M.E. (FULL-TIME) /
M.TECH. (FULL-TIME)

Prospectus No.111736

संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY

अभ्यासक्रमिका

(FACULTY OF ENGINEERING & TECHNOLOGY)

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Prescribed for
Post Graduate Two Year Degree Course
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(Full-Time)
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I & II Year Examinations
2010 - 2011 & Onwards

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SANT GADGE BABA AMRAVATI UNIVERSITY AMRAVATI

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinances Booklet the various conditions/ provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.
Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.

Ordinance No. 6/2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

TWO YEAR POST GRADUATE DEGREE COURSE IN MASTER OF ENGINEERING (FULL-TIME)
COMPUTER ENGINEERING
CREDIT GRADE SYSTEM
FIRST SEMESTER

Sr. No.	Subject Code	Subject	Teaching Scheme: Hours/Week: Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Examination Scheme: Theory: Duration of Paper (Hr.)	Max. Marks Theory Paper	Max. Marks College Assess-ment	Total	Min. Passing Marks: Theory Paper	Subject	Practical: Max. Marks: External	Internal	Total	Min. Passing Marks
1	1RME1/ 1RMEF1/ 1KMEF1	Advanced Computer Architecture	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
2	1KMEF2/ 1RMEF2/ 1RME2	Algorithmics	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
3	1RME3/ 1RMEF3/ 1KMEF3	Operating System Design	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
4	1KMEF4	Object-Oriented Systems	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
5	1RMEF5/ 3RME2	Mobile Computing	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
6	1KMEF6	Algorithmics -LAB.	0	0	2	2	1	-	-	-	-	-	-	25	25	50	25
7	1KMEF7	Operating System Design-LAB.	0	0	2	2	1	-	-	-	-	-	-	25	25	50	25
			20	0	4	24	22				500					100	
														TOTAL			600

SECOND SEMESTER

Sr. No.	Subject Code	Subject	Teaching Scheme Hours/Week Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Examination Scheme Theory Duration of Paper (Hr.)	Max. Marks Theory Paper	Max. Marks College Assess-ment	Total	Min.Passing Marks Theory Paper	Subject	Practical Max.Marks External	Internal	Total	Min. Passing Marks
1	2KMEF1	Network Systems Design	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
2	2RMEF2/ 2RME2/ 2KMEF2	Advanced Compiling Techniques	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
3	2KMEF3	Embeded Systems Design	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
4	2KMEF4	Elective	4	0	0	4	4	3	80	20	100	40	50	-	-	-	-
5	2KMEF5	Technical Paper Writing	0	1	0	1	1	-	-	-	-	-	-	-	50	50	25
6	2KMEF6	Seminar	0	1	0	1	1	-	-	-	-	-	-	-	50	50	25
7	2KMEF7 2RME4	Advanced Compiling Techniques-LAB.	0	0	2	2	1	-	-	-	-	-	-	25	25	50	25
8	2KMEF7	Embeded Systems Design-LAB.	0	0	2	2	1	-	-	-	-	-	-	25	25	50	25
			16	2	4	22	20				400					200	
														TOTAL			600

Elective : 1) Human Computer Interfaces 2) Systems Security 3) Image Processing & Computer Vision

THIRD SEMESTER

Sr.	Subject	Subject	Lecture	Tutorial	P/D	Total	Credits	Internal Marks	Total	Min.Passing Marks
1	3KMEF1	SEMINAR AND DISSERTATION	-	-	6	6	15	100	100	50
			-	-	6	6	15		100	
									TOTAL	100

FOURTH SEMESTER

Sr.	Subject	Subject	Lecture	Tutorial	P/D	Total	Credits	External Marks	Internal Marks	Total	Min.Passing Marks
1	4KMEF1	SEMINAR AND DISSERTATION	-	-	12	12	30	200	100	300	150
		TOTAL	-	-	12	12	30			300	
										TOTAL	100
										GRAND TOTAL	1600

Semester III

Seminar : Seminar to be delivered on work completed during third semester. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

Dissertation : Title of the dissertation work to be submitted to the University on or before 15th Sept. (for regular examination) and 15th of February (for supplementary exam.).

Semester IV

Seminar : to be delivered on the complete work of dissertation. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

Note : Thesis of dissertation work must be submitted to the University on or before 30th April (for regular exam.) and 30th November (for supplementary exam.). Thesis of Dissertation work be submitted with late fee to the University upto 31 May (for regular exam.) and 31st December (for supplementary exam.). The late fee shall be charged as in case of Examination form.

Notes : 1. Student should fill the examination form in the begining of 3rd semester jointly for 3rd & 4th semester.

2. Single marksheet for 3rd & 4th semester together will be given to the student.

SYLLABUS
PRESCRIBED FOR
TWO YEAR P.G. DEGREE COURSE IN
MASTER OF ENGINEERING (FULL TIME)
COMPUTER ENGINEERING
SEMESTER PATTERN
SEMESTER : FIRST

1KMEF1/ 1RMEF1/1RME1
ADVANCED COMPUTER ARCHITECTURE

Unit I: Fundamentals: Technology & Computer usage trends, costs, Performance measurements. Quantitative principles of Computer design. Concepts of memory hierarchy. Instruction set architectures. Memory addressing. Operations in the instruction set. Encoding. Role of compilers. DLX architecture.

Unit II: Pipelining: Basic principles & DLX. Various hazards: Pipelines, data, control hazards. Implementation issues. Multicycle operations. Crosscutting issues. Instruction set design and piplelining. MIPS R4000 pipeline architecture.

Unit III: Advanced pipeline and instruction - level parallelism: concepts & challenges. Data hazards & dynamic scheduling. Dynamic Hardware prediction. Compiler support for ILP. Hardware support for parallelism. Studies of ILP. Power PC620.

Unit IV: Memory- hierarchy design : Basics of caches, Reducing cache miss & hit time. Main memory. Virtual memory. Protections Examples of virtual memory. Issues in the design of memory hierarchies. Alpha APX 21064 Memory hierarchy.

Unit V: Storage Systems: Types of storage devices, Buses & their types, performance I/O performance measures. Reliability, Availability and RAID. Interfacing to an Operating system. Designing an I/O system. Unix file system performance.

Unit VI: Interconnection Networks: Introduction & basic concepts, Computer connection to interconnection network. Interconnection network media. Practical issues. Examples of interconnection networks. Issues for interconnection networks. Internet working. An ATM network of workstations.

Text Book:

Hennessy J.L., Patterson D. A, "Computer Architecture: A Quantitative Approach" 2/e (Harcourt Asia).

Reference Books:

1. Hayes J.P., "Introduction to Computer Architecture", (McGraw Hill)).

2. Tenanbaum A. S., "Computer Organization and Architecture", (PHI).
3. Hwang K., "Advanced Computer Architecture", (McGraw Hill).
4. Hamacher V.C, "Computer Organization", (McGraw Hill).

1KMEF2/ 1RMEF2/1RME2 ALGORITHMICS

Unit I: Introduction: Mathematical Notations, Proof techniques, Elementary algorithmics, Efficiency of algorithms : Examples. Asymptomatic notations: conditional asymptomatic notations. Notation with several parameters. Operations on asymptomatic notations.

Unit II: Algorithm analysis: Analysing control structures. Examples. Average-case analysis. Amortized analysis. Solving recurrences. Review of data structures: Arrays, Stacks, Queries, Records & Pointers, Lists, Graphs, Trees, Associative tables, Heaps.

Unit III: Greedy Algorithms: Some characteristics, Graphs: Minimum spanning trees, shortest paths. The knapsack problem, Scheduling, Divide & Conquer : Introduction - general template, Binary search, sorting, median finding & matrix multiplication. Exponentiation. Cryptograph.

Unit IV: Dynamic programming: Examples, Principle of optimality, Knapsack problem & shortest paths. Chained matrix multiplication, Recursion, Memory function. Graphs: Travarsing trees. Depth-first-search : Directed & undirected graphs : Breadth-first-search. Back tracking. Branch-and-Bound. Minimax principle.

Unit V: Probability algorithms: Introduction, pseudorandom generation. Numerical probabilistic algorithms. Monte Carlo algorithms. Las Vegas algorithms. Parallel algorithms: Basic techniques. Work & efficiency. Examples. Parallel evaluations of expressions. Parallel sorting networks & parallel sorting.

Unit VI: Computational complexity. Introduction. Information-theoretic arguments. Adversary arguments. Linear reduction, Introduction to NP-completeness. Heuristic algorithms. Approximate algorithms. NP-hard approximation problems. Approximation schemes.

Text Book:

G. Brassard, P. Bratley. "Fundamentals of Algorithmics" (PHI).

Reference Books:

1. Horowitz and Sahni, "Fundamentals of Algorithms", (Galgotia).
2. Aho, Ullman, "Analysis & Design of Computer Algorithms", (Addison-Wesley).
3. Donald E. Knuth, "The Art of Computer Programming", Vols. I, II & III, (Addison-Wesley).

1KMEF3/1RMEF3/ 1RME3
OPERATING SYSTEM DESIGN

Unit-I: Introduction to OS Internals. Overview of OS and Kernel, Linux and classic UNIX kernels. Kernel Source tree. Process management in Linux: Process descriptor and task structure, process creation, implementation of threads, process termination, process scheduling.

Unit-II: Process Scheduling in Linux: The Linux Scheduling Algorithm, Preemption and Context Switching, Real-Time, Scheduler-Related System Calls, System Calls: Handler, Implementation and Context. Interrupts and Interrupt Handlers.

Unit-III: Kernel Synchronization in Linux: Critical Regions and Race Conditions, Locking, Deadlocks, Contention and Scalability. Kernel Synchronization Methods: Spin Locks, Semaphores, Completion Variables. Preemption Disabling.

Unit-IV: Time Management in Linux: Kernel Notion of Time, Hardware Clocks and Timers, The Timer Interrupt Handler, Delaying Execution. Memory Management in Linux: pages, zones, kmalloc, vmalloc, slab layer allocator, statically allocating on the stack, high memory mapping. Per-CPU Allocations.

Unit-V: The Virtual File System in Linux: common file system interface, file abstraction layer, UNIX file system, VFS, dentry object, Super block object, file object, data structure associated with file systems and with a process. The Block I/O Layer and I/O Scheduler in Linux.

Unit-VI: The Process Address Space, the Memory Descriptor, Memory Areas, Page Tables. The Page Cache and Page Write back: Page Cache, Radix Tree, Buffer Cache. Linux Kernel Modules: Building, installing, Loading and managing. Portability in Linux.

Text Book:

Robert Love, "Linux Kernel Development" Pearson Education, (2/e).

Reference Books:

i. Daniel Bovet, "Understanding the Linux Kernel" O'Reilly Publications 2/e.

ii. Rubini and J. Corbet . "Linux Device Drivers." O'Reilly and Associates, 2001.

iii. Mosberger & Eranian. "IA-64 Linux Kernel: Design & Implementation" PHI.

iv. McKusick & Neil . "The FreeBSD Operating System" Addison-Wesley, 2004.

1KMEF4 OBJECT ORIENTED SYSTEMS

Unit I UML structure; UML building blocks; UML common mechanisms; Architecture. Unified Process (UP): UP axioms; UP structure; UP phases. Requirements workflow. Software requirements – Meta model; Requirements workflow detail; Defining requirements; Finding requirements. Use case modeling; Use case specification; Requirements tracing; Advanced use case modeling; Actor generalization; Use case generalization.

Unit II The analysis workflow; Analysis artifacts – Meta model; Analysis workflow detail; Analysis model - rules of thumb. Objects and classes; UML object notation UML class notation; Scope; Object construction and destruction. Analysis classes, Relationships; link; association; dependency; Inheritance and polymorphism. Generalization; Class inheritance; Polymorphism; Advanced generalization.

Unit III Analysis packages; Packages and namespaces, Nested packages; Package dependencies; Package generalization; Architectural analysis. Use case realization – elements; Interactions; Lifelines; Messages; Interaction diagrams; Sequence diagrams; combined fragments and operators; Communication diagrams. Advanced use case realization; Interaction occurrences; Continuations.

Unit IV Activity diagrams; Activity semantics; Activity partitions; Action nodes; Control nodes; Object nodes; Pins. Connectors; Interruptible activity regions; Exception handling; Expansion nodes; Sending signals and accepting events; Streaming; Advanced object flow features; Multicast and multireceive; Parameter sets; Interaction overview diagrams.

Unit V The design workflow; Design artifacts metamodel; Design workflow detail; Architectural design. Design classes; Anatomy of a design class; Inheritance; Templates; Nested classes. Refining analysis relationships; Design relationships; Aggregation semantics; Composition semantics; One-to-one, Many-to-one and One-to-many associations; Collections; Reified relationships; Interfaces: Provided and required interfaces; Interface realization vs. inheritance; Ports. Component-based development; Component stereotypes; Subsystems; Designing with interfaces.

Unit VI Use case realization-design; Modeling concurrency; Subsystem interactions; Timing diagrams; State machine

diagrams; States; Transitions; Events. Advanced state machines; Composite states; Submachine states; Submachine communication. The implementation workflow; Implementation artifacts – meta model; Artifacts. Deployment; Architectural implementation; The deployment diagram; Nodes; Artifacts; Deployment.

Text Book:

Jim Arlow, Ila Neustadt "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design" (2/e), Pearson Education.

Reference Books:

1. Booch, Rumbaugh, Jacobson, "The UML Users Manual", Pearson Education.
2. James Rumbaugh, Jacobson, Booch, "UML Reference Manual', Pearson Education.
3. Jacobson et al., 'The Unified Software Development Process', Pearson Education.
4. Bennett, McRobb, Farmer, "Object-Oriented Systems Analysis and Design Using UML" (TMH)

1KMEF5 MOBILE COMPUTING

Unit I: Characteristics, Fundamentals and Infrastructure of cellular system, Satellite system, Network protocol, Ad Hoc and sensor network, Wireless MAN's, LAN's and PAN's. Mobile Ratio Propagation: Types of Radio waves, Propagation mechanism, Free space propagation, Land propagation, Path loss, Slow fading, Fast fading, Doppler effect, Delay spread, Coherence Bandwidth ,Inter symbol and Co-channel Interferences.

Unit II: Cellular Concept: Cell area, Signal strength and cell parameter, Capacity of a cell, Frequency reuse, Cluster, Co-channel Interference, Cell Splitting, Cell sectoring. Channel allocation: Static allocation verses Dynamic allocation, fixed channel allocation (FCA), Dynamic channel allocation, Hybrid channel allocation (HCA), Allocation in specialized system structure, System Modeling.

Unit III: Mobile communication systems: Cellular system infrastructure, Registration, Handoff parameter and underlying support Roaming support, Multicasting, Security and privacy, Firewall and system security. Exiting wireless system: AMPS, IS-41, GSM, IMT-2000.

Unit IV: Ad hoc And sensor network: Characteristic of MANET, Applications, Routing, Table – driven routing protocol, Source initiated On- demand Routing, Hybrid protocol, Wireless sensor network, Fixed wireless sensor networks.

Unit V: Wireless MANs, LANs and PAN's**:** Wireless metropolitan area networks (WMANs), Wireless Local Area networks (WLANs), and Wireless Personal Area networks (WPANs), Recent Advances, Introduction, and Ultra –wideband technology.

Unit VI: Multimedia services requirement, Push –to-talk (PTT) technology, Mobility and resources management for Integrated system, Multicast in Wireless networks, Directional and smart antennas, Design issue in sensor networks, Bluetooth network, Low - power design, XML, Threat and security issue..

Text Book:

Agrawal D P and Zeng Q A, "Introduction to Wireless and Mobile Systems", (CENGAGE) (2/e).

Reference Books:

1. Jochen Schiller, "Mobile Communication", (Pearson Education) Second Edition.
2. C.K. Toh, "Ad Hoc Mobile Wireless Networks: Protocols & Systems", (Pearson Edu.)
3. Rajkamal, "Mobile Computing" (Oxford University Press).
4. George A, "Mobile Ad Hoc Networks: From Wireless LANs to 4G Networks" (TMH).

1 KMEF6

Algorithmics-Lab: Based on 1KMEF2 Algorithmics.

1 KMEF 7

Operating System Design Lab: Based on 1KMEF3 Operating System Design.

SEMESTER : SECOND

2KMEF1 NETWORK SYSTEMS DESIGN

Unit I: Network analysis, architecture and design process overview. System and service descriptions, services and performance characteristics. Network supportability. Requirements Analysis: user-, application-, device-, network- and performance requirements.

Unit II: Requirement Analysis: process; gathering and listing requirements, service metrics development, behavior characterization, RMA -, delay-, capacity-, supplemental performance requirements development. Requirement mapping. Specifications development.

Unit III: Flow analysis: Basics, flow identification and development, Flow models, flow prioritization, flow specifications. Network

architecture: component architectures, reference architecture, architectural models, systems and network architectures.

Unit IV: Addressing and routing architecture: Fundamentals, Addressing mechanisms, Routing mechanisms, Addressing strategies, Routing strategies. Architectural considerations for addressing and routing.

Unit V: Network Management Architecture: Objectives and basics, Defining Network Management, Network Management Mechanisms, Architectural considerations for network management architecture.

Unit VI: Performance Architecture: Objectives and basics, Performance Mechanisms, Architectural considerations for Performance mechanisms. Network layout, Design traceability and Design metrics.

Text Books:

James D. McCabe, "Network Analysis, Architecture, and Design" (2/e) Morgan Kaufmann 2003.

Reference Books:

1. Andrew S. Tenanbaum "Computer Networks", 4th Ed., Pearson Education.
2. James F. Kurose, Keith W. Ross "Computer Networking: A Top-Down Approach" TMH.
3. William Stallings "Data and Computer Communications" 7th Ed., Pearson Education.
4. Priscilla Oppenheimer "Top-Down Network Design" Second Edition, Cisco Press, 200

2KMEF2/2 RMEF2/2 RME2
ADVANCED COMPILING TECHNIQUES

Unit I: Symbol-Table Structure: Storage Classes, Visibility, and Lifetimes, Symbol Attributes and Symbol-Table Entries, Local Symbol-Table Management, Global Symbol-Table Structure, Storage Binding and Symbolic Registers, Approaches to Generating Loads and Stores.

Unit II: Intermediate Representations: Issues in Designing an Intermediate Language, High-Level, Medium-Level and Low-Level Intermediate Languages, Multi-Level Intermediate Languages, Sample Intermediate Languages: MIR, HIR, and LIR, Representing MIR, HIR and LIR. ICAN Naming of Data Structures, Routines to Manipulate Intermediate Code.

Unit III: Run-Time Support: Data Representations and Instructions, Register Usage, The Local Stack Frame, The Run-Time Stack, Parameter-Passing Disciplines, Procedure Prologues, Epilogues, Calls, and Returns, Code Sharing and Position-Independent Code, Symbolic and Polymorphic Language Support.

Unit IV: Producing Code Generators Automatically: Introduction, need and applications to Automatic production of Code Generators, a Syntax-Directed Technique. Introduction to Semantics-Directed Parsing, Tree Pattern Matching and Dynamic Programming.

Unit V: Control-Flow Analysis: Various Approaches, Depth-First Search, Preorder Traversal, Post order Traversal, Breadth-Firs Search, Dominators and Post dominators, Loops, Strongly Connected Components, Reducibility, Interval Analysis, Control Trees, Structural Analysis.

Unit VI: Data-Flow Analysis: Basic Concepts, Taxonomy of Data-Flow Problems, Solution Methods: Iterative, Lattices of Flow Functions and Control-Tree-Eased. Structural Analysis, Interval Analysis, Du-Chains, Ud-Chains, Webs, SSA Form. Dealing with Arrays, Structures, and Pointers. Automating Construction of Data-Flow Analyzers.

Text Book:

Steven S. Muchnick, "Advanced Compiler Design Implementation" (Hartcourt Asia- Morgan Kaufman).

Reference Books:

1. Aho, Sethi, Ullman, "Compilers: Principles Techniques and Tools" (Pearson).
2. D. M. Dhamdhere, "Compiler Construction" (2/e), Macmillan.
3. Cooper & Torczon, "Engineering a Compiler" Elsevier.
4. K C. Louden, "Compiler Construction: Principles and Practice" Cengage.

2KMEF3 EMBEDDED SYSTEM DESIGN

UNIT I Architecture of Embedded System, Hardware Architecture, Software Architecture, RTOS, Architecture of Kernel ,Features/ Characteristics of RTOS,. Task Scheduling, Signals, Events, Queues, Mail Boxes, Semaphores, Creation of Threads and Inter Thread Communication, Memory Management

UNIT II Detailed study of PIC18 Family Microcontroller Architecture, Pin Description, File Structure, Status Register, PIC data formats, Directives, RISC Architecture in PIC, SFR, PIC18

Hardware Connections, PIC 18 Timers, PIC 18 Serial Port, PIC 18 Interrupts. Features of ATMEL, ARM, AVR Microcontrollers.

UNIT III PIC 18 Instruction set, Programming using C / Assembly: Data types, time delays, I/O Programming, Data Conversion, Timer/ Counter, Serial Port, Interrupt programming, ADC,DAC, Sensor Interfacing.

UNIT IV Clock-Driven Scheduling: Notation and Assumptions, Static, Timer Driven Scheduler, General structure of Cyclic Schedules, Cyclic Executives, Improving the Average Response Time of periodic Jobs, Scheduling Sporadic Jobs, Practical Consideration and Generalizations, Algorithms for Constructing Static Schedules, Pros and Cons of Clock-Driven Scheduling.

UNIT V Priority-Driven Scheduling of Periodic Tasks: Static Assumption, Fixed-Priority versus Dynamic-Priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms, A Schedulability Test for Fixed-Priority Tasks with Short Response Times, Schedulability Test for Fixed-Priority Tasks with Arbitrary Response Times, Sufficient Schedulability Conditions for the RM and DM Algorithms.

UNIT VI Scheduling Aperiodic and Sporadic Jobs in Priority-Driven Systems: Assumption and Approaches, Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth, and Weighted Fair Queuing Servers, Scheduling of Sporadic Jobs, Real-time Performance for Jobs with Soft Timing Constraints.

TEXT BOOKS:

1. Dr. K.V. K. K. Prasad "Embedded / Real Time System : Concepts, Design, & Programming" Dreamtech Press Publication
2. Mohammad Ali Mazidi, Rolin D. Mckinly, Danny Causey: "PIC Microcontroller and Embedded system using Assembly and C for PIC18" Pearson Education
3. Jane W.S. Liu : Real Time System, Pearson Education

REFERENCE BOOKS:

1. Raj Kamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill
2. John B. Beatman, Design with PIC Microntroller, Prentice Hall
3. Barry B. Brey, Applying PIC18 Microntroller, Architecture, Programming and Interfacing using C and Assembly, Prentice Hall.
4. Phillip A. Laplante: Real-Time Systems Design and Analysis, (Wiley InterScience)

2KMEF4 **ELECTIVE**

(1) HUMAN COMPUTER INTERFACES

UNIT- I: Human factors of interactive software: Goals of system engineering & User-interface design, motivation for human factors, accommodation of human diversity, High level theories, Object-Action interface model, Recognition of the diversity, Eight golden rules of interface design, Preventing errors, Guidelines for data display and data entry, Balance of automation and human control.

UNIT -II: Managing design process, Organizational design to support usability, the three pillars of design, Development methodologies, ethnographic observation, Participatory Design, Scenario Development, Social impact statement for early design review, legal issues, Software tools: specification methods, Interface-Building tools, Evaluation and Critiquing tools.

UNIT- III: Direct manipulation and virtual environments, example of direct manipulation system, Explanations of direct manipulation, OAI model, Visual thinking and icons, direct manipulation programming, home automation, Remote Direct manipulation, Virtual environments.

UNIT- IV: Interaction devices: Keyboards and function keys, Pointing devices, Speech recognition , digitization and generation, Image and Video Displays, Printers. Response time and Display rate: Theoretical foundations, Expectations and attitudes, User Productivity, Variability.

UNIT -V: Multiple window strategies, Individual windows design, multiple window design, Coordination by tightly coupled windows, Image browsing and tightly coupled windows, Personal role management and elastic windows. Computer supported cooperative work: Goals of Cooperation, Asynchronous interaction, Synchronous distributed and face-to-face, applying CSCW to education.

UNIT- VI: Information search and visualization, Database Query and phrase search in textual documents, multimedia documents searches, Information visualization, advanced filtering. Hypermedia and the World Wide Web, Genres and goals and designers, Users and their tasks, Object action interface model for web site design.

Text Book

Ben Shneiderman "Designing the User Interface" (Pearson Education)

Reference Books:

1. R. Beale, A.J. Dix, J. E. Finlay, G. D. Abowd "Human Computer Interaction" (Prentice-Hall).
2. Joann Hackos, Janice Redish, "User and Task Analysis for Interface Design"(Wiley).
3. Jeff Raskin, "The Humane Computer Interface" (Pearson Education).
4. Jesse James Garrett, "The Elements of User Experience" (New Riders)

2KMEF4 ELECTIVE

(2) SYSTEMS SECURITY

UNIT-I Introduction: Security, Attacks, Computer criminals, Method of Defense. Cryptography: Substitution ciphers, Transpositions, Symmetric and asymmetric systems, cryptanalysis, data encryption standard, AES Encryption algorithms Public Key Cryptography, RSA Algorithms, Uses of Encryptions.

UNIT-II Program Security: Secure programs, Non-malicious program errors, Computer Viruses and Other malicious code, Targeted malicious code, controls against program threats.

UNIT-III Operating System Security: Protected Objects and methods of protection, Memory address protection, Control of access to general objects, File protection Mechanism, User Authentication**:** Authentication basics, Password, Biometrics.

UNIT-IV Trusted Operating System, Security Policies, models of Security, Trusted Operating System, Design, Design elements , security features of ordinary and Trusted Operating System, Kernalised design , separation , virtualizations , Layered design , typical OS Flows assurance method , Open Source Evolutions.

UNIT-V Database Security: Security requirements for Database, Reliability and integrity, sensitive data, interface, multilevel database, Proposals for multilevel security: separations, design of multilevel secure databases, Trusted Front-end Practical issues.

UNIT-VI Networks Security: Threats in networks, Network security controls, Firewalls, Intrusion detection systems, Secure E-mail. Administrating Security: Planning, Risk Analysis, Organization, security policies, Physical security.

Text Book:

C.P. Pfleeger and S. L. Pfleeger, "Security in Computing", Pearson Education (LPE)

Reference Books:

1. Stallings, "Cryptography and Network Security:" Pearson Education (LPE)
2. Matt Bishop, "Computer Security: Art and Science", Pearson Education
3. Kaufman, Perlman, Speciner, "Network Security" PHI.
4. Eric Malwald, "Network Security: A Beginner's Guide", TMH

2KMEF4 ELECTIVE

(3) IMAGE PROCESSING & COMPUTER VISION

Unit-I: Introduction to image processing, computer vision. Digitized images: basic concepts, image digitization, sampling, and quantization, digital image properties. Data structures for image analysis: traditional data structures and hierarchical data structures.

Unit-II: Image pre-processing: pixel brightness transformation, geometrical transformation, local pre-processing, image smoothing, edge detection, scaling, parametric edge models, multi-spectral images, adaptive neighborhood pre-processing, image restoration.

Unit-III: Image Segmentation: Thresholding, threshold detection methods, optimal thresholding, Edge-based segmentation, edge image thresholding, edge relaxation, border tracing and detection, Hough transforms, region-based segmentation and matching.

Unit-IV: Shape: Region identification, contour-based shape representation and description, region-based shape representation and description, shape classes. Object recognition: knowledge representation, statistical pattern recognition, syntactic pattern recognition.

Unit-V: Image Understanding: parallel, serial processing and hierarchical control, bottom-up, model-based and combined control strategies, point distribution models, contextual image classification, scene labeling & constraint propagation, semantic region growing.

Unit-VI: Linear discrete image transforms: Fourier, Hadamard, Discrete Cosine and Wavelets. Applications of these transforms. Image data compression: predictive methods, vector quantization, Hierarchical, progressive compression. JPEG & MPEG image compression.

Text Book:

Sonka M, Hlavac H, Boyle R "Image Processing, Analysis, and Machine Vision", (2/e) Brooks/Cole Thomson Learning.

Reference Books:

1. Gonzalez and Woods, “Digital Image Processing” (2/e) Pearson Education.
2. Forsyth, “Computer Vision” Pearson Education.
3. Chanda and Majumdar, “Digital Image Processing and Analysis” PHI.
4. Horn B K P, “Robot Vision” MIT Press, Cambridge, MA.

2KMEF5 Technical Paper Writing: Practice of technical paper writing as per IEEEE or ACM standards.

2KMEF6 Seminar: Based on recent trends in Computer Engineering taken form the Journals like IEEE transactions or ACM transactions.

2 KMEF7 Advanced Compiling Techniques Lab: Based on 2KMEF2 Advanced Compiling Techniques

2KMEF8 Embedded Systems Design Lab: Based on 2KMEF3 Embedded Systems Design.

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THIRD SEMESTER

3KMEF1 SEMINAR AND DISSERTATION

FOURTH SEMESTER

4KMEF1 SEMINAR AND DISSERTATIONI

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