

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: IMAGE PROCESSING & MACHINE VISION

Semester: II

Program: M.TECH. A & R

Time: 03 hrs.

Max. Marks: 100

CODE : ECEG 7004

Instructions: ATTEMPT ALL QUESTIONS

SECTION A (4Q X 5 Marks = 20 Marks)

S. No.		Marks	CO
Q 1	Explain the following: (i) Image restoration (ii) Segmentation	5	CO1
Q 2	Explain relational structures with the help of Quadtrees.	5	CO3
Q 3	Discuss Inverse filtering.	5	CO4
Q 4	Discuss 2-component image model in detail.	5	CO2

SECTION B (4Q X 10 Marks = 40 Marks)

Q 5	Explain topological data structures with the help of RAG (region adjacency graph).	10	CO3
Q 6	Explain following relational structures: (i) Pyramids (ii) Quadtrees	10	CO4
Q 7	Explain different edge detector operators. (atleast 5 operators 3 x 3 size)	10	CO5
Q 8	Name the following image operator application and discuss in detail. $\frac{1}{9} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}, \frac{1}{10} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	10	CO1

SECTION-C (2Q X 2 = 40 Marks)

Q 9	For the given image, apply any 3 x 3 edge operator.	20	CO4
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100	0	0	255	1	3
200	9	12	34	90	120
98	23	90	45	87	2
87	5	10	54	11	12
1	5	9	9	8	1
0	7	9	0	1	1

Q 10

For the given image details below, develop HAAR classifier with detailed steps.



106, 76px

437 × 258px

640 × 427px

20

CO5

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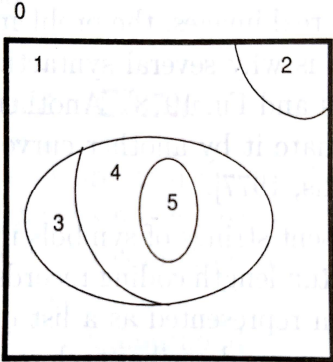
CODE: ECEG 7004

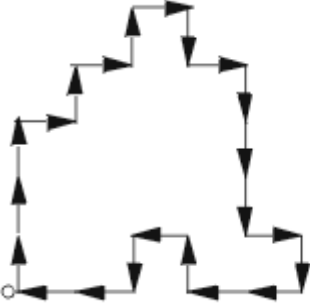
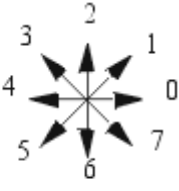
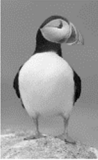

Instructions: ATTEMPT ALL QUESTIONS

SECTION A (4Q X 5 Marks = 20 Marks)

S. No.		Marks	CO
Q 1	Explain different types of image pre-processing in detail.	5	CO1
Q 2	Discuss Homomorphic filtering and compare it with other types of filtering.	5	CO2
Q 3	Discuss following for statistical pattern recognition. (i) Nearest neighbor technique (ii) Support vector machines	5	CO3
Q 4	Explain Clustering with the help of a 2-d feature space plot.	5	CO4

SECTION B (4Q X 10 Marks = 40 Marks)

Q 5	Derive following correlation expression for template matching. $Corr_T(x) = \sum_{i=1}^{r_T} \sum_{j=1}^{c_T} (T_{i,j} I_{x_a+i, x_b+j})$	10	CO3
Q 6	Derive RAG (regions adjacency graph) for following: 	10	CO2

Q 7	Break the following 5 x 5 operator into two separate operators of 1 x 5 and 5 x 1 size. $\begin{bmatrix} 1 & 4 & 6 & 4 & 1 \\ 4 & 16 & 24 & 16 & 4 \\ 6 & 24 & 36 & 24 & 6 \\ 4 & 16 & 24 & 16 & 4 \\ 1 & 4 & 6 & 4 & 1 \end{bmatrix}$	10	CO3
Q 8	Derive expression for Canny edge detection algorithm.	10	CO1
SECTION-C (2Q X 2 = 40 Marks)			
Q 9	(i) For the given image, apply any 3 x 3 edge operator. $\begin{matrix} 100 & 0 & 0 & 255 & 1 & 3 \\ 200 & 9 & 12 & 34 & 90 & 120 \\ 98 & 23 & 90 & 45 & 87 & 2 \\ 87 & 5 & 10 & 54 & 11 & 12 \\ 1 & 5 & 9 & 9 & 8 & 1 \\ 0 & 7 & 9 & 0 & 1 & 1 \end{matrix}$	20	CO5
Q 10	(i) Derive chain code for following: <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p>8-connected</p>  </div> </div>	10	CO4
	(i) Explain frequency domain local pre-processing in detail, and derive appropriate image processing for following image transformation. <div style="display: flex; justify-content: center; align-items: center; margin-top: 20px;">   </div>	10	