BOOKLET NUMBER : 6312

L. Irini

Facsimile of Principal

G. PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Nandikotkur Road, Kurnool - 518452

INTERNAL EXAMINATION ANSWER BOOK

Hall Ticket Number									
2	0	A	T	1	A	0	4	0	1

Regulations : R20

Program : B. Tech / M. Tech / MBA

Semester : I / II / III / IV / V / VI / VII / VIII

Name : S. Abdul Rehman

Branch : ECE

Name of the Subject : DIP

Date of Exam : 29/11/2023

S. Abdul Rehman
29/11/2023
Signature of the Student with Date

Signature of the Invigilator with Date

For Office Use Only

Candidates are required to read the instructions printed inside (Overleaf) very carefully.

Name of the Subject : DIP

To be filled in by the Examiner only

PART - A / PART - B

MARKS AWARDED

Q.No.	1	2	3	4	5	6	7
a	9			5	2	0	
b							
c							
d							
e							
f							
Total	9			5	2	0	
Total in Figures :	16						
Total in Words :	one six						

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Signature of the Examiner

INSTRUCTIONS TO THE CANDIDATES

1. This booklet contains 22 pages, Candidates must ensure it before writing and in case a defective answer book is issued it must be returned to the invigilator and a new and defect free answer book must be obtained.
2. All candidates must be present in the examination halls 15 minutes before the commencement examinations.
3. Candidates are allowed to sit as per the seating plan only.
4. Before the candidate begins to answer, hall ticket number, program, semester, subject name, branch. etc., are to be filled in. Failure to enter all or any of these particulars may disqualify the paper from valuation.
5. Candidate is prohibited from

   (a) writing :

   - Their hall ticket number in any part of their answer book. except in the space provided for on the title sheet of answer book,
   - Their name or any other matter or any symbol, which may lead to their identification in any part of the answer book.
   - Anything addressing the examiner in any manner whatsoever, in their answer book
   - Objectionable / obscene language in the answer book.
   - Anything other than their hall ticket number on the question paper.

   (b) Either seeking or providing any assistance to the fellow candidates in the exam.

   (c) Possessing a manuscript or a printed matter, in any form, in the examination hall.

   (d) Bringing loose sheets or paper into the examination hall and detaching any paper from the answer book.

   (e) Carrying Mobile Phone / Electronic Gadgets to Exam Hall.

Violation of these instructions will be viewed as a case of malpractice, which is a punishable offence.

6. Before beginning to answer any question, candidates must write the correct question number, in the margin only and should not write anything else in the margin.
7. Answer must be written legibly on both sides of the paper. It is not necessary to start each answer on a fresh page. Candidates should not use any other color for writing, except BLACK or BLUE.
8. All parts of the question must be answered in one place only.
9. Rough work, if any, must be separated. from the subject matter, by a line and noted as rough work.
10. The answer book, at the end of the examination, must be handed over to the Asst. Superintendent (Invigilator) by the candidate. This responsibility lies with the candidate only.
11. Candidates should maintain absolute silence during the time of examination. Misbehaviour. in any form, by the candidate, in the examination hall, will attract severe punishment.
12. Candidates are permitted to leave the examination hall only after the expiry of half of the allotted time and candidates will be permitted to carry the question paper only when they are leaving the exam hall in the last half an-hour.
13. No additional answer books will be supplied.

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START WRITING FROM HERE

1) a) Smoothing filter

Smoothing filter are mostly used for blurring and for noise reduction.

→ Lowpass spatial filtering

For a 3×3 spatial filter; a mask in which all Co-efficients have a value of '1' is arranged and Scale the Sum by dividing 'R' by 9.

$\frac{1}{9} \times$

1	1	1
1	1	1
1	1	1

$\frac{1}{25} \times$

1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

This is Called neighbourhood averaging.

→ Median Filtering:

The gray level of each pixel is replaced by the median of the gray levels in a neighbourhood of that pixel, instead of averaging.

- Median filtering is effective when noise pattern Contains a strong spike like Components.

→ i) All elements are arranged in ascending & descending order.

ii) The median of the sorted value is Chosen as pixel value

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(i)

1	3	5
7	108	2
2	3	4

1 2 2 3 3 4 5 7 108.

3 is median.

1	3	5
7	(3)	2
2	3	4

b) Sharpening filters:

The objective of Sharpening filter is to highlight fine detail in an image (or) to enhance detail that has been blurred.

→ High pass Spatial filtering:

The shape of impulse response needed to implement a high pass Spatial filtering indicates that the filter should have positive Co-efficient in Centre and negative Co-efficient around it.

-1	-1	-1
-1	8	-1
-1	-1	-1

The filter eliminates zero frequency.

→ for more effective use, high boost filtering.

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High boost filtering

High boost filtering sharpen the image more effectively

High pass filtered image = original - Low pass filtered image

High boost = (A) (original) - Low pass ; A = Amplification factor

= (A-1) (original) + original - Low pass

∴ High boost = (A-1) (original) + High pass filtered image

i) A=1 ; yields standard high pass result.

ii) A>1 ; part of original is added back to high pass result, which restores.

Substracting a blurred image from original is called "unsharpmasking".

Derivative filters

Averaging of pixels over a region tends to blur detail in an image.

→ The most common method of differentiation in image processing applications is the "gradient".

$$\nabla f = \begin{bmatrix} \frac{\partial f}{\partial x} \\ \frac{\partial f}{\partial y} \end{bmatrix}$$

mag of ∇f, $\nabla F = \left[\left(\frac{\partial f}{\partial x}\right)^2 + \left(\frac{\partial f}{\partial y}\right)^2 \right]^{1/2}$.

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4) Thresholding:

$f(x,y)$ is an image with light object on dark background.

The way to extract objects from background is to select a threshold 'T' that separates these nodes and point (x,y) in image. at which

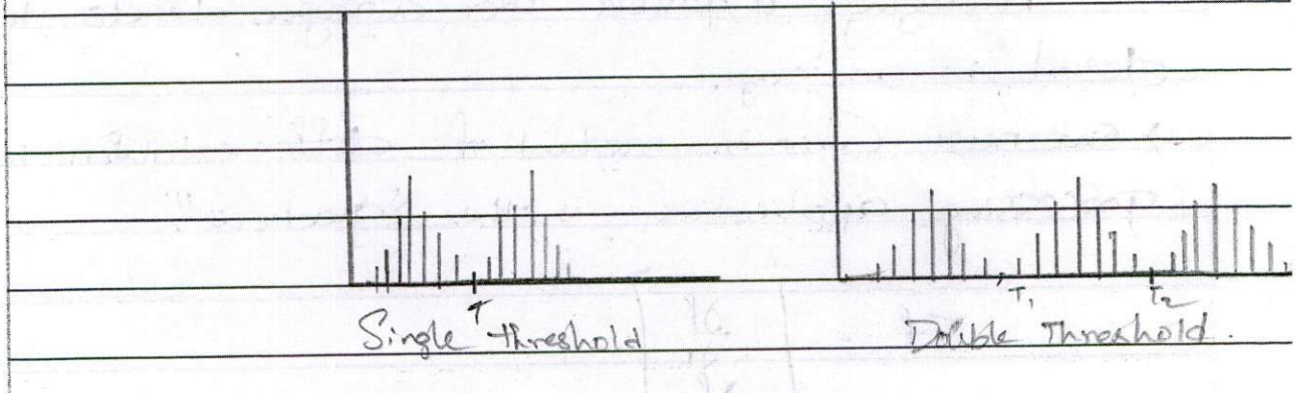
$f(x,y) > T$ is called an object point,

otherwise the point is called background point.

Segmented image $g(x,y) = \begin{cases} 1, & \text{if } f(x,y) > T \\ 0, & \text{if } f(x,y) \leq T \end{cases}$

where T is constant applicant over an entire imag

This process is reffered as Global thresholding



Global thresholding:

The following iterative algorithms is used for estimating automatically the threshold value for each image.

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1) Select an initial estimate for global threshold 'T'

2) Segment the image using 'T'.

3) Compute the average intensity values m_1 & m_2 for the pixels

4) Compute new threshold,

$$T = \frac{m_1 + m_2}{2}$$

5) Repeat Step 2-4 until difference between values of 'T' in Successive iterations is Smaller than a Predefined parameter, ΔT.

6) Given transmission of message, "went."

Code - Tree

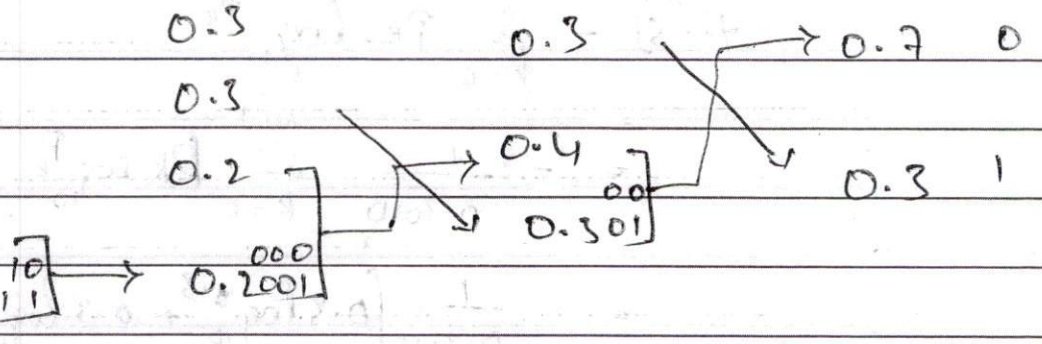
$P(e) = 0.3$

$P(n) = 0.3$

$P(t) = 0.2$

$P(w) = 0.1$

$P(.) = 0.1$



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Code word

character	Probability	C.W	Length of Code word
e	0.3	01	2
n	0.3	01	2
t	0.2	00	0
w	0.1	10	2
.	0.1	11	2

Length of message

$$L = P_0L_0 + P_1L_1 + P_2L_2 + P_3L_3 + P_4L_4$$

$$= 0.3\times 2 + 0.3\times 2 + 0.2\times 0 + 0.1\times 2 + 0.1\times 2$$

$$= 0.3 + 0.3 + 0 + 0.2 + 0.2$$

$$L = 1$$

$$H(S) = \sum_{k=0}^{N-1} P_k \log_2 \frac{1}{P_k}$$

$$= -\frac{1}{0.3010} \sum_{k=0}^{N-1} P_k \log_{10} P_k$$

$$= -\frac{1}{0.3010}\left(0.3\log_{10}0.3 + 0.3\log_{10}0.3 + 0.2\log_{10}0.2 + 0.1\log_{10}0.1 + 0.1\log_{10}0.1\right)$$

$$= -\frac{1}{0.3010}($$

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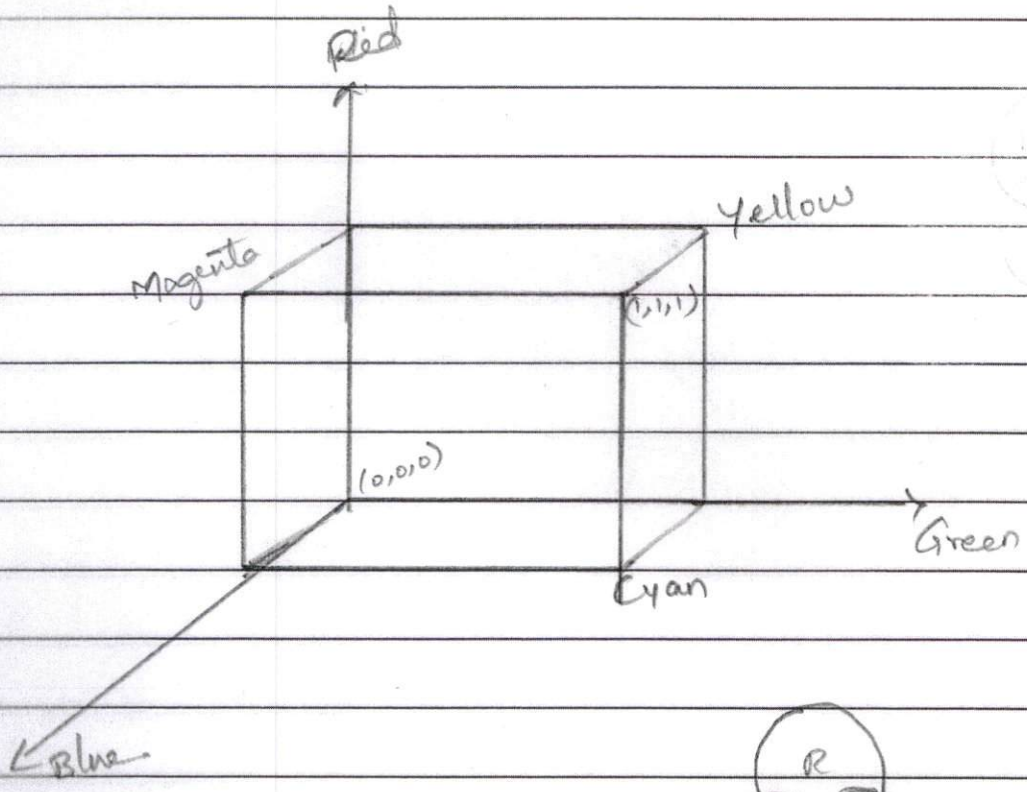
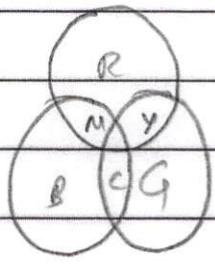
6

5) RGB

→ RGB model is Red, Green, Blue model.

→ An image consists of this 3 colours of their mixture.





Mixing of R, G, B colours forms CMY colours.

CMY

→ CMY represents Cyan Magenta Yellow.

Red + Green = Yellow

Blue + Green = Cyan

Blue + Red = Magenta.

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