SYLLABUS FOR MASTER OF TECHNOLOGY (M.TECH) DEGREE
IN
INFORMATION TECHNOLOGY
In-House

FIRST SEMESTER							
Sl No.	**CODE**	**THEORY**	**CONTACT PERIODS / WEEK**			**TOTAL HOURS**	**CREDITS**
			L	**T**	**P**		
1	PGIT101	Advanced Engineering Mathematics	3	1	2	6	4
2	PGIT102	Software Engineering & CASE Tools	2	0	2	4	3
3	PGIT103	Processor Architecture & Organization	3	0	2	5	4
4	PGIT104	Information System Design	2	0	2	4	3
5	**PGIT105**	Real Time Operating Systems	3	0	2	5	4
6	PGIT106	Seminar	0	0	2	2	1
		TOTAL				**26**	**19**

SECOND SEMESTER							
Sl No.	**CODE**	**THEORY**	**CONTACT PERIODS/WEEK**			**TOTAL HOURS**	**CREDITS**
			L	**T**	**P**		
1	PGIT201	Advanced topics in Data Base Management	3	1	2	6	4
2	PGIT202	Advanced topics in Network & Computer Security	3	0	2	5	4
3	PGIT203	Distributed & Mobile Computing Systems	3	0	2	5	4
4	PGIT204	Communication Systems	3	0	0	3	3
5	PGEIT201	Elective I	3	0	0	3	3
6	PGEIT202	Elective II	3	0	0	3	3
		TOTAL				**25**	**21**

Elective I: a) Advanced Imaging Technology
b) Embedded Computer Systems
Elective II: a) Fault Tolerant Computing
b) Digital Signal Processing
c) Multimedia Technology

THIRD SEMESTER							
Sl No.	**CODE**	**THEORY**	**CONTACT PERIODS / WEEK**			**TOTAL HOURS**	**CREDITS**
			L	**T**	**P**		
1	PGPIT301	Project I				**18**	**18**

FOURTH SEMESTER							
Sl No.	**CODE**	**THEORY**	**CONTACT PERIODS / WEEK**			**TOTAL HOURS**	**CREDITS**
			L	**T**	**P**		
1	PGPIT401	Project II				**18**	**18**

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PGIT101 ADVANCED ENGINEERING MATHEMATICS

- FOURIER SERIES, INTEGRALS AND TRANSFORMS: PERIODIC FUNCTIONS, TRIGONOMETRIC FUNCTIONS, TRIGONOMETRIC SERIES, FOURIER SERIES, EULER FORMULA FOR THE FOURIER COEFICIENTS, EVEN AND ODD FUNCTIONS, HALF RANGE EXPANSIONS, FOURIER COSINE AND SINE TRANSFORMS, FOURIER TRANSFORM, PROPERTIES OF FOURIER TRANSFORM, PROPERTIES OF THE 2-DIMENSIONAL FOURIER TRANSFORM, CONVOLUTION THEOREM, PARSEVAL'S FORMULA, DISCRETE FOURIER TRANSFORM, FAST FOURIER TRANSFORM
- LAPLACE TRANSFORMS: LAPLACE TRANSFORM, INVERSE TRANSFORM, LINEARITY, SHIFTING, TRANSFORMS OF DERIVATIVES AND INTEGRALS, HIGHER ORDER DIFFERENTIAL EQUATIONS, DIFFERENTIATION AND INTEGRATION OF TRANSFORMS, CONVOLUTION THEOREM
- ADVANCED LINEAR ALGEBRA: VECTOR SPACES, LINEAR TRANSFORMATIONS, EIGENVALUES, EIGENVECTORS, SOME APPLICATIONS OF EIGENVALUE PROBLEMS, SYMMETRIC, SKEW-SYMMETRIC AND ORTHOGONAL MATRICES, SIMILARITY OF MATRICES, BASIS OF EIGENVETORS, DIAGONALISATION
- Z-TRANSFORMS: SEQUENCE, REPRESENTATION OF SEQUENCE, BASIC OPERATIONS ON SEQUENCES, Z-TRANSFORMS, PROPERTIES OF Z-TRANSFORMS, CHANGE ON SCALE, SHIFTING PROPERTY, INVERSE Z-TRANSFORM, SOLUTION OF DIFFERENCE EQUATIONS, REGION OF CONVERGENCE, BILINEAR(S TO Z) TRANSFORM
- WALSH FUNCTION AND HADAMARD TRANSFORM: GENERATING WALSH FUNCTIONS OF ORDER N, CHARACTERISTICS AND APPLICATIONS OF WALSH FUNCTION, HADAMARD MATRIX, PROPERTIES, FAST HADAMARD TRANSFORM, APPLICATIONS
- WAVELET TRANSFORM: FUNDAMENTALS, THE FOURIER TRANSFORM AND THE SHORT TERM FOURIER TRANSFORM, RESOLUTION PROBLEMS, MULTI-RESOLUTION ANALYSIS, THE CONTINUOUS WAVELET TRANSFORM, THE DISCRETE WAVELET TRANSFORM
- STOCHASTIC PROCESS: PROBABILITY: REVIEW, RANDOM VARIABLES, RANDOM PROCESSES, RANDOM WALK, BROWNIAN MOTION, MARKOV PROCESS, QUEUES

REFERENCES BOOKS:

1. KRYSZIG, 'ADVANCED ENGINEERING MATHEMATICS'
2. MATHEW JON & WALKER R L, 'MATHEMATICAL METHODS OF PHYSICS'
3. "TEN LECTURES ON WAVELETS', PHILADELPHIA, PA: SIAM, 1992
4. YARLAGADDA R K R & HERSHEY J E, 'HADAMARD MATRIX ANALYSIS AND SYNTHESIS WITH APPLICATIONS TO COMMUNICATIONS AND SIGNAL/IMAGE PROCESSING', KLUWER ACADEMIC PUBLISHERS, 1997
5. WEBSITES:

   HTTP://USERS.ROWAN.EDU/~POLKAR,

   HTTP://WWW.DC.NET/SPARTAN/CHUCK.HTML

SYLLABUS FOR MASTER OF TECHNOLOGY (M.TECH) DEGREE
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PGIT102 SOFTWARE ENGINEERING & CASE TOOLS

INTRODUCTION: LIFE CYCLE MODELS, REQUIREMENTS ANALYSIS AND SPECIFICATION, FORMAL REQUIREMENTS SPECIFICATION. FUNDAMENTAL ISSUES IN SOFTWARE DESIGN: GOODNESS OF DESIGN, COHESION, AND COUPLING. FUNCTION-ORIENTED DESIGN: STRUCTURED ANALYSIS AND DESIGN. OVERVIEW OF OBJECT-ORIENTED CONCEPTS, USER INTERFACE DESIGN. CODING STANDARDS AND GUIDELINES. CODE WALKTHROUGH AND REVIEWS. UNIT TESTING. BLACK BOX AND WHITE BOX TESTING. INTEGRATION AND SYSTEM TESTING. SOFTWARE QUALITY AND RELIABILITY. SEI CMM AND ISO 9001. SIX SIGMA. CLEAN ROOM TECHNIQUE. SOFTWARE PROJECT MANAGEMENT. SOFTWARE METRICS, COST ANALYSIS AND ESTIMATION, MANPOWER AND TIME MANAGEMENT CONFIGURATION MANAGEMENT. SOFTWARE MAINTENANCE ISSUES AND TECHNIQUES. SOFTWARE REUSE. CLIENT-SERVER SOFTWARE DEVELOPMENT, CASE TOOLS.

REFERENCE BOOKS:

1. R.G. PRESSMAN: SOFTWARE ENGINEERING, TMH
2. BEHFOROOZ, SOFTWARE ENGINEERING FUNDAMENTALS, OUP
3. C. GHEZZI, M. JAZAYERI AND D. MANDRIOLI: FUNDAMENTALS OF SOFTWARE ENGINEERING, PHI
4. I. SOMERVILLE: SOFTWARE ENGINEERING, PEARSON EDUCATION
5. UMA, ESSENTIALS OF SOFTWARE ENGINEERING, JAICO
6. ROYCE: SOFTWARE PROJECT MANAGEMENT, PEARSON EDUCATION
7. P. JAMES, PEDRYCZ AND WITOLD: SOFTWARE ENGINEERING- AN ENGINEERING APPROACH, JOHN WILEY
8. HUMPHREY: MANAGING THE SOFTWARE PROCESS, PEARSON EDUCATION

PGIT103 TOPICS IN COMPUTER ORGANIZATION & ADVANCED MICROPROCESSORS

- INTRODUCTION TO COMPUTER ORGANIZATION:
  - REGISTER TRANSFER FUNCTIONS
  - DATAPATH DESIGN
  - CONTROL DESIGN (MICROPROGRAM CONTROL UNIT, HARDWIRED CONTROL UNIT, NANO PROGRAMMING)
  - INPUT/OUTPUT SYSTEMS AND DESIGN OF I/O PROCESSORS
- ADVANCED PROCESSOR TECHNOLOGY
  - DESIGN SPACE OF PROCESSORS
  - INSTRUCTION SET ARCHITECTURE
  - CISC SCALAR PROCESSOR
  - RISC SCALAR PROCESSOR
- SUPER SCALAR & VECTOR PROCESSOR

- THE VLIW ARCHITECTURE
- SUPERSCALAR & VECTOR PROCESSOR

- ARCHITECTURE OF MOTOROLA POWER-PC 860 & INTEL ARM PROCESSORS
- PERIPHERAL INTERFACING & INTERFACE STANDARDS
  - SYNCHRONOUS / ASYNCHRONOUS SERIAL DATA TRANSMISSION & UART, DMA CONTROLLERS, INTERRUPT CONTROLLERS, DRAM CONTROLLERS,
  - IEEE 488 INTERFACE BUS
  - RS232C, RS422, RS423 SERIAL INTERFACES, I^2 C BUS, PCI BUS&
  - CONTROLLER
  - INTERFACING A MICROPROCESSOR WITH MEMORY & VARIOUS
  - I/O CONTROLLERS
- ADVANCED MEMORY TECHNOLOGY
  SRAM, SDRAM, FLASH MEMEORY, DUAL PORT MEMORY, CACHE MEMEORY, INTERLEAVED MEMORY.
- APPLICATION OF ADVANCED MICROPROCESSORS.

PGIT104 INFORMATION SYSTEM DESIGN

- GENERAL METHODOLOGIES FOR INFORMATION SYSTEMS DESIGN – STRUCTURED APPROACH, OBJECT-ORIENTED APPROACH, PROTOTYPING, RATIONAL UNIFIED PROCESS, CASE TOOLS.
- QUALITY ASSURANCE IN INFORMATION SYSTEMS – SEI CMM AND ISO 9001.
- CODING METHODOLOGIES – STANDARD CODING TECHNIQUES, EXTREME PROGRAMMING.
- TESTING – DIFFERENT ASPECTS OF TESTING, UNIT AND SYSTEM TESTING, REGRESSION TESTING.
- INFORMATION SYSTEM PROJECT MANAGEMENT AND PROCESS METRICS.
- DEVELOPMENT OF TYPICAL INFORMATION SYSTEMS – FINANCE AND ACCOUNTING, INVENTORY CONTROL, E-COMMERCE.

SYLLABUS FOR MASTER OF TECHNOLOGY (M.TECH) DEGREE
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PGIT105 REAL TIME OPERATING SYSTEMS

- DEFINITION OF REAL-TIME
- TEMPORAL AND EVENT DETERMINISM
- ARCHITECTURE REVIEW AND INTERFACING
- INTERRUPTS, TRAPS AND EVENTS
- RESPONSE TIMES AND LATENCY.
- REAL-TIME CLOCKS
- OPERATING SYSTEMS
- STRUCTURE OF AN RTOS
- NUCLEUS, SERVERS, SCHEDULERS AND DISPATCHERS
- SYNCHRONIZATION AND COMMUNICATION: PRIORITY AND DISTRIBUTION QUEUES
- DEVICE DRIVERS
- SHORT CASE STUDIES E.G. VXWORKS. RTLINUX, REAL TIME NT. MULTITASKING & MULTIPROGRAMMING
- KERNELS
- PROCESSES & TASK
- CONTEXT SWITCHING, THREADS, MMU, PCB
- UNIX CIRCA 1990- THREAD.

PGIT201 ADVANCED TOPICS IN DATA BASE MANAGEMENT

- OVERVIEW OF DBMS: LOGICAL DATABASE DESIGN, PHYSICAL DATABASE DESIGN, QUERY OPTIMIZATION: HEURISTIC BASED OPTIMIZATION, COST BASED OPTIMIZATION, TRANSACTION MANAGEMENT: TRANSACTION, CONCURRENCY CONTROL PROTOCOL, RECOVERY.
- DISTRIBUTED DATABASE: DISTRIBUTED DATABASE ARCHITECTURE, LEVELS OF DISTRIBUTION TRANSPARENCY, DDB DESIGN, TRANSLATION OF GLOBAL QUERIES, QUERY OPTIMIZATION FOR DDB, CONCURRENCY CONTROL FOR DDB.
- OBJECT ORIENTED DATABASE: OO PARADIGM, OO DATA MODELS: OBJECT IDENTIFIERS, RELATIONSHIP AND INTEGRITY, ER DIAGRAMMING MODEL FOR OO RELATIONSHIPS, OBJECT RELATIONAL DATA MODELS.
- DATA WAREHOUSING: COMPONENTS, BUILDING A DATA WAREHOUSE, DATA EXTRACTION, CLEANUP AND TRANSFORMATION, OLAP.
- FUTURE TRENDS IN DATA MODELS: SEMANTIC DATA MODELS, DM FOR LOOSELY STRUCTURED DATA ITEMS.

RECOMMENDED BOOKS:

1. ALEX BERSON, STEPHEN J SMITH; "DATA WAREHOUSING, DATA MINING, AND OLAP"; TATA MCGRAW-HILL PUBLISHING COMPANY LIMITED, 1997, ISBN 0-07-058741-8
2. S CERI, G PELAGATTI; "DISTRIBUTED DATABASES: PRINCIPLES AND SYSTEMS"; TATA MCGRAW-HILL PUBLISHING COMPANY LIMITED, 2002, ISBN 0-07-066215-0
3. M TAMER OZSU, P VALDURIEZ; "PRINCIPLES OF DISTRIBUTED DATABASE SYSTEMS"; PEARSON EDUCATION PVT. LTD., 2005, ISBN 81-7808-375-2.
4. J. L. HARRINGTON; "OBJECT ORIENTED DATABASE DESIGN CLEARLY EXPLAINED"; MORGAN KAUFMANN PUBLISHERS, 2001, ISBN 0-12-326428-6.
5. A K MAJUMDER, P BHATTACHARYA; "DATABASE MANAGEMENT SYSTEMS"; TATA MCGRAW-HILL PUBLISHING COMPANY LIMITED, 2004, ISBN 0-07-462239-0

PGIT202 ADVANCED TOPICS IN NETWORK & COMPUTER SECURITY

- *INTRODUCTION TO INTERNETWORKING: HOW NETWORKS DIFFER, HOW NETWORKS CAN BE CONNECTED, CONNECTIONLESS INTERNETWORKING, TUNNELING, FRAGMENTATION, OVERVIEW OF UNDERLYING TECHNOLOGIES (ETHERNET, TOKEN RING, TOKEN BUS, FDDI, PPP).*
- NETWORK LAYER PROTOCOLS: IPV4, IPV6, NAT, ARP, RARP, DHCP, ICMP, OSPF, BGP, IGMP
- TRANSPORT LAYER PROTOCOLS: UDP, REMOTE PROCEDURE CALL, RTP, TCP, TCP TAHOE, TCP RENO, TCP NEW RENO, TCP SACK.
- MOBILE TELEPHONE SYSTEMS: INTRODUCTION TO WIRELESS NETWORKS AND CELLULAR TECHNOLOGY, AMPS, D-AMPS, GSM, GPRS, CDMA.
- WIRELESS NETWORKS: WLAN: INTRODUCTION, PROBLEMS AND SOLUTIONS, PROTOCOL STACK, ACCESS METHODS, SERVICES.
- AD-HOC NETWORKS: INTRODUCTION, ROUTING CHALLENGES FOR AD-HOC NETWORKS, ROUTING PROTOCOLS (AODV, DSDV, DSR,). TRANSPORT PROTOCOLS (ATCP, TCP-F, TCP BUS).
- WIRELESS INTERNET: MIPV4, MIPV6, TCP PERFORMANCE, I-TCP, TCP SNOOP, FREEZE TCP, WWP, TCP REAL.
- CONGESTION CONTROL: GENERAL PRINCIPLES, CONGESTION PREVENTION POLICIES, CHOKE PACKET, RED, ECN, ELN, ELN-ACK.
- *QOS PROVISIONING: DELAY GUARANTEES, NETWORK DELAY, DELAY JITTER, PLAY OUT DELAY, ADMISSION CONTROL, QOS OBJECTIVES, THE RSVP APPROACH, MRSVP.*
- APPLICATIONS: DNS, WAP, INTERNET RADIO, VOICE OVER IP.
- SECURITY: INTRODUCTION TO CRYPTOGRAPHY, SYMMETRIC KEY AND PUBLIC KEY ALGORITHMS, DIGITAL SIGNATURES, IPSEC, FIREWALL, VPN, VLAN, WIRELESS SECURITY, AUTHENTICATION PROTOCOLS.

PGIT203 DISTRIBUTED & MOBILE COMPUTING SYSTEMS

- CHARACTERIZATION OF DISTRIBUTED SYSTEMS, ARCHITECTURAL MODELS FOR MOBILE & DISTRIBUTED SYSTEMS.
- CLOCKS AND TIME (UTC, CLOCK SYNCHRONIZATION, LOGICAL CLOCKS), DEADLOCK, CRITICAL SECTION, PROCESS MIGRATION, TERMINATION DETECTION, ALGORITHMS IN DISTRIBUTED ENVIRONMENT.
- DISTRIBUTED OBJECTS AND REMOTE INVOCATION, RPC, PROCESSES AND THREADS.
- SECURITY, DIGITAL SIGNATURES, CRYPTOGRAPHY PRAGMATICS, DISTRIBUTED FILE SERVICE.
- FAILURE RECOVERY, FAULT TOLERANCE AND RELIABILITY OF MOBILE & DISTRIBUTED COMPUTING.
- FUNDAMENTALS OF MIDDLEWARE, THE CHALLENGE OF MULTIMEDIA AND REAL-TIME PROGRAMMING/ REFLECTIVE MIDDLEWARE.
- CORBA AND CORBA PROGRAMMING.
- THE CHALLENGE OF MOBILE COMPUTING.
- LANS/WANS, MOBILITY AND WIRELESS NETWORKS; ROUTING; PROTOCOLS. WIRELESS TECHNOLOGIES: WAP, GPRS, BLUE-TOOTH, MOBILE IP.

RECOMMENDED BOOKS:

1. DISTRIBUTED SYSTEMS: CONCEPTS AND DESIGN (3RD ED.); COULOURIS, DOLLIMORE AND KINDBERG; ADDISON WESLEY, 2000.
2. DISTRIBUTED SYSTEMS (2ND ED.); S MULLENDER; ADDISON WESLEY, 1999.
3. DISTRIBUTED SYSTEMS FOR SYSTEM ARCHITECTS; P VERISSIMO AND L RODRIGUES; KLUWER, 2001.
4. ADVANCE CORBA PROGRAMMING WITH C++; HENNING, VINOSKI; ADDISON-WESLEY, 1999.
5. ARCHITECTING WITH RM-ODP; JANIS R. PUTMAN; PRENTICE HALL, 2001.
6. DISTRIBUTED SYSTEMS PRINCIPLES AND PARADIGMS; TANENBAUM S, MAARTEN V.S; MCGRAW-HILL, 2001.

PGIT204 MULTIMEDIA TECHNOLOGY

INTRODUCTION & OVERVIEW: MULTIMEDIA TODAY, IMPACT OF MULTIMEDIA, MULTIMEDIA SYSTEMS, COMPONENTS AND ITS APPLICATIONS, ARCHITECTURES & ISSUES FOR DISTRIBUTED MULTIMEDIA SYSTEMS

MEDIA & TIME

- DIGITAL AUDIO REPRESENTATION AND PROCESSING:

USES OF AUDIO IN COMPUTER APPLICATIONS, DIGITAL REPRESENTATIONS OF SOUND, TRANSMISSION OF SOUND, DIGITAL AUDIO SIGNAL PROCESSING, BRIEF SURVEY OF SPEECH RECOGNITION AND GENERATION.

- VIDEO TECHNOLOGY
  RASTER SCANNING PRINCIPLES, SENSORS FORM TV CAMERAS, COLOR FUNDAMENTALS, COLOR VIDEO, ANALOG & DIGITAL VIDEO ARTIFACTS.
- DIGITAL VIDEO AND IMAGING COMPRESSION
  VIDEO COMPRESSION TECHNIQUES, STANDARDIZATION OF ALGORITHMS, RECORDING FORMATS AND STANDARDS (JPEG, MPEG, H.261), DVI TECHNOLOGY.
- TIME BASED MEDIA REPRESENTATION AND DELIVERY
  MODELS OF TIME, TIME AND MULTIMEDIA REQUIREMENTS, SUPPORT FOR SYSTEM TIMING ENFORCEMENT-DELIVERY.

MULTIMEDIA INFORMATION SYSTEMS

- OPERATING SYSTEM SUPPORT FOR CONTINUOUS MEDIA APPLICATIONS
  LIMITATIONS IN WORKSTATION OPERATING SYSTEMS, NEW OS SUPPORT, EXPERIMENTS USING REAL-TIME MACH
- MIDDLEWARE SYSTEM SERVICES ARCHITECTURE
  GOALS OF MULTIMEDIA SYSTEM SERVICES, SOME VIEWS OF THE MULTIMEDIA SYSTEM SERVICES ARCHITECTURE, A CLOSER LOOK AT THE CLASSES AND OBJECTS, MEDIA STREAM PROTOCOL
- MULTIMEDIA DEVICES, PRESENTATION SERVICES, AND THE USER INTERFACE
  MULTIMEDIA SERVICES, AND THE WINDOW SYSTEM, CLIENT CONTROL OF CONTINUOUS MEDIA, DEVICE CONTROL, TEMPORAL COORDINATION AND COMPOSITION
- MULTIMEDIA FILE SYSTEM AND INFORMATION MODELS
  THE CASE FOR MULTIMEDIA INFORMATION SYSTEMS, FILE SYSTEM SUPPORT FOR MULTIMEDIA, DATA MODELS FOR MULTIMEDIA AND HYPERMEDIA INFORMATION
- MULTIMEDIA PRESENTATION AND AUTHORING
  CURRENT TRENDS IN THE INDUSTRY, DESIGN PARADIGMS AND USER INTERFACES, BARRIERS TO WIDESPREAD USE.

MULTIMEDIA COMMUNICATIONS SYSTEMS:

- MULTIMEDIA SERVICES OVER THE PUBLIC NETWORK: REQUIREMENTS, ARCHITECTURES, AND PROTOCOLS.
- MULTIMEDIA INTERCHANGE
  QMF FORMAT, OMFI, MHEG, TRACK MODEL AND OBJECT MODEL, REAL-TIME INTERCHANGE.

MULTIMEDIA APPLICATIONS:

INTERACTIVE TELEVISION, VIDEO-ON-DEMAND, VIDEO CONFERENCING, EDUCATIONAL APPLICATIONS, INDUSTRIAL APPLICATIONS, MULTIMEDIA ARCHIVES AND DIGITAL LIBRARIES, MEDIA EDITORS.

REFERENCE BOOKS:

1. RALF STEINMETZ AND KLARA NAHRSTEDT, MULTIMEDIA: COMPUTING, COMMUNICATIONS & APPLICATIONS, PEARSON ED.
2. NALIN K. SHARDA, MULTIMEDIA INFORMATION SYSTEM, PHI.
3. FRED HALSALL, MULTIMEDIA COMMUNICATIONS, PEARSON ED.
4. KOEGEL BUFORD, MULTIMEDIA SYSTEMS, PEARSON ED.
5. FRED HOFFSTETTER, MULTIMEDIA LITERACY, MCGRAW HILL.
6. RALF STEINMETZ AND KLARA NAHRSTEDT, MULTIMEDIA FUNDAMENTALS: VOL. 1- MEDIA CODING AND CONTENT PROCESSING, PHI.
7. J. JEFFCOATE, MULTIMEDIA IN PRACTICE: TECHNOLOGY AND APPLICATION, PHI.
8. PRABHAT K. ANDLEIGH & KIRAN THAKRAR, MULTIMEDIA SYSTEMS DESIGN, PHI.

PGEIT201 ELECTIVE I

A) ADVANCED IMAGING TECHNOLOGY

- IMAGE REPERSENTATION & MODELLING
- THE HUMAN EYE-BRAIN SYSTEM AS A MODEL
- IMAGE FORMATION
- IMAGE MODELS
- BASIC IMAGE PROCESSING: SAMPLING AND QUANTISATION, BRIGHTNESS AND COLOUR, HISTOGRAM OPERATIONS, FILTERS AND CONVOLUTION, FREQUENCY DOMAIN PROCESSING
- EDGE DETECTION
- BOUNDARIES AND LINE EXTRACTION
- SEGMENTATION AND FEATURE EXTRACTION
- 2-D SHAPE REPRESENTATION AND MATCHING
- RECOVERING DEPTH INFORMATION
- 3-D REPRESENTATION AND MATCHING
- VISUAL PERCEPTION – THE HUMAN EYE, HOW IT WORKS AND FAILS
- IMAGE HARDWARE AND SOFTWARE – CAMERAS, DISPLAYS, FRAMEGRABBERS. AND IMAGE PROCESSING ARCHITECTURES.
- IMAGE FORMATION – 2D IMAGE ACQUISITION AND SAMPLING THEORY
- IMAGE TRANSFORMS – FOURIER TRANSFORM, APPLICATION AND USE, WAVELET TRANS, HADAMARD COSIGN TRANSFORM

- IMAGE ENHANCEMENT – POINT AND REGION OPERATORS, HISTOGRAMS, UNSHARP MASKING
- IMAGE COMPRESSON – JPEG, MPEG
- IMAGE RESTORATION – DIRECT, INVERSE, PSEUDO-INVERSE, BLURRING (SPATIAL MOTION)
- IMPLEMENTATIONS – SOFTWARE AND HARDWARE
- IMAGE INTERPRETATION – EDGE DETECTION, FEATURE EXTRACTION, TEMPLATE MATCHING, HOUGH TRANSFORM
- CASE STUDIES – ULTRASOUND AND PET IMAGE ANALYSIS: CLINICAL FEATURE EXTRACTION
- AUTOMATIC GAIT RECOGNITION: MOVING SPECTRUM ANALYSIS AND DESCRIPTION

B) EMBEDDED COMPUTER SYSTEMS

- HARDWARE SOFTWARE CO-DESIGN
- DATA-FLOW IN EMBEDDED SYSTEM
- EMBEDDED SYSTEMS DEVELOPMENT CYCLE
- EMBEDDE SYSTEM DESIGN ISSUES
    - HARDWARE ISSUES
        - PROCESSOR
        - MEMORY
        - PERIPHERALS
    - SOFTWARE ISSUES
        - PROGRAMMING LANGUAGES
        - TIME CRITICALITY
        - RTOS
    - TESTING
        - SOFTWARE & HARDWARE TESTING TECHNIQUES:
        - TESTING PHASES
        - TESTING TOOLS
- CLASSIFICATION OF PROCESSORS
- ARCHITECTURE OF GENERAL PURPOSE EMBEDDED PROCESSORS
- EMBEDDED SYSTEM DEVELOPMENT TOOLS

PGEIT202 ELECTIVE II

A) FAULT TOLERANT COMPUTING

- INTRODUCTION AND MOTIVATION
- ISTORE: HARDWARE OVERVIEW AND SOFTWARE CHALLENGES
- GRAPEVINE AND PORCUPINE: APPLICATIONS OF DISTRIBUTED SERVERS,

- COMMUNICATION AND RPC
- TIME & CLOCKS IN DISTRIBUTED SYSTEMS
- CONSENSUS
- INTRODUCTION TO SPEC
- ABSTRACTION FUNCTIONS
- EXTENDED STATIC CHECKING
- DISTRIBUTED DATA STRUCTURES
- BENCHMARKING
- LOAD BALANCING
- SELF-STABILIZING ALGORITHMS

B) DIGITAL SIGNAL PROCESSING

- INTRODUCTION
    - SIGNALS, SYSTEMS & SIGNAL PROCESSING
    - CLASSIFICATION OF SIGNALS
    - *AID* & *D/A* CONVERSION
    - THE CONCEPT OF FREQUENCY.
- DISCRETE -TIME SIGNALS & SYSTEMS
- THE Z - TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF L TI SYSTEM.
- DISCRETE FOURIER TRANSFORMS & FREQUENCY ANALYSIS
- FINITE WORD LENGTH IN DIGITAL FILTERS.
- SPECIAL PURPOSE HARDWARE FOR DIGITAL FILTERING AND FFT.
- DIGITAL FILTER DESIGN: IIR AND FIR FILTERS.
    - SOFTWARE IMPLEMENTATION OF DIGITAL FILTERS.