SYLLABUS OF MASTER IN MULTIMEDIA DEVELOPMENT

First Semester

Category: Departmental / Specialization Basket

PAPER-I

PG / CRSE-MMD / T/ 111A- Computer Graphics

Introduction [Areas of Computer Graphics]; Graphics Standards [VDI, VDM, PHIGS, IGES]; Uses of Computer Graphics; Classification of Application [Type (dimensionality), Type of Interaction, Role of the Picture, Logical and Temporal relationship between objects and their pictures]; Categories of Computer Graphics [Vector Graphics, Raster Graphics]; What is Image [Dots, Pixels, Digital Image, Digital Image Representation (Resolution, Aspect Ratio (Pixel, Image, Screen), Pixel Depth)]; Coordinate System; Image Processing and Picture Analysis; Interactive Graphics

Output Primitives – Points and Lines [(Definitions, Concept of Point in the CRT monitor, Pixel positioning in Output Devices)]; Line Drawing Algorithm [(Line Drawing in Output Devices, Line Drawing in Digital Devices, General Consideration of Line Drawing, Methods of Drawing Line in Digital Devices, General Equation of a Straight Line, Incremental or DDA Algorithm, Bresenham's Line Algorithm)]; Circle Drawing Algorithm [Definition of a Circle, Equation of Circle in Cartesian Coordinate, Equation of Circle in Polar Coordinates, Problems of Scan Converting Method, Symmetry of Circles, Bresenham's / Midpoint Circle Algorithm]; Filled-Area Primitives [Introduction to Polygons, Problem of finding interiors of Filled Areas, Rules of identifying Interior Regions (Odd-even, Non-zero Winding number), Application of Inside-Outside Tests]; Filling Algorithm [Scan-Line Polygon Fill, Scan-Line Fill of Curved Boundary Areas, Boundary Fill, Food Fill]; Attributes of Output Primitives [Line Attributes, Curve Attributes, Area-fill Attributes, Character Attributes, Antialiasing, Character Generation].

Display Technologies – Introduction [Types of Visual Display Unit (Monochrome, Grayscale, Color)]; Other Components [Adapter Card, Single Cable]; Creation of Pictures; Cathode Ray Tube; Color CRT; Scanning; Multisync Monitors; Interlacing; Monitor Specifications [(Horizontal Scan Rate, Vertical Scan Rule, Dot Pitch, Pixel Addressability, Aspect Ratio, Size, Color Depth)]; Liquid Crystal Display [Structure of LCD Display, Technology behind LCD Display, Comparison between CRT & LCD Display]; Plasma Display [(Structure of Plasma Display)]; Virtual Reality (VR) [Introduction to Virtual Reality and Virtual Environments, Types of VR Systems (Immersive, Non-immersive, Hybrid), Benefits of VR]; Historical Development of VR; A Generic VR Systems [(Introduction, Virtual Environment, VR Technology, Modes of Interactions, VR Systems)]; Raster Scan Systems; Input Devices; Hard Copy Devices

Color and Shading – Basic Idea of Color and Light [(What is Color, Achromatic Color, Halftone & Dithering, Chromatic Color)]; Color Mixing [Subtractive Color Mixing, Additive Color Mixing, Color Model (CMY, RGB, HSV, CIE)]; Shading [Why do you need shade, Illumination model (Ambient light model, Diffused light model, Specular light model), Shading Model (Flat model, Gouraud model, Phong model), Surface Details

(Why detailing of surface, Surface Polygon, Texture Mapping, Bump Mapping)]; Transparency (Non-refractive transparency, Refractive transparency)]
Transformation – Introduction to Transformation; Types of Transformation [Basic Transformation (Translation, Scaling, Rotation), Other Transformations (Reflection, Shear, Affine, Raster methods for transformation), Matrix Representations, Homogeneous Coordinate Transformation, Composite Transformation, Transformation between Coordinate Systems]
Viewing – Viewing Pipeline [Window, View Port]; Viewing Coordinate Systems [Local Coordinate System, World Coordinate System, Device Coordinate System, Normalised Device Coordinate System, Modeling Transformation]; Window to View Port Transformation; Clipping Algorithm [Point Clipping, Line Clipping (Cohen-Sutherland Line Clipping), Area Clipping (Polygons)]
Animation – What is Animation?; Historical Background; Uses of Animation; Key frames & Tweening; Computer Based Animation; Cell Animation; Path Animation; Transformation [Types of Transformation (Translation, Rotation, Scaling), Co-ordinate System]; 2D Versus 3D Animation; Animation Techniques [Onion Skinning, Motion Cycling, Masking]; Special Effects [Color Cycling, Morphing, Warping]; Animation File Formats [Animated GIF, QuickTime, AVI, FLIC]; Tools for 2D Animation [Authoring tools for animation, Popular stand-alone animation software]; Introduction to Flash5

PAPER-II

PG / CRSE-MMD / T/ 112A- Multimedia Technology
Introduction [Definition, Evolution, Multimedia presentation and production, Characteristics of a multimedia presentation, Components and Structure, Hardware and Software Specifications, Digitization concepts, Application domains]; Visual Display Systems [Introduction, Cathode ray tube (CRT), Video adapter card and cable, Liquid crystal display (LCD), Plasma display panel (PDP), Comparison between CRT and LCD]; Text [Introduction, Types of text, ASCII codes, Unicode standards, Font, Insertion of text, OCR, File formats]; Image and Graphics [Introduction, Image types, Color and color models, Scanner, Digital camera, Interface standards, Specification of digital images, Color management systems, Device independent color models, Gamma and gamma correction, Image processing steps and software, File formats, Image output on monitor and printer]; Audio [Introduction, Nature of sound waves, Musical sound and noise, Tone and note, Psycho-acoustics and decibels, Microphone, Amplifier, Speakers, Digital audio specifications, Synthesizers, Musical Instrument Digital Interface (MIDI), Sound card, Audio processing steps and software, File formats]; Video [Introduction, Video frames and frame rate, Analog video camera, Video signal formats, Television broadcasting standards, Digital video, Digital video standards, PC Video, Video processing steps and software, File formats]; Compression [Introduction, CODEC, Types of compression, Types of redundancies, Lossless compression techniques, Lossy compression techniques, Run length encoding, Huffman coding, Arithmetic coding, Lempel-Ziv-Welsh coding, Differential pulse code modulation, GIF standard, JPEG standard, H.261/H.263/ H.264, MPEG-1, MPEG-2, MPEG-4, MPEG-7, AMR, AAC]; CD-Technology [Working principles, CAV vs. CLV, Rated speed, Merits and Demerits, CD Formats, CD-DA, CD-ROM, CD-I, CD-ROM/XA, Photo-CD, Video-CD, CD-R,

CD-RW, MO, DVD, CD vs. DVD, DVD variants, UDF, DVD-Video, DVD-Audio, DVD-R, DVD-RW, DVD-RAM]; Multimedia Architecture and Transmission [Windows multimedia support, Windows API, Graphic libraries, DirectX, OpenGL, Distributed multimedia applications, Videoconference, Video on demand, Real time transport protocols, Streaming, Windows Media Framework, Quicktime Architecture, Ogg Framework, Temporal relationships, Synchronization]; Multimedia Databases [Introduction, Limitations of textual descriptions of media, Content based storage and retrieval (CBSR), Image color, Image texture, Image shape, Audio speech and music discrimination, Video cut detection and shot identification, "low-level" vs. "high-level" features, Design and implementation of a prototype system]

References

- Ranjan Parekh, "Principle of Multimedia", Tata McGraw Hill, New Delhi, 2006. ISBN: 0-07-058833-3
- Fred Halsall, "Multimedia Communications : Applications, Networks, Protocols and Standards", Pearson Education Ltd., 2001.
- Francois Fluckiger, "Understanding Networked Multimedia : Applications and Technology", Prentice Hall, 1995.
- Prabhat K Andleigh, Kiran Thakrar, "Multimedia System Design", Prentice Hall, 1996
- Ralf Steinmetz, Klara Nahrstedt, "Multimedia Computing, Communications and Applications", Prentice Hall, 1995
- Nalin Sharda, "Multimedia Information Networking", Prentice Hall, 1999, ISBN : 0132587734

PAPER-III

PG / CRSE-MMD / T/ 113A- Computer Network and Web Technologies

Introduction to Digital Communication [Overview of Computer Network, NIC, communication media, MAC address, TCP/IP (IP classes, IPv4 and IPv6, layered architecture - ISO model), Overview of common protocols: ARP, ICMP, Routing : Static, Dynamic; Domain Name Servers, DHCP; Access Methodology (CSMA/CD, Token Ring)]; Introduction to Internet [Overview : What is the Internet, Evolution of the Internet, How Internet Works (Packet Switching), Services Offered on the Internet (E-mail: POP3, SMTP, IMAP, MIME; Network News, Telnet, FTP, IRC, Whiteboard, Archie, Gopher; World Wide Web), Overview : What is the World Wide Web, Evolution of the WWW, Client-Server Model of the Internet; Browsers, Web Servers, Proxy Servers, , Hypertext, HTML, URL, Home Page, Search Engines; Internet Access Methods : Dial-up connection, Leased Line connection, ISDN Internet Service Providers (ISP) : Connection through an ISP Server, Shell and PPP accounts]; Hypertext Transfer Protocol (HTTP) [Overview - HTTP Basics, elements, Client request, Server response; HTTP Headers; Session Management - Persistent connections, Cookies, streaming]; General concepts of web server [Web server Configuration & Administration; Virtual hosting]; Client side technologies [Hypertext Markup Language (HTML): Structure of HTML Document - Meta tags, Links, Text, Lists, Tables, Inclusions (Objects, Images, and Multimedia contents), Forms, Frames, Image Maps; Style Sheets; JavaScript

(Document Object Model, Object Reference - Objects, Methods and Properties, Event Handlers. Language constructs - Statements and Operators]; Server side technologies [CGI, Server Side Scripting (Working Principles, Implicit objects, Session Handling, Database Connectivity, File Handling]; Extensible Markup Language (XML) [Overview; Schemas-DTD (Document Type Definitions), XML Data, Namespaces, XSL, XSLT]; Extensible Hypertext Markup Language (XHTML)

Category: Inter-Disciplinary Basket

PAPER-IV

PG / CRSE-MMD / T/ 114A- Multimedia Design Principles and Authoring

Multimedia Document and Interchange formats [MHEG and Hypermedia, SGML, Open Document Architecture (ODA), Open Media Framework Interface (OMFI)]; Authoring Metaphors [Introduction, Definition & functions of Metaphors, Basic Categories - Slide show metaphor, Book metaphor, Timeline metaphor, Windowing metaphor, Icon metaphor]; Creating Scripts, flowcharts & Storyboards [What are scripts, storyboards and flowcharts, Advantages of Storyboarding, Interactive Storyboarding, Simple interactive flowcharts, Complex interactive flowcharts, Writing scripts, Case studies]; Introduction to Authoring Tools [Features and overview of Macromedia Director and its authoring language Lingo, Features & Overview of Asymetrix ToolBook, Features & Overview of Macromedia Authorware, Features and overview of Macromedia Flash and its scripting language Action Script]

PAPER-V

PG / MMD / T/ 115A - Corporate Communication in Multimedia

Modes of Marketing Communications [Advertising - Mission, Money, Message, Media, Measurement; Sales Promotion - Consumer promotion tools, Trade promotion tools, Sales force promotion tools; Public Relations - PR and MPR; Personal Selling - Sales force, Professionalism, Negotiation; Direct Marketing - On-line shopping, Customer databases, Major channels]; Developing Effective Communications [Identifying target audience - Familiarity scale, Favourability scale; Determining objectives - Cognitive stage, Affective stage, Behaviour stage; Designing messages - Message content, format and sources; Selecting communication channels - Personal, Non-personal; Establishing budget - Affordable method, Percent of sales method, Competitive parity method, Objective and task method; Deciding on promotional tools - Advertising, Sales promotion, Public relations, Personal selling, Direct marketing; Measuring results; Integrated mix]; Marketing & Financial Management [Customer value, Customer satisfaction, Customer retention, High performance business, Value chain, Value delivery network, SWOT analysis - Strength, Weakness, Opportunity, Threat, Goal formulation, Strategy formulation, Strategic alliances, Feedback and Control, Brand and brand equity, Packaging and labeling, Income statement, Cash flow statement, Balance sheet]; Network Security and Electronic Payments [IT Security Systems - Objectives of Security Systems, Classification and cost, Attacks and Threats : Password cracking, Denial of service attack (ping floods, spoofing), Social engineering (pretexting, phising), Programmatic attack

(computer virus, computer worm, Trojan horse, malware, spyware, adware), Security Mechanisms - Authentication, Biometrics, Firewall, Encryption (symmetric, asymmetric), Integrity checks, Certifying Authorities, Digital Signatures, Security Protocols (AAA, RADIUS, Diameter, IPsec, Checksum, PAP, CHAP, Hash, MD5), Secure Sockets Layer (SSL), Electronic Payment systems - Magnetic cards, Smart cards, Electronic cash, Secure Electronic Transaction (SET) protocol]; E-commerce [Definition, Scope: B2B - EDI, Layered architecture, EDI flowchart, Benefits, EDIFACT: B2C - Requirements of E-shops, Infrastructure, Web site considerations, Building an E-commerce site, Taxes and custom duties, Shipping charges, Financial transactions, Build Buy and Rent options (Yahoo Store, IBM WebSphere Commerce, MS Commerce Server, Adobe Cold Fusion), Web Servers (MS IIS, Apache HTTP Server)]; Communications [Communicating at Work : Nature of communication, Principles of communications, Using communication networks, Choosing the optimal communication channel : Verbal and Non-verbal messages : Verbal messages, Non-verbal communication : Listening : Barriers to effective listening, Approaches to listening, Reasons for Listening : Working in Teams : Characteristics of groups and teams, Types of groups and teams, Leadership and influence in groups and teams, Problem solving communication : Organizing Ideas : Importance of clear organization, Gathering ideas and material, Planning the introduction, Organizing the body, Planning the conclusion : Verbal and Visual Support in Presentations : Functions of supporting materials, Verbal support, Visual aids : Delivering the Presentation : Types of delivery, Guidelines for delivery, Question and answer sessions

References

- Philip Kotler, "Marketing Management", Prentice Hall of India Pvt. Ltd. (millennium ed.), New Delhi, 2000
- Ronald Brian Adler, Jeanne Marquardt Elmhorst, “Communicating at Work: Principles and Practices for Business and the Professions”, McGraw Hill, 2006.
- Gary P. Schneider, “Electronic Commerce”, Thomson Publishers (7th edition), ISBN: 1-4188-3703-2, 2006

PAPER-VI

PG / CRSE-MMD / T/ 116A - Human Computer Interaction

Introduction [Human factors, Fundamentals of Human perception, Human skill level and Behaviour, Dialogues and tasks, Framework for HCI, Modeling Human Computer Interaction]; Human Computer Interface Design [Information Design, Interaction Design and Sensorial design, Guidelines for user interface design, Dialogue Design, Graphic Design and Style issues, Standard interface elements in windows, Interface Design tool: Introduction to Visual BASIC]; Structured System Analysis and Design Methodology (SSADM) [Methodology for Dialog design, Prototyping, Prototyping tools]; Visual Design [Introduction, Visual Rhetoric, Organising information, Factors designers consider when creating illustration and visual design, Designing for screen, Typography for computer screen, Spatial relationships in the interface, Symbols & Semiotics in the interface. Visual design methodology : (Clarity, Consistency, Appearance), Visual

Coding, Layout Principles]; Cognitive aspect in Multimedia Presentation [Cognitive domain of learning, Knowledge and Skill, Retention, Learning Style, Affective and Cognitive domain learning, Role of the creator of Multimedia learning material, Presentation format, Interactivity, System Quality, Media mix, Cognitive issues in user interface]

Category: Sessional Courses

SESSIONAL 1

PG / MMD / S / 111- Laboratory
Image Editing [Selection, Painting and Transformation tools, Layers, Channels, Masks, Anti-aliasing, Dithering, Filters]; Audio Editing [Normalization, Mixing, Cross-fading, Dynamics, Filters, Mono/stereo formats, Noise gate]; Video Editing [Importing clips, trimming clips, splitting clips, manipulating audio content, adding transitions, changing speed of a clip, changing opacity, applying special effects, superimposing an image, exporting a movie]

SESSIONAL 2

PG / MMD / S / 112- Seminar

Second Semester

Category: Departmental / Specialization Basket

PAPER-VII

PG / CRSE-MMD / T/ 127A - Object Oriented Programming
History of the development of object Programming Languages, Basic concepts OOP : Objects, Classes and Message Passing. Notations of abstraction, encapsulation / information hiding and modularity. Instantiation and initialisation of objects. Inheritance – single, multilevel, multiple and repeated. Run-time polymorphism, Aggregation, Difference between conventional and object oriented programming, Advantages and disadvantages of OOP, Class libraries, Language features of C++, Overview of Java, Essential differences between Java and C++, Object oriented programming using C++ & Java.

PAPER-VIII

PG / MMD / T/ 128A - Multimedia Authoring for Handheld Devices
Wireless Access Protocol (WAP) and Wireless Markup Language (WML), Rudimentary ideas of modern telephone signaling --- the SS7 protocol, Short Message Service (SMS) and Multimedia Messaging Service (MMS), MMS details (MM1, MM2, MM4, etc, MMS authoring, MMS transport, etc.), Real-time Protocol and Real-time Control

Protocol (RTP and RTCP), Streaming in 3rd generation mobile architecture, Experimenting with the (open source) mpeg suite and Live RTP stack, Voice and Video over IP --- Videophones (together, Media over IP), Session Initiation Protocol (SIP) and its use in Media Over IP. Skype as a case study, Multimedia Design Principles and Authoring for handheld devices, Application Development using Flash Lite.

PAPER-IX

PG / MMD / T/ 129A - Advanced Graphics & Animation

Advanced Graphics [3-D Display methods, 3-Dgraphics packages, Polygon surfaces, Curves lines and Surfaces, Spline representations, Bezier Curves and Surfaces, B-Spline Curves, Beta-Splines, Relational Splines, Convection between Spline representations. Displaying Spline, Curves, Methods 3-D Planar Geometric projection. Transformation, Rotation Scaling, other Transformations, Composite Transformations, 3-D Transformation functions, Modelling and Co-ordinate transformations, 3-D viewing concepts, Representing solid, Sweep representation, Boundary representation, Spatial partitionary representation, Constructive solid geometry, Octress, BSP Trees, Fractal-Geometry]; Introduction to Animation [Animation as a special effect, Types of Animation, Overview of computer based animation]; Two – D Animation [Types of 2-D Animations; Sprite & Rendering]; Two – D Image Manipulation Techniques [Tools for 2D – Animation]; 3D Animation [Basics of 3D modelling, Using transform modifiers, Creation of Static and Animated Materials, Creation and Rotation of Wireframe Objects, Keyframing and Animation Editing, Forward and Inverse Kinematics, Surface Modelling : Flat and curved surfaces, Bending, Warping, Lighting and Materials : Effects of Lights, Attributes of Materials, Textures, Hilight and Shadow, Spotlights, Techniques, Rendering : Scanline rendering, Raytracing rendering, Organic Modelling : Character animation, Bipedal Animation, Meshes, Skeletons, Special Effects : Morphing, Lens flare, Glow, Splash, Blur etc., Tools for 3D : Animation, Animation file formats.

Category: Inter-Disciplinary Basket

PAPER-X

PG / CRSE-MMD / T/ 1210A - Management of Software System Development

Software Engineering [Introduction, Software Engineering Lifecycles, Requirement Engineering, Structured System Design, Data oriented Analysis and Design, Object Oriented Analysis and Design, Software Project management; Production Process [Introduction, Life Cycle for Multimedia Production, The Process of Production management, Production Metaphors, Human roles in Production, Planning & Project Management, PERT/CPM, Intellectual Property rights and Copyright issues, HRD Management Functions]; Data Base Management Concepts [Introduction to relational data model, relational algebra, Introduction to SQL, ANSI – SQL2 : Constants and assertions, views, Database design : Conceptual databases design. Theory of normalisation, Relational Theory and SQL : Relational concepts, relational algebra, relational calculus, Application development using SQL, Database Security]

Category: Sessional Courses

SESSIONAL 1

PG / MMD / S / 121- Advanced Graphics & Animation Laboratory
2D Animation [Creating vector graphics, Creating 2D animation, Working with layers, Symbols and libraries, buttons, movie clips, Grouping aligning and transforming objects, Colors gradients and transparencies, Creating animated GIF files, Motion tweening, Motion guides, Shape tweening, Shape hints, Masking, Animating a mask, Interaction, Using 2D animation software, Using scripting languages (e.g. ActionScript), Publishing an animated movie]; 3D Animation [Modeling : Creating 3D animation, view-ports and projections, wire-frame and rendered models, Selecting objects, Translating rotating and scaling objects, Creating on customized planes, Rendering scenes, Pivot points, Linear and circular array of objects, Creating 2D shapes, Methods of extrusion, lathing and lofting, Using Boolean operations, Using space warps and particle systems; Surface Texture : Adding surface materials, Using material editors, Creating transparent object, Creating metallic objects; Lights : Placing lights, Adjusting light parameters, Shadows, Reflections; Cameras : Placing cameras, Camera movements, Camera motion paths; Animation : Creating key frames, Tweening, Rendering, Time-scaling, Adding background sound and images.

SESSIONAL 2

PG / MMD / S / 122- Seminar
Design story, flowline, script, storyboard for a multimedia presentation on a subject of choice ; Design of a half an hour Web enabled CBT on a different subject of choice ; Presentation.

Third and Fourth Semester

Category: Sessional Courses

SESSIONAL 1

PG / MMD / TH / 21- Thesis Work

SESSIONAL 2

PG / MMD / VV/ 22- Viva-Voce