

**KADI SARVA VISHWAVIDYALAYA
GANDHINAGAR**



**Master of Science
(Information Technology)**

M.Sc. (IT)

June 2010

(2 Years Full Time: 4 Semesters Programme)

**LDRP Campus, Sector – 15, Nr. KH – 5 Circle,
Gandhinagar - 382015**

About Sarva Vidyalaya and Kadi Sarva Vishwavidyalaya

Sarva Vidyalaya Kelvani Mandal has been established in the year 1919, by a Philanthropist “Pujya Chhaganbha”. The basic principle preached by him, “Kar Bhala Hoga Bhala” has been the driving force for the growth of education activities managed by the trust. Having started with just 6 students then, today the trust manages and runs various schools and colleges both at Kadi and Gandhinagar with more than 48,000 students being educated. Of these, around 6,500 students, both boys and girls stay in the hostels being managed by the trust.

The trust is being nourished and managed by its alumni who occupy respectable positions in the society. Many of its alumni have settled abroad and they shower in donations to benefit the existing as well as prospective students for providing them with better facilities for study as well as stay.

Initially started in 1919, the trust currently has land of around 165 acres together at Kadi and Gandhinagar. At Kadi, the trust has a land of 137 acres where in, various schools and colleges are being run and a Gaushala which helps in nourishing Children with milk with around 125 cows. At Gandhinagar, the trust has a total of 28 acres of land where in various schools, colleges (technical as well as non-technical), hostels and staff quarters exist.

The trust has always been in the forefront for provisions of value based education to all the students irrespective of Caste, Creed and Religion etc. Keeping in with the main motto “Kar Bhala Hoga Bhala” the trust has surrendered all its management quota seats in all courses being run by it and the admissions to the various courses strictly conducted on the basis of merit through centralized admission process. At present the trust runs various schools from preprimary to Higher Secondary level both at Kadi and Gandhinagar as well as Colleges both technical and nontechnical at Kadi and Gandhinagar.

Sarva Vidyalaya Kelvani Mandal – Kadi Campus at a glance

Having started in the year 1919, the trust slowly and steadily made its presence felt in the society and the efforts of “Chhaganbha” have not gone waste with the development of schools at Kadi. The campus grew from 9 acres in 1923 to 137 acres by 1934 with the acquisition of land for the purpose of establishing schools, hostels and Gaushala as well. In the year 1960 Sarva Vidyalaya Kelvani Mandal has set its foot into providing technical education with the establishment of an Industrial Training Institute at Kadi. The trust went on to establish the Science College, Pramukh Swami Science College in the year 1965 which was later upgraded into Science and Arts College, Pramukh Swami Science and H.D.Patel Arts College. This has led to the growth of education activities in and around Kadi and the trust has also started various other colleges leading to the degree and postgraduate degrees like BBA, BCA, MBA, MCA, PGDCA, B.Ed., and PTC.

Sarva Vidyalaya Kelvani Mandal- Gandhinagar Campus at a glance

The trust has been striving hard for the development of education and related activities since 1919 and looking in to this, the Government of Gujarat invited Sarva Vidyalaya Kelvani Mandal to set up education facilities at Gandhinagar in 1976. At that time the trust was allotted a land of 13 acres for establishing schools for the benefit of the population staying in and around Gandhinagar. Since then the trust has set up many educational institutions and hostels which have proved to be the backbone of the development of education in the state of Gujarat and currently more than 36,000 students are being educated at andhinagar of which around 4,000 students both boys and girls are staying in the hostels.

With a need to spread education further and develop a kind of professionalism in the young generation of Gujarat, the trust has started the first self financed college, Kalupur Bank Institute of Pharmaceutical Education and Research (KBIPER) offering B. Pharmacy program with the approval of AICTE in the year 1995 for which Government of Gujarat allotted a land measuring 20,000 sq. meters i.e. 5 acres. Currently KBIPER is also offering post graduate and doctoral research programs besides B. Pharmacy. The journey of Sarva Vidyalaya continued further with the establishment of S. K. Patel Institute of Management and Computer Studies offering MBA and MCA programs in the year 1998. The trust went on to establish other institutes offering BBA, BCA, B.Com., B.Ed., PTC and other vocational courses.

In the year 2005, the trust has established an Engineering college for which Government of Gujarat has allotted a land of around 40,000 sq. Mts, in Sector 15 of Gandhinagar. In addition to this in the year 2006, the trust has also established a Polytechnic College, the VPMP Polytechnic College.

The University has been set up vide Gujarat Act No.21, dated 16.5.2007 and has been recognized by University Grant Commission vide letter no.F-9-18-2008 (CPP-I) under the name and style "KADI SARVA VISHWAVIDYALAYA".

The objectives of the university are-

1. To provide need based education and develop courses of contemporary relevance.
2. To be a University of excellence by providing research based activities which would foster higher economic growth.
3. To provide education to all irrespective of caste, creed and religion.

The Post Graduate courses and Research in Computer Science and Information Technology got initiated parallel to the commencement of the University in 2007-08.

The trust set up a Nursing college and started imparting B.Sc. Nursing education since Session 2008-09. A number of new courses including CHOICE BASED COURSES are being currently planned.

M.Sc. INFORMATION TECHNOLOGY:

The curriculum of this programme is designed to equip students with the knowledge and skills in the area information technology and computer application by training them in various emerging technologies at a considerable depth. Our vision is to inculcate values, identify hidden talents, provide opportunities for students to realize their full potential and shape them into good professionals, future entrepreneurs, and above all excellent human beings.

Information technology involves study, design, development, implementation, support and management of information systems that are computer-based. The scope of information technology is very wide and is gaining momentum with each passing day, to encompass many fields of work and study.

COURSE DETAILS:

M.Sc. Information Technology at Kadi Sarva Vishwavidyalaya, Gandhinagar, is a two years course comprising of four semesters with English as medium of instruction. The curriculum has been developed with basic courses like Database Systems Application, Advanced Web-based Applications, Software Engineering & Project Management, Multimedia and Virtual Reality Applications, Enterprise Resource Planning, Building Applications using Microsoft .Net Platform, Mobile Computing, Linux Systems and Network Administration, Data Warehousing & Data Mining, Internet Programming using Java etc.. More emphasis is being laid on Practical work enabling students to learn and gain hands on training and experience with the tools & techniques. The detailed syllabus and pattern of teaching and examinations are provided on www.ksvuniversity.org , the web site of KSV.

ELIGIBILITY:

The candidates seeking admission to **M.Sc. IT** at Kadi Sarva Vishwavidyalaya, Gandhinagar must have a Bachelor's degree of minimum three years duration in any discipline among B.C.A., B.Sc. (I.T.), B.Sc. (Computer Science / Applications), B.Sc. (Information Science / System), BE (IT), BE (CE/CS) with at least second class.

Kadi Sarva Vishwavidhyalaya
Master of Science (Information Technology)

Rules and Regulations

R. M.Sc. (IT)– 1: Candidates for admission to the Master of Science (Information Technology) must have a Bachelor's degree of minimum three years duration in any discipline among B.C.A., B.Sc. (I.T.), B.Sc. (Computer Science / Applications), B.Sc. (Information Science / System), BE (IT), BE (CE/CS) with at least second class.

R. M.Sc. (IT)– 2: The duration of the course will be full time two academic years. The examination for the Master of Science (Information Technology) course will be conducted under the semester system. For this purpose the academic year will be divided into two semesters. No candidate will be allowed to join any other fulltime course simultaneously.

R. M.Sc. (IT)– 3: No candidates will be admitted to any semester examination for Master of Science (Information Technology) unless it is certified by the HOD, M.Sc. IT.

"That he/she has attended the courses of study to the satisfaction of the HOD, M.Sc. IT."

For granting the terms, minimum attendance of 85% of the theory lectures and practical's will be required out of the total number of lectures and practical's conducted in the terms.

R. M.Sc.(IT)– 4: Candidates desirous of appearing at any semester examination of the M.Sc.(IT) course must forward their application in the prescribed form to the Registrar, through the HOD, M.Sc. IT on or before the date prescribed for the purpose under the relevant intimation of the University.

R. M.Sc.(IT)– 5: For any Semester, the maximum marks in any subject(s) for the internal and external assessments shall be shown in the teaching and examination scheme for each individual subjects. For the purpose of internal assessment, tests, quizzes, assignment or any other suitable methods of continuous evaluation may be used by the department.

If a student keeps term and does not appear for examinations as well as if he/she fail to reappear in the re-test (block test) examination in the same academic session, his/her internal in the relevant subject(s) would be considered as ABSENT (INCOMPLETE grade "I"). The department will submit the internal marks of all subject(s) as per the notification of the University.

R. M.Sc. (IT)– 6: No candidate will be permitted to reappear at any semester examination, which he/she has already passed.

R. M.Sc. (IT)– 7: To obtain the Degree of Master of Science (Information Technology), student should clear all the four semester examinations within a period of four years from the date of his/her Registration. Failing which, he/she shall be required to register himself/herself as a fresh candidate and keep the attendance and appear and pass in the four semester examinations afresh from first semester onwards in order to obtain the Degree of Master of Science (Information Technology).

R. M.Sc. (IT)– 8: There shall be an Examination at the end of each of the four semesters to be known as First semester Examination, Second semester Examination, Third semester Examination and Fourth semester Examination respectively, at which a student shall appear in that portion of papers practical and Viva- Voce if any, for which he/she has kept the semester in accordance with the regulations in this behalf.

A candidate, whose term is not granted for whatsoever reason, shall be required to keep attendance for that semester or terms when the relevant papers are actually taught at the department.

R. M.Sc. (IT)– 9: No candidates will be allowed to reappear in a subject/course in which he/she has already passed. He/She can reappear only for the examination i.e. Internal or University examination in which he/she has failed. His/Her marks in the examination passed will be carried forwarded.

Rules for Grading – M.Sc. IT Programme (KSV)

1. Theory Subjects and Practical Subjects are allotted credits as per the hours allocated to them per week. (i.e. 1 hr = 1 Credit = 25 Marks).
2. To pass a subject in any Semester a candidate must obtain a minimum of 45% of marks under each head of the subject and minimum of 45% in the individual subject head.
3. If a candidate fails in any heads of a subject, he has to appear for that particular head to pass. (That is, for example if candidate fails in midterm exam of a subject, he has to reappear for midterm of that subject.)
4. The performance of each candidate in all the subjects will be evaluated on 7-point scale in term of grades as follow:

Grading Scheme		Percentage according to Grade	Grade Points	Qualitative Meaning of Grade
1	A +	90-100	10	Outstanding
2	A	80-89	9	Excellent
3	A-	70-79	8	Very Good
4	B +	60 - 69	7	Good
5	B	50-59	6	Average
6	B-	45-49	5	Fair
7	F	Less Than 45	0	Fail
8	I	Incomplete		

Award of class:

The class awarded to a student with his/her M.Sc. (IT) course is decided by his/her final CPI as per the following table:

Distinction	CPI not less than 7.50
First Class	CPI less than 7.50, but not less than 6.50
Second Class	CPI less than 6.50, but not less than 5.50
Pass Class	CPI less than 5.50, but not less than 5.00

SEMESTER PERFORMANCE INDEX (SPI)

- The performance of a student in a semester is expressed in terms of the Semester Performance Index (SPI).
- The Semester Performance Index (SPI) is the weighted average of course grade points obtained by the student in the courses taken in the semester. The weights assigned to course grade points are the credits carried by the respective courses.

$$\text{SPI} = \frac{g_1 c_1 + g_2 c_2 + \dots}{c_1 + c_2 + \dots}$$

Where g_1, g_2, \dots are the grade points obtained by the student in the semester, for courses carrying credits c_1, c_2, \dots respectively.

CUMULATIVE PERFORMANCE INDEX (CPI)

- The cumulative performance of a student is expressed in terms of the Cumulative Performance Index (CPI). This index is defined as the weightage average of course grade points obtained by the students for all courses taken since his admission to the program, where the weights are defined in the same way as above.
- If a student repeats a course, only the grade points obtained in the latest attempt are counted towards the Cumulative Performance Index.

5. For any Semester the maximum marks for the internal and external assessments shall be shown in the teaching and examination scheme. For the purpose of internal assessment, tests, quizzes, assignments or any other suitable methods of assessment may be used by a department.

6. Semester Passing Scheme :

- a For each semester examination, a candidate will be considered as pass/clear if he/she has secured "B-" OR above grade in the Internal as well as in the University Examination separately in each course of theory, practical and project work.
- b For each semester examination, a candidate will be considered as fail if he/she has secured "F" grade in any or all of the subject(s).
- c If the candidate does not fulfill the subject requirements, he/she will be given I-grade and the candidate will have to complete the course requirement before the commencement of the next semester-end examination. If the candidate does not clear I grade in any subject, he/she will be considered fail – F grade.
- d Candidate has to clear his / her 'F' grade or 'I' grade, if any, in the next examination.

7. Semester Promotion Scheme:

A candidate will be promoted to the subsequent Semester according to the following scheme:

- a A candidate would be granted admission to the Second Semester irrespective of the result of First Semester. He/She will be permitted to pursue his/her study of the Second Semester, provided his/her term for the first semester is granted and applied for the university examination.
- b A candidate would be granted admission to the Third Semester if and only if he/she has cleared all the subjects of First Semester and irrespective of the result of Second Semester. He/She will be permitted to pursue his/her study of the Third Semester, provided his/her term for second semester is granted and applied for the university examination.
- c A candidate would be granted admission to the Fourth Semester if and only if he/she has cleared all the subjects of Second Semester. He/She will be permitted to pursue his/her study of the Fourth Semester, provided his/her term for third semester is granted and applied for the university examination.
- d The final degree would be awarded to the student on successful completion of all the Semester.

8. Following criteria would be followed for awarding the mark statement of any Semester:

- The Grade (Mark) sheet will contain separate grades internal and University examination for each of compulsory papers (subjects), Practical work, Project Work and overall grade for all the subjects combined.
- It will also contain percentage and the class obtained. The percentage will be calculated on the basis of cumulative performance index (CPI) obtained by candidate.
- CPI will be shown in each semester's Grade (mark) sheet for each end-semester examination.

9. Subject wise Grade and grade points will be calculated based on the Grading Scheme defined. For example:-

FOR SEMESTER-1

SUBJECTS	TOTAL MARKS (INT + EXT)	MARKS SECURED (INT + EXT)	IN PERCENTAGE	GRADE	POINTS AS PER GRADE	SUBJECT WISE CREDIT POINTS	PRODUCT OF CREDIT POINTS AND GRAD POINTS (Total Credits)
DSA	100	75	75.00	A-	8	4	32
AWA	100	64	64.00	B+	7	4	28
SEPM	100	82	82.00	A	9	4	36
MM & VRML	100	54	54.00	B	6	4	24
Project-I	150	73	49.00	B-	5	6	30
P-106	100	80	80.00	A	9	4	36
P-107	100	72	72.00	A-	8	4	32
TOTAL						30	218

SPI : 218 / 30 = 7.27

CPI = 7.27

FOR SEMESTER-2

SUBJECTS	TOTAL MARKS (INT + EXT)	MARKS SECURED (INT + EXT)	IN PERCENTAGE	GRADE	POINTS AS PER GRADE	SUBJECT WISE CREDIT POINTS	PRODUCT OF CREDIT POINTS AND GRAD POINTS (Total Credits)
.Net	100	82	82.00	A	9	4	36
E-Gov & GIS	100	76	76.00	A-	8	4	32
MC	100	71	71.00	A-	8	4	32
Linux	100	65	65.00	B+	7	4	28
Project-II	150	45	30.00	F	0	6	0
P-206	100	52	52.00	B	6	4	24
P-207	100	44	44.00	B-	5	4	20
TOTAL						30	172

SPI : 172 / 30 = 5.73
CPI: 6.50 (As Follow)

SEMESTER	POINTS OF SEM (SPI)
SEM-1	7.27
SEM-2	5.73
Total SPI	13.00
CPI	6.50

In this case, the candidate is failing in one subject i.e. Project-II, and he/she has secured 5.23 SPI for semester II and 7.27 CPI for semester I and II both. Whenever the candidate clears the subject i.e. Project-II in the next semester examination, the total credits for that subject will be add to CPI of the candidate.

1. To calculate the final grade of the course, CPI will be calculated as follows:–

SEMESTER	POINTS OF SEM (SPI)
SEM-1	6.79
SEM-2	5.30
SEM-3	8.33
SEM-4	5.56
Total SPI	25.98
CPI	6.50

CPI : 6.50

Class of M.Sc. IT Course will be now – ‘**First**’ as it falls in that range.

Syllabus of M.Sc. (IT)

Semester – I

101. Database Systems Application
102. Advanced Web based Applications
103. Software Engineering and Project Management
104. Multimedia and Virtual Reality applications
105. Project – I
106. Practical based on paper 101,102
107. Practical based on paper 103,104

Semester - II

201. Enterprise Resource Planning
202. Building Applications Using Microsoft .Net Platform
203. Mobile Computing and WAP based Applications
204. Linux Systems & Network Administration
205. Project – II
206. Practical based on paper 201,202
207. Practical based on paper 203,204

Semester - III

301. Data Warehousing & Data Mining
302. Internet Programming using Java
303. Elective - I
304. Elective – II
305. Project – III
306. Practical based on paper 301,302
307. Practical based on elective papers

Semester - IV

401. Project Work

M.Sc. (IT)– III Elective Subjects List:

- | | |
|---|----------------------------|
| 1. Advanced Software Engineering | 2. Artificial Intelligence |
| 3. High Performance Computing with Cluster & Grid | 4. Embedded Systems |
| 5. Network security and Cryptography systems | 6. Software Testing |
| 7. E-Governance Applications and GIS | |

KADI SARVA VISHWAVIDYALAYA - GANDHINAGARTeaching & Examination scheme
Effective from Academic Year July 2009 onwards**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)****M.Sc. (IT) 1ST SEMESTER**

Sr. No./ Sub Code	Subject Title	Credit	Teaching Scheme	Exam Scheme					
			Theory/ Practical	Theory		Practical		Sessional Marks	Total Marks
				Hrs	Max Marks	Hrs	Max Marks		
P101	Database Systems Application	4	4	3	70	-	-	30	100
P102	Advanced Web based Applications	4	4	3	70	-	-	30	100
P103	Software Engineering and Project Management	4	4	3	70	-	-	30	100
P104	Multimedia and Virtual Reality applications	4	4	3	70	-	-	30	100
P105	Project – I	6	6	-	-	-	100	50	150
P106	Practical based on paper (P101 & P102)	4	4	-	-	3	100	-	100
P107	Practical based on paper (P103 & P104)	4	4	-	-	3	100	-	100
Total			30						750
Total hours			30						
Total Credits of semester			30						

KADI SARVA VISHWAVIDYALAYA - GANDHINAGAR

Teaching & Examination scheme
Effective from Academic Year July 2009 onwards

MASTER OF SCIENCE (INFORMATION TECHNOLOGY)

M.Sc (I.T) 2nd SEMESTER

Sr. No./ Sub Code	Subject Title	Credit	Teaching Scheme	Exam Scheme						
				Theory/ Practical	Theory		Practical		Sessional Marks	Total Marks
					Hrs	Max Marks	Hrs	Max Marks		
P201	Building Applications Using Microsoft .Net Platform	4	4	3	70	-	-	30	100	
P202	Enterprise Resource Planning	4	4	3	70	-	-	30	100	
P203	Mobile Computing and WAP based Applications	4	4	3	70	-	-	30	100	
P204	Linux Systems & Network Administration	4	4	3	70	-	-	30	100	
P205	Project – II	6	6	-	-	-	100	50	150	
P206	Practical based on paper (P201 & P202)	4	4	-	-	3	100	-	100	
P207	Practical based on paper (P203 & P204)	4	4	-	-	3	100	-	100	
Total			30						750	
Total hours			30							
Total Credits of semester			30							

KADI SARVA VISHWAVIDYALAYA - GANDHINAGAR

Teaching & Examination scheme
Effective from Academic Year July 2009 onwards

MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**M.Sc (I.T) 3rd SEMESTER**

Sr. No./ Sub Code	Subject Title	Credit	Teaching Scheme	Exam Scheme					
				Theory		Practical		Sessional Marks	Total Marks
				Hrs	Max Marks	Hrs	Max Marks		
P301	Data Warehousing & Data Mining	4	4	3	70	-	-	30	100
P302	Internet Programming using Java	4	4	3	70	-	-	30	100
P303	Elective – I	4	4	3	70	-	-	30	100
P304	Elective – II	4	4	3	70	-	-	30	100
P305	Project-III	6	6	-	-	-	100	50	150
P306	Practical based on paper (P301 & P302)	4	4	-	-	3	100	-	100
P307	Practical based on paper (P303 & P304)	4	4	-	-	3	100	-	100
Total			30						750
Total hours			30						
Total Credits of semester			30						

KADI SARVA VISHWAVIDYALAYA - GANDHINAGAR
Teaching & Examination scheme
Effective from Academic Year July 2009 onwards

MASTER OF SCIENCE (INFORMATION TECHNOLOGY)

M.Sc. (IT) 4th SEMESTER

Sr. No./ Subject Code	Subject Title	Credit	Teaching Scheme		Exam Scheme			
			Reporting Hrs.	Industry Work Hrs.	Practical		Sessional Marks	Total Marks
					Hrs	Max Marks		
P401	Project Work	30	2	30	-	500	250	750
								750
Total Hours			30					
Total Credits of semester			30					

Note: This semester is devoted for the Project Work where student will work on an IT project of any organization. The project will be done by the student involving him in a group, if possible at the industry site or at the any organization permitted by HOD of the programme.

Each student has to work 30 hours per week on project and keep daily record of work done. This record will be evaluated during reporting interaction at the Institution. This will be considered as continuous evaluation (Internal/Term Work) and marks will be allocated under this head out of marks under Examination scheme.

Detailed Syllabus

Paper – 101

M.Sc. (IT) – 1

Database Systems Application

1. Concepts of Database Systems

• Relational Database Model

Relational Database Management System (RDBMS) - an introduction
Characteristics of RDBMS
Dr. E. F. Codd's Rules for RDBMS
DBMS and RDBMS - A Comparison
Components of RDBMS

• Entity Relationship (ER) Modeling

Data Modeling Schema
Entity Relationship (ER) Diagram
Concepts of ERD
Categories of Attributes
Simple or Atomic Attribute
Composite Attribute
Multi-Valued Attribute
Derived Attribute
Relationship strength
Weak (Non-Identifying) Relationship
Strong (Identifying) Relationship
The development stages of ER Diagram

• Normalization of Database Tables

Need of normalization
1st Normal Form
2nd Normal Form
3rd Normal Form
Denormalization

2. Structured Query language (SQL)

- Data Definition Language (DDL)
- Data Manipulation Language (DML)
- Transaction Control Language (TCL)
- Data Control Language (DCL)

3. PL/SQL Programming

• PL/SQL structures

Simple blocks
Control structures
PL/SQL records
Recognizing the Basic PL/SQL Block and Its Sections

Describing the Significance of Variables in PL/SQL
Distinguishing Between PL/SQL and Non-PL/SQL Variables
Declaring Variables and Constants
Executing a PL/SQL Block
Variables, Constants, data types

- **Error checking – exception handling**
 - Defining exceptions
 - Using the when others clause
 - Ensuring complete error checking
 - Passing error messages to calling routine
- **Cursors in PL/SQL**
 - Cursor basics
 - Using a cursor for a multi-row SQL query
- **Iteration in PL/SQL**
 - For loop
 - While loop

4. Advanced PL/SQL Programming

- **PL/SQL tables**
 - Defining PL/SQL tables
 - Reasons to use PL/SQL tables
 - Populating a PL/SQL table
 - Retrieving from a PL/SQL table
- **Triggers in PL/SQL**
 - Triggers and database events
 - Defining a trigger
 - Timing a trigger
 - Enabling and disabling a trigger
- **Stored procedures, functions and packages**
 - Basics of stored procedures
 - Basics of functions
 - Basics of packages
 - Basics of Sequences

5. Database Administration

DBMS Architecture
Performance Tuning (RC, RM, HWM, INDEX)
Backup and Recovery Management (Export, Import, Flashback)
Database Open Stages (Nomount, Mount, Open)
Tablespaces
Shutdown Types
Startup Types
SqlLoder Utility
Basics DBCA
Basics of Listener

Reference:

1. Database Systems: Concepts Design and Implementation
Dr. N. N Jani, Ms. shivani Trivedi, Ms. Nidhi Devecha, Ms. Rebecca Jobdas
Books India Publication.
2. Database System Concepts- Silberschatz, Korth, Sudarshan, Fifth Edition,
McGraw Hill
3. Fundamentals of Database Systems, Elmasri ,Navathe, Pearson
Education, Fifth Edition (2008)
4. An Introduction to Database Systems, C.J.Date, a Kannan, S Swaminathan,
Pearson Education, Eighth Edition (2006) (Equivalent Reading)
5. Oracle 9i, PL/SQL Programming by Scoot Urban, Oracle Press

Advance Web based Applications

- Introduction
- Writing PHP Programs and basic HTML review
- Forms - getting data from the client
- Loops and arrays, HTML tables, CSS
- Functions and includes - organizing your code
- File and Directory Handling
- PHP Database Connectivity
- Retrieving data from MySQL
- Manipulating data in MySQL
- Authentication and session handlers
- Regular expressions
- Object-oriented PHP
- Error and exception handling
- Networking with PHP
- E-mail, XML, and web services

Books:

Professional PHP	- WROX
Making use of PHP	By Ashok Appu
Practical PHP & MYSQL	By Jono Bacon
Pro PHP Security	By Charis Snyder
Beginning PHP5 and MYSQL	By w. Jason Gilmore
PHP & MySQL for dynamic websites	By Larry Ullman
PHP & MYSQL Web development	By Luke Welling

Software Engineering and Project Management

- Software Processes
 - Software Process Models, Process Iteration, Process Activities, The Rational Unified Process, Computer-Aided Software Engineering
- Software Requirements
 - Functional and non-functional requirements, User requirements, System requirements, Interface specification
- Requirements engineering processes
 - Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management
- Application Architectures
 - Data-processing systems, Transaction-processing systems, Information and resource management systems, Event-processing systems
- Object-oriented Design
 - Objects and object classes, An object-oriented design process, Design evolution
- Verification and Validation
 - Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods
- Software Testing
 - System testing, Component Testing, Test case design, Test automation

Project Management

- Introduction of Project Management
 - Project
 - Project Management
 - Goal and Objective of Project Management
 - Scope
 - 4Ps People Product Process Project
- Project Management Life Cycle
 - Project Time Management
 - Project Cost Management
 - Project Quality Management
 - Project Human Resource Management
 - Project Team Management
 - Project Risk Management
 - Risk Plan
 - Risk Identification
 - Risk Quantification
 - Project Success Criteria
 - Project Failure Criteria

- Project Implementation
 - Resource Requirement
 - Types of Resource Men Materials Finance
- Project Monitoring and Control
 - Closing Project
 - Project Inventory Management
- Understanding of MS.Project (Practical)

Recommended books:

Software Engineering (Seventh Edition) Sommerville Pearson Education
 Project Management for the 21st Century Beenet P Lientz, Kathryn P Rea-
 Academic Press, 1995

Reference books:

1. Project Management David I Cleland Mcgraw Hill International
2. Project Management Dennis Lock

Multimedia and Virtual Reality applications

- Computer Graphics
 - Vector graphics
 - Fundamentals
 - Shapes
 - Transformations and Filters
 - 3-D Graphics
 - Bitmapped graphics
 - Resolution
 - Image Compression
 - Image Manipulation
 - Geometrical Transformation
 - Combining Vectors and Bitmaps
 - File Formats

- Video
 - Digitizing Video
 - Video Standards
 - Video Compression techniques
 - Digital Video Editing and Post-Production
 - Streamed Video and Video Conferencing

- Animation
 - Captured Animation and Image Sequences
 - Digital Cel' and Sprite Animation
 - Key Frame Animation
 - 3-D Animation

- Sound
 - The Nature of Sound
 - Digitizing Sound
 - Processing Sound
 - Compression
 - Formats
 - MIDI
 - Combining Sound and Picture

- Animation Tools (Ref. Flash)
 - Motion twining & Shape twining
 - Movie, Graphics and Button Concept
 - Motion path & Guide Layer
 - Masking
 - Animation effects

- Action script
- Embedding sounds in flash file
- Advanced Action script
- Exercise of Flash

- Video Editing Tools
 - Adobe Premier
 - Adobe After Effects

- Virtual Reality Markup Language
 - VRML Background
 - Basic VRML Concepts
 - Building Complex Objects
 - Object Appearance
 - Using Lights
 - Viewpoints, Sound and Anchors

Reference Books:

Digital Multimedia	Chapman
Distributed Multimedia System	
Multimedia Communication System	LPE
Flash Bible	TechMedia
VRML	BPB

Paper – 105

M.Sc. (IT) - 1

Project – I

This is aimed to apply the learned concepts, procedures and tools to architect or build an application to develop the skill of application development using acquired knowledge. The students should be motivated to develop the model of application nearer to real life applications and present their work during the evaluation of the projects by the examiners.

A small database application developed by the students using any RDBMS as back-end and front-end of their choice.

Here the emphasis will be given on database design.

Expected Outcome:

Properly normalized database design, usage of primary keys, foreign keys, constraints and necessary indices. All the tables should be populated with enough number of records to test functionality and show case the application features and reports

Working application with enough of number of records created should be demonstrated.

Project report should be prepared specifying requirement specifications and testing details in line with the requirement specifications.

Duration of the project evaluation is of three hours.

Paper – 106

M.Sc. (IT) - 1

Practical based on paper papers: P101,P102

Paper – 107

M.Sc. (IT) - 1

Practical based on paper papers: P103,P104

Enterprise Resource Planning

- Introduction to ERP
 - ERP Concept
 - Reasons for the growth of the ERP Market
- Evolution of ERP
 - Conceptual Model of ERP
 - The Evolution of ERP
 - The Structure of ERP
 - Two-tier Architecture
 - Three-tier Architecture
 - Architecture Overview of SAP R/3 ERP
 - Architecture Overview of Baan's ERP
- The Best Practices in ERP
 - The Concept of Best Practice
 - Style of Manufacturing
 - Manufacturing Industries
 - Project Industries
 - Service Industries
 - Demand Management
 - Sales and Operations Planning
 - Significance and Advantages of S&OP
 - S&OP Practice in ERP
 - Organization Structure and Elements
 - Activity Based Costing (ABC)
 - Basic ABC Principles
 - Elements of ABC
 - Costing Methods
- ERP Vendor Analysis
 - SAP
 - SAP Industry Solutions
 - Oracle
 - Oracle Industry Specific Solutions
 - Oracle Implementations in India
 - PeopleSoft
 - Industry Solutions
 - Baan
 - Product Functionality
 - Baan Industry Specific Solutions
 - Baan Implementations in India
 - J.D. Edwards
 - Products
 - J.D. Edwards in Industry Specific Solutions
 - Ramco

- Ramco Implementations in India
 - QAD
 - Products
 - ERP Domain Expertise
 - Oracle Financials
 - mySAP ERP
 - Baan Manufacturing
 - Peoplesoft Human Capital Management
- Basic Functional Modules in ERP
 - Manufacturing
 - Distribution
 - Financial
 - Item Control Module
 - BoM Module
 - Financial Accounting Module
 - Master Production Scheduling Module
 - MRP Module
 - CRP Module
 - Purchase Control Module
- ERP Implementation
 - Implementation Approach
 - Elements of Implementation Methodology
- Making ERP a Success
 - The Indian Scenario
 - ERP “AS IS”
 - Customization
 - Prerequisites of ERP
 - Five Elements for Making ERP Success
- ERP and Related Technologies
 - Business Process Re-engineering
 - Data Warehousing
 - Data Mining
 - OLAP
 - Product Lifecycle Management
 - Supply Chain Management
 - Customer Relationship Management
 - Geographical Information Systems
 - Intranets and Extranets
- ERP Implementation Life Cycle
 - Objectives of ERP Implementation
 - Different Phases of ERP Implementation
 - Why do many ERP Implementations Fail
- ERP Package Evaluation and Selection

Referebce Books :

- Enterprisewide Resource Planning – Theory and Practice
by Rahul V. Altekar, PHI
- Enterprise Resource Planning , second edition
by Alexis Leon, Tata McGraw Hill

Building Applications Using Microsoft .Net Platform

MS .Net Introduction, Features, Advantages

- **MS .Net Framework and Architecture**

MS .Net Platform:

Microsoft .NET and Windows DNA, Microsoft .NET Architecture Hierarchy

Features of the .NET Platform:

Multilanguage Development, Platform and Processor Independence, Automatic Memory Management, Easy Deployment, Distributed Architecture, Interoperability with Unmanaged Code, Security, Performance and Scalability

Components of the .NET Architecture:

MS .NET Runtime, Managed/Unmanaged Code, Intermediate Language, Common Type System, MS .NET Base Class Library (BCL), Assemblies, Metadata, Assemblies and Modules, Assembly Cache, Reflection, Just In Time Compilation, Garbage Collection

- **MS .Net Programming with C#**

Introduction to C# .Net language

Creating Your First C# Program

Compiling and Executing, Defining a Class, Declaring the main() Method, Organizing Libraries with Namespaces, Using the using Keyword, Adding Comments

Introducing Data Types

Value Types-Primitive Data Types

Reference Types

Explaining Control Structures

Using the if Statement, Using the if-else Statement, Using the switch case Statement, Using the for Statement, Using the while Statement, Using the do while Statement, Using the break Statement, Using the continue Statement, Using the return Statement, Using the goto Statement

Understanding Properties and Indexers

Using Properties:

Get Accessor, Set Accessor

Accessing Lists with Indexers

Using Delegates and Events

Delegates:

Single Cast, Multicast

Events

Using Exception Handling

Using the try Block, Using the catch Block, Using the finally Block, Using the throw Statement

Understanding Inheritance, Polymorphism

Microsoft .Net Visual Programming

Visual Programming Paradigm using C#.Net and VB.Net
Windows Forms and Controls
Web Forms and Controls
Application Development with C#.Net and VB.Net

Database Application Development with ADO.Net

Introduction to ADO.NET
ADO.NET Architecture
 Understanding the ConnectionObject
 Building the Connection String
 Understanding the CommandObject
 Understanding DataReaders
 Understanding DataSets and DataAdapters
 DataTable
 DataColumn
 DataRow
 Differences between DataReader Model and DataSet Model
 Understanding the DataViewObject
Working with System.Data.OleDb
 Using DataReaders
 Using DataSets

Web Application Development with ASP.Net

Introducing the ASP.NET
ASP.NET Server Controls
Working with User Controls
Custom Controls
Validation Controls
Understanding the Web.config File
Using the Global.asax Page

Reference Books :

- Inside C#, by Tom Archer, Microsoft Press
- Microsoft ADO. Net, by Rebecca M. Riordan, Microsoft Press
- ASP .Net Unleashed, BPB Publication
- Beginning C#, Wrox Publication
- VB.Net Black Book

Mobile Computing and WAP based Applications

Introduction to wireless networks and mobile computing

- **Wireless Transmission:**
Frequencies, signals, antennas, signal propagation
Multiplexing (SDM, FDM, TDM, CDM), modulation (ASK, FSK, PSK),
spread spectrum, cellular system
- **Medium Access Control:**
Hidden/exposed terminals, near/far terminals, SDMA, FDMA, TDMA,
CDMA
- **Wireless LANs:**
infra red vs. radio transmission, infrastructure vs. ad-hoc networks
IEEE 802.11: architecture, MAC layer
Synchronization, power management, roaming,
IEEE 802.11: 802.11b, 802.11a, new developments; Bluetooth
overview
- **Mobile IP:**
Overview, network elements, packet delivery, agent discovery,
registration
Tunneling and encapsulation, optimization., IPv6, IP micro-mobility
support, DHCP and mobile IP
- **Mobile Transport Layer:**
Traditional TCP and implications on mobility, indirect TCP, snooping
TCP Discussion of project Ideas
Mobile TCP, fast retransmit/fast recovery, selective retransmission,
and transaction oriented TCP
TCP over 2.5/3G networks, performance-enhancing proxies
- **Mobile Computing:**
WWW architectures for mobile computing
WAP – architecture, protocols (WDP, WTLS, WTP, WSP)
WAP – Wireless Applications Environment, WML, Push architecture,
push/pull services, push-pull based data acquisition, WAP1.x stacks; I-
mode; WAP 2.0
- **Wireless Telecomm Networks:**
Evolution of wireless telecomm networks; GSM, GPRS
IS-95, CDMA-2000, W-CDMA
- **Messaging Services.**
Short Message Services (SMS)
Multimedia Message Services (MMS)
Multimedia transmission over wireless
- **Pervasive computing and information access**
Application framework, Architecture, and Development
- **Overview of wireless sensor networks**
- **Overview of Wireless LAN Protocols: WiFi, WiMAX – 802.16**

Reference Books:

- Mobile Communications(II Edition) By John Schiller Pearson Publication
- Mobile Computing By Dr N.N Jani

Linux Systems & Network Administration

- Linux Basics & Shell Programming
 - Introduction to UNIX and Linux
 - Introduction to Linux Shell
 - Basic Shell Commands
 - Introduction Text Editors – vi, nedit
 - Advanced Shell Commands (grep, awk, expr, chmod, chown etc)
 - Using Shell Commands & Scripts
 - Shell Programming
 - Introduction
 - Shell Variables
 - Setting the PATH Environment Variable
 - Decision Control Statements
 - Looping Statements
 - Shell Functions
 - Regular Expressions

 - Linux File System
 - File system and File system hierarchy standard
 - Root Directory: /, System Directories /boot, /bin, /sbin, /proc, dev, /etc, /var, /usr, /home, /lib /mnt , /opt, /media
 - Mounting file systems Automatically :(/etc/fstab) and manually : mount and Umount

 - Basics of Linux System Administration System Services
 - Files, Directories & Permission-Ownership
 - Managing Users and Groups
 - Techniques for Backup and Recovery
 - scheduling tasks : cron

 - Basics of Linux Networking
 - Checking Connectivity
 - Gateway / Route
 - Creating & Configuring Ethernet
 - Configure Ethernet for DHCP Network
 - Network configuration : system-config-network
 - Interface configuration scripts : /etc/sysconfig/network-scripts
 - Network Clients (ssh, telnet, ftp, scp, rsync, wget, yum, CPAN)

 - Installing Apache The Web server (httpd)
-

- Samba Installation Configuration
- FTP Server
- Mail Server

References:

The complete reference : Fedora 7 and Red Hat Enterprise Linux
By : Richard Petersen : TMH

Linux Complete, Sybex BPB,
UNIX – Concepts & Application, Sumitabha Das, BPB
www.linuxhomenetworking.com
Linux manuals from www.redhat.com

Paper – 205

M.Sc. (IT) - 2

Project – II

This is aimed to apply the learned concepts, procedures and tools to architect or build an application to develop the skill of application development using acquired knowledge. The students should be motivated to develop the model of application nearer to real life applications and present their work during the evaluation of the projects by the examiners.

A small database application developed by the students using any RDBMS as back-end and front-end of their choice.

Here the emphasis will be given to the database design and functionality of the selected application.

Expected Outcome:

Properly normalized database design, usage of primary keys, foreign keys, constraints and necessary indices. All the tables should be populated with enough number of records to test functionality and show case the application features and reports

Usage of procedures, functions and triggers at back-end is desired.

Working application with enough of records created should be demonstrated.

Project report should be prepared specifying requirement specifications and testing details in line with the requirement specifications. Technical design document should also be included.

Duration of the project evaluation is of three hours.

Paper – 206

M.Sc. (IT) - 2

Practical based on paper papers: 201,202

Paper – 207

M.Sc. (IT) - 2

Practical based on paper papers: 203,204

Data Warehousing and Data Mining

- Overview – ERP – CRM – SCM
 - Evolution of ERP
 - Advantages of ERP
 - Different Phases of ERP Implementation
 - Reasons for ERP Implementation failure
 - Introduction to Supply Chain Management
 - Objectives of Supply Chain Management
 - Two faces of Supply Chain Management
 - Introduction to CRM

- Data warehousing- Introduction
 - Data Warehouse as defined by Inmon
 - Differences between OLTP & Data Warehouse
 - Comparative chart between OLTP and OLAP
 - Need to construct separate Data Warehouse

- Data warehousing –Architecture
 - Three tier Data Warehouse Architecture
 - Components of a Data Warehouse
 - Data Cube
 - OLAP operations for multidimensional data
 - OLAP Servers (ROLAP, MOLAP, HOLAP)
 - ETL process overview
 - Data Profiling, Change Data Capture
 - Data Cleaning, Data Integration and Transformation
 - Staging Area
 - Operational Data Store (ODS)
 - Metadata for Data Warehouse

- Data warehousing –Design
 - Dimensional modeling - introduction
 - Benefits of Dimensional Modeling
 - Fact tables and fact table keys
 - Dimension tables and dimension tables keys
 - Fact table granularity
 - Four step dimensional design process
 - Three Fundamental Grains
 - Surrogate Keys
 - Date Dimension
 - Multiple currencies and Units of measures
 - Factless fact tables, consolidated fact tables

- Slowly Changing Dimensions and Technique for handling SCD
- Concept Hierarchies
- Degenerate Dimension
- Conformed Dimension
- Snowflake Schema

- Introduction to Data Mining
- KDD and Data Mining
- Machine learning- An introduction
- Knowledge Discovery Process
- Data mining – Techniques
 - Market Basket Analysis
 - Association Rules Mining
 - Classification
 - Cluster Analysis
 - Web Data Mining
 - Search Engines
- Data Mining Algorithms
 - Naïve Algorithm,
 - Apriori Algorithm
- Data Mining Applications
 - Financial Data Analysis
 - Retail Industry
 - Telecommunication Industry

Reference Books :

- Data Mining Concepts and Techniques - Jiawei Han and Micheline Kamber
- Introduction to Data Mining with Case Studies - G K Gupta
- The Data Warehouse Lifecycle Toolkit – Ralph Kimbal, Margy Ross
- The Data Warehouse Toolkit - Ralph Kimbal, Margy Ross
- Data Warehousing in the Real World – Sam Anahory, Dennis Murray
- Data Mining – Pieter Adriaans, Dolf Zantinge

Internet Programming using Java

- Java Technology - An overview of java
- Java language components: Data types, variables and arrays, Operators, Control statement, Introducing classes, methods, Inheritance, Packages and interfaces, Exception handling
- I/O, File Handling, String Handling
- Multithreaded programming
- Applet Fundamentals and Applet Class
- Event Handling and Introduction to Swing
- Database connectivity using java
- Networking using java
- J2EE – Understanding, exploring and Applications Development
- Servlet – Understanding and using
- JSP-Understanding and using

Books

The complete Reference Java 2
Parick Naughton
Herbert Schildt

Programming with Java
E Balaguruswamy

www.sun.com

Paper – 303 (Elective – 1)

M.Sc. (IT) – 3

First elective subject from given list

Paper – 304 (Elective – 2)

M.Sc. (IT) – 3

Second elective subject from given list

Paper – 305

M.Sc. (IT) - 3

Project-III

This is aimed to apply the learned concepts, procedures and tools to architect or build an application to develop the skill of application development using acquired knowledge. The students should be motivated to develop the model of application nearer to real life applications and present their work during the evaluation of the projects by the examiners.

A database application developed by the students using any RDBMS as back-end and front-end of their choice.

Here the emphasis will be given to the database design, front-end proto-type, functionality and testing procedures for the selected application.

Expected Outcome:

Properly normalized database design, usage of primary keys, foreign keys, constraints and necessary indices. All the tables should be populated with enough number of records to test functionality and show case the application features and reports

Usage of procedures, functions and triggers at back-end is desired.

Working application with enough of records created should be demonstrated.

Project report should be prepared specifying requirement specifications and testing details in line with the requirement specifications. Technical design document should also be included typically with ER-Diagram, and architecture diagram.

Duration of the project evaluation is of three hours.

Paper – 306

M.Sc. (IT) - 3

Practical based on paper papers: 301,302

Paper – 307

M.Sc. (IT) - 3

Practical based on paper papers: 303,304

Semester – III Elective Subject Details Syllabus

Elective – 1

M.Sc. (IT) – 3

Advance Software Engineering

1. User Interface Design

Design Issues, UI design process, User analysis, User Interface prototyping, Interface evaluation

2. Rapid Software Development

Agile methods, Extreme programming, Rapid application development, Software prototyping

3. Software Reuse

Reuse landscape, Design patterns, Generator-based reuse, Application frameworks, Application system reuse

4. Configuration Management

Configuration management planning, Change management, Version and release management, System building

5. Object Oriented Software Testing

Testing strategies for Conventional Software, Test Strategies for Object-Oriented Software – Unit Testing in the OO Context, Integration Testing in the OO Context, Validation Testing – Validation Test Criteria, Configuration Review, Alpha and Beta Testing, System Testing – Recovery Testing, Security Testing, Stress Testing, Performance Testing, Black Box and White Box testing, Black Box Testing methods

6. Technical metrics for Object Oriented Systems

Requirements coverage related metrics, Efforts related metrics, Review process related metrics, Test process related metrics, Defects related metrics, Productivity related metrics, Schedule related metrics.

7. Component Base Software Engineering

Engineering of component based Systems, The Component Based Software Engineering process, Domain Engineering, Component Based Development, Classifying and Retrieving Components

8. Process Improvement

Process and product quality, Process classification, Process measurement, Process change, The CMMI framework, The SEI capability maturity model, Problems with the CMM, The CMMI model.

- **Case Studies of all above**

Bibliography

- Software Engineering- (Seventh Edition) – Sommerville, Pearson Education
- Software Engineering- A Practitioner's Approach By Roger S. Pressman

Network Security and Cryptography

Networking Fundamentals: OSI Reference Model, TCP/IP Reference mode, Guided and unguided media, Sliding window Protocols, Shortest Path Distance , Vector Routing.

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internet work security.

Classical Encryption: Conventional Encryption model, Steganography, Classical Encryption Techniques (Substitution and Transposition).

Block Ciphers and the DES: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles

More On Symmetric Ciphers: Block cipher Modes of Operation

Confidentiality using Symmetric Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Finite Fields: Modular arithmetic, Euclidean Algorithm,

Public Key Cryptography: Principles of public key Cryptography, RSA Algorithm,

Key Management: Key management, Diffie-Hellman Key exchange.

Number theory: Prime numbers, Fermat's and Euler's theorems, Testing for primality, the Chinese remainder theorem, Discrete logarithms.

IP and Web Security: Overview of IP Security, Web Security requirements, Overview of Secure sockets layer and Transport layer security

Intruders and Malicious Software and firewalls: Intruders, Viruses and Rotated threats, Firewall Design Principles, Trusted systems.

Text Books:

1. Cryptography and Network Security: Principles and Practice - William Stallings Fourth Edition, Pearson Education., 2000;
2. Computer Networks : Andrews. Tanenbaum, Fourth Edition
3. TCP/IP Protocol Suite : Behrouz A. Forouzan

High Performance Computing with Cluster & Grid

Introduction HPC

Fundamental concepts of high performance computing

Parallel Computing

Performance analysis and performance tuning for sequential programs, Parallel programs on shared-memory architectures, parallel programs on distributed-memory architecture, and parallel programs on hybrid architectures.

Cluster Computing

- Overview of Cluster Computing
 - The Role of Clusters
 - Definition and Taxonomy
 - Distributed Computing
 - Limitations
- Cluster Planning
 - Architecture and Cluster Software
 - Design Decisions
 - Network Hardware
 - Network Software
 - Protocols
 - Distributed File Systems
 - Virtualization technologies
 - Benchmarks

Grid Computing

- Introduction
 - What is a grid?
 - Infrastructure of hardware and software
 - Main Projects and Applications
 - The Open Grid Forum
 - International Grid Trust Federation
- Grid Architecture
- Overview of Resource Managers
- Overview of Grid Systems
- Application Management
 - Grid Application Description Languages
 - Application Partitioning
 - Meta-scheduling
 - Mapping
 - Monitoring

- Web Services
- Grid Portals
- Clouds

Application Softwares (Open Source)

- Globus (Linux)
- Alchemi and Aneka (Windows)

References:

- Parallel Algorithms, H. Casanova, A. Legrand, Y. Robert, Chapman & Hall, 1st Edition. The instructor will provide lecture notes in addition to the material in the textbook.

Artificial Intelligence

Introduction

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information.

Searching Techniques

Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

Knowledge Representation

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects

Learning

Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

Applications

Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction -

Probabilistic language processing - Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

Text Books

- Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.

References

- Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
- Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
- George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

Embedded Systems

Introduction to Embedded Computing

1.1 Introduction

1.2 Overview

- Characteristics of Embedding Computing Applications
- Concept of Real time Systems
- Challenges in Embedded System Design

1.3 Design Process

- Requirements
- Specifications
- Architecture Design
- Designing of Components
- System Integration

Embedded System Architecture

2.1 Instruction Set Architecture

- CISC and RISC instruction set architecture

2.2 Basic Embedded Processor/Microcontroller Architecture

2.2.1 CISC Examples

- 8051

2.2.2 RISC Example

- ARM

Designing Embedded Computing Platform

3.1 Using CPU Bus

- Bus Protocols
- Bus Organisation

3.2 Types of memory

- On-chip Memory
 - Register Bank
 - Bit Memory
 - SFR Memory
- External Code Memory
- External RAM

3.3 Special Function Register

- SFR Types & Description

3.4 Basic Registers

- Accumulator
- Data Pointer(DPTR)
- Program Counter

- Stack Pointer
- 3.4 Addressing Modes
 - Immediate addressing
 - Direct addressing
 - Indirect addressing
 - External Direct addressing
 - Code indirect addressing
- 3.5 Timers
- 3.6 Interrupts

Serial Communication

External Parameters and Interfacing

- Input Devices
 - Switches
 - Matrix Keypads
- Output Devices
 - LED
 - LCD
 - SSD
 - Hyper Terminal

References:

- Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes
- David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
- Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003

Software Testing

- (1) Fundamentals of testing
 - Why is testing necessary?
 - Causes of software defects
 - Testing and quality
 - How much testing is enough?
 - General testing principles
 - Fundamental test process
 - Test planning and control
 - Test analysis and design
 - Test implementation and execution
 - Evaluating exit criteria and reporting
 - Test closure activities

- (2) Testing throughout the software life cycle
 - Software development model – V Model
 - Verification and Validation
 - Test levels
 - Unit testing
 - Integration testing
 - System testing
 - Acceptance testing – Alpha Testing, Beta Testing
 - Test types
 - Functional testing
 - Non-functional testing
 - Confirmation testing (Re-testing)
 - Regression testing

- (3) Static techniques
 - Static techniques and the test process
 - Review process
 - Phases of a formal review
 - Roles and responsibilities
 - Types of review – Peer Review, Walkthrough, Inspection
 - Success factors for reviews

- (4) Test design techniques
 - The Test Development Process
 - Specification-based or black-box techniques
 - Equivalence partitioning
 - Boundary value analysis
 - Decision table testing
 - State transition testing
 - Structure-based or white-box techniques
 - Statement coverage

- Decision (Branch) coverage
 - Experience-based techniques
- (5) Types of System Testing
 - Performance Testing, Load Testing, Stress Testing
 - Security Testing, Usability Testing
 - Smoke Testing, Compatibility Testing
 - Recovery testing, Backup testing
- (6) Test management
 - Test organization
 - Test organization and independence
 - Tasks of the test leader and tester
 - Test planning and estimation – Test Plan IEEE 829
 - Test Cases
 - Structure of Test Cases
 - Test Case Template
 - Exit criteria
 - Test Reports
 - Configuration management
- (7) Defect Tracking and Defect Reporting
 - Bug Life Cycle Stages
 - Priority, Severity
 - Defect Prevention Meetings, Defect Parato charts.
- (8) Tool support for testing
 - Tool support for static testing
 - Tool support for test specification
 - Tool support for test execution and logging
 - Tool support for performance and monitoring

Reference Books :

- Software Engineering R. Pressmen – 6th Ed
- Software Engineering Sommerville
- Introducing Software Testing Louise Tamres
- Effective Methods for software Testing William Perry, John Wiley & Sons
- Software Testing in Real World Edward Kit
- Software Testing Techniques Boris Beizer
- Software quality assurance: Principles and Practices by Nina Godbole, Narosa Publishing

E-Governance Applications and GIS

E-Governance Applications and Services

- Introduction to E-governance
- Role of ICT's in E-governance
- Need, Importance of E-governance
- Major Areas of E-governance Services
- Public Grievances: Telephone, Ration card, Transportation
- Rural Services: Land Records
- Police: FIR registration, Lost and Found
- Social Services: Death, Domicile, School Certificates
- Public Information: Employment, Hospitals, Railway
- Agricultural Sector: Fertilizers, Seeds
- Utility Payments: Electricity, Water, Telephone
- Commercial: Income tax, Custom duty, Excise duty
- Challenges against E-governance
- Study of E-governance initiatives in Indian states
- Gujarat, Andharapradesh, Maharashtra, Kerala, Karnataka etc.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

- Introduction
- Purpose of GIS
- Real world represent through GIS
- Components of GIS
- Maps and GIS
 - Map Scale
 - Classes of maps
 - The mapping process
 - Mapping concept features & properties
- GIS data models & data management
- Entering, Editing & querying Data

- Spatial concepts
- Raster & Vector format in GIS
- Raster based GIS data Analysis
 - Reclassification
 - Overlay analysis
- Vector based GIS data processing
 - Attribute database query
 - Address geocoding
 - Buffering
- Topological overlay analysis
- N/W Analysis
- 3-D Analysis
- The functionality available within GIS
- The benefits of GIS
- The Applications of GIS & case Studies
- Introduction of Global Positioning System
- Introduction of Remote Sensing

Reference:

Workbook on E-Governance (Dept. of Comp. Science)
 Thesis of Dr. A.R. Patel, North Guj. University.
 Geo-Information International Publications
 E-Governance Projects, PHI Publications
 Concepts and techniques of Geographic Information System
 By C.P Lo, Albert K.W. Yeung
 Fundamentals of Geographic Information System
 By Michael N. Demers and E-Tutorial

Project Work

This is aimed to provide practical exposure to students in the actual projects of the industry and various types of other organizations. They need to apply learned concepts, procedures and tools to the project assigned as per the need of the project. The students should be motivated to deliver the expected output as per the requirement of the project and add-value to the project by applying their skills and knowledge. Student should present their work done in the project to the examiners during the evaluation of the projects.

Minimum four months of the industrial utility project should be carried out at the organization.

The project work can be related one or combination of the following types:

- Software Development
- Software Testing
- Software Maintenance
- ERP - implementation, maintenance, support and customization
- Database Administration and Support
- System and Network Administration
- System Study, Analysis and Design of major applications
- Multimedia Application Development
- Web-site development with database application
- Data Warehousing
- Data Mining
- Application of Software Tools in Research Project/Organization
- Applications/Work related GIS, GPS, RS
- Applications related to Embedded Systems
- Any industrial utility work in the area of IT – with prior approval of HOD – M.Sc. IT

The work carried out in the project should be well-documented, approved & certified by the respective authorities of the organization.