

# Model Question Paper-1/2 with effect from 2021(CBCS Scheme)

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## Sixth Semester B.E. Degree Examination

### COMPUTER GRAPHICS AND FUNDAMENTALS OF IMAGE PROCESSING

TIME: 03 Hours

Max. Marks: 100

- Note: 01. 02. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
03.  
04.

Module -1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	What is computer graphics? Explain the applications of computer graphics.	L1	1	8
	b	Explain the Architecture of a raster-graphics system with a display processor.	L2	1	6
	c	Explain DDA line drawing algorithm with procedure.	L1	1	6
OR					
Q.02	a	Define the terms i) Resolution ii) Aspect ratio iii) Pixel. iv)Bitmap v) Frame buffer	L1	1	5
	b	Explain the operations for displaying a picture using GLUT.	L2	1	7
	c	Explain Bresenham's Line drawing algorithm. Digitize the line by using Bresenham's Line drawing algorithm with end points (20,10) and (30,18) having slope 0.8	L3	1	8
Module-2					
Q. 03	a	Explain the basic 2D geometric transformations in detail with snippet of code for each.	L2	2	9
	b	Write a note on inverse transformations. Derive matrices for each.	L1	2	6
	c	Show that i) two successive rotations are additive and ii) two successive scaling are multiplicative.	L3	2	5
OR					
Q.04	a	Explain two-dimensional pivot point scaling with neat sequences of an object. Explain with matrix representations and equations	L3	2	8
	b	What are homogeneous coordinates? Explain 3D transformations with homogeneous coordinate approach and derive matrices for each.	L2	2	6
	c	Explain i) Reflection and ii) Shear	L1	2	6
Module-3					
Q. 05	a	Define computer animation. Explain the stages to design animation sequences.	L1	3	6
	b	Explain OpenGL interactive input device functions. i) GLUT Keyboard functions ii) GLUT Mouse functions.	L2	3	6
	c	Discuss Interactive picture construction techniques.	L2	3	8
OR					
Q. 06	a	Explain the logical classification of input devices	L1	3	6
	b	How are menus and submenus are created in open-gl? Illustrate with an example.	L2	3	8
	c	Write a complete opengl program to demonstrate animation effects on simple object.	L3	3	6

<b>Module-4</b>																					
Q. 07	a	Define image processing, List, and explain types of images.	L1	4	6																
	b	Given a gray scale image of size 5 inches by 6 inches scanned at the rate of 300 dpi answer the following i) How many bits are required to represent the image? ii) How much time is required to transmit the image if the modem is 28 kbps? iii) Repeat the aforementioned if it were a binary image	L3	4	8																
	c	Consider an image point [2, 2]. Perform the following operations and show the results of these transforms. a) Translate the image right by 3 units. b) Perform scaling operation in both x-axis and y axis by 3 units. c) Rotate the image in x axis by $45^{\circ}$	L3	4	6																
OR																					
Q. 08	a	Discuss the practical applications of Classification of Image processing Operations. i) Arithmetic operations ii) Logical operations iii) Geometrical operations	L2	4	6																
	b	Define Euclidian distances $D_4$ , $D_8$ . Let $V = \{0, 1\}$ . Compute the $D_e$ , $D_4$ , and $D_8$ distances between two pixels p and q. Let the pixel coordinates of p and q be (3,0) and (2,3) respectively for the image given below. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	L3	4	6
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1	0	0	1																		
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1	1	1	1																		
	c	Explain the fundamental steps in image processing.	L1	4	8																
<b>Module-5</b>																					
Q. 09	a	Explain in detail stages of Edge detection process with block diagram.	L1	5	8																
	b	Explain the steps in automatic image analysis and interpretation.	L2	5	6																
	c	Explain canny edge detection algorithm.	L3	5	6																
OR																					
Q. 10	a	What is image segmentation? Classify the image segmentation algorithms.	L2	5	8																
	b	Explain first order edge detection operators i) Roberts operator ii) Prewitt operator iii) Sobel operator	L3	5	6																
	c	Explain Edge detection with an example. List the types of edges.	L1	5	6																

\*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

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## Sixth Semester B.E. Degree Examination Computer Graphics and Fundamentals of Image Processing

TIME: 03 Hours

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Define Computer Graphics. Explain the basic operation of video monitors based on standard CRT design.	L1	CO1	(06 Marks)
	b	Briefly explain the characteristics of raster scan displays method.	L1	CO1	(06 Marks)
	c	Explain a) Colour CRT Monitors. b) Flat-Panel Displays.	L1	CO1	(08 Marks)
OR					
Q.02	a	Explain line drawing algorithms, shows line path between endpoint positions.	L2	CO1	(06 Marks)
	b	Define the following terms with respect to i) Bitmap ii) Pixmap iii) Aspect Ratio iv) Frame Buffer.	L1	CO1	(08 Marks)
	c	Provide the steps of Bresenham line drawing algorithm and apply the algorithm on endpoints as (20, 10) and (30, 18).	L1	CO1	(06 Marks)
Module-2					
Q.03	a	Explain translation, rotation, scaling in 2D homogeneous coordinate system with matrix representation.	L1	CO2	(08 Marks)
	b	With a neat diagram explain 3D Translation and also show the transformation matrix in Homogenous Coordinate System.	L2	CO2	(06 Marks)
	c	Briefly explain shear method of two-dimensional transformations.	L2	CO2	(06 Marks)
OR					
Q.04	a	Briefly explain reflection method of two-dimensional transformations.	L2	CO2	(06 Marks)
	b	Explain general two dimensional pivot point rotation and derive the composite matrix.	L1	CO2	(08 Marks)
	c	Provide a simple Example for OpenGL 3D Transformations.	L1	CO2	(06 Marks)
Module-3					
Q.05	a	Explain the following Picture construction techniques a. Basic Positioning Methods. b. Dragging.	L1	CO3	(08 Marks)
	b	Explain the various Mouse and Keyboard functions available in GLUT.	L1	CO3	(06 Marks)
	c	Explain the various components and types of Computer Animation Languages.	L2	CO3	(06 Marks)
OR					
Q.06	a	Explain in details about logical classification of input devices.	L2	CO3	(06 Marks)
	b	Write a note on open GL animation procedure.	L2	CO3	(06 Marks)
	c	Explain how character animation is achieved using a. Articulated Figure Animations. b. Motion Capture.	L1	CO3	(08 Marks)

<b>Module-4</b>					
Q.07	a	Define image processing? With a neat diagram explain the nature of image processing environment.	L1	CO4	(08 Marks)
	b	Briefly explain the function of digital image representation.	L2	CO4	(06 Marks)
	c	List and explain the colour classification of images.	L2	CO4	(06 Marks)
OR					
Q.08	a	Briefly explain the image processing and other closely related fields.	L2	CO4	(06 Marks)
	b	Explain a) Image Topology b) Connectivity.	L1	CO4	(08 Marks)
	c	Explain translation, scaling, and reflection operation in image processing.	L1	CO4	(06 Marks)
<b>Module-5</b>					
Q.09	a	What is segmentation? Explain different characteristics of segmentation.	L1	CO5	(08 Marks)
	b	List and explain the types of segmentation algorithms based on user interaction.	L1	CO5	(06 Marks)
	c	Explain about different types of edge detectors.	L1	CO5	(06 Marks)
OR					
Q.10	a	Explain canny edge detection algorithm in detail.	L2	CO5	(05 Marks)
	b	Explain contextual and Non-contextual algorithms.	L1	CO5	(07 Marks)
	c	Explain about point detection and line detection.	L1	CO5	(08 Marks)

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### Sixth Semester B.E. Degree Examination Computer Graphics and Fundamentals of Image Processing

TIME: 03 Hours

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Define Computer Graphics. Explain the basic operation of video monitors based on standard CRT design.	L1	CO1	(06 Marks)
	b	With a neat diagram explain the electrostatic deflection of the electron beam in a CRT.	L1	CO1	(07 Marks)
	c	Explain a) Line attributes. b) Curve attributes in open GL.	L1	CO1	(07 Marks)
OR					
Q.02	a	Define the following terms with respect to i) Bitmap ii) Pixmap iii) Aspect Ratio iv) Frame Buffer.	L1	CO1	(08 Marks)
	b	List and explain any six applications of computer graphics.	L2	CO1	(05 Marks)
	c	Write Bresenham's line drawing algorithm. Using bresenham's line drawing algorithm calculate the pixel positions for the screen coordinates (1, 1) and (6, 7).	L1	CO1	(07 Marks)
Module-2					
Q.03	a	Explain general two dimensional pivot point rotation and derive the composite matrix.	L1	CO2	(08 Marks)
	b	With a neat diagram explain 3D Translation and also show the transformation matrix in Homogenous Coordinate System.	L2	CO2	(07 Marks)
	c	Briefly explain two-dimensional composite transformations.	L1	CO2	(05 Marks)
OR					
Q.04	a	Briefly explain reflection method of two-dimensional transformations.	L2	CO2	(06 Marks)
	b	Explain the basic principle of open GL geometric transformations.	L1	CO2	(06 Marks)
	c	Explain the following open GL geometric transformation functions a. glMatrixMode(). b. glPopMatrix.	L1	CO2	(08 Marks)
Module-3					
Q.05	a	Explain the various stages in the design of an animation sequence.	L1	CO3	(08 Marks)
	b	Explain the various Mouse and Keyboard functions available in GLUT.	L1	CO3	(06 Marks)
	c	Explain the various components and types of Computer Animation Languages.	L2	CO3	(06 Marks)
OR					
Q.06	a	Explain in details about logical classification of input devices.	L2	CO3	(06 Marks)
	b	Explain the various OpenGL animation procedures. a. glutInitDisplayMode() b. glutSwapBuffers()	L1	CO3	(07 Marks)
	c	Explain how character animation is achieved using a. Articulated Figure Animations. b. Motion Capture.	L1	CO3	(07 Marks)

<b>Module-4</b>					
Q.07	a	Define image processing? With a neat diagram explain the nature of image processing environment.	L1	CO4	(08 Marks)
	b	Briefly explain the image processing and other closely related fields.	L1	CO4	(06 Marks)
	c	Briefly explain the functions of different data types of images.	L2	CO4	(06 Marks)
OR					
Q.08	a	Explain a) Image Topology b) Connectivity.	L1	CO4	(06 Marks)
	b	Briefly explain the image coordinate system of Cartesian coordinate system & MATLAB environments.	L1	CO4	(08 Marks)
	c	Explain translation, scaling, and reflection operation in image processing.	L1	CO4	(06 Marks)
<b>Module-5</b>					
Q.09	a	Define image segmentation? Explain the region of interest (ROI) on image segmentation.	L1	CO5	(07 Marks)
	b	List and explain the different logical operations of IP.	L1	CO5	(07 Marks)
	c	Explain about different types of edge detectors.	L1	CO5	(06 Marks)
OR					
Q.10	a	Explain translation and scaling operations in image processing.	L1	CO5	(06 Marks)
	b	Explain canny edge detection algorithm in detail.	L1	CO5	(07 Marks)
	c	Explain contextual and Non-contextual algorithms.	L1	CO5	(07 Marks)

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Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			Bloom's Taxonomy Level	COs	Marks
Q.01	a	What is Computer Graphics? Explain the application of Computer Graphics.	L2	CO1	06
	b	Explain with neat diagram operation of cathode-Ray Tubes and shadow-mask CRT.	L2	CO1	08
	c	Compare and contrast Raster and Random-scan displays with suitable figures.	L2	CO1	06
OR					
Q.02	a	Describe the basic structure of an OpenGL graphics program with the necessary OpenGL functions.	L2	CO1	06
	b	Explain Bresenham's Line drawing algorithm, with an example.	L2	CO1	06
	c	Using Bresenham's scan line algorithm digitize the line segment (20, 10) and (30, 18).	L2	CO1	08
Module-2					
Q. 03	a	What is the need of a Homogeneous Coordinate System? Explain Translation, Rotation and Scaling in 2D Homogeneous Coordinate System with matrix representation.	L2	CO2	08
	b	Explain different OpenGL routines used for manipulating display window.	L2	CO2	06
	c	Explain OpenGL raster transformations and OpenGL geometric transformation functions.	L2	CO2	06
OR					
Q.04	a	Explain any two of the 3D geometric transformation.	L2	CO2	06
	b	Explain shear and reflection transformation technique.	L2	CO2	06
	c	What is concatenation of transformation? Explain the following considering 2D: i) Rotation about a fixed point ii) Scaling about a fixed point.	L2	CO2	08
Module-3					
Q. 05	a	Explain in detail the logical classification of input devices.	L2	CO3	06
	b	Describe in detail the interactive picture construction techniques.	L2	CO3	08
	c	Explain different OpenGL interactive Input-Device functions.	L2	CO3	06
OR					
Q. 06	a	Explain OpenGL menu functions in detail.	L2	CO3	06
	b	Write a note on OpenGL Animation Procedures.	L2	CO3	06
	c	Explain character animation in detail.	L2	CO3	08
Module-4					
Q. 07	a	Define Image Processing. With a neat diagram explain image processing environment	L2	CO4	06

	b	List and explain various image processing applications	L2	CO4	06
	c	With a neat diagram give the classification of Images. Explain in detail classification of images based on nature, attributes and colour.	L2	CO4	08
OR					
Q. 08	a	Define Image topology. Briefly explain the topological properties. i) Connectivity ii) Relations iii) Distance Measures.	L2	CO4	06
	b	Briefly explain arithmetic operations on images.	L2	CO4	06
	c	Explain various Geometric operations on images.	L2	CO4	08
<b>Module-5</b>					
Q. 09	a	Explain the classification of image segmentation algorithms.	L2	CO5	06
	b	Explain the basic types of discontinuities in a digital image.	L2	CO5	08
	c	Briefly explain the various stages in edge detection.	L2	CO5	06
OR					
Q. 10	a	Explain the following First Edge Detection operators i) Roberts operator ii) Prewitt operator and iii) Sobel operator.	L2	CO5	06
	b	What are template matching masks? Explain any 3 template matching masks.	L2	CO5	06
	c	Explain canny edge detection algorithm in detail.	L2	CO5	08