DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

. Regular & Supplementary Winter Examination-2023

Course: B. Tech **Semester :V**

Branch: Electronics and Computer Engg. / Electronics and Computer Science Engg.

Subject Code & Name: Digital Signal & Image Processing (BTECPC502)

Max Marks: 60 **Date:03-01-24** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Show that the following signals are periodic or non-periodic a) $x(n) = e^{j7\pi n}$ b) $x(n) = 3e^{j\frac{3}{5}(n+\frac{1}{2})}$	CO1	6
B)	Write any 6 properties of Discrete Time Fourier Transform.	CO 2	6
C)	Find the Fourier transform of given signals. Also plot magnitude and phase. a) $x(n) = \delta(n)$ b) $x(n) = a^n\, u(n)$	CO 1	6
Q.2	**Solve Any Two of the following.**		**12**
A)	a) Compute the 4-point DFT of $x(n) = (-1)^n$ ….$0 \le n \le 3$ using matrix method. b) Perform linear convolution using circular convolution of given signals. $x(n) = \{2, 5, 0, 4\}, \quad h(n) = \{4, 1, 3\}$	CO2	6
B)	Find the inverse z-transform using long division method for given signal. $X(Z) = \frac{1 - 0.5Z^{-1}}{1 - 0.75Z^{-1}}$	CO 2	6
C)	Use initial value theorem to find the initial value of the signals. a) $X(Z) = \frac{2+Z^{-1}}{(1-Z^{-1})(1+0.5\,Z^{-1})}$ b) $X(Z) = \frac{1-3\,Z^{-1}}{(1-0.1\,Z^{-1})(1+0.6\,Z^{-1})}$	CO 2	6

Q. 3 Solve Any Two of the following. **12**

A) Define Image. Explain with neat sketch the human visual system. CO5 6

B) Perform Opening and Closing morphological operations on the given image. Use without replication. CO 4 6

0	1	1	1	0
0	1	1	1	0
0	1	1	1	0
0	1	1	1	0
0	1	1	1	0

Image

0	1	0
1	1	1
0	1	0

Mask

C) Explain Hit-Miss algorithm. Solve the following using Hit-Miss algorithm. CO 3 6

Image=

1	1	1	0
1	1	0	1
1	1	0	0

B=

(1)	0
0	1

W=

1	1
1	1

Q.4 Solve Any Two of the following. **12**

A) Write short notes on Thinning, Thickening and Region filling morphological operations. CO 5 6

B) Compute Discrete Cosine Transform matrix for N=4. CO 2 6

C) Explain in detail types of Smoothening filters and Sharpening filters. CO 4 6

Q. 5 Solve Any Two of the following. **12**

A) Explain the need of sampling and quantization. Explain briefly uniform and non-uniform quantizers. CO 3 6

B) Define histogram. What is the need of histogram equalization? Write the steps for histogram equalization. CO 3 6

C) Explain the following concepts CO 4 6

a) Region growing

b) Region merging and splitting

***** End *****