# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

| **B.E.IV (IT) 8th Semester** | | Teaching Scheme | | | Examination Scheme | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory Exam | | Practical/Quiz/Viva/T.W. etc. | | | | |
| | | | | | University Exam. | | University Exam. | | Tutorial | Cont. Evaluation | Total Marks |
| Course | Course No. | L Hrs. | T Hrs. | P Hrs. | Duration Hrs. | Marks | Duration Hrs. | Marks | | | |
| Internet Technology & Application | IT 801 IT | 3 | 0 | 2 | 3 | 100 | 3 | 30 | 0 | 20 | 50 |
| Artificial Intelligence | IT 802 IT | 3 | 0 | 2 | 3 | 100 | 3 | 30 | 0 | 20 | 50 |
| Distributed Systems | IT 803 IT | 3 | 0 | 2 | 3 | 100 | 3 | 30 | 0 | 20 | 50 |
| Elective –I | IT 804 IT | 3 | 1 | 0 | 3 | 100 | 0 | 0 | 25 | 0 | 25 |
| Elective-II | IT 805 IT | 3 | 1 | 0 | 3 | 100 | 0 | 0 | 25 | 0 | 25 |
| Project | IT 806 IT | 0 | 0 | 8 | 0 | 0 | 0 | 120 | 0 | 80 | 200 |
| | TOTAL: | **15** | **2** | **14** | **-** | **500** | **-** | **210** | **50** | **140** | **400** |
| **Total Contact Hours: 31** | | | | | | | | **Total Marks: 900** | | | |

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**INTERNET TECHNOLOGY AND APPLICATION – IT 801 IT**

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 0 | 2 |
| Examination Scheme<br>Marks | 100 | Cont. Evaluation : 00<br>Examination : 00 | Cont. Evaluation : 20<br>Examination : 30 |

**(A) THEORY:**

**Introduction** – Internet Origin & Development – Internet Architecture frame work – Word Wide Web.

**Advanced Java Programming** – Java Applets –Java Servlet – Java script – Applications – Integrating Java & Java script – Security in Java.

**Extensible Markup Language (XML)** – Introduction – Origin and Goals – XML Documents – Common syntactic constructs – XML tags – XML Processors.

**Internet Application** – Interactive Web page Development – Interfacing with Data bases , Internet Access and security – Authentication, Active Server Pages (ASP), VBScript, Active-X, Characteristics of web-servers, Design of Web-Servers (Apache ,Internet Information Server-IIS , Oracle Application Server-OAS), Desirable characteristics of web-sites (based on their intended purpose).

**(B) PRACTICALS:**

Based up on the syllabus prescribed above.

**(C) TEXT BOOKS:**


**(1)** ASP in a nutshell By A. Keytom weissinger,2nd Edition, O'Reilly's press
**(2)** JavaScript and DHTML Cookbook : Danny Goodman, O'reilly's press
**(3)** Java Servlet and Java Server Pages By James Goodwill, Techmedia.
**(4)** The Complete reference JAVA, by Herbert Schildt, 2nd Edition, TMH publication
**(5)** Michael : The Web Programming Desktop Reference , PHI, 1998 ed.


**(D) REFERENCES:**


**(1)** Christoph Wilie, Christian Koller : ASP in 24 hours ,SAMS Publication
**(2)** ASP 3. Programmer's approach :WROX Press Publication.
**(3)** Core servlets and JSP by Marty Hall , Larry Brown., Pearson Education.
**(1)** Core JSP by Damon Hougland ,Prentice Hall PTR publication


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**ARTIFICIAL INTELLIGENCE: IT 802 IT**

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 0 | 2 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 00<br>Examination : 00 | Cont. Evaluation : 20<br>Examination : 30 |

## (A) THEORY

**Problems And State Space Search**
The AI Problems, The Underlying Assumption, What is an AI Techniques, the Level of the model, Criteria for success, some general references, one final word.

**Problems, Problem spaces and search**
Defining the problems as a state space search, production systems, production characteristics, production system characteristics, and issues in the design of search programs, additional problems.

**Heuristic Search Techniques**
Generate and test, Hill Climbing, Best First search, Problem Reduction, Constraint satisfaction, means-ends analysis.

**Knowledge Representation Issues**
Representation and mappings, Approaches to knowledge Representation.

**Using Predicate Logic**
Representation simple facts in logic, representing Instance and Is a Relationship. Computable functions and predicates, Resolution.

**Representing knowledge using rules**
Procedural versus Declarative knowledge, Logic programming, forward versus backward reasoning.

**Symbolic Reasoning under uncertainty**
Introduction to non-monotonic reasoning. Logics for nonmonotonic reasoning.

**Statistical Reasoning**
Probability and bays' theorem, Certainty factors and Rule base systems, Bayesian Networks, Dempster-Shafer Theory, and Fuzzy Logic.

**Weak Sot and Filler Structure**
Semantic Nets, Frames.

**Advance Topics.**

Game Playing: Overview and Example Domain.
The blocks world, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.

**Natural Language Processing**

Introduction, Syntactic Processing, Semantic Analysis, Discourse And Pragmatic Processing.

**Connectionist Models**

Introduction: Hopfield Networld, Learning in neural Networld, Application of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI and Symbolic AI.

**Expert Systems**

An introduction to Expert System, Explanation Facilities, Expert System Developments Process, Knowledge Acquisition.

**Introduction to Prolog.**

Introduction to Prolog, Syntax & Numeric Function, Basic list manipulation Functions in Prolog, Functions, Predicates & Conditional Input, Output & Local Variables, iteration and Recursion, Property lists & Arrays, Miscellaneous Topics, LISP & Other AI Programming Languages.

**(B) PRACTICAL & TERM WORK**

The Practical and Term Work will be based on the topics covered in the syllabus.

**(C) TEXT BOOK:**

**(1)** Artificial Intelligence By Elaine Rich and Kevin Knight ,Reprint 2003 , TMH
**(2)** Introduction to Prolog Programming By Carl Townsend.

**(D) REFERENCES:**

**(1)** Artificial Intelligence and Expert System Development, By D. W. Rolston,TMH Publication.
**(2)** Artificial Intelligence and Expert Systems, By DW Patterson., PHI publication
**(3)** Prolog Programming For Artificial Intelligence, By Ivan Bratko, Addison-Wesley.
**(4)** Programming with Prolog, By Klocksin and Mellish, Springer-Verlag Telos publication.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**DISTRIBUTED SYSTEMS: IT 803 IT**

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 0 | 2 |
| Internal Examination Scheme Marks | 100 | Cont. Evaluation : 00<br>Examination : 00 | Cont. Evaluation : 20<br>Examination : 30 |

## (A) THEORY

**Introduction:-**Definition of Distributed System-Goals-Hardware Concepts-Software Concepts-The Client-Server Model.

**Communication:-**Layered Protocols-Remote Procedure Call-Remote Object Invocation-Message-Oriented Communication- Stream-Oriented Communication.

**Processes:-**Threads-Clients- Servers- Code Migration-Software Agents.

**Naming:-**Naming Entities- Locating Mobile Entities-Removing Unreferenced Entities.

**Synchronization:-**Clock Synchronization- Logical Clocks.-Global State-Electron Algorithms-Mutual Exclusion. Distributed Transactions.

**Consistency and Replication:-**Introduction-Data-Centric Consistency Models-Client-Centric Consistency Models-Distribution Protocols-Consistency Protocols-Examples.

**Fault Tolerance:-**Introduction to Fault Tolerance-Process Resilience-Reliable Client-Server Communication. Reliable Group Communication.-Distributed Commit.-Recovery.

**Security:-**Introduction to Security- Secure Channels- Access Control.-Security Management.-Example: Kerberos. Example: SEASAME. Example: Electronic Payment Systems.

**Distributed Object-Based Systems and Distributed File Systems:**

## (B) PRACTICALS:

Based upon the syllabus prescribed above based on the distributed architecture like CORBA & RMI.

**(C) REFERENCES:**


**(1)** Distributed System: Principles and Paradigm by A.Tanenbaum,1st Edition, EEE,PHI publication.

**(2)** G F Colouris and J Dollimore: Distributed Systems: Concepts & Design, Addison Wesley, 1988.

**(3)** S Mullender (Ed): Distributed Systems, Addison Wesley,1989.

**(4)** Research papers from current journals.

**(5)** Java Distributed Computing by Jim Farley ,O'Reilly Publications,1998


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT : ELECTIVE-I**

## 1. DATA WAREHOUSING & DATA MINING

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Internal Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Introduction to warehousing**; warehousing techniques; data gathering and analysis; decision support; current reporting architecture; features like subject oriented, integrated, nonvolatile, time variant; decision support and transaction processing

**Business requirements**; inputs of data warehouse; data mart and data warehouse; development phases; RI; ROI; Query tools; Developer perspective; User's perspective; Empowering users; Oracle and data warehousing; Total solutions; OLAP and universal server relationships.

**Design methodology**; Information utilities infrastructures; warehouse design architecture; integration layer and high performance; data store and data flow; stages of data store and data flow; alternate warehousing architecture; normalized design development methodology; data warehousing risks; technology risk; project management risk; business risk; phases like vision; discovery; architecture; construction; construction goal; implementation; audit and iteration; database objects; import and export; OEM; Data Mart suits; Code generation tools; engine based tools; transparent gateway; data transformation; partitioning options; differences; building partitioned objects; choosing the partition key; row placement; traditional partitioning; striping and splitting; guidelines for warehousing; installing PPES.

**Physical data warehousing**; VLDB; NLS; parallelism; MPP and SMP; cost based optimizer and statistics; Dual schema access approach; activating and de-activating a schema; accessing schema; owner; table space segregation; system and application table spaces.

**Indexing the warehouse**; transaction entry parameter; warehouse and backup; recovery; image backup; security and warehouse; policies; tool based and password security; OEN security.

**Data mining**: Benefits of mining; discovery relationships and patterns; fraud detection; scalability of electronic solution; decision making process and data mining techniques; neural networks; association discovery; clustering; sequential discovery; data mining solutions.

**(A) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above.

**(B) TEXT BOOKS:**

**(1)** Oracle8 Data Warehousing – A practical guide,Michael J. Corey, Oracle Press Edition ,TMH Publication.

**(2)** Essential Oracle8i Data Warehousing : Designing, Building ,Managing Oracle Data
Warehouses, By: Gary Dodge, Tim Gorman, W. H. Inmon, John Wiley & Sons.

**(3)** Mattison , Rob Mattison : Web Data Warehousing and Knowledge Management.) McGraw Hill,1999.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT : ELECTIVE-I**

## 2 . KNOWLEDGE BASED MANAGEMENT SYSTEM

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Introduction to Knowledge** –Based systems System and expert Systems – Structure of KBS – Knowledge- Centered problem Solving Strategies – Search Methods – Knowledge Representation. Logic and Automated Reasoning – Rule – Based Systems Forward & Backward-Reasoning Systems – Analogical and Case-Based Reasoning – Qualitative Reasoning. Associative networks – Frames, and Objects – Uncertainty management. Advanced Reasoning Techniques.

**The Software Lifecycle in Knowledge** – based systems. Feasibility Analysis. Requirements Specification and Design. Knowledge Acquisition and system Implementation. Practical Considerations in Knowledge Acquisition – alternative Knowledge Acquisition Means. Project management. Knowledge Based Management systems like The CLIPS Systems and The Personal Consultant shell Systems.

**Impact of the web on the Knowledge management.**

### (B) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

### (C) TEXTBOOKS/REFERENCES:


**(1)** Ram D. Sriram : Intelligent Systems for Engineering : A Knowledge – Based Approach, Spinger Verlag; August 1997 )

**(2)** Avelino J. Gonzalez, Douglas D : The Engineering of Knowledge – Based Systems : Theory and Practice Book and 2 Disks, Prentice-Hall, 1994.

**(3)** Sabrina Sestito, Tharam S. Dillon : Automated Knowledge Acquisition, Prentice Hall.

**(4)** International Series in Computer systems science and engineering, 1995.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT: ELECTIVE-I**

## 3. Enterprise Resource Planning

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

E-**Commerce to E-Business**
Flexible Business Design, Definition of value, E-Business communities, Customization and Integration, E-Business Architecture, Business Engineering, Customer Relationship Management, Business Process Model, Customer Centric Business, Pre Order, Point of Order and Post Order Customer Support

**Supply Chain Management**
Business & Technology Forces – Driving Needs for SCM-Managing Order Acquisition Process
Elements of SCM

**ERP –** Introduction, the E-Business Backbone, Evolution, Definition-Advantages, Business Modeling,

**ERP and Related Technologies**
BPR – Business Process Reengineering-MIS – Management Information System
DSS – Decision Support System-EIS – Executive Information System
Data Warehousing – Data Mining-OLAP – Online Analytical Processing

**ERP – Manufacturing Perspective**
MRP – Material Requirement Planning-BOM – Bill of Material
MRP – Manufacturing Resource Planning-DRP – Distributed Requirement Planning
PDM – Product Data Management-MTO – Make to Order and MTS – Make To Supply
ATO – Assemble To Order ETO – Engineer to Order
CTO – Configure To Order

**ERP Modules** – Finance, Plant Management, Quality Management, Material Management

**ERP Implementation Life Cycle** – Pre-Evaluation Screening, Package Evaluation, Project Planning, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-User Training, Maintenance

**Tutorial assignments:**
Based upon the syllabus prescribed above.

**Text Book/Reference Book(s)**
**(1**) E-Business Roadmap for Success By Dr. Ravi Kalakota, Marcia Robinson – Addison Wesley
**(2)** Enterprise Resource Planning Concepts And Practice, By Vinod Kumar Garg N.K. Venkitakrishnan, PHI
**(3)** Enterprise Resource Planning By Alexis Leon, Tata McGraw Hill
**(4)** Customer Relationship Management by John, G and Thomsan Boehm, PHI

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT : ELECTIVE-I**

## 4 E-COMMERCE, DATA ENCRYPTION AND SECURITY

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation: 10<br>Examination : 15 | Cont. Evaluation: 00<br>Examination : 00 |

## (A) THEORY

**Conventional Encryption:**
Conventional Encryption Model, Steganography, Classical Encryption Techniques

**Conventional Encryption Techniques:**
Simplified DES, Block Cipher Principles, Data Encryption Standards, Differential and Linear Cryptography Principles, Block Cipher design Principles, Mode of Operation, Algorithms Like Triple DES, International Data Encryption Algorithm, Blowfish, Rc5, Cast-128, Rc2, Characteristics of Advanced Symmetrical Block Cipher, Issues of Conventional Encryption Like Traffic Distribution, Random Number Generation, Key Distribution.

**Public Key Cryptography:**
Principles of Public Key Cryptography, RSA Algorithm, Key Management, Elliptic Curve, Cryptography, Diffie-Hellman Key Exchange

**Number Theory:**
Prime And Relative Prime Numbers, Modular Arithmetic, Euler's Theorem, Euclid's Algorithms, Discrete Logarithm Tics.

**Message Authentication and Hash functions :**
Authentication Requirements, Functions, Message Authentication code, Hash Algorithms, Security of Hash Functions and MACs, MD5 Message Digest Algorithms, Secure Hash Algorithm, Ripemd-160, Hmac.

**Introduction to E-Commerce:**
Introduction TO E-Commerce, Transactions On E-Commerce , Requirements of Security on E-Commerce

**Network Security:**
Digital Signatures, Authentication Protocols, Digital Signature Standards, Application Authentication Techniques Like Kerberos, X.509 Directory Authentication Services, Active Directory Service of windows @ Nt /Windows @2000

**IP Security E-Mail Security:**

IP Security Overview, Architecture, Authentication Header, Encapsulation Security Payload , Combining Security Association , Key Management, Pretty Good Privacy, S/Mime types

**Web Security**

Web Security Requirements, SSI and Transport Layer Security, Secure Electronic Transactions, firewall Design Principles, Trusted Systems.

**(B) TUTORIAL ASSIGNMENTS:**

Based up on the syllabus prescribed above.

**(C) REFERENCES:**

**(1)** Cryptography and Network Security-Principles and Practice 2nd Edition, William Stalling, PHI.

**(2)** Bruce Scheneir : Applied Cryptography, John wiley Publication,1997.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT: ELECTIVE-I**

## 5. INFORMATION TECHNOLOGY & MANAGEMENT

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

**(A) THEORY**

**Information Technology**: Models and Principles: Systems & Information Theory- Users / Machine Systems – Database Management – logical / physical design.

**Information Storage and Retrieval** – content analysis, indexing search systems, library automation.

**Information Systems Applications**: Office automation, Communication, Intranet/Internet – Web centric business.

**Information interfaces and presentation**- multimedia information systems, user interfaces.

Ethical and social Impact of Information Systems.

**Information security** – threats and counter measures.

Electronic Banking, Electronic publishing, Electronic Polling Systems – on line Exam / monitoring / evaluation systems.

Standards / patents / Copyrights.

**(B) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above.

**(C) TEXTBOOK/REFERENCES:**

**(1)** M. Cook, Building Enterprise Information Architectures: Reengineering Information Systems, Prentice – Hall-1996.

**(2)** D. Tapscott (Editor), Blueprint to the Digital Economy: Wealth Creation in the era of E-Business, McGraw-Hill – 1998.

**(3)** K. Laudon, J. Laudon, Management Information System : New approaches to organization and technology, Prentice Hall India, 1998.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT: ELECTIVE-I**

## 6. ADVANCED DATABASE MANAGEMENT SYSTEMS

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation :10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

**(C) THEORY**

**Introduction:** Objectives and Review of the basic concepts – The Object – oriented data Model – Object oriented databases = ODMG – Nested Relation Model.

**Database System architectures:** Centralized systems – Client – Server systems – Parallel systems, Distributed systems – Network Types. Parallel Databases parallelism – Inter – query and Intra-query Parallelism – Inter – operation & Intra-operation parallelism – Design of parallel Systems. Distributed Databases_: Distributed DBMS Implementations. Features of Distributed client/server DBMS. Advanced RDBMS Features, RDBMS Reliability and Availability Robustness – Consistency fault Tolerance. RDBMS Administration. Distributed data storage-Distributed query Processing – Distributed Transaction model – Commit Protocols – Concurrency control – Deadlock handling. Multi – Database connectivity standards – Concept of the Middle – ware Product.

**Web Enabled Applications:** Review of 3-tier architecture – The middle – ware – Typical Middle – ware products and their usage. Architectural support for 3 – tier applications : technologies like RPC, CORBA, Com. Web Application server – WAS architecture – Concept of Data Cartridges – JAVA/HTML components. WAS security.

**Special Topics:** Security and Integrity, Standardization, Performance Benchmarks, Performance Tuning, time in Databases, User Interfaces, Active databases.

**Data & web warehousing:** data Ware house Definition and Characteristics data warehouse architecture, Client/Server Computing Model & data Warehousing. Query and Reporting Tools – Applications – OLAP & Tools – data Mining & Tools – data Visualization – Data Marts – Data Warehouse Administration and management. Data warehouse Design Considerations – Tools, performance Considerations – data Warehouse & DBMS Specialization – Mapping the Data Warehouse to a Multiprocessor architecture – data partitioning.

Multi-relational OLAP, MOLAP, ROLAP – Managed Query Environment (MQE), OLAP Tools and the Internet.

**(D) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above.

**(E) REFERENCES:**


**(1)** A Silberschatz, Henry Korth, S Sudarshan : Database systems Concepts, McGraw Hill, 3rd Ed, 1997.

**(2)** Alex Berson, Stephen J. Smith : Data warehousing, data Mining, and OLAP, (McGraw Hill series on data warehousing and data management 1998.)

**(3)** R Sigmore, M O Stegman, J Creamer : The ODBC solution, McGraw Hill 1995.

**(4)** Mattison , Rob Mattison : Web Data Warehousing and Knowledge Management. (Data Management) McGraw Hill,1999.

**(5)** Technical Notes and Literature on the Oracle Web – site.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 804 IT: ELECTIVE-I**

## 7. DECISION SUPPORT SYSTEM

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (B) THEORY

Overview of Management support Systems; Decision Making, systems, Modeling and Support; Overview of decision support systems; Modeling and Model Management; User Interface; types of Decision support Systems viz. Organization DSS, Enterprise Decision support systems, Executive Information and Support system; Constructing Decision Support Systems;. Knowledge-based DSS, knowledge management Techniques for decision support; Artificially Intelligent DSS, Expert Systems, Knowledge Representation; Artificial Neural Networks. Decision support and data & web warehousing.

### (C) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

### (D) TEXT BOOKS:


**(1)** Efraim Turban, jay E. Aronson : Decision support systems and Intelligent Systems, PHI, 5th Ed 1998.

**(2)** Clyde W. Hosapple, Andrew B. Whinston: Decision Support System : A Knowledge – Based Approach,1996.

**(3)** Andrew P. Sa : Decision Support Systems Engineering , Wiley Series in Systems Engineering, 1991.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT: ELECTIVE-II**

## 1. PARALLEL PROCESSING & ARCHITECTURE

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Introduction to parallel Processing** – Generation of parallel Computers – Architectural Classifications schemes – parallel Processing applications – Memory sub Systems and Input output management – Pipelining and vector Processing – Interconnection Networks and array processors.

**Multi – processor architecture and programming** – parallel Programming language and Environment.

**Data flow Computers** – static data flow, Dynamic Dataflow architecture – advance topics.

### (B) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

### (C) REFERENCES:


**(1)** Kai Hwang, F. Briggs, Computer architecture and parallel Processing, TMH publication, 1986.

**(2)** M. Flynn, computer Architecture **:** Pipelined and Parallel Processor Design ,1996,
Narosa Publishing.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT : ELECTIVE-II**

## 2. COMPILERS FOR ADVANCED ARCHITECTURES

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Introduction to Compiler structure** – Intermediate Representations – Code generation – resources, templates – Flow Analysis – Control Flow, Data Flow – dependence analysis and dependence graph.

**Code optimizations** – redundancy elimination, loop optimizations, procedure optimizations, register allocation, code scheduling, low-level optimizations, register allocation, code scheduling, low-level optimizations – Instruction scheduling and parallelization techniques.

**Compiler Design and implementation for parallel computer systems** – Vector pipelined, superscalar, SIMD, MIMD machines – Compiling issues for novel architecture with fine grain parallelism.

### (B) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

### (C) REFERENCES:


**(1)** Aho, sethi, Ullman, Compilers : Principles, Techniques, and Tools, Addison wesley – 1986

**(2)** N. Writh, Compiler Construction, Addison wesley – 1996.

**(3)** S. Muchnick, Advanced Compiler design and Implementation, Academic press / Morgan Kaufmann – 1997.

**(4)** M. Wolfe, L. ortega, C. Shaklin, High performance Compiler for parallel Computing, addison wesley – 1996.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT : ELECTIVE-II**

## 3. ADVANCED OPERATING SYSTEMS

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Overview:** Synchronization Mechanisms, Process Deadlocks, architecture of Distributed Systems, Theoretical Foundations.

**Distributed Mutual Exclusion** – Distributed Deadlock Detection – Agreement protocols – Distributed File Systems Distributed Shared Memory – Distributed scheduling – Recovery – Fault Tolerance. Resource security and Protection: access and Flow Control.

**Data security:** Cryptography – Multiprocessor systems architecture – Multiprocessor Operating systems. Introduction to database Operating Systems – Concurrency Control: Theoretical Aspects – Concurrency Control algorithms. Micro-Kernel architecture based Operating Systems.

Operating Systems based on Object Oriented approach and their design.

### (B) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

### (C) TEXT BOOK:


**(1)** Mukesh Singhal, Niranjan G. shivaratri (Contributor) : advanced Concepts in Operating Systems : Distributed database, and Multiprocessor Operating Systems, McGraw – Hill series in Computer science,1994.

**(2)** Crawley : Operating systems : An Object oriented Approach, McGraw Hill, 1998.

**(3)** A S Tanenbaum : Modern Operating Systems, Prentice – Hall, EEE,1993.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT: ELECTIVE-II**

## 4. IMAGE PROCESSING AND PATTERN RECOGNITION

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

## (A) THEORY

**Introduction:**
Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital Image Signal Processing Systems

**Digital Image fundamentals**
Elements of visual perception, Image signal Representation, Imaging System Specification, Building Image Quality, and Role of Computers

**Image Transforms:**
DFT, Properties of 2 Dimensional Fourier Transform, FFT, Walsh Transform, Hadamard Transform, DCT, Harr Transform, and the Slant Transform

**Image Enhancement:**
Enhancement by Point Processing, Spatial Filtering, Enhancement in frequency Domain, Color Image Processing

**Image Segmentation:**
Detection of Discontinuities, Edge Linking and Boundary Detection, Region Oriented Segmentation, Use of Motion in Segmentation

**Image Compression:**
Fundamentals, Image Compression Models, Error Free Compression, Lossy Compression, Image Compression Standards

**Representation:**
Representation Schemes, Boundary Descriptors, File Formats

**Recognition:**

Element of Image Analysis, Patterns and Classes, Decision Theoretic Methods, Structural Methods.

## (B) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

## (C) PROGRAMMING REQUIREMENT

Familiarity with the following topics is highly recommended:

**(1)** **Data Structure:** Data types and structures, lists, queues, stacks, trees, set, etc.

**(2)** **Algorithm:** Analysis, Design, sorting methods, Numerical Methods, Algorithm on graphs, etc.

**(3)** **Operating System & Programming Environment:** UNIX Systems, C, SQL, and Matlab.

## (D) TEXT BOOKS:


**(1)** Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods, Addition Wesley, 1993.

**(2)** Fundamental of digital Image Processing By Anil K. Jain, Prentice Hall, 1998

**(3)** Computer Vision and Image Processing By Anil K. Jain, Prentice Hall, 1989.


## (E) REFERENCE BOOKS:


**(1)** Mastering Matlab 5 by Duance Hanselman and Bruce Littlefiled, Prentice Hall, 1998

**(2)** Pattern Classification and Scene analysis by Richard O. Duda and Peter E. Hart, John Wiley and Sons, 1973.

**(3)** Digital Image Processing, Third Edition by Bernd Jahne, Springer-verlag, 1995.

**(4)** Pattern Recognition Engineering by Morton Nadler and Eric P.Smith, John Wiley and Sons, 1993.

**(5)** Clustering and classification by P.Arbie, L.J.Hubert, J.Schalkoff, John Wiley and sons, 1989.

**(6)** Digital Image Processing and Computer Vision by Robert J. Schalkoff, John Wiley and Sons, 1989.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT: ELECTIVE-II**

## 5. MOBILE COMPUTING

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Introduction**: History, Physical and Technological constraints, Impact on Computer Science, Wireless Communications

**Radio Propagation**, Media Access, Wireless communication Systems

**Wireless Networks**: Packet Radio Network (GPRS), Wireless LAN/WAN

**Mobile Networking**: Mobile-IP, Ad-Hoc Networks and Ad-hoc Routing

**Wireless Protocols** : Wireless TCP, WAP And WML Scripting, Session Mobility

**Information Management**: Data Dissemination and Broadcast Models, Mobile database And Mobile Transaction Location-Independent and Location-Dependent computing Models Naming, Locating, And Routing, Mobility, And Handoff, Location Awareness and Environmental discovery

**Mobile Applications And Services** : Mobile Agents, Transco ding And Proxy Architecture, Wireless Web and WAP Security. Authentication in Mobile Applications, Privacy Issues

**Case Study:** Satellite Networks: Satellite MAC, Multicast Over Satellite, Asymmetric Routing, TCP Over Satellite, LEO Constellation And LEO Routing

**New Topic**

Power Management and Energy-Awareness Computing, Information Appliances Mobile Wireless Networks Simulation

**(B) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above.

**(C) TEXT BOOK:**

**(1)** Mobile IP The Internet Unplugged by James D. Soloman, 1997,PHI Publication.

**(2)** Mobile IP: Design Principles and Practice by Charles E. Perkins, Prentice Hall,PTR,1st edition,1998

**(3)** Wireless Networking Handbook by Jim Geier ,New Riders Publishing.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT : ELECTIVE-II**

## 6. DIGITAL SIGNAL PROCESSING.

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

### (A) THEORY

**Signals and Systems:** Continuous Time And Discrete Time signals, Transformations of the independent variable, Exponential and Sinusoidal signals, unit impulse and unit step functions, continuous time and discrete time systems, basic system properties.

**Linear Time Invariant System:** Discrete Time LTI systems, The Convolution sum, properties of LTI systems, causal LTI systems described by difference equations.

**Fourier series and Fourier Transformation:** Fourier series representation of Fourier series, continuous time Fourier Transformation, Discrete time Fourier Transformation.

**Sampling:** Sampling Theorem, Reconstruction of a signal from its samples using Interpolation, Aliasing, Sampling of discrete time signals.

**Z Transforms:** The Z transformation Definition, The Region of convergence for the Z transform, Inverse Z transform, Properties of Z transform, Analysis and characterization of LTI systems using Z transforms, Unilateral Z Transforms.

**Discrete Fourier Transform:** Definition Inverse DFT, Properties of DFT, Relation between DFT and Z Transform. Circular convolution, Linear convolution of sequence FFT algorithms. (Decimation in time and decimation in frequency) Etc.

**Introduction to Digital Filtering:** FIR Filter and its structure, IIR filter and Its Structure, Hardware realization of Filter, Application

**Spectrum Analysis:** Spectrum Analysis using FFT, Some considerations in Spectrum Analysis, The chirp Z Transform Algorithm, Power Spectrum for Noisy Signals.

**(B) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above.

**(C) TEXT BOOK:**

**(1)** Signals and Systems- 2nd Ed. Alan V. Oppenheim & Alan S. Willsky With Hamid Nawas ,PHI Publication

**(2)** Digital signal Processing-Alan V. Oppenheim & Schafer,PHI publication

**(3)** Digital signal Processing-By Dr. Sonjit K. Mitra ,TMH publication.

**(D) REFERENCES:**

**(1)** Discrete Time Signal Processing- by Alan V. Oppenheim & Schafer, PHI Publication.

**(2)** Theory & Application of Digital Signal Processing –Howrence R. Rabines & Bernard Gold ,PHI publication.

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## IT: ELECTIVE-II

## 7. SOFTWARE RELIABILITY

## B. E. IV (IT) –8th SEMESTER

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

**(A) THEORY**

**Overview Of Software Reliability Engineering**

Software reliability concepts – reliability – s/w reliability and h/w reliability – s/w reliability modeling

**Defining Necessary Reliability**

Concepts – procedure – special situations – Background

**Developing Operational Profiles**

Determining Operational modes – Determining occurrence probabilities – Handling the evolution of the definition of operation during system development.

**Software Verification and Validation** – Motivation- Testing and Verification –Introduction to formal Methods – Various approaches-theorem proving – Model checking – modeling concurrent systems – Temporal logics – CTL & LTL model checking – Introduction to State Space explosion – BDD

**Preparing For Test**

Preparing Test Cases – Preparing Test Procedures –Test efficiency – Increasing test efficiency using run categories-Allocating test time – Invoking Test – Identifying system failures-CASE tools for generation Testing vs. correction proofs.

**Applying Failure Data to Guide Decisions**

Certification test – Reliability Growth test –Evolving Programs- Unreported failures-Certification test at different risk levels and discrimination Ratios

**Deploying Software Reliability Engineering**

Persuasion – Executing the deployment – Using a consultant

**Software Reliability Models**

General Characteristics – Random process –With and without fault removal-Particularization-Classification-Comparison –Recommended Models

## (A) TUTORIAL ASSIGNEMENT

Based upon the syllabus above

## (C) TEXT BOOK


1. Software Reliability Engineering by John D. Musa TMH Publications,1998.
2. Handbook of Software Reliability Engineering by Michael R. Lyu,TMH publication,1995
3. Software Reliability: Measurement,Prediction,Application by John D. Musa,1987
4. Model Checking : Clarke, Grumberg, Plede ,The MIT Press,2001


## (D) REFERECE BOOK


1. Design and Validation of Computer Protocol By Holzmann,e-book, Bell laboratories.
2.Software Reliability Modeling by Min xie, World Scientific Publishing.


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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**IT 805 IT: ELECTIVE-II**

## 8. Cluster Computing

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 3 | 1 | 0 |
| Examination Scheme Marks | 100 | Cont. Evaluation : 10<br>Examination : 15 | Cont. Evaluation : 00<br>Examination : 00 |

**(A) THEORY**

**Introduction/Overview of Technology**

Parallel processing overview -SMP vs. Distributed Mem.-Beowulf/Clusters/NOW Network Options -Parallel Architectures -Fine vs. Course Grained -Batch Systems

**Messege Passing**

Message Passing (methodology, history) - Essential API (six calls)- PTP communication-Collective communications-Data manipulation and communicators Derived data types - Timing and tools (second, less simple programming assignment)

**Basic Distributed Algorithms**

Master Slave -Spatial/Data Decomp- Pipelining -Loop unrolling (start establishing programming projects)

**OpenMP and PThreads**

Overview of shared memory –Limitations-Combination with message passing Basic

**Shared Memory Algorithms**

Processor Pool (variation of M/S) -Loop unrolling

**Performance and Scaling**

Benchmarking (the 12 ways to improve performance)-scalability -Communication bottlenecks -Latency hiding -Reliability – check pointing and restart

**Other Technologies**

Visualization Tools and techniques-Grid Computing

**(B) TUTORIAL ASSIGNMENTS:**

Based upon the syllabus prescribed above

**(C) TEXT BOOKS**

1 . Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers by Barry Wilkinson and Michael Allen, Prentice Hall, 1999.

2. Using MPI: Portable Parallel Programming with the Message Passing Interface - 2nd Edition by William Gropp, Ewing Lusk and Anthony Skjellum, MIT Press, 1999.

**(C) REFERENCES**

1. Beowulf Cluster Computing with Linux, edited by Thomas Sterling, MIT Press, 2002.

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# VEER NARMAD SOUTH GUJARAT UNIVERSITY

**B.E.- IV (Information Technology)**

**Semester - VIII**

**Project: IT 806 IT**

| | Lecture | Tutorial | Practical |
|---|---|---|---|
| Teaching Hours | 0 | 0 | 8 |
| Examination Scheme Marks | - | - | Cont. Evaluation : 80<br>Examination 120 |

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## LIST OF ELECTIVE SUBJECTS

| Sr. No. | Elective-I | Sr. No. | Elective-II |
|---|---|---|---|
| **1.** | Data Warehousing and Data Mining | **1.** | Parallel Processing and Architecture |
| **2.** | Knowledge Based Management System | **2.** | Compilers for Advanced Architectures |
| **3.** | Enterprise Resource Planning | **3.** | Advanced Operating System |
| **4.** | E-commerce, Data Encryption and Security | **4.** | Image Processing and Pattern Recognition |
| **5.** | Information Technology and Management | **5.** | Mobile Computing |
| **6.** | Advanced Database Management System | **6.** | Digital Signal Processing |
| **7.** | Decision Support System | **7.** | Software Reliability |
| | | **8.** | Cluster Computing |