SARDAR PATEL UNIVERSITY
Programme: MCA
Semester: V
Syllabus with effect from: June 2015

Paper Code: PS05CMCA04	Total Credit: 4
Title Of Paper: Computer Graphics	

Unit	Description in detail	Weighting (%)
1	**Introduction** A survey of major applications of Computer Graphics and Multimedia, Software Standards, Input devices (keyboard, touch panels, light pens, mouse, track ball, space ball and Voice system), Display devices (Random scan-raster scan monitors, Colour CRT monitors, Direct View storage devices, Plasma panel displays, LED, LCD monitors, Three - D monitors), Simple raster-display system: introduction, problems and solutions, Display processor systems, Standard graphics pipeline, Introduction to multiprocessing,: pipelining and parallelism, multiprocessor rasterization architecture(pipeline and parallelism).	
2	**Output primitives, Two Dimensional Transformations** Graphics Functions, Algorithms for output primitives (Line, Circle, Ellipse, Character Generation) and attributes of output primitives (line, color, area-fill, Text), Bundled attributes and Antialiasing methods. Basic transformations: Translation, Rotation (about origin and about pivot point), Scaling (related to a fixed point), Reflection and Shear with examples. Matrix representation of basic transformations and homogeneous coordinates, Composite transformations, Transformation between coordinate systems, Raster method for transformations.	
3	**Clipping and 3D object representation concepts** Viewing pipeline, Windowing & Clipping, Window to view port transformation, Point, Line and polygon, curve and text clipping algorithms. 3D coordinate systems, 3-D display methods: Parallel projection, perspective projection. 3D Object representations: Polygon Surfaces, Curved lines and surfaces, Quadratic surfaces, Introduction of blobby objects and Spine representations.	
4	**3D transformations and Surface detection concepts** 3D transformations (translation, rotation and scaling), 3D viewing: Viewing pipeline, Visible Surface detection methods: Back face detection methods and the Z- Buffer algorithm, Introduction and need of Illumination models and surface-rendering methods and Color models (RGB, CMY, YIQ, YCbCr and HSI) and conversion between different models.	
5	**Image Operations** Image Representation: Graphics Formats (GIF (Graphics Interchange Format), Microsoft Windows Bitmap (BMP), JPEG File Interchange Format, MPEG, TIFF (Tag Image File Format), PNG (Portable Network Graphic Format)), Introduction, applications and components of Image processing system, Human vision system, Image formation, Digitization: Sampling & Quantization, Image Enhancement: Contrast Intensification (with examples) and smoothing (with examples), Sharpening and noise reduction.Introduction of: Image restoration, Image compression (Lossy & Loss-less compression), Image Registration, Multi-Valued Image processing (Multi-spectral & Multi-modal) with applications, Image analysis (Segmentations, Edge & Line detection, Feature extraction,	

	Image description & Recognition).	
6	**Virtual Reality using Multimedia** Introduction to Multimedia with its applications, Multimedia hardware & software, Introduction of digital medium and various facets of multimedia: digital audio, multimedia texts, hypermedia, Graphics, Animation: two-dimensional and three-dimensional animation techniques and digital video and basic concept for color display. Multimedia project design / development concepts, Multimedia authoring, characteristics of authoring tools, authoring methodologies and multimedia programming.	

Basic Text & Reference Books

- Donald Hearn & M. Pauline Baker: Computer Graphics. PHI, 1995.
- Foley J. D., Van Dam A.: Fundamentals of Interactive Computer Graphics, Addison-Wesley, 1982.
- Rafael C. Gonzalez & Richard E. Woods: Digital Image Processing, Addision-Wesley Publishing Company, 1993
- S. Gokul: Multimedia Magic, BPB Publication, 1998
- Newman W., Sproul R. F. : Principles of Interactive Computer Graphics, McGraw-Hill, 1980.
- F. S. Hill, J. R. : Computer Graphics. MacMillan Publishing Company,1990.
- B. Chanda, D. Dutta Majumder: Digital Image Processing and Analysis, PHI, 2000.