**Name:**

**Enrolment No:**

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

**Course: Digital Image Processing (GIEG 323)** **Semester: VI**
**Program: B.Tech (CSE with specialization in BAO, BFSI, CCVT, CSF, ERA, MFT, OGI, HI)**
**Time: 03 hrs.** **Max. Marks: 100**

**Instructions: All sections are compulsory.**
**In section B, Question number 9 and 10 has internal choice to attempt.**
**In section C, Question number 12 and 13 has internal choice to attempt.**

## SECTION A

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Define Digital image. What is a pixel and how does it relate to the resolution of image? | **4** | **CO1** |
| Q 2 | What is Geometric transformation? Explain them with applications. | **4** | **CO1** |
| Q 3 | Describe the Gaussian High Pass Filter along with its usage. | **4** | **CO2** |
| Q 4 | Explain the process of image sharpening and smoothing in digital image processing. | **4** | **CO3** |
| Q 5 | Explain the 4 categories of image pre-processing methods in spatial domain. | **4** | **CO4** |
| | **SECTION B** | | |
| Q 6 | Explain the process of Contrast Enhancement using Histogram Equalization in gray scale image. Calculate full scale contrast stretch for following:<br>2 8 9 9<br>2 3 10 9<br>8 3 3 11<br>8 3 10 11 | **10** | **CO1** |
| Q 7 | Describe Inverse and Pseudo inverse filtration process for image restoration. | **10** | **CO5** |
| Q 8 | Explain all the related image derivatives involved in line and edge detection required for gray scale image segmentation. | **10** | **CO5** |
| Q 9 | Explain all the Linear and Non-Linear Spatial Filters. | **10** | **CO2** |
| | OR | | |
| Q 10 | Compute the (2,4) output pixel of correlation for following using Spatial filtering process | **10** | **CO2** |

| | | | |
|---|---|---|---|
| | A =<br>17 24 1 8 15<br>23 5 7 14 16<br>4 6 13 20 22<br>10 12 19 21 3<br>11 18 25 2 9<br><br>And the correlation kernel is h =<br>8 1 6<br>3 5 7<br>4 9 2 | | |
| **SECTION-C** | | | |
| Q 11 | Differentiate between Erosion and Dilation processes used in morphological image processing. | **20** | **CO3** |
| Q 12 | Explain the advantages of Canny Edge detector used in image segmentation. | **20** | **CO4** |
| | OR | | |
| Q 13 | Explain Marr-Hildreth Edge Detector used in image segmentation. | **20** | **CO4** |

# CONFIDENTIAL ✓

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|---|---|---|---|---|---|---|---|
| **Name of Examination** (Please tick, symbol is given) | : | **MID** | | **END** | ✓ | **SUPPLE** | |
| **Name of the School** (Please tick, symbol is given) | : | **SOE** | | **SOCS** | ✓ | **SOP** | |
| **Programme** | : | **B.Tech (CSE with specialization in BAO, BFSI, CCVT, CSF, ERA, MFT, OGI, HI)** | | | | | |
| **Semester** | : | **VI** | | | | | |
| **Name of the Course** | : | **Digital Image Processing** | | | | | |
| **Course Code** | : | **GIEG 323** | | | | | |
| **Name of Question Paper Setter** | : | **Dr. Durgansh Sharma** | | | | | |
| **Employee Code** | : | **40001612** | | | | | |
| **Mobile & Extension** | : | **9999014029 & 1733** | | | | | |

**Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE": NOT APPLICABLE**

## FOR SRE DEPARTMENT

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**Note: - Pl. start your question paper from next page**

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**SECTION A**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | What is a Color Model? Mention the list hardware oriented color models and their applications. | 4 | CO1 |
| Q 2 | What is image translation, image rotation and scaling? | 4 | CO1 |
| Q 3 | Describe the Butterworth High Pass Filter along with its usage. | 4 | CO2 |
| Q 4 | Explain Fast Fourier transform and its usage in digital image processing. | 4 | CO3 |
| Q 5 | Explain the usage of negative transforms and Log transforms in DIP. | 4 | CO4 |
| | **SECTION B** | | |
| Q 6 | What is HIS Model? Describe the conversion from (RGB to HIS) Model and (HIS to RGB) Model. | 10 | CO1 |
| Q 7 | Explain the process of Contrast Enhancement using Histogram Equalization in gray scale image. Calculate full scale contrast stretch for following:<br>3 11 8 3<br>10 11 8 3<br>9 9 2 8<br>10 9 2 3 | 10 | CO5 |
| Q 8 | Describe the Weiner filter process for image restoration. | 10 | CO5 |
| Q 9 | Explain the spatial correlation and convolution for spatial filtering process. | 10 | CO2 |
| | OR | | |
| Q 10 | Explain all the operational steps involved in spatial filtering process. | 10 | CO2 |
| | **SECTION-C** | | |
| Q 11 | How does Opening and Closing processes eliminates small holes and fills gaps in contours | 20 | CO3 |
| Q 12 | Explain the process of boundary extraction and its advantage towards the process of edge detection in morphological image processing. | 20 | CO4 |

| | | | |
|---|---|---|---|
| | OR | | |
| Q 13 | Explain the utility of Canny edge detector in the process of image segmentation. | **20** | **CO4** |