (c) State properties of Z transformation and explain anyone property. **07**
- Q.3** (a) Define direct Z transformation. **03**
 (b) What is ROC of Z transform? State its properties. **04**
 (c) Find z-transform and ROC of $a^n u[n] + a^{-n} u[-n-1]$ **07**
- OR**
- Q.3** (a) Draw block diagram of discrete time system. **03**
 (b) State various structures to represent discrete time system. Explain anyone structure. **04**
 (c) What is linear phase? Explain with an example. **07**
- Q.4** (a) What is discrete time Fourier transform? **03**
 (b) State condition for existence of discrete time Fourier transform. **04**
 Find the discrete-time Fourier transform of the sequence $x(n)=u(n)$.
 (c) State properties of DTFT. Explain anyone property. **07**
- OR**
- Q.4** (a) What is FFT? **03**
 (b) State advantages of FFT over DFT. **04**
 (c) Explain how inverse DFT can be computed using FFT. **07**
- Q.5** (a) State differences between floating point and fixed-point numbers. **03**
 (b) What is quantization? What are its effects? **04**
 (c) What is scaling? Explain its requirements in digital computations. **07**
- OR**
- Q.5** (a) State various types of DSP architectures. Draw simple block diagram of any one **03**
 architecture.
 (b) What is pipelining? Explain how it improves speed of computation. **04**
 (c) State names of standard peripherals required for DSP chip meant for Power Electronics **07**
 Application. Justify requirement of each peripheral.
