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| **Name:**<br>**Enrolment No:** | UPES UNIVERSITY WITH A PURPOSE |

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**
**End Semester Examination, July 2020**

**Course: B.Tech CSE+BAO** **Semester: VI**
**Program: Digital Image Processing** **Time : 02 hrs.**
**Course Code: CSEG3001** **Max. Marks: 60**

**Instructions:**

**SECTION A**

**Each question carry one marks for correct answer.**

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| 1 | MC | The spatial coordinates of a digital image (x,y) are proportional to: | Position | **incorrect** | Brightness | correct | Contrast | incorrect | Noise | incorrect |
| 2 | MC | Among the following image processing techniques which is fast, precise and flexible. | Optical | incorrect | Electronic | incorrect | Photographic | incorrect | Digital | correct |
| 3 | MC | An image is considered to be a function of a(x,y), where a represents: | Height of image | incorrect | Width of image | **incorrect** | Amplitude of image | correct | Resolution of image | incorrect |
| 4 | MC | What is the first and foremost step in Image Processing? | Image restoration | inco | Image enhancement | incor | Image acquisition | corre | Segmentation | incor |

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| | | | | rrect | | rect | | ct | | rect |
| 5 | MC | What is the next step in image processing after compression? | Wavelets | incorrect | Segmentation | incorrect | Representation and description | incorrect | Morphological processing | correct |
| 6 | MC | What is the step that is performed before color image processing in image processing? | Image restoration | correct | Wavelets and multi resolution processing | incorrect | Image enhancement | incorrect | Image acquisition | incorrect |
| 7 | MC | To convert a continuous sensed data into Digital form, which of the following is required? | Sampling | incorrect | Quantization | incorrect | Both Sampling and Quantization | correct | Neither Sampling nor Quantization | incorrect |
| 8 | MC | To convert a continuous image f(x, y) to digital form, we have to sample the function in __________ | Coordinates | incorrect | Amplitude` | incorrect | All of the mentioned | correct | None of the mentioned | incorrect |
| 9 | MC | For a continuous image f(x, y), how could be Sampling defined? | Digitizing the coordinate values | correct | Digitizing the amplitude values | incorre | All of the mentioned | incorre | None of the mentioned | incorre |

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| 10 | MC | For a continuous image f(x, y), Quantization is defined as | Digitizing the coordinate values | incorrect | Digitizing the amplitude values | correct | All of the mentioned | incorrect | None of the mentioned | incorrect |
| 11 | MC | Assume that an image f(x, y) is sampled so that the result has M rows and N columns. If the values of the coordinates at the origin are (x, y) = (0, 0), then the notation (0, 1) is used to signify : | Second sample along first row | correct | image enhancement | incorrect | First sample along first row | incorrect | Second sample along second row | incorrect |
| 12 | MC | Let Z be the set of real integers and R the set of real numbers. The sampling process may be viewed as partitioning the x-y plane into a grid, with the central coordinates of each grid being from the Cartesian product Z2, that is a set of all ordered pairs (zi, zj), with zi and zj being integers from Z. Then, f(x, y) is said a digital image if: | (x, y) are integers from Z2 and f is a function that assigns a gray-level value (from Z) to each distinct pair of coordinates (x, y) | incorrect | (x, y) are integers from Z2 and f is a function that assigns a gray-level value (from R) to each distinct pair of coordinates (x, y) | correct | (x, y) are integers from R2 and f is a function that assigns a gray-level value (from R) to each distinct pair of coordinates (x, y) | incorrect | (x, y) are integers from R2 and f is a function that assigns a gray-level value (from Z) to each distinct pair of coordinates (x, y) | incorrect |
| 13 | MC | Let Z be the set of real integers and R the set of real numbers. The sampling process may be viewed as partitioning the x-y plane into a grid, with the central coordinates of each grid being from the Cartesian product Z2, that is a set of all ordered pairs (zi, zj), with zi and zj being integers from Z. Then, f(x, y) is a digital image if (x, y) are integers from Z2 and f is a | The Digital image then becomes a 1-D function whose coordinates and amplitude values are integers | incorrect | The Digital image then becomes a 2-D function whose coordinates and amplitude values are integers | correct | The gray level can never be integer | incorrect | None of the mentioned | incorrect |

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| | | function that assigns a gray-level value (that is, a real number from the set R) to each distinct coordinate pair (x, y). What happens to the digital image if the gray levels also are integers? | | | | | | | | |
| 14 | MC | The digitization process i.e. the digital image has M rows and N columns, requires decisions about values for M, N, and for the number, L, of max gray levels. There are no requirements on M and N, other than that M and N have to be positive integer. However, the number of gray levels typically is | Two times the integer value i.e. L = 2k | incorrect | A Real power of 2 i.e. L = 2k | incorrect | An integer power of 2 i.e. L = 2k | correct | None of the mentioned | incorrect |
| 15 | MC | After digitization process a digital image with M rows and N columns have to be positive and for the number, L, max gray levels i.e. an integer power of 2 for each pixel. Then, the number b, of bits required to store a digitized image is: | b=L*N*k | incorrect | b=M*L*k | incorrect | b=M*N*L | incorrect | b=M*N*k | correct |
| 16 | MC | In digital image of M rows and N columns and L discrete gray levels, calculate the bits required to store a digitized image for M=N=32 and L=16. | 4096 | correct | 16384 | incorrect | 8192 | incorrect | 512 | incorrect |
| 17 | MC | What is the tool used in tasks such as zooming, shrinking, rotating, etc.? | Sampling | incorrect | Interpolation | correct | Filters | incorrect | None of the mentioned | incorrect |

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| 18 | MC | The type of Interpolation where for each new location the intensity of the immediate pixel is assigned is ____________ | bicubic interpolation | incorrect | cubic interpolation | incorrect | bilinear interpolation | incorrect | nearest neighbour interpolation | correct |
| 19 | MC | The type of Interpolation where the intensity of the FOUR neighbouring pixels is used to obtain intensity a new location is called ___________ | cubic interpolation | incorrect | nearest neighbour interpolation | incorrect | bilinear interpolation | correct | bicubic interpolation | incorrect |
| 20 | MC | The most familiar single sensor used for Image Acquisition is | Microdensitometer | incorrect | Photodiode | correct | CMOS | incorrect | None of the mentioned | incorrect |
| 21 | MC | The difference is intensity between the highest and the lowest intensity levels in an image is ____________ | Noise | incorrect | Saturation | incorrect | Contrast | correct | Brightness | incorrect |
| 22 | MC | ______________ is the effect caused by the use of an insufficient number of intensity levels in smooth areas of a digital image. | False Contouring | correct | Gaussian smooth | incorrect | Contouring | incorrect | Interpolation | incorrect |
| 23 | MC | The procedure done on a digital image to alter the values of its individual pixels is | Neighbourhood | inc | Image Registration | inc | Geometric Spacial | inc | Single Pixel Operation | cor |

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| | | | Operations | orrect | | orrect | Transformation | orrect | | rect |
| 24 | MC | Of the following, __________ has the maximum frequency. | UV Rays | incorrect | Gamma Rays | correct | Microwaves | incorrect | Radio Waves | incorrect |
| 25 | MC | Which of the following is impractical to measure? | Brightness | correct | Frequency | incorrect | Radiance | incorrect | Luminance | incorrect |
| 26 | MC | Which of the following is used for chest and dental scans? | Gama rays | incorrect | Soft X-Rays | correct | Radio Waves | incorrect | Infrared Rays | incorrect |
| 27 | MC | A commercial use of Image Subtraction is ____________ | Mask mode radiography | correct | MRI scan | incorrect | CT scan | incorrect | None of the mentioned | incorrect |
| 28 | MC | Region of Interest (ROI) operations is commonly called as ____________ | Masking | corre | Shading correction | incorr | Dilation | incorr | None of the mentioned | incorr |

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| | | | | ct | | ect | | ect | | ect |
| 29 | MC | If every element of a set A is also an element of a set B, then A is said to be a _________ of set B. | Disjoint set | incorrect | Complement set | incorrect | Union | incorrect | Subset | correct |
| 30 | MC | Consider two regions A and B composed of foreground pixels. The ________ of these two sets is the set of elements belonging to set A or set B or both. | XOR | incorrect | NOT | incorrect | OR | correct | AND | incorrect |
| 31 | MC | Image processing approaches operating directly on pixels of input image work directly in _____________ | Transform domain | incorrect | Spatial domain | correct | Inverse transformation | incorrect | None of the mentioned | incorrect |
| 32 | MC | Median filter belongs to which category of filters? | Linear spatial filter | incorrect | Frequency domain filter | incorrect | Sharpening filter | incorrect | Order static filter | correct |
| 33 | MC | Which of the following expression is used to denote spatial domain process? | g(x,y)=T[f(x,y)] | correct | f(x+y)=T[g(x+y)] | incorrect | g(xy)=T[f(xy)] | incorrect | g(x-y)=T[f(x-y)] | incorrect |

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| 34 | MC | Which of the following shows three basic types of functions used frequently for image enhancement? | Linear, logarithmic and inverse law | incorrect | Power law, logarithmic and inverse law | correct | Linear, logarithmic and power law | incorrect | Linear, exponential and inverse law | incorrect |
| 35 | MC | Which expression is obtained by performing the negative transformation on the negative of an image with gray levels in the range[0,L-1] ? | s=L+1-r | incorrect | s=L+1+r | incorrect | s=L-1-r | correct | s=L-1+r | incorrect |
| 36 | MC | What is the general form of representation of log transformation? | $s=c\log_{10}(1/r)$ | incorrect | $s=c\log_{10}(1-r)$ | incorrect | $s=c\log_{10}(1*r)$ | incorrect | $s=c\log_{10}(1+r)$ | correct |
| 37 | MC | What is the general form of representation of power transformation? | $s=cr^{\gamma}$ | correct | $c=sr^{\gamma}$ | incorrect | s=rc | incorrect | $s=rc^{\gamma}$ | incorrect |
| 38 | MC | If f(x,y) is an image function of two variables, then the first order derivative of a one dimensional function, f(x) is: | f(x+1)-f(x) | correct | f(x)-f(x+1) | incorrect | f(x-1)-f(x+1) | incorrect | f(x)+f(x-1) | incorrect |
| 39 | MC | In spatial domain, which of the following operation is | Integration | inc | Average | inc | Median | inc | Differentiation | cor |

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| | | done on the pixels in sharpening the image? | | orrect | | orrect | | orrect | | rect |
| 40 | MC | The derivative of digital function is defined in terms of difference. Then, which of the following defines the second order derivative $\partial^2 f/\partial x^2$ = ___________ of a one-dimensional function f(x)? | f(x+1)-f(x) | incorrect | f(x+1)+ f(x-1)-2f(x) | correct | All of the mentioned depending upon the time when partial derivative will be dealt along two spatial axes | incorrect | None of the mentioned | incorrect |
| 41 | MC | What is the difference between Convolution and Correlation? | Image is pre-rotated by 180 degree for Correlation | incorrect | Image is pre-rotated by 180 degree for Convolution | correct | Image is pre-rotated by 90 degree for Correlation | incorrect | Image is pre-rotated by 90 degree for Convolution | incorrect |
| 42 | MC | The function that contains a single 1 with the rest being 0s is called _______________ | Identity function | incorrect | Inverse function | incorrect | Discrete unit impulse | correct | None of the mentioned | incorrect |
| 43 | MC | Which of the following conditions does the threshold T(r) must satisfy? | T(r) is double-valued and monotonically decreasing in the interval $0 \le r \le 1$; and | incorrect | T(r) is double-valued and monotonically increasing in the interval $0 \le r \le 1$; and | incorrect | T(r) is single-valued and monotonically decreasing in the interval $0 \le r \le 1$; and | incorrect | T(r) is single-valued and monotonically increasing in the interval $0 \le r \le 1$; and | correct |

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| | | | $0 \le T(r) \le 1$ for $0 \le r \le 1$ | | $0 \le T(r) \le 1$ for $0 \le r \le 1$ | | $0 \le T(r) \le 1$ for $0 \le r \le 1$ | | $0 \le T(r) \le 1$ for $0 \le r \le 1$ | |
| 44 | MC | Histogram equalization or Histogram linearization is represented by of the following equation: | $s_k = \sum^{k}_{j=1} n_j/n$ k=0,1,2,……,L-1 | incorrect | $s_k = \sum^{k}_{j=0} n_j/n$ k=0,1,2,……,L-1 | correct | $s_k = \sum^{k}_{j=0} n/n_j$ k=0,1,2,……,L-1 | incorrect | $s_k = \sum^{k}_{j=n} n_j/n$ k=0,1,2,……,L-1 | incorrect |
| 45 | MC | While performing the median filtering, suppose a 3*3 neighborhood has value (10, 20, 20, 20, 15, 20, 20, 25, 100), then what is the median value to be given to the pixel under filter? | 20 | correct | 15 | incorrect | 100 | incorrect | 25 | incorrect |
| 46 | MC | In linear spatial filtering, what is the pixel of the image under mask corresponding to the mask coefficient w (1, -1), assuming a 3*3 mask? | f (x, -y) | incorrect | f (x + 1, y) | incorrect | f (x, y – 1) | incorrect | f (x + 1, y – 1) | correct |
| 47 | MC | Which of the following is/are considered as type(s) of lowpass filters? | Ideal | incorrect | Butterworth | incorrect | Gaussian | incorrect | All of the mentioned | correct |
| 48 | MC | If, $F_{hp}(u, v)=F(u, v) – F_{lp}(u, v)$ and $F_{lp}(u, v) = H_{lp}(u, v)F(u, v)$, where $F(u, v)$ is the image in frequency domain with $F_{hp}(u, v)$ its highpass filtered version, $F_{lp}(u, v)$ its lowpass filtered component and $H_{lp}(u, v)$ the transfer function of a lowpass filter. Then, unsharp masking can be implemented directly | $H_{hp}(u, v) = H_{lp}(u, v)$ | incorrect | $H_{hp}(u, v) = 1 + H_{lp}(u, v)$ | incorrect | $H_{hp}(u, v) = – H_{lp}(u, v)$ | incorrect | $H_{hp}(u, v) = 1 – H_{lp}(u, v)$ | correct |

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| | | in frequency domain by using a filter. Which of the following is the required filter? | | | | | | | | |
| 49 | MC | Which of the following is the useful descriptor of a boundary, whose value is given by the ratio of length of the major axis to the minor axis? | Radius | incorrect | Eccentricity | correct | Perimeter | incorrect | Area | incorrect |
| 50 | MC | Based on the 4-directional code, the first difference of smallest magnitude is called as: | Shape Number | correct | Chain Number | incorrect | Difference | incorrect | Difference Number | incorrect |
| 51 | MC | What is the set of pixels of 8-neighbors of pixel p at coordinates (x, y)? | (x+1, y), (x-1, y), (x, y+1), (x, y-1), (x+2, y), (x-2, y), (x, y+2), (x, y-2) | incorrect | (x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2) | incorrect | (x+2, y), (x-2, y), (x, y+2), (x, y-2), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2) | incorrect | None of the mentioned | correct |
| 52 | MC | Opening morphological operators with rolling structuring element (SE) | Sharps | incorrect | Shrinks | incorrect | Smooths | correct | Deletes | incorrect |
| 53 | MC | Hit-or-miss transformation is used for shape | removal | incorrect | detection | correct | compression | incorrect | padding | incorrect |

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| 54 | MC | (AoB)oB is equal to | A.B | incorrect | A+B | incorrect | A o B | correct | A x B | incorrect |
| 55 | MC | Best removal of lines from image will be produced by the structuring element (SE) of size | 5 x 5 | correct | 1 x 1 | incorrect | 2 x 2 | incorrect | 3 x 3 | incorrect |
| 56 | MC | The reflection of set B is the | {w\|w = -(-b)} | incorrect | {w = -b} | incorrect | {w\|w = b} | incorrect | {w\|w = -b} | correct |
| 57 | MC | What is meant by probability density function? | Probability distributions | incorrect | Continuous variable | incorrect | Discrete variable | incorrect | Probability distributions for Continuous variables | correct |
| 58 | MC | Automated vehicle is an example of ______ | Supervised learning | correct | Unsupervised learning | incorrect | Active learnin | incorrect | Reinforcement learning | incorrect |
| 59 | MC | Based on the 4-directional code, the first difference of | Shape number | cor | Chain number | inc | Difference | inc | Difference Number | inc |

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| | | smallest magnitude is called as: | | rect | | orrect | | orrect | | orrect |
| 60 | MC | Which of the following techniques of boundary descriptions have the physical interpretation of boundary shape? | Fourier transform | incorrect | Statistical moments | correct | Laplace transform | incorrect | Curvature | incorrect |