M.TECH IT (COURSEWARE ENGINEERING)

Digital Distance Mode

COURSE CURRICULUM

SCHOOL OF EDUCATION TECHNOLOGY

First Semester

Sl. No	Code	Subject Name	Contact Periods / Week		Credit	Marks	
			Lecture	Practical		Theory	Sessional
1.	SET/D/T/101	*Paper-I* Computer Graphics	3		3	100	
2.	SET/D/T/102	*Paper-II* Multimedia Technology	3		3	100	
3.	SET/I/T/101	*Paper-IV* Multimedia Design Principles and Authoring	3		3	100	
4.	SET/S/101	Multimedia Laboratory		4	3		100
5.		Seminar *(to be evaluated in 2nd Semester)*		3			
		Sub Total	**9**	**7**	**12**	**300**	**100**
		Total	**16**		**12**	**400**	

Second Semester

Sl. No	Code	Subject Name	Contact Periods / Week		Credit	Marks	
			Lecture	Practical		Theory	Sessional
1.	SET/I/T/102	*Paper-V* Principles of Education Technology	3		3	100	
2.	SET/I/T/103	*Paper-VI* Human Computer Interaction	3		3	100	
3.	SET/D/T/103	*Paper-III* Computer Network & Web Technology	3		3	100	
4.		Seminar		3	6		200
5.	SET/S/202	Term Paper		3	3		100
		Sub Total	**9**	**6**	**18**	**300**	**300**
		Total	**15**		**18**	**600**	

Third Semester

Sl. No	Code	Subject Name	Contact Periods / Week		Credit	Marks	
			Lecture	Practical		Theory	Sessional
1.	SET/D/T/201	*Paper-VII* Object Oriented Programming	3		3	100	
2.	SET/I/T/201	*Paper-X* Management of Software System Development	3		3	100	
		Sub Total	**6**		**6**	**200**	
		Total	**6**		**6**	**200**	

Fourth Semester

Sl. No	Code	Subject Name	Contact Periods / Week		Credit	Marks	
			Lecture	Practical		Theory	Sessional
1.	SET/D/T/202	*Paper-VIII* Multimedia Communication in Mobile Environment	3		3	100	
2.	SET/D/T/203	*Paper-IX* Educational Management & Quality Assurance	3		3	100	
		Sub Total	**6**		**6**	**200**	
		Total	**6**		**6**	**200**	

Fifth & Sixth Semester

Sl. No	Code	Subject Name	Contact Periods / Week		Credit	Marks	
			Lecture	Practical		Theory	Sessional
1.	SET/Th/301	Dissertation - Thesis - Viva-Voce		16	12 0		300 100
		Total		**16**	**12**		**400**

Syllabus

SET/D/T/101 – 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**

SET/I/T/201 – 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]

SET/I/T/102 – Principles of Education Technology

- **Introduction** [What is Education Technology, Objectives of Education Technology (Macro Level, Micro Level), Individualized instruction, Aspects of Individualization]; **Model of Learning** [The six views of learning (The Behaviorist View, The Cognitive View, The Developmental View, The Humanist View, The Cybernetic View, The Constructivist View)]; **Taxonomies of Educational Objectives** [Benjamin Bloom and his collaborators like Krathwohl's model, Thomas Gilbert model with three patterns of behavior, Piaget Model Based on Cognitive Development Concepts, Gagne's Hierarchical Model of 8 principal categories of learning outcomes]; **Models of teaching** [Information Processing Models, Social Interaction Models, Personal Models of Teaching, Behaviour Modification Models, Well Practiced Teaching Methods]; **Knowledge, Skill and Attitude** [A Classification Schema for Skilled Performance (Dimension 1: The Domains of Performance, Dimension 2: The Reproductive/Productive Scale, Distinction between factual knowledge and conceptual knowledge, The Structuring of Knowledge in the Mind)]; **Educational Aids** [General characteristics of educational aids, Training aspects of Instructors, Different aspects of modern technology usage, Scientific Evaluative System]; **Quantitative Methods in Education Psychology** [Basic Statistical Analysis {Measures of Central Tendency, Measures of Variability, Correlation (Data gathering, Hypothesis testing, Result presentation)}]; **Instruction Design** [Broad levels of decision making with instruction designing (Course level, Lesson level, Instructional event level, Learning step level), The Control of Instruction, Prescriptive and Student Controlled Systems, IT Enabled Intelligent Systems)]; **Knowledge and Skill** [Comparison of Expositive & Experiential strategies, Tactics for the teaching of knowledge, Tactics selected for the implementation of a given strategy, Selecting strategies for teaching of skills, Tactics for teaching of skills, Tactics specific to the objectives sub-category, Tactics specific to the content and the students, Identifying critical sub-skills]; **Organising Courseware** [General Guidelines, Subject Classification, Pedagogical analysis (Aims Objectives, Main Benefits, Assumptions, Scope, Functions, Sources, Limitations, Evaluations, Management, Socio-Academic relevance]; **Organising Course materials** [Lecture notes, View graphs, Free run videos, Web based lecture notes, Interactive CBT]; **Media planning** [Verbal and Non-Verbal, Print and Non-print Materials]; **Evaluation Design** [Methods of Evaluation, Computer aided evaluation, Courseware organisation vis a vis evaluation]; **Courseware Life Cycles** [Courseware Inspection and QA, Courseware Evaluation and Impact Analysis, Effort Estimation and Costing]

SET/D/T/102 – 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

SET/I/T/101 – 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]

SET/I/T/103 – Human Computer Interaction (HCI)

- **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]

SET/D/T/103 – 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)**

SET/D/T/203 – Educational Management and Quality Assurance

- **Introduction** [Elements of Organisational theory, Types of Educational Organisation, System Concepts and Educational Organisation, Defining Educational Objectives and Goals, Individual and Organisational Goals - conflict resolutions, Measuring Quality and Productivity in Educational Organisation, Acreditation, Costing of Educational Services, Limitations of Organisation theories in educational perspective, Quality Circle and participatory Quality Improvement, Total Quality Management - basic principles]; **IT Enabled Distance Education** [Evolution of Distance Education, Dominant Modes of Distance Education, The Basic Infrastructure for Digital Distance Education, Course Re-engineering for Digital Distance Education, Copyright Issues, Ownership of Course Material, Educational Fair Use Guidelines for Distance Learning, Accreditation and Quality Assurance for Distance Education, Managing a Distance Education Program, Economics of Distance Learning, Staffing a Distance Education Program, Help Line (For Students, For Faculty)]

SET/D/T/201 – 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

SET/D/T/202 – Multimedia Communication in Mobile environment

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 Application Development for handheld devices, J2ME, J2ME classes and profiles, Midlet, Command Listener, Displayable, Forms, etc., The Model-view-Control paradigm for application development, J2ME Canvas and Game Canvas, Multimedia and game application development on J2ME

SET/S/101 – Multimedia 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]

SET/S/202 – Term Paper

Design of a half an hour standalone CBT on a subject of choice.

SET/S/202 – Seminar

[Development of a piece of Content, Presentation]