K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Jan-Feb ~~Nov – Dec~~ 2026
B. Tech Program: AIDS Scheme I/II/IIB/III: III
Supplementary ~~Regular~~ Examination: TY Semester: V
Course Code: AIDLC5042 and Course Name: Image and Video Processing
Date of Exam: ~~28/11/2025~~ 02/02/26 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Perform histogram equalization on the following image: 2 5 3 5 2 2 5 6 5 2 1 1 1 2 1		CO2	AP
b)	Explain Run-Length Coding (RLC) with a suitable example and compute RLC for the sequence: 00000111110010100011.		CO4	AP
c)	Given the pixel value r = 213, perform bit-plane slicing by extracting bit-plane 0, 1, 2, and 7. Show the binary representation, extract each plane, and explain how these planes contribute to image reconstruction.		CO2	AP
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Explain the importance of the human visual system (HVS) in image perception. Describe brightness adaptation.		CO1	U
b)	Define sampling and quantization in digital image processing. Explain two differences.		CO1	U
c)	Explain 4-connected, 8-connected, and m-connected pixel connectivity with diagrams.		CO3	U
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Construct the Huffman code for: 0→8, 64→4, 128→3, 192→1		CO4	AP

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	Compute average code length and encoded bitstream.			
b)	You need to sharpen a 4K-resolution architectural image. Apply the concept of High-Boost filtering to propose an enhancement approach, and justify whether spatial-domain or frequency-domain filtering is better suited for this task based on computation and frequency control.		CO2	AP
c)	Apply Region Growing to the given image (threshold ≤ 4). (Consider 8 Adjutancy). Seed point is 13 (Highlighted in bold)		CO3	AP

11	23	22	25	20	26	19
14	25	16	14	11	16	21
25	20	27	26	18	**13**	23
26	18	13	13	22	17	27
10	22		12	28	21	12
17	11	12	25	17	28	16
24	15	25	11	28	29	24

Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	Discuss the effectiveness of Hadamard Transform. Compute 4×4 HT of x=[0,2,3,1].		CO4	AP
b)	A drone must track a running person, but due to limited bandwidth, video is down-sampled. (a) Apply sampling theory to explain how reducing frame rate affects motion-based object tracking. (b) Apply background modeling (running average or Gaussian) to a short frame sequence to detect motion regions.		CO5	AP
c)	Evaluate how AI-based satellite image processing supports environmental monitoring. Discuss two major challenges.		CO6	AP

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