SOMAIYA
VIDYAVIHAR UNIVERSITY

	Semester:– January 2024 – April 2024	
Maximum Marks: 100	Examination: ESE Examination	Duration: 3 Hrs.
Programme code: 01 Programme: UG (B.Tech)	Class: TY	Semester: VII (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: Computers	
Course Code: 116U01C601	Name of the Course: Digital Signal and Image Processing	

Instructions: 1) Draw neat diagrams 2) All questions are compulsory
3) Assume suitable data wherever necessary

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	20
i)	Determine whether the following signal is periodic or not: $$x(n) = sin\frac{\pi}{8}n\wedge2$$	5
ii)	Given is a 3*3 image, plot its bit planes.	5

9	10	8
11	12	15
13	14	9

Que. No.	Question	Max. Marks
iii)	Explain in short different types of discrete time signals (any five).	5
iv)	Explain different mathematical operations on signals.	5
v)	Write a short note on digital negative.	5
vi)	Determine even and odd parts of the signal: $x(n) = \{2,-2,6,-2\}$ ↑	5

Que. No.	Question	Max. Marks
Q2 A	Test the following systems for time invariance:	10
i)	$y(n) = x(n) + x(n-1)$	05
ii)	$y(n) = 2nx(n)$	05
	OR	
Q2 A	Construct the block diagram and signal flow graph of the discrete time system whose input-output relations are described by following difference equation $y(n) = 0.4y(n-1)+x(n)-3x(n-2)$	10
Q 2 B	Solve	10
i)	An 8 point sequence is given by $x(n) = \{2,1,2,1,1,2,1,2\}$. Compute 8-point DFT of x (n) by radix-2 DIT-FFT.	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	20
i)	Explain the following spatial enhancement techniques with suitable example	10

	and state one application of each. a) Contrast stretching b) Log Transformation	
ii)	Compute the discrete cosine transform (DCT) matrix for N = 4.	10
iii)	Explain Low-pass Filtering in Frequency Domain	10

Que. No.	Question	Max. Marks
Q4	Solve any **Two**	20
i)	Describe Canny Edge Detector in detail with an example.	10
ii)	Using Hough transform show that the following points are collinear. Also find the equation of the line for (x,y) plane are (1,2) ; (2,3) and (3,4).	10
iii)	Explain different Morphological operations with necessary equations.	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any **four**	20
i)	Run Length Encoding.	5
ii)	JPEG Compression	5
iii)	Hoteling Transform	5
iv)	Vector Quantization	5
v)	Region Split and Merge based segmentation	5
vi)	Image Moments	5