M. Sc.
COMPUTER SCIENCE

SYLLABUS (2007-2010)

under
CHOICE BASED CREDIT SYSTEM
(CBCS)

ST. JOSEPH'S COLLEGE (AUTONOMOUS)
(Nationally Reaccredited with A+ Grade/
College with Potential for Excellence)
TIRUCHIRAPPALLI - 620 002

FEATURES OF CHOICE BASED CREDIT SYSTEM (PG COURSES)

The Autonomous St. Joseph's College (1978) Reaccredited with A+ Grade from NAAC (2007) has introduced the choice based credit system (CBCS) for UG and PG courses from the academic year 2001-2002.

OBJECTIVES of Credit System:
* To provide mobility and flexibility for students within and outside the parent department
* To provide broad based education
* To help students learn at their own pace
* To provide students scope for acquiring extra credits
* To impart more job oriented skills to students
* To make any course multi-disciplinary in approach

What is credit system?
Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. However, there could be some flexibility because of practicals, field visits and tutorials. The following Table shows the relation between credits and hours.

Hours in a week	Hours (2-3)	Hours (4)	Hours (5-6)
Theory Credits	1	3	4
Practicals Credits	1	2	3

For PG courses (2 years) a student must earn a minimum of 100 credits. For MCA course (3 years) the student must earn 140 credits to get a pass. For a two year PG degree course the minimum number of papers offered by a department is 18.

COURSE PATTERN
The Postgraduate degree course consists of three major components. They are Core Course, Optional Course and Extra Department Course (EDC).

Core Course
A core course is the course offered by the parent department, totally related to the major subject, components like Practicals, Projects, Group Discussion, Viva, Field Visit, Library record form part of the core course. All the students of the course must take the core courses.

Optional Course
The optional course is also offered by the parent department. The objective is to provide choice and flexibility within the department. The student can choose his/her optional. The optional is related to the major subject. The difference between core course and optional course is that there is choice for the student. The department is at liberty to offer optional course every semester or in any two semesters. It must be offered at least in two semesters. The staff too may experiment with diverse courses.

Extra Department Course (EDC)
EDC is an interdepartmental course offered by a department for the students belonging to other departments. The objective is to provide mobility and flexibility outside the parent department. This is introduced to make every course multi-disciplinary in nature. It is to be chosen from a list of courses offered by various departments. The list is given at the end of the syllabus copies. Two EDCs must be taken by students.

Day College student may also take an EDC from PG SFS Course and *vice versa.* This provision enables students to earn extra credits. The EDCs are offered in the II and III semesters. For the day college student it is offered in the last hour and for the PG SFS course students in the first hour or zero hour. The EDCs are expected to be application oriented and inter-disciplinary.

For Two Year Degree Programme		For Three Year MCA Programme	
	Credits		Credits
Core -	84	Core -	121
Optionals -	8 (2 semesters)	Optionals -	8 (2 semesters)
EDC -	6	EDC -	9
Shepherd -	2	Shepherd -	2
Total -	100	Total -	140

Credit System Codes:

The various papers in the different courses are coded. The following code system is adopted.

Each code indicates the following particulars

1) The year of introduction/revision of syllabus (07)
2) Whether it is undergraduate or postgraduate course (U or P)
3) The discipline's name is indicated by two letters as shown below:

Sl. No.	Course	Subject Code
1.	Biochemistry	BI
2.	Biotechnology	BT
3.	Business Administration	BU
4.	Chemistry	CH
5.	Commerce	CO
6.	Computer Applications	CA
7.	Computer Science	CS
8.	Economics	EC
9.	English	EN
10.	English - General	GE
11.	Electronics	EL
12.	Foundation Course	FC
13.	French	FR
14.	Hindi	HI
15.	History	HS
16.	Human Resource Management	HR
17.	Information Technology	IT
18.	Mathematics	MA
19.	Physics	PH
20.	Plant Biology & Plant Biotechnology	PB
21.	Personnel Management & Industrial Relations	PM
22.	Sanskrit	SA
23.	Statistics	ST
24.	Tamil	TA
25.	Tamil - General	GT
26.	Transport Management	TM
27.	Journalism (EDC)	JO
28.	Law (EDC)	LA
29.	Short Hand (English) (EDC)	SH

4) The semester number (1 or 2 or 3 or 4 for 2-year course)
5) The paper number: The courses in the discipline fall into three categories

    Core papers-numbers   : 20 to 39

    Optional papers - numbers : 41 to 49

    EDC's   : 61 to 70

    For MCA course offered by Department of Computer Science, the following paper numbers used:

    Core papers   : 51 to 80

    Optional Papers   : 81 to 90

The following examples illustrate the above concept.
The first semester Core papers in Chemistry is given the code 07PCH121
The EDC offered by Chemistry department in Semester III is given the code 07PCH362

Evaluation:
For each course there is formative continuous internal assessment (CIA) and semester examinations (SE) in the weightage ratio 50:50. The following table illustrates how one evaluates the Overall Percentage Marks (OPM) for a student in Chemistry PG course in the all papers put together
OPM= $(a_1 b_1 + a_2 b_2 + .. a_{23} b_{23}) / (b_1 + b_2 + …+ b_{23})$
Where $a_1, a_2 ... a_{23}$ indicate the marks obtained in the 4 semesters for 23 papers and $b_1, b_2 … b_{23}$ indicate the corresponding credits for the 23 courses.
For example if total credit points in 23 papers is 6860 then the OPM is given by
OPM = 6860/total number of credits = 6860.0/98=70.0

If OPM is between 50 and 60, the student gets II class. If OPM is 60 and more, then the student is placed in I class. If the OPM score is 75 and more the student gets first class with distinction.
The performance in shepherd programme is indicated by a pass and is not taken into account for computing OPM.

Declaration of result

———————— has successfully completed M. Sc. degree course with FIRST CLASS. The student's overall average percentage of marks is 70. The student has acquired 2 more credits in SHEPHERD programme.

M. Sc. - COMPUTER SCIENCE

Sem	Subject Code	Subject Title	Hrs/Week	Cr
I	07PCS121	Database Systems	5	5
	07PCS122	Mathematical Foundations	5	5
	07PCS123	Object Oriented Modeling & JAVA	5	5
	07PCS124	Data Structures and Algorithms	5	5
	07PCS125	Software Lab – I (Java)	3	2
	07PCS126	Software Lab – II (RDBMS and D2K)	3	2
	07PCS127	Personal Soft Skills **	3	2
		Library	1	
Total for Semester I			**30**	**26**
II	07PCS228	Grid Computing	5	5
	07PCS229	Computer Organization & Architecture	5	5
	07PCS230	Digital Image Processing	5	5
	07PCS231	Software Lab – III (ASP & XML)	3	2
	07PCS232	Interpersonal Soft Skills **	3	2
	07PCS241	TCP / IP (or)		
	07PCS242	Compiler Design	5	4
	*	EDC	4	3
Total for Semester II			**30**	**26**
III	07PCS333	Data Warehousing and Data Mining	5	5
	07PCS334	Software Engineering	5	5
	07PCS335	Artificial Neural Networks	5	5
	07PCS336	Software Lab – IV (MATLAB)	3	2
	07PCS337	Mini Project	3	2
	07PCS343	Distributed Operating System (or)		
	07PCS344	Parallel Processing	5	4
	*	EDC	4	3
Total for Semester III			**30**	**26**
IV	07PCS438	Major Project	30	20
Total for Semester IV			**30**	**20**
IV		Extension Service: SHEPHERD		2
Total Credits for All Semesters				**100**

*   Code numbers according to the subjects chosen.
** Soft Skills will have only viva-voce exam conducted by a panel.

Sem: I   Hours/Week: 5
07PCS121   Credits: 5

DATABASE SYSTEMS

AIM

To offer a through exposure to the design and manipulation of relational database systems and to introduce the concepts of database security, concurrency, integrity and distributed database system.

UNIT 1   13 Hrs

INTRODUCTION: Database systems application - database system versus file system - view of data - data models - database languages - database users and administrators - transaction management - data base systems structure. Entity-Relationship model: Basic concepts – constraints - keys - E-R Diagram - Extended E-R features. Relational model: structure of relational database - the relational algebra.

UNIT 2   13 Hrs

SQL: Basic structure - set operations - aggregate functions - null values - nested sub queries – views - complex queries - modification of the database - joined relations - DDL-Embedded SQL. Integrity and Security: Domain constraints - referential integrity – assertion - triggers. Object-oriented database: Object-oriented data model - object-oriented languages – persistent programming languages - complex types.

UNIT 3   13 Hrs

Normalization: Non-loss decomposition and functional dependencies - First, second and third normal forms - dependency preservation - Boyce/Codd normal forms - multivalued dependencies and fourth normal forms - join dependencies and fifth normal forms - other normal forms.

UNIT 4   13 Hrs

Recovery & Concurrency: Transaction - transaction recovery - system recovery -two-phase commit. Concurrency: Three concurrency problems – locking – deadlock -serializability. Security: Introduction - discretionary access control - mandatory access control - data encryption.

UNIT 5   13 Hrs

INTEGRITY, VIEWS & DISTRIBUTED DATABASE: The golden rule. Views: View retrieval - view updates - snapshots. Distributed database: Objectives - problems of distributed systems - client/server systems.

Books for Study

1. Silberschatz, Korth & Sudershen," Database System concepts", 4th Ed., McGraw-Hill, Calfornia, 2002.
   UNITS I & II : Ch: 1.1 – 1.4, 1.6 – 1.8, 2.1 – 2.3, 2.5, 2.7, 3.1, 3.2, 3.6, 3.7, 4.1 – 4.12, 6.1 – 6.4, 8.2, 8.3, 8.4, 9.2.
2. C.J.Date, "An Introduction to Database Systems", Pearson Education, New Delhi, 2005.
   UNITS III, IV & V : Ch: 11.2 – 11.5, 12.2, 12.3, 12.7, 14.2 – 14.4, 14.6, 15.2, 15.3, 15.5, 15.6, 16.2, 16.3, 16.5, 8.6, 9.3, 9.4, 9.5, 20.3 – 20.5.

Books for Reference

Bipin C. Desai, "An Introduction to Database Systems", Galgotia Pub., New Delhi, 1999.

Sem:I   Hours/Week: 5
07PCS122   Credits: 5

MATHEMATICAL FOUNDATIONS

AIM
To impart the mathematical concepts and numerical methods required to Computer Science.

UNIT 1   13 Hrs
RECURSION AND RECURRENCE RELATION: The many faces of recursion - Sequences - Recurrence relation - Some common   recurrence relation - Generating functions.

UNIT 2   13 Hrs
CODING THEORY: Introduction - Cryptography - Caesar Cypher Coding - Matrix encoding - Scrambled codes - Hamming metric - Hamming Distance - Error Detecting Capability of an encoding.

UNIT 3   13 Hrs
MATHEMATICAL LOGIC: Propositions - evaluation - precedence rules -Tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system - Deductive proofs - inference rules - proofs and sub proofs.

UNIT 4   13 Hrs
RELIABILITY THEORY: Definition - Failure data analysis - MTTF and MTBF, Hazard Rate and Failure density. Hazard Models - Constant and Linearly increasing Hazard - Weibull's Model. System reliability.

UNIT 5   13 Hrs
NUMERICAL METHODS: Polynomial Equations: Birge-Vieta, Graeffe's root squaring methods – Integration: Gauss Lagrange – Gauss Chebyshev – Gauss Laguerre and Gauss Hermite Methods.

BOOKS FOR STUDY
1. Alan Doerr, Kenneth, Levasseur, "Applied Discrete Structure for Computer Science", Galgotia Pub., New Delhi, 1995,   (Chapters : 8.1 - 8.5) (For UNIT-I).
2. James L. Fisher, "Application Oriented Algebra", Dun Donnelly Pub., 1977. (Chapter 9.1 to 9.5 only) (For UNIT-II).
3. David Gries, "The Science of Programming", Narosa Pub. House, New Delhi, 1993. (Chapters 1,2,3.1 to 3.3) (For UNIT – III).
4. Srinath, L.S, "Reliability Engineering", East-West Press, 1975. (Chapters 2,3,4,6.1 to 6.9) (For UNIT – IV).   M.K. Jain, S.R.K. Iyengar, R.K.Jain, "Numerical Methods for Scientific and Engineering Computation", 3rd Ed., New Age Pub., New Delhi, 1992, Chapters: 2.8.5.8 (For UNIT-V)

BOOKS FOR REFERENCE
1. Gerald, C.F., "Applied Numerical Analysis", Addision-Wesley, 1978.
2. Bernard Kilman, Robert C.Busby, "Discrete Mathematical Structure for Computer Science", 2nd Ed., PHI, New Delhi, 1988.
3. Trembley, J.P., Manohar, R., "Discrete Mathematical Structure with applications to Computer Science", McGraw Hill, 1987.
4. Roy Longbottom, "Computer System Reliability", John-Wiley, 1980.

Sem:I   Hours/Week: 5
07PCS123   Credits: 5

OBJECT ORIENTED MODELING & JAVA

AIM

To provide a sound understanding of the fundamental concepts of the Object Technology. To facilitate a mastery of the notation and process of Object-Oriented modeling and design. To teach the realistic application of Object-Oriented software systems.

UNIT 1   13 Hrs

OVERVIEW: Object-Oriented System Development – Object basics – Development Life Cycle – Object Oriented Methodologies – Unified Modeling Language. Object Oriented Analysis: Use-Case Driven – Process – Identifying use cases.

UNIT 2   13 Hrs

OBJECT ANALYSIS: Classification – Identifying Object relationships, attributes, and methods. Object Oriented Design: The Object-Oriented design process and design axioms – Designing classes.

UNIT 3   13 Hrs

JAVA: Classes - Inheritance: Super class - Sub class - 'Super' Keyword – Method overriding – abstract class. Packages and Interfaces: Packages – importing packages – Interfaces. Exception Handling: Exception types – Multiple catch clauses – nested try statement.

UNIT 4   13 Hrs

THREADS: Model – priorities – synchronization – interthread communications. Applets: Architecture – display methods. String Handling: String constructors – string operations – string buffer. AWT: Classes – controls – layout managers – menus – event model.

UNIT 5   13 Hrs

STREAM I/O AND FILES: I/O classes and interfaces – files – stream classes – byte streams – character streams – serializations. SERVLETS: Life cycle of a servlet – handling HTTP requests and responses. Java Beans: Application builder tools – using BDK – JAR files – using bound properties. Networking: Networking classes and interfaces – InetAddress – Datagrams.

Books for Study
1. Ali Bahrami, "Object Oriented Systems Development using the UML", McGraw-Hill, California, 1999.
   Units I & II
   Ch: 1 to 13
2. Herbert Schildt, The Complete reference Java 2", McGraw-Hill, 5th Ed., New Delhi, 2002.
   Units III, IV & V
   Ch: 2 to 13, 17- 22, 25,27

Books for Reference
1. Andrew Haigh, "Object Oriented Analysis and Design",McGraw-Hill, New Delhi, 2001.
2. Grady Booch, "Object-Oriented Analysis and Design", 2nd Ed., Addison –Wesley, California, 1994.
3. Patrick Naughton, Herbert Schildt, "The Complete Reference-Java", McGraw-Hill, New Delhi, 1997.

Sem:I   Hours/Week: 5
07PCS124   Credits: 5
DATA STRUCTURES AND ALGORITHMS
AIM
To impart a detailed knowledge on Data Structure and to give an exposure to the development of algorithms related data structure.

UNIT 1   **13 Hrs**
PRIMITIVE DATA STRUCTURE: Introduction - operations of data structure - number systems – integer - real numbers, character, logical and pointer information and their representation - linear data structure - concepts of non-primitive data structures - storage structures for arrays – stacks - operations on stacks - applications of stacks - queues and its applications - priority queues.

UNIT 2   13 Hrs
LINKED LINEAR LISTS: Operation in linked list - circularly linked linear lists - doubly linked linear lists - applications of linked linear list. Non-linear data structure trees - binary trees - operations on binary trees - storage representation and encapsulation of binary trees - conversion of general trees into binary trees.

UNIT 3   13 Hrs
SORTING: Sorting arrays - straight insertion - straight selection - straight exchange - insertion by diminishing increments - tree sort - partition sort – finding the median - comparisons of array sorting methods - efficiency, analysis and time complexity of algorithms.

UNIT 4   13 Hrs
SEQUENTIAL FILE STRUCTURE: Elementary file operations - sorting sequential file - straight merging - natural merging - balanced multiway merging - poly phase sort - distribution of initial runs.

UNIT 5   13 Hrs
RECURSIVE ALGORITHMS: Recursive algorithms - Hilbert's curve, Sierpinski curve, - back - tracking algorithms - eight queens problem - knight's tour problem - stable marriage problem - optimal selection.

Books for Study
1. Jean Paul Trembly and Paul G.Sorenson , "An Introduction to Data Structure with Applications", 2nd Ed., McGraw Hill, New Delhi, 2005.
   Chapters: 1.1 – 1.4, 3.1-3.4, 3.5.2,3.6,3.8,4.1-4.3.1, 5.1.
   UNITS I & II
2. Nicklaus Wirth, "Algorthms +Data structures = Programs", PHI, New Delhi, 2002.
   Chapters: 2.1,2.2.3.1,2.3.2,2.3.4,3.1 –3.5, 4.1- 4.3
   UNITS III, IV & V

Books for Reference
1. Ellis Horowitz, Sartaj Sahni & Senguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications, New Delhi, 2005.
2. P.S.Deshpande & O.G.Kalede, "C & Data Structures", Dreamtech Press, New Delhi, 2003.

Sem:I   Hours/Week:3
07PCS125   Credits:2

SOFTWARE LAB - I (JAVA)

1. Classes & Objects - Constructors
2. Inheritance and Method overriding
3. Packages and Interfaces
4. Inter-Thread Communication
5. Exception Handling
6. Stream I/O & Files
7. Applications - Java Applets
8. Servlets
9. Networking
10. RMI – Applications
11. Singly Linked List
12. Binary Tree Creation and Traversals

Sem:I   Hours/Week:3
07PCS126   Credits:2

SOFTWARE LAB - II (RDBMS & D2K)

1. SQL: DDL, DML(nested queries, built-in functions, types of joins)

2. Integrity constraints.

3. An Information system design

   - creation, retrieval
   - retrieval using cursors
   - updation using triggers
   - usage of forms and procedures
   - report generation(using SQL script)

4. D2K: insertion, deletion & updation through forms

Sem:I   Hours/Week:3
07PCS127   Credits:2

PERSONAL SOFT SKILLS

AIM: To impart basic personal soft skills like listening, speaking, reading, writing, learning in order to empower the students for better educational performance.

UNIT 1   12 Hrs
LISTENING SKILL: What is Listening – Importance of Listening – Active and Passive listening – Reasons to Improve listening – Roadblocks to Effective Listening – Types of Effective Listening – Questions to Ask Yourself in conversations – Improving Listening Skills – Listen to the Feelings – Exercises for Listening to Feeling, Role-Play Activities.

UNIT 2   12 Hrs
SPEAKING SKILL: What is Speaking – Opening a Speech – Speaking to the Hearts – Attention Gaining Devices – Storytelling Techniques - Humor Techniques – Speech Gimmicks – Performance Techniques – Closing a Speech – Speech Exercises.

UNIT 3   12 Hrs
READING SKILL: What is Reading – Problems with Reading – Deciding What to Read – Getting Ready to Read – Different Types of Reading – Active Reading – SQ4R – Taking Notes from Reading – Improve your Reading – Exercises for Reading.

UNIT 4   12 Hrs
WRITING SKILL: What is Good Writing – Establish your Topic – Organize your Ideas – Target Audience – Presentation Techniques – Language Usage – Resume Writing – E-main Writing – Telephone Etiquette – Exercises for Writing.

UNIT 5   12 Hrs
LEARNING SKILL: Introduction to Learning – Learning Styles – Taking Notes – Learning for exams – time Management – Stress Management – Exercises for Learning Techniques.

Books for Reference

1. E.H.McGrath S.J., "Basic Managerial Skills for All ", 6th Ed., Prentice Hall of India , New Delhi, 2004.

Sem:II   Hours/Week:5
07PCS228   Credits:5
GRID COMPUTING

AIM

To gain knowledge on suite of technologies that explicitly recognizes the new economics of computing and networking.

UNIT 1   11 Hrs

OVERVIEW: History – types of computing – grid computing model – grid protocols – globus tool kit – OGSA – global grid forum. Types of Grids: Desktop grids – desktop grids defined – desktop grid technology – key elements to evaluate – desktop grid suitability – key areas for exploration – grid server – additional functionality to consider – role of grids in an enterprise computing infrastructure – practical uses of desktop grids – real world examples.

UNIT 2   12 Hrs

TYPES OF GRIDS: Cluster grids: Clusters – industry examples – cluster grids.   HPC grids: Five steps to scientific insight – applications and architectures – HPC application development environment – production HPC reinvented – HPC grids. Data grids: Data grids – alternative to data grids – avaki data grid – data grid architecture.

UNIT 3   12 Hrs

THE OPEN GRID SERVICES ARCHITECTURE: An analogy for OGSA – evolution to OGSA – OGSA overview – Building on the OGSA platform – implementing OGSA – based grids. Creating and Managing Grid Services: Services and the grid – converting existing software – service discovery – operational requirements – tools and toolkits – support in UDDI – UDDI and OGSA – UDDIe – uses – quality and service management.

UNIT 4   13 Hrs

GRID-ENABLING SOFTWARE APPLICATION: Grid Computing – the needs of Grid users – grid deployment criteria – methods of grid deployment – Grid – enable software – requirements – programming tools and expertise – process – grid enabling a main stream.
software application: an example. Application Integration: Application Classification – grid requirements – integrating application Grid – Enabling Network Services – Managing grid Environments.

UNIT 5   14 Hrs

GRID COMPUTING ADOPTION IN RESEARCH AND INDUSTRY: Global grid architecture – Examples of research and industry gird implementation. Grids in life sciences – Grids in the telecommunications sector – Grids in other industries – Hive Computing for transaction processing grids.

Books for Study
1. Ahmar Abbas. "Grid Computing: A practical Guide To Technology and Applications", Fire Wall Media, New Delhi, 2004.
   Chapters: 3-10 , 12-20.

Books for Reference
1. Joshy Joseph, Craig Fellenstien, "Grid Computing", Pearson Education, First Indian Reprint , New Delhi,2004,

Site For Reference
   www.gridblog.com

Sem:II   Hours/Week:5
07PCS229   Credits:5

COMPUTER ORGANIZATION AND ARCHITECTURE

AIM

To give basic knowledge on various building blocks of a typical digital computer and programming concepts for Intel 8051 micro controller.

UNIT 1   13 Hrs

BASIC COMPUTER ORGANIZATIONS: Basic computer organization and design: instruction codes - computer register - computer instruction - timing and control - instruction cycle - memory reference instructions - input/output &interrupt - design of basic computer - design of accumulator logic. Microprogrammed control: Control memory- address sequencing - micro program example - design of control unit.

UNIT 2   13 Hrs

CPU: General register organization - stack organization - instruction formats - addressing modes - data transfer and manipulation - program control - RISC. Pipeline & vector processing: Parallel processing – pipelining - arithmetic pipeline - instruction pipeline - RISC pipeline - vector processing - array processors.

UNIT 3   12 Hrs

COMPUTER ARITHMETIC: Computer arithmetic: Addition, subtraction, multiplication and division algorithms - floating point arithmetic operations - decimal arithmetic unit - decimal arithmetic operations.

UNIT 4   12 Hrs

 MDS MICRO CONTROLLERS: Micro computer development system – microprocessor kits – single chip microcomputer – embedded processor – digital signal processor – IO processor – co-processor - Intel 740 - 3d graphics chip – Intel 8086 – classification of 8086 instructions – 8086 registers – description of 8086 instructions.

UNIT 5   12 Hrs

MICROPROCESSORS: Examples of 8086 assembly language programs – Intel 80186 – Intel 80286, Intel 8088 – 32bit and 64bit microprocessor: Intel 80386 – Intel 80486 – pentium processor – MMX technology – pentium MMX – pentium pro microprocessor – Dynamic execution of instruction – speculative execution – branch prediction – pentium-II – celeron – pentium-IV – IA-64 itanium - some other microprocessor.

Books for Study
1. M. Morris Mano, "Computer System Architecture", 3rd Ed., Prentice Hall of India, New Delhi, 2003.
    UNITS I,II & III
2. B.Ram, "Fundamentals of Microprocessors & Micro Computers", 6th Ed., Dhanpat Rai, New Delhi, 2005.
    UNITS IV & V

Books for Reference
1. Thomas C.Bartee,"Computer Architecture and Login Design", McGraw Hill, New York, 1991.
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, " The 8051 Micro Controller and Embedded Systems", Pearson Education, New Delhi, 2000.

Sem:II   Hours/Week:5
07PCS230   Credits:5

DIGITAL IMAGE PROCESSING

AIM
To stimulate interest in the techniques and applications of image processing.

UNIT 1   11 Hrs
DIGITAL IMAGE FUNDAMENTALS: Introduction – Fundamental steps in Digital Image Processing – Components of an Image Processing System – Image Sampling and Quantization – Basic relationships between Pixels – Basic Gray Level transformation – Histogram Processing – Basics of Spatial Filtering – Smoothing Spatial Filters.

UNIT 2   12 Hrs
IMAGE ENHANCEMENT AND COLOR IMAGE PROCESSING: Introduction to Fourier Transform and Frequency Domain – Smoothing Frequency Domain Filters – Ideal Lowpass Filters - Gaussian Lowpass Filters – Sharpening Frequency Domain Filters – Ideal Highpass Filters – Gaussian Highpass Filters – Color Fundamentals – Color Models – Color Transformations – Smoothing and Sharpening – Color Segmentation

UNIT 3   13 Hrs
MORPHOLOGICAL IMAGE PROCESSING: Preliminaries – Dilation and Erosion – Opening and Closing – Hit or Miss Transformation - Basic Morphological algorithms – Detection of Discontinuities – Thresholding – Region Based Segmentation.

UNIT 4   12 Hrs
REPRESENTAION, DESCRIPTION & OBJECT RECOGNITION: Representation – Chain Codes – Polygonal Approximation – Signatures – Boundary Segments – Skeletons – Boundary Descriptors – Relational Descriptors – Patterns and Pattern Classes – Recognition Based on Decision Theoretic Methods – Neural Networks – Structural Methods.

UNIT 5   14 Hrs
DIGITAL IMAGE PROCESSING IN MATLAB: Vector & Matrix Indexing – Image Reading, Displaying, Writing – Sub Plotting Images – Different Translations – Various Enhancements – Image Operations – Image Transformations.

Books for Study
1. R.Gonzalez and R.E. Wood, "Digital Image Processing", Prentice Hall of India, New Delhi, 2002.
    Ch: 1.1, 1.4, 1.5, 2.4.1 - 2.4.3, 2.4.5, 2.5, 3.2, 3.3, 3.5, 3.6, 4.2, 4.3.1, 4.3.3, 4.4.1, 4.4.3, 6.1, 6.2, 6.4 - 6.7, 8.1, 8.2, 8.4.4, 8.5. 8.6, 9.1 – 9.5, 10.1, 10.3.1 – 10.3.5,10.4, 11.1, 11.2, 11.5, 12.1, 12.2.3, 12.3.

Books for Reference
1. A. Rosenfeld and A.C.Kak, "Digital Picture Processing", Prentice Hall, New Delhi, 1982.
2. W.K.Pratt, "Digital Image Processing", McGraw Hill, New Delhi, 1981

Sem:II   Hours/Week:3
07PCS231   Credits:2

SOFTWARE LAB - III (ASP & XML)

ASP

1.   Sending Server, client & user details [Request & Response] to the client

2.   Chatting using Application and session object

3.   DB access using Server Object

4.   File uploading & downloading using Server object

5.   Login form expiry

6.   Student Biodata

7.   Cookies manipulation

XML

8.   Content displaying using XSL, CSS

9.   Inter database access

10. XML Manipulation using parser

Sem:II   Hours/Week:3
07PCS232   Credit:2

INTERPERSONAL SOFT SKILLS

AIM
To impart various interpersonal skills which are needed for job hunting and working in the industry.

UNIT   12 Hrs
COMMUNICATION SKILL: Importance of Right Communication – Body Language –
Facial Expressions – Eye Contact & Eye Movements – Tone of Voice – Languages -
Etiquettes – Cross Cultural Communication – Exercises for Communication.

UNIT 2   12 Hrs
GROUP DISCUSSION & INTERVIEW TECHNIQUES: Components of Group Discussion –
Points to Remember in Group Discussion – Personal Interview Techniques – Mock Interview
– Stress Interview – Exercises for group Discussion – Exercises for Interview.

UNIT 3   12 Hrs
LEADERSHIP SKILL: Definition of Good Leader – Different Kinds of Leaders – Personal
Qualities of a Good Leader – Relationship Traits of a Good Leader – Leadership Strategies –
Role of a Leader – Leading and Motivation – Managerial Skills for a Good Leader –
Exercises for Leadership.

UNIT 4   12 Hrs
TEAM BUILDING: Importance of Team Work – Intra and Inter Team Work – Team
Building – Conflict Management – Negotiation – Persuasion – Assertive Skills – Dealing
with Difficult Behaviors – Exercises for Team Building.

UNIT 5   12 Hrs
PROFESSIONAL EFFECTIVENESS: Importance of Professional Effectiveness – Self
management – Creativity Management – Time Management – Stress Management – Priority
Management – Presentation Management – Change Management – Exercises for Professional
Effectiveness.

Book for Reference:
Mohan, "Basic Managerial Skills for All", 6th Ed., Prentice Hall Of India, New Delhi.

Sem:II   Hours/Week:5
07PCS241   Credits:4

OPTIONAL: TCP/IP

AIM
To understand the concepts of TCP/IP and their usage in communication network.

UNIT 1   12 Hrs
INTRODUCTION TO TCP: What is TCP/IP network? Role of DARPA - The ARPA evolution - transmission from proprietary network to open TCP/IP - Overview of TCP/IP Networks – TCP/IP Application overview – The Internet - TCP/IP protocol layering concepts: Principles - OSI Model - The DoD model - TCP/IP Implementation Hierarchy

UNIT 2   13 Hrs
NETWORKING WITH TCP/IP: Network support: TCP/IP on IEEE LANs – Understanding IEEE 802.3 Frames – SNAP Header – TCP/IP on Token Ring Networks - TCP/IP Internetworking infrastructure – IP addressing – what is network addressing - IP address – Special IP address – Assigning IP address.

UNIT 3   12 Hrs
ADDRESS RESOLUTION PROTOCOLS: Need for ARP – ARP Format - ARP operation-Network monitoring with ARP – timeouts in ARP cache table - ARP budget network-Duplicates address and ARP - Protocol Trace for ARP – Reverse Address Resolution protocol : RARP Packet Trace - Internet protocol: IP abstraction – IP Datagram - IP Trace.

UNIT 4   13 Hrs
IP ROUTING & ICMP PROTOCOL: IP Routing Concepts: Basic routing concepts – Datagram delivery – Host and Router - Routing Tables – Processing Datagrams – ICMP Protocol – CMP – ICMP services – ICMP Types and Echo/PING – ICMP type 3 - Destination unreachable, ICMP type 4 – Source quench – ICMP type 5 – Redirect. IP subnetting – Subnetting – Motivation for subnets – Subnet mask – Routing for subnet – IP Routing Protocol - Routing Information Protocol.

UNIT 5   12 Hrs
TCP/UDP: Transfer Protocol – feature-host environment – connection opening and closing – TCP message format - cumulative ACK in TCP - adaptive Timeouts - minimizing Impact TCP-UDP. Automatic Configuration – Dynamic configuration using BOOTP - Dynamic configuration using DHCP – Application services – DNS – Mail – Protocols – Remote Access Protocols – File Access Protocols – Internet Access protocols

Book for Study
1. Karanjit S. Siyan, "Inside TCP/IP", 3rd Ed., Techmedia, New Delhi
        Ch: 1-9, 11-13

Books for Reference
1. Behrouz A. Forouzan with Sophia Chung Fegan, "TCP/IP Protocol Suite", 2nd Ed., Tata McGraw-Hill , New Delhi, 2003.
2. Andrew S Tanenbaum , "Computer Networks", 3rd Ed., Prentice Hall of India, New Delhi, 2005.

Sem:II   Hours/Week:5
07PCS242   Credits:4

Optional: COMPILER DESIGN

AIM
To introduce various phases of a compiler and also to develop skills in designing a compiler.

UNIT 1   13 Hrs
INTRODUCTION: Different Phases of Compiler - Finite State Automation and Lexical analysis – A Simple Approach to the Design of Lexical Analyzers - Regular Expressions - A Language for Specifying Lexical Analyzers.

UNIT 2   13 Hrs
SYNTAX SPECIFICATION: Context Free Grammars – Parsers - Derivation and Parse trees – Shift Reduce Parsing – Operator Precedence Parsing - Top-Down Parsing - Predictive Parsers.

UNIT 3   13 Hrs
CODE GENERATION: Intermediate Code Generation – Translation – Implementation of Syntax – Directed Translators – Intermediate Code – Postfix Notation – Parse Trees and Syntax Trees – Three Address Codes, Quadruples and Triples

UNIT 4   12 Hrs
SYMBOL TABLES: Contents of a Symbol Table – Data Structures for Symbol Tables – Implementation of a Simple Stack Allocation Scheme – Implementation of Block Structured Languages – Storage Allocation in Block Structured Languages – Errors – Lexical Phase Error.

UNIT 5   12 Hrs
CODE OPTIMIZATION AND CODE GENERATION: Elementary Code Optimization technique – Loop Optimization – DAG Representation of Basic Blocks – Value Numbers and Algebraic Laws – Object Programs – Problems in Code Generation – A Machine Model – A Simple Code Generator

Book for Study
1. Alfred V. Aho, Jeffery D.Ullman, "Principles of Compiler Design", Narosa, New Delhi, 2002.
   Ch:1.1-1.11,3.1-3.7,4.1,4.2,5.1-5.5,7.1–7.6,9.1,9.2,10.1,10.2,11.1,11.2,12.1-12.4,15.1-15.4

Books for Reference
1. Dick Grune, Henri E. Bal, Ceriel J.H.Jacobs, Koen G. Langondeon, "Modern Compiler Design", Wiley, Singapore, 2003
2. Louden K., "Compiler Construction, Principles and Practice", Thomson, New Delhi, 2003

Sem:III   Hours/Week:5
07PCS333   Credits:5

DATA WAREHOUSING & DATA MINING

AIM
 To provide an understanding of the data warehousing and data mining concepts.

UNIT 1   13 Hrs
DATA MINING AND DATA PREPROCESSING: Data Mining – Motivation – Definition – Data Mining on kind of data – Functionalities – Classification – Data Mining Task Primitives – Major issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

UNIT 2   12 Hrs
DATA WAREHOUSING: Introduction – Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From data Warehousing to Data Mining – On Line Analytical Processing – On Line Analytical Mining.

UNIT 3   12 Hrs
FREQUENT PATTERNS, ASSOCIATIONS AND CLASSIFICATION: The Apriori algorithm – Generating Association rules from frequent item sets – Mining various kinds of association rules – Definition of Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy learners – K-Nearest Neighbor Classifier – Other classification methods.

UNIT 4   12 Hrs
CLUSTER ANALYSIS: Definition – Types of data in Cluster Analysis – Categorization of major Clustering techniques – Portioning Methods – Hierarchical Methods – Agglomerative and Divisive Hierarchical Clustering – BIRCH – ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

UNIT 5   13 Hrs
SPATIAL, MULTIMEDIA, TEXT AND WEB DATA: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Social Impacts of Data Mining – Trends in Data Mining.

Books for Study
 1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 2nd Ed., Morgan Kaufmann, 2006.
    Ch: 1.1 - 1.4, 1.6, 1.7, 1.9, 2.1, 2.3 – 2.5, 3, 5.2.1, 5.2.2, 5.3, 6.1, 6.3 – 6.6, 6.9.1, 6.10, 7.1 – 7.5, 7.7, 7.8, 7.11, 10.2 – 10.5, 11.1, 11.4, 11.5.

Books for Reference
1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. Arun K.Pujari, " Data Mining Techniques", University Press, 2001.

Sem:III   Hours/Week:5
07PCS334   Credits:5

SOFTWARE ENGINEERING

AIM

To introduce the basic concepts of software engineering and the various phases in software development.

UNIT 1   13 Hrs

SOFTWARE PROCESS AND PROCESS MODELS: Software Engineering- A Layered technology – process framework – The capability Maturity Model Integration – process patterns – process assessment – personal and team process models – process technology – product and process – process models – prescriptive models – waterfall model – incremental process model – evolutionary model – specialized process models – unified process – agile view of process.

UNIT 2   12 Hrs

SOFTWARE ENGINEERING PRACTICE: Software Engineering practice – communication practice – planning, modeling and construction practices – deployment – system engineering – computer-based system – system engineering hierarchy – business process engineering – an overview – product engineering overview – system modeling – requirement engineering – tasks – initiating requirement engineering process – eliciting requirements – developing use cases – building analysis model – negotiating requirements – validating requirements.

UNIT 3   12 Hrs

ANALYSIS AND DESIGN ENGINEERING: Requirement analysis – analysis modeling approaches – data modeling concepts – object oriented analysis – scenario based, flow oriented and class based modeling – creating behavioral model – design engineering – design context of software engineering – design process and design quality – design concepts – design model – pattern based software design – architecture design – software architecture – data design – architectural styles and patterns – architectural design – assessing alternative architectural designs – mapping data flow.

UNIT 4   12 Hrs

COMPONENT LEVEL AND INTERFACE DESIGN: Definition of component – designing class based components – conduction component level design – object constraint language – designing conventional components – user interface design – golden rules – user interface analysis and design – interface analysis – interface design steps – design evaluation.

UNIT 5   13 Hrs

TESTING AND QUALITY MANAGEMENT: Testing strategies – strategic approach – strategic issues – test strategies for conventional software and object oriented software – validation testing – system testing – art of debugging – software testing fundamentals – white box testing – basis path testing – control structure testing – black box testing – object oriented testing methods – testing for specialized environments – testing patterns – quality management

Books for Study

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 6th Ed., McGraw Hill International, 2005. Ch: 2–14 & 26.

Books for Reference

1. Ian Sommerville, "Software Engineering", Addition Wesely, Singapore, 2002
2. Stephen R. Schach, " Classical and Object oriented Software Engineering", McGraw Hill, New Delhi, 1999.

Sem:III   Hours/Week:5
07PCS335   Credits:5

ARTIFICIAL NEURAL NETWORKS

AIM

Introduce some of the fundamental techniques and principles of neural network systems. Investigate some common models and their applications.

UNIT 1   12 Hrs

INTRODUCTION: Definition - Fundamental Concepts – Applications - Advantages and disadvantages – Classifications - Biological Neural Network - Artificial Neural Structure - Activation Functions - Adding Bias – Perception - MLP

UNIT 2   12 Hrs

FEEDFORWARD ANNs: Feedforward Neural Network: Structure - Delta Rule - Architecture and Training - Radial Basis Function - Time Delay NN

UNIT 3   13 Hrs

ATTRACTOR ANNs: Associative Learning - Attractor NN - Linear Associative Memory - Hopfield Network - Content Addressable Memory - Simulated Annealing - Boltzmann Machine - Bidirectional Associative Memory

UNIT 4   12 Hrs

UNSUPERVISED ANNs: Clustering Procedures - C-Means Algorithm - Learning Vector Quantization - MAXNET - Self-Organizing Feature Maps - Adaptive Resonance Architectures

UNIT 5   13 Hrs

ANN SIMULATION IN MATLAB: Creating a Custom Neural Network – Initializations – Setting Weights and Bias – Using Different Transfer Functions – Using Training Parameters – Simulating and Plotting Network – Designing a Complete FF Neural Network (Supervised) – Designing Self Organizing Maps (Unsupervised).

Books for Study
1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill, New Delhi, 1997.
   UNIT 1: 1.1.3, 1.1.4, 1.1.2, 1.3.4, 1.6, 3.2.1, 3.3-3.5, 4.4-4.5
   UNIT 2 : 6.1-6.3, 10.2-10.3
   UNIT 4 : 9.1-9.5
2. Satish Kumar, "Neural Networks: A Classroom Approach", McGraw-Hill, New Delhi, 2004.
   UNIT 3 : 10.1-10.4, 10.5.1, 10.6, 10.14.1, 10.14.2, 10.15.1, 10.16
   UNIT 5 : 13.2, 14.1-14.8, 15.4-15.5

Books for Reference
1. Haykin Simon, Neural Networks: A Comprehensive Foundation, 2nd Ed., Addison Wesley, Singapore, 2001.
2. Freeman a. James and Skapura M. David, Neural Networks: Algorithms, Applications, and Programming Techniques, Addison-Wesley Longman, California, 2002.

Sem:III   Hours/Week:3
07PCS336   Credits:2

SOFTWARE LAB – IV (MATLAB)

1.   Matrix Manipulations

2.   Control Statements

3.   Functions

4.   Graphs & Charts

5.   Basic Image Manipulations

6.   Image Enhancements

7.   Image Transformations

8.   Designing Basic Neural Networks

9.   Feedforward Neural Network

10. Self-Organizing Map Neural Network

Sem:III   Hours/Week:5
07PCS343   Credits:4
Optional: DISTRIBUTED OPERATING SYSTEMS

AIM
To provide a clear description of the fundamental concepts and design principles that are applicable to a variety of distributed operating system and to provide the basic knowledge in file system structure, semaphore and IPC Mechanism of UNIX operating system.

UNIT 1   13 Hrs
DISRIBUTED COMPUTING SYSTEM: Evolution – models - distributed operating system - issues in designing DOS - distributed computing environment. Communication In Distributed System: protocols - features of good message passing system - issues in IPC by message passing – synchronization – buffering - process addressing - failure handling - group communication

UNIT 2   12 Hrs
SYNCHRONIZATION: Clock synchronization – event ordering - mutual exclusion – deadlock -election algorithms. Process Management: Process migration - threads.

UNIT 3   12 Hrs
SECURITY: Potential attacks to computer systems – cryptography – authentication - access control - digital signatures - design principles.

UNIT 4   12 Hrs
File System Structures: History - system structure - user perspective. Internal Representation Of Files: Inodes - structure of a regular file – directories - conversion of path to an inode - super block - inode assignment to new file - allocation of disk blocks. System Calls For The File System: Open – read – write – close - file creation - creation of special files - change directory, root - owner and mode stat and fstat – pipes – dup - mounting and unmounting file systems-link and unlink.

UNIT 5   12 Hrs
INTER PROCESS COMMUNICATION: process tracing - system V IPC - sockets. Multi Processor Systems: Problem of multiprocessor systems - solution with master and slave processors - solution with semaphores.

Books for Study
1. Pradeep K.Sinha , "Distributed Operating Systems Concepts and Design", Prentice Hall, New Delhi, 2004.   Ch: 1.2,1.3,1.5-1.7,2.5,3.2-3.5,3.8-3.10,6,8,11.2.
   UNITS I, II & III
2. Maurice J Bach, "The Design of the UNIX Operating System", Prentice Hall of India, New Delhi, 1995.   Ch: 1.1-1.3,4.1-4.7,5.1-5.16,11.1,11.2,11.4,12.1-12.3
   UNITS IV & V

Books for Reference
1. Andrew S Tanaenbaum, "Modern Operating Systems", Prentice Hall, New Delhi,1997.
2. W.Richard Stevens , " UNIX Networking Programming", Prentice Hall, New Delhi,1993.

Sem:III   Hours/Week:5
07PCS344   Credits:4

Optional: MANAGEMENT INFORMATION SYSTEMS & ERP

AIM

To give an understanding of the importance of Information Systems, how it relates to managerial end-users and the vital role of Information Technology in business and to impart the knowledge on evolution implementation and advantages of an ERP System.

UNIT 1   13 Hrs

INTRODUCTION TO INFORMATION SYSTEMS (IS): Why study IS - why business need Information Technology (IT) - Fundamentals of IS concepts - overview of IS - solving business problems with IS - developing IS solutions.

UNIT 2   13 Hrs

INFORMATION SYSTEMS FOR BUSINESS OPERATIONS: Business IS - Marketing, manufacturing, human resource, accounting and financial information systems - transaction processing system - management information and decision support systems.

UNIT 3   12 Hrs

MANAGING INFORMATION TECHNOLOGY: Managing information resource and technologies - Global IT management - planning and implementing business change with IT.

UNIT 4   12 Hrs

ENTERPRISE RESOURCE PLANNING (ERP): An overview - benefits of ERP - ERP and related technologies - Business process reengineering - data warehousing – data mining - online analytical processing - supply chain management.

UNIT 5   12 Hrs

ERP IMPLEMENTATION: ERP implementation life cycle - implementation methodology - hidden cost - organizing the implementation - vendors, consultants and users contracts with vendors, consultants and employees project management and monitoring - ERP present and future - turbo change the ERP systems - Enterprise Integration Applications - ERP and E-commerce - ERP and Internet.

Books for Study

1. James A O' Brien, "Management Information Systems for managing IT in the Internetworked Enterprise", 4th Ed., Tata McGraw Hill, New Delhi, 1999.
    Ch: 1- 3, 10, 11 (sec 1 only), 13 , 14
    UNITS I, II & III
2. Alexis Leon, " ERP Demystified", Tata McGraw Hill, New Delhi, 2000.
    Ch: 1 – 9 , 10 – 12, 14 – 18, 36 – 40.
    UNITS IV & V

Books for Reference

W.S. Jaswadekar, "Management Information Systems", Tata McGraw Hill, New Delhi, 1998.

EXTRA DEPARTMENT COURSES (EDC)
OFFERED BY THE VARIOUS DISCIPLINES DURING II AND III SEMESTERS

Sem	Code No.	Title of the Paper	Hr	Cr
Department of Biochemistry				
II	07PBI261	Applied Nutrition*	4	3
III	07PBI362	First Aid Management*	4	3
Department of Biotechnology				
II	07PBT261	Basics of Bioinformatics*	4	3
III	07PBT362		4	3
Department of Botany				
II	07PBO261	General Microbiology	4	3
III	07PBO582	Remote Sensing and Geographical Information System	4	3
Department of Chemistry				
II	07PCH261	Environmental Chemistry	4	3
III	07PCH362	Industrial Chemistry	4	3
Department of Commerce				
II	07PCO261	Fundamentals of Accounting for Managers	4	3
III	07PCO362	Principles of Management	4	3
Department of Computer Science				
II	07PCS261	Internet Concepts*	4	3
II	07PCS261	Internet Concepts	4	3
III	07PCS362	Computer Applications for Social Sciences*	4	3
III	07PCS362	Computer Applications for Social Sciences	4	3
Department of Economics				
II	07PEC261	General Economics	4	3
III	07PEC362	Indian Economy	4	3
Department of Electronics				
II	07PEL261	Electronics in Communication*	4	3
III	07PEL362	Computer Hardware*	4	3
Department of English				
II	07PEN261	English for Specific Purposes	4	3
III	07PEN362	Interviews and Group Dynamics	4	3
Department of French				
II	07PFR261	Beginners Course in French	4	3
III	07PFR362	Advanced Course in French	4	3

Department of Hindi

II	07PHI261	Beginners Course in Hindi	4	3
III	07PHI362	Advanced Course in Hindi	4	3

Department of History

II	07PHS261	Public Administration*	4	3
III	07PHS362	Applied Tourism*	4	3

Department of Human Resource Management

II	07PHR261	Sociology for Competitive Examinations	4	3
III	07PHR362	Human Resource Management	4	3

Department of Mathematics

II	07PMA261	Operations Research	4	3
III	07PMA362	Numerical Methods	4	3

Department of Physics

II	07PPH261	Physics for Rural Development	4	3
III	07PPH362	Medical Physics	4	3

Department of Sanskrit

II	07PSA261	Beginners Course in Sanskrit	4	3
III	07PSA362	Advanced Course in Sanskrit	4	3

Department of Statistics

II	07PST261	Statistics for Biomedical Sciences*	4	3
III	07PST362	Data Analysis*	4	3

Department of Tamil

II	07PTA261	Beginners Course in Tamil	4	3
II	07PTA261	அரசுப் பணித்தேர்வுத் தமிழ் - I*		
III	07PTA362	Advanced Course in Tamil	4	3
IIII	07PTA683	அரசுப் பணித்தேர்வுத் தமிழ் - II*	4	3

Non-Departmental Courses

Journalism

II	07PJO261	Beginners Course in Journalism	4	3
III	07PJO362	Advanced Course in Journalism	4	3

Law

II	07PLA261	Beginners Course in Law	4	3
III	07PLA362	Advanced Course in Law	4	3

Shorthand

II	07PSH261	English Shorthand-I	4	3
III	07PSH362	English Shorthand-II	4	3

(* Offered by Self Financing Section)