

L. N. GOVERNMENT COLLEGE  
(AUTONOMOUS)  
PONNERI – 601204

DEPARTMENT OF COMPUTER SCIENCE



M.Sc Computer Science

SYLLABUS

(Effect from the Academic Year 2020-21)

**L. N. GOVERNMENT COLLEGE (AUTONOMOUS), PONNERI – 601204**  
**DEPARTMENT OF COMPUTER SCIENCE**

**M.Sc DEGREE COURSE IN COMPUTER SCIENCE SYLLABUS**  
**(Effective from the Academic Year 2020-21)**

**SEMESTER - 1**

Subject Code	Subject Type		Subject Code	Credits	Lecture Hours	IM	EM	Max Marks
20PFM1A	MT	1	Design and Analysis of Algorithm	4	5	25	75	100
20PFM1B	MT	2	Programming in PHP	4	5	25	75	100
20PFM1C	MT	3	Advanced Database Management System	4	5	25	75	100
20PFM11	MP	1	PHP Programming Lab	3	4	40	60	100
20PFM12	MP	2	Advanced RDBMS Lab	3	4	40	60	100
20PFE1A	ELE	1	a Mathematical Foundation for Computer Science	3	5	25	75	100
20PFE1B			b Optimization Techniques					
20PFE1C			c Advanced Statistical Methods					
20PFS1A	SS	1	Advanced Essential of Language & Communication	2	2	40	60	100
				23	30			700

**SEMESTER - 2**

Subject Code	Subject Type		Subject Code	Credits	Lecture Hours	IM	EM	Max Marks
20PFM2A	MT	4	Distributed Operating System	4	5	25	75	100
20PFM2B	MT	5	Programming in Python	4	5	25	75	100
20PFM2C	MT	6	Internet of Things	4	4	25	75	100
20PFM21	MP	3	Programming in Python Lab	3	4	40	60	100
20PFE2A	ELE	2	a Cloud Computing	3	4	25	75	100
20PFE2B			b Mobile Computing					
20PFE2C			c Software Project Management					
20PFE2D	ELE	3	a Advanced Computer Networks	3	4	25	75	100
20PFE2E			b Soft Computing					
20PFE2F			c Embedded Systems					
20EDC21	EDC	1	Hardware and Networking	3	2	25	75	100
20PFS2A	SS	2	Essentials of Spoken & Presentation Skills	2	2	40	60	100
20PFS2B	SS	3	Managerial Skills	2	2	40	60	100
				28	30			900

### SEMESTER - 3

Subject Code	Subject Type		Subject Code	Credits	Lecture Hours	IM	EM	Max Marks
20PFM3A	MT	7	Principals of Compiler Design	4	5	25	75	100
20PFM3B	MT	8	Advanced Java Programming	4	5	25	75	100
20PFE3A	ELE	4	a Information Security	3	5	25	75	100
20PFE3B			b Cryptography					
20PFE3C			c Internet Security and Computer Forensics					
20PFE3D	ELE	5	a Object Oriented System Development	3	4	25	75	100
20PFE3E			b Data Mining and Data Warehousing					
20PFE3F			c Data Science and Big Data Analysis					
20PFM31	MP	4	Advanced Java Programming Lab	3	4	40	60	100
20PFM32	MPR	5	Mini Project	3	3	40	60	100
20EDC31	EDC	2	Internet and its Applications	3	2	25	75	100
20PFS3A	SS	4	Logical and Numerical Aptitude Skills & Group Discussion	2	2	40	60	100
20PFI3A	IN	1	**Internship (Duration Summer Vacation 4 to 6 Weeks of 1 <sup>st</sup> Year)	2	-	40	60	100
				28	30			900

### SEMESTER - 4

Subject Code	Subject Type		Subject Code	Credits	Lecture Hours	IM	EM	Max Marks
20PFP41	PR	1	Project & Viva Voce	16	30	40	60	100
				16	30			100

MT – MAJOR THEORY	MP – MAJOR PRACTCAL	ELE - ELECTIVE	EDC – EXTRA DISCIPLINARY COURSE
SS – SOFT SKILL	MPR – MINI PROJECT	IN - INTERNSHIP	PR – PROJECT & VIVAVOCE

***\*\* Internship will be carried out during the summer vacation of the first year and marks should be sent to the COE of the College and the same will be included in the Third Semester Marks Statement.***

Subject	Credits
Major	63
Elective and EDC	21
Softskill	8
Internship	2
<b>Total</b>	<b>94</b>

**LOGANATHA NARAYANASAMY GOVT. COLLEGE (AUTONOMOUS)  
PONNERI**

**MASTER OF COMPUTER SCIENCE DEGREE COURSE  
CHOICE BASED CREDIT SYSTEM (CBCS)  
(Effect from the academic year 2020 – 2021)**

**REGULATIONS**

**1. ELIGIBILITY FOR ADMISSION:**

Candidates with B.Sc. degree in Computer Science or Computer Science & Technology or B.C.A. degree of this University or any other degree accepted as equivalent thereto by the Syndicate shall be eligible for admission to M.Sc Computer Science Degree Course.

**2. ELIGIBILITY FOR THE AWARD OF DEGREE**

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than two academic years, passed the examination of all the four semesters prescribed earning minimum 90 credits and fulfilled such conditions as have been prescribed therefore.

**3. DURATION OF THE COURSE**

**Two years Courses:** The duration of the course is for two academic years consisting of four semesters.

**4. MEDIUM OF INSTRUCTION**

The medium of Instruction and Examination (Written and Viva) shall be English.

**5. COURSE OF STUDY:**

The scheme of examinations for different semesters shall be as follows:

**APPENDIX-B**

**The following procedure is to be followed for Internal Marks:**

Theory Papers	Internal Marks
Best 2 tests out of 3	10
Attendance	5
Seminar	5
Assignment	5
Total	25

**Break-up Details for Attendance**

Theory Papers	Marks
Below 49%	No Marks
50% to 64%	2 Marks
65% to 74%	3 Marks
75% to 89%	4 Marks
90% to 100%	5 Marks

### **Practical Internal Marks**

Practicals	40 Marks
Attendance	5 Marks
Practical Best 2 out of 3	30 Marks
Record	5 Marks

### **Project:**

Theory Papers	Marks
Internal Marks Best 2 out of 3 Presentations	20 Marks
Viva	20 Marks
Project Report	60 Marks

## **6. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTERS**

(i) Candidates shall register their names for the First semester examination after the admission in the PG courses.

(ii) Candidates shall be permitted to proceed from the First Semester upto the Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subject) Semester subjects.

(iii) Candidates shall be eligible to proceed to the subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the Syndicate from time to time.

Provided in case of candidate earning less than 50% of attendance in any one of the semester due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidate shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

## **7. PASSING MINIMUM:**

- a) There shall be no Passing Minimum for Internal.
- b) For External Examination, Passing Minimum shall be of 50% (Fifty Percentage) of the maximum marks prescribed for the paper.
- c) In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- d) Grading shall be based on overall marks obtained (internal + external).

## **8. CLASSIFICATION OF SUCCESSFUL CANDIDATES:**

Candidates who secured not less than 60% of aggregate marks (Internal + External) in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate (Internal + External) shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations (theory papers, practicals, project and viva-voce) prescribed for the course in the First appearance.

### **9. RANKING:**

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations under “Requirements for Proceeding to subsequent Semester” are only eligible for Classification.

### **10. PATTERN OF QUESTION PAPER:**

PART – A (50 words)	-	Answer 10 out of 12 Questions	10 x 2 = 20 marks
PART – B (200 words)	-	Answer 5 out of 7 Questions	5 x 5 = 25 marks
PART – C (500 words)	-	Answer 3 out of 5 Questions	3 x 10 = 30 marks

### **QUESTION PAPER FOR PRACTICALS**

The external examiner will prepare a question paper on the spot with the help of the Question Bank supplied by the Controller’s office.

### **11. APPEARANCE FOR IMPROVEMENT:**

Candidates who have passed in a theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improve his marks, then his improved marks will be taken into consideration for the award of Classification only. Such improved marks will not be counted for the award of Prizes / Medals, Rank and Distinction. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration. Candidate will be allowed to improve marks in the Practical, Project, Viva-voce, Field work.

### **12. TRANSITORY PROVISION:**

Candidates who have undergone the course of study prior to the academic year 2008-2009 will be permitted to appear for the examinations under those Regulations for a period of three years i.e., up to and inclusive of April/May 2012 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

## Question Paper pattern

L.N. GOVT. COLLEGE (AUTONOMOUS), PONNERI - 601201

M.Sc., COMPUTER SCIENCE

For candidates admitted from 2020 – 2021)

Max Marks 75

**Section A: (10 x 2 = 20 Marks)**

10 Questions to be answered out of 12 Questions.

(Minimum of 2 Questions and Maximum of 3 Questions to be chosen from each unit)

**Section B: (5 x 5 = 25 Marks)**

5 Questions to be answered out of 7 Questions.

(Minimum of 1 Questions and Maximum of 2 Questions to be chosen from each unit)

**Section B: (10 x 3 = 30 Marks)**

3 Questions to be answered out of 5 Questions.

(One Question to be chosen from each unit)

# M.SC DEGREE COURSE IN COMPUTER SCIENCE

## SYLLABUS

### SEMESTER - 1

#### MAJOR THEORY - 1

Title of the Course/ Paper	<b>Design and Analysis of Algorithms</b>		
Major Theory	First Year & First Semester	Credit: 4	SUB CODE: <b>20PFM1A</b>
Objective of the course	This course gives insight into the design and analysis for selected problems.		
Course outline	Unit 1: Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-“oh” notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.		
	Unit 2: Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.		
	Unit 3: Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack.Search techniques for graphs – DFS-BFS-connected components – biconnected components.		
	Unit 4: Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.		
	Unit 5: Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.		
Outcomes	Demonstrate advantages and disadvantages of specific algorithms and data structures, Select basic data structures and algorithms for autonomous realization of simple programs or program parts Determine and demonstrate bugs in program, recognise needed basic operations with data structures Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures. Analyse the time and space complexity of algorithms. Design their own data structure according to the application need.		

#### Recommended Texts

1. E. Horowitz, S. Sahni and S. Rajasekaran, 1999, Computer Algorithms, Galgotia, New Delhi.

#### Reference Books

1. G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
2. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.



3. S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

## MAJOR THEORY – 2

Title of the Course/ Paper	<b>Programming In PHP</b>		
Major Theory	First Year & First Semester	Credit: 4	SUB CODE: <b>20PFM1B</b>
Objective of the course	Acquaint themselves with the fundamental concepts and programming environment of PHP		
Course outline	<p>Unit 1: : Introduction – The Origin of PHP-PHP is better than Its alternatives – How PHP works with the Web Server – Hardware and Software requirements and installation – PHP Pros and Cons – PHP: past, present and future (PHP 30, PHP 40, and PHP 5) – Strength of PHP – Basic PHP Development – How PHP scripts work – Basic PHP syntax – PHP variables – PHP data types – Displaying type information – Testing for a specific data type –Operators – Variable manipulation – Dynamic variables – String in PHP – Control Structures – The if statement, Using the else clause with if statement, multiple if, nested if, switch statement, Using the ? Operator – Summary</p> <p>Unit 2: Arrays: Single-Dimensional Arrays – Multidimensional Arrays – Casting Arrays –Associative arrays – Accessing arrays – Getting the size of an array – Looping through an array – Looping through an associative array – Examining arrays – Joining arrays – Sorting arrays – Sorting an associative arrays Loops – The while statement – The do while statement – The for statement – Break &amp; continue Nesting loops – For each loops Functions – Introduction of functions – PHP Library Function – Array functions – String functions – Date and time functions – Other important functions – User Defined Function – Defining a function with parameters and without parameters – Returning value from function – Dynamic function calls – Accessing variable with the global statement – Function calls with the static statement – Setting default values for arguments – Passing arguments by value – Passing arguments to a function by reference</p> <p>Unit 3: Working With the File System – Creating and deleting a file – Reading and writing text files – Working with directories in PHP – Checking for existence of file – Determining file size – Opening a file for writing, reading, or appending – Writing Data to the file – Reading characters – Working With Forms – Forms – Super global variables – The server array – A script to acquire user input – Importing user input – Accessing user input – Combine HTML and PHP code – Using hidden fields – Redirecting the user – File upload and scripts Validation – Server side validation – Client side validation (Java script) – Working With Regular Expressions.</p> <p>Unit 4: Classes and Objects – Introduction of Objects oriented programming – Define a class – Creating an object – Object properties – Object methods – Object constructors and destructors – Class constants, Access modifier, Class inheritance – Abstract classes and methods – Object serialization – Checking for class and method existence – Exceptions – Summary. Introduction To Database – Introduction to SQL – Connecting to the MYSQL –Database creation and selection – Database table creation, update table structure – insert, update, delete data to a table – Fetch data from table, Acquiring the value, Joins, sub query – Finding the number of rows – Executing multiple queries – Cookies – The anatomy of a cookie</p>		

	<p>– Setting a cookie with PHP – Deleting a cookie – Creating session cookie – Working with the query string – Creating query string.</p> <p>Unit 5: Session – What is session – Starting a session – Working with session variables – Destroying session – Passing session Ids – Encoding and decoding session variables – Disk Access, I/O, And Mail – File upload – File download – Environment variables – E-mail in PHP – Random numbers – AJAX (Asynchronous JavaScript and XML) – Introduction to AJAX – Introduction to XML – HttpRequest Object – Method and Properties of XML – HttpRequest – Application of AJAX in web application.</p>
Outcomes	<p>Understand the use of PHP with HTML and use a PHP editing program.</p> <p>Understand the ability to create PHP website and Develop functional PHP script.</p> <p>Develop a MySQL database.</p> <p>Develop Database connectivity using MySQL.</p> <p>Debug script. Develop Web Applications and Understand AJAX and XML.</p>

**Recommended Text:**

1. David Sklar, Nathan Torkington, *Learning PHP*, 5<sup>th</sup> edition, O'Reilly publishers.
2. W Jason Gilmore, *Beginning PHP and MySQL5 From Novice to Professional*, Apress.
3. Kevin Yank , *Build Your Own Database Driven Web Site Using PHP & MySQL*, sitepoint.

**Reference books:**

1. Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre, *Programming PHP*, 2006, O'Reilly publishers.
2. Luke Welling, Laura Thomson, *PHP and MySQL Web Development*, 3<sup>rd</sup> Edition, 2004, Sams publishers.

## MAJOR THEORY - 3

Title of the Course/ Paper	<b>Advanced Database Management System</b>		
Major Theory	First Year & First Semester	Credit: 4	SUB CODE: <b>20PFM1C</b>
Objective of the course	This course introduces the concepts of Advanced Database Management System		
Course outline	<p>Unit 1: Introduction to DBMS and ER Model-Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, Database administrator and users, data dictionary, overall system Architecture. Basic concepts of ER, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation</p> <p>Unit2: Domains, Relations and Keys, Relational Algebra &amp; SQL-Domains, Relations, kind of relations, relational database, various types of keys-candidate, primary, alternate and foreign key. Relational algebra, SQL- set operations, aggregate functions, null values, nested sub queries, views, join relations, DDL in SQL.</p> <p>Unit 3: Functional Dependencies and Normalization-Basic definitions, trivial and non-trivial dependencies, introduction to normalization, non-loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.</p> <p>Unit 4: Transaction, concurrency and Recovery-Basic concepts of Transaction, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, concurrency control-two phase locking and deadlock handling, Recovery System-Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Shadow Paging.</p> <p>Unit 5: Storage structure and file organizations-Overview of physical storage media, magnetic disks-performance and optimizations, basic idea of RAID, file organizations, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization.</p>		
Outcomes	<p>Design ER-models to represent simple database application scenarios and Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.</p> <p>Describe the fundamental elements of relational database management systems</p> <p>Improve the database design by normalization</p>		

### Recommended Text

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan – Database System Concepts – Mcgraw Hill, 3<sup>rd</sup> Edition.

### Reference Books:

2. J. Date, A. Kannan and S. Swaminathan, "An Introduction to Database Systems", 8th Edition, 2009, Pearson Education.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 5th Edition, 2007, Pearson Education.



## MAJOR PRACTICAL - 1

Title of the Course/ Paper	<b>PHP Programming Lab</b>		
Major Practical	First Year & First Semester	Credit: 3	SUB CODE: <b>20PFM11</b>
Objective of the course	This course gives practical training in PHP Programming LAB		
Course outline	<ol style="list-style-type: none"><li>1. Get Name Of The User From A Form And Show Greeting Text</li><li>2. Calculator Program</li><li>3. Programs Using Functions</li><li>4. Programs To Use Loops, Control Flow Statements</li><li>5. Programs To Manipulate Arrays</li><li>6. Programs To Read And Write Files</li><li>7. Hit Counter Using Cookies</li><li>8. User Login System Using Sessions</li><li>9. Address Book Using MYSQL</li><li>10. Blog System With Comments Using Classes</li></ol>		

## MAJOR PRACTICAL – 2

Title of the Course/ Paper	<b>Advanced RDBMS Lab</b>		
Major Practical	First Year & First Semester	Credit: 3	SUB CODE: <b>20PFM12</b>
Objective of the course	This course trains the students the programming skills in solving database system application problems.		
Course outline	<p>Students are advised to use the concepts like Data Normalization, Link between table by means of foreign keys and other relevant data base concepts for developing databases for the following problems. The implementation of each problem should have necessary input screen Menu-driven query processing and pleasing reports. The choice or RDBMS is left to the students. Necessary validations must be done after developing database.</p> <ol style="list-style-type: none"><li>1. Library Information Processing.</li><li>2. Students Mark sheet processing.</li><li>3. Ballot counting system.</li><li>4. Gas booking and delivering system.</li><li>5. Income Tax calculations.</li><li>6. Bank Transactions.</li><li>7. Pay roll processing.</li><li>8. Airline / Railway reservation system.</li><li>9. Question Database and conducting quiz.</li><li>10. Inventory system.</li></ol>		

## ELECTIVE -1A

Title of the Course/ Paper	<b>Mathematical Foundations of Computer Science</b>		
Elective	First Year & First Semester	Credit: 3	SUB CODE: <b>20PFE1A</b>
Objective of the course	This course introduces the fundamental concepts of Theoretical Computer Science		
Course outline	Unit 1: Propositions and Compound Propositions – Logical Operations – Truth Tables –Tautologies and Contradictions – Logical Equivalence –Algebra of Propositions – Conditional and Biconditional Statements –Arguments – Logical Implication – Quantifiers – Negation of Quantified Statements – Basic Counting Principles – Factorial – Binomial Coefficients – Permutations – Combinations – Pigeonhole Principle – Ordered and Unordered Partitions.		
	Unit 2: Order and Inequalities – Mathematical Induction – Division Algorithm – Divisibility – Euclidean Algorithm – Fundamental Theorem of Arithmetic – Congruence Relation – Congruence Equations – Semigroups – Groups – Subgroups – Normal Subgroups – Homomorphism – Graph Theory: basic definitions-paths, reachability, connectedness matrix representation of graphs, trees.		
	Unit 3: Finite Automata and Regular Expressions: Finite State Systems – Basic definitions – Non-deterministic finite automata – Finite automata with $\epsilon$ -moves – Regular expressions.		
	Unit 4: Properties of Regular sets: Pumping lemma – Closure properties – Decision Algorithms – Myhill – Nerode Theorem – Context Free Grammars – Derivation Trees.		
	Unit 5: Simplifying Context free grammars - Chomsky normal forms – Greibach Normal forms – Pushdown automata and context-free languages.		
Outcomes	Understand mathematical logic and to develop analytical solutions for logical problems Equip with counting techniques to Solve combinatorial problems. Comprehend the algebraic structure and formal languages with their applications to handle abstract generalizations and computability Manipulate and analyse data numerically and graphically		

### Recommended Text

1. J.P.Tremblay and R.Manohar, Discrete Mathematical Structures with applications to Computer Science, Tata McGraw-Hill, New Delhi.

### Reference Books

1. P.Linz, 1997, An Introduction to Formal Languages and Automata, Narosa Pub. House, New Delhi.
2. S. Lipschutz and M. Lipson, Discrete Mathematics, Tata McGraw-Hill, New Delhi.
3. J.E.Hopcraft and J.D.Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi.
4. D.C.Kozen, Automata and Computability, Springer-Verlag, New York.
5. J. Martin, Introduction to Languages and the Theory of Computation, Tata McGraw-Hill, New Delhi.

## ELECTIVE -1B

Title of the Course	Optimization Techniques		
Elective	First Year & First Semester	Credit: 3	SUB CODE: <b>20PFE1B</b>
Course Outline	Unit 1: Nature and scope of OR- Linear programming – formulation – graphical solution (2 variables) of LPP- Application & Advantages of LPP – Simplex method – artificial variable- Big M method- Two phase method.		
	Unit 2: Duality in LPP – Dual –simplex method -Transportation problem – Assignment problem.		
	Unit 3: Sequencing problem-processing n jobs 2 machines and 3 machines, n jobs 3 machines, n jobs m machines.		
	Unit 4: Characteristics of game theory – minmax and maxmin criterion – saddle point- value of games – games with saddle points – two-person zero sum game.		
	Unit 5: Applications of PERT/CPM techniques – network diagram representation-time estimates and critical path in network analysis – problems in PERT/CPM.		
Outcomes	Understand and apply linear, integer programming to solve operational problem with constraints Apply transportation and assignment models to find optimal solution in warehousing and Travelling Comprehend the algebraic structure and formal languages with their applications to handle abstract generalizations and computability		

### Recommended Text

1. Sunderesan, Ganapathy Subramanian & Ganesan – Resource Management Techniques
2. P.R.Vittal & M.Malini, Problems In Operations Research

### Reference Books

1. S.D. Sharma, Operations Research, KedarNath Ram Nath Publications
2. V.K.Kapoor, Operations Research, Sultan Chand Publications.
3. Manmohan, Kanthi, Swarup Gupta, Operations Research, Sultan Chand Publications.
4. Taha, Operations Research, TMH Publications



## ELECTIVE -1C

Title of the Course/ Paper	<b>Advanced Statistical Methods</b>		
Elective	First Year & First Semester	Credits - 3	SUB CODE: <b>20PFE1C</b>
Objective of the course	Objective: To provide knowledge in Statistical methods and applications and to offer expertise in quantitative analysis		
Course outline	Unit 1: Theory of probability -probability rules -Baye's theorem -Probability distribution -Binomial, Poisson and Normal. Statistical decision theory -Decision environment -decision making under certainty and uncertainty and risk conditions -EMV, EOL and marginal analysis -value of perfect information - decision tree analysis		
	Unit 2: Sampling-Meaning of random sample -sampling methods -sampling error and standard error relationship between sample size and standard error Sampling distribution -characteristics- central limit theorem -estimating population parameters - point and interval estimates -estimating proportion, percentage and mean of population from large sample and small sample		
	Unit 3: Testing hypothesis -testing of proportions and means -large samples - small samples -one tailed and two tailed tests -testing differences between mean and proportions -errors in hypothesis testing -chi square distribution - characteristics -applications -test of independence and tests of goodness of fit - inferences -F distribution- testing of population variance- analysis of variance - one way and two way		
	Unit 4: Correlation and regression -Simple, partial and multiple correlation - simple, partial and multiple regressions -estimation using regression line - standard error of estimate -testing significance of correlation and regression coefficients -interpreting correlation -explained variation and unexplained variation - coefficient of determination		
	Unit 5: Multivariate analysis – factor, cluster and discriminant analysis – software packages for analysis –SPSS feature		
Outcomes	Define and identify basic concepts in inferential and descriptive statistics. Explain and apply the concepts and procedures of descriptive statistics. Describe and utilize principles of probability and hypothesis testing. Apply and interpret common inferential statistical tests and correlational methods.		

### Recommended Text

1. Richard I. Levin and David S Rubin, Statistics for Management, 7th Ed. Pearson Education New Delhi
2. Gupta, Statistical Methods, Sultan Chand
3. Johnson, Applied Multivariate Statistical Analysis, 5th Ed, Pearson Education

## SEMESTER - 2

### MAJOR THEORY - 4

Title of the Course/ Paper	<b>Distributed Operating System</b>		
Major Theory	First Year & Second Semester	Credit: 4	SUB CODE: <b>20PFM2A</b>
Objective of the course	This course introduces the various concepts related to Distributed Operating System		
Course outline	Unit 1: Fundamentals: What is Distributed Operating System – Evolution of Distributed Computing System – Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity – What is a Distributed Computing System – Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment. Introduction to Computer Networks – Network types – LAN –WAN – Communication protocols – Internetworking – ATM Technology		
	Unit 2: Message Passing: Introduction – Desirable features – Issues in PC Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding – Process Addressing – Failure Handling – Group Communication		
	Unit 3: Distributed Shard Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory – Consistency Models – Replacement Strategy – Thrasing – Other Approaches to DSM – Heterogeneous DSM – Advantages Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm		
	Unit 4: Distributed File System: Introduction – Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles		
	Unit 5: Security: Introduction – Potential Attacks to Computer System – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles		
Outcomes	<b>a.</b> Develop, test and debug RPC based client-server programs in Unix <b>b.</b> Design and build application programs on distributed systems <b>c.</b> Improve the performance and reliability of distributed programs <b>d.</b> Design and build newer distributed file systems for any OS.		

#### Recommended Text

1. Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003

#### Reference Books:

1. Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.

## MAJOR THEORY – 5

Title of the Course/ Paper	<b>Programming in Python</b>		
Major Theory	First Year & Second Semester	Credit: 4	SUB CODE: <b>20PFM2B</b>
Objective of the course	Develop a basic understanding of programming and the Python programming language and understand the basics of Strings, Lists and Tuples. To develop the skills of designing Graphical user interface in Python.		
Course outline	Unit 1: Introduction to Python - Installing in various Operating Systems - Variables and Data Types - Operators – Conditional Statements- if-if-else-nested if – Looping – for-while-nested loops– Control Statements- break-continue-pass- Input/output Statements Unit 2: Sequences -String Manipulations - Lists – Tuples – Mapping and Set types - Dictionaries –Set- Functions-Defining a function – calling a function – types of function – function arguments-lambda function- Exception Handling- Modules Unit 3: File handling - Object Oriented Programming - Classes - Objects – Attributes - Inheritance - Overloading - Polymorphism -Interacting with Databases - Introduction to MySQL - interacting with MySQL –Database connection-creating database table, insert operation, read operation-update operation-delete operation - Regular Expressions - Text handling Unit 4: Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using PyGTK–Tooltip, Check button, Combo box, Menus, Calendar, Image, Image processing- Network Programming- socket module - server socket methods - client socket methods - general socket methods- Web services using SOAP Unit 5 : Data Science in Python –Numpy – Numpy introduction, Data types Object – dtype-Numerical operations on Numpy arrays– Changing the dimensions of arrays -matrix arithmetic Scipy–introduction – basic functions – special function – optimization – linear algebra –Pandas-Introduction to Series and DataFrames – reading and writing data – Data Exploration – Data Munging- Introduction to version control system – subversion/Git.		
Outcomes	Understand the programming basics (operations, control structures, data types, etc.) and explain basic principles of Python programming language. Develop GUI applications using PyGTK. Implement basic object-oriented concepts like inheritance and polymorphism. Implement database and GUI applications. Understand data science in python and begin to implement code using Numpy.		

### Recommended Text

1. Allen B Downey,” *Think Python: How to Think Like a Computer Scientist*”, 1<sup>st</sup> Edition 2012, O’Reilly Publications.
2. Jeff McNeil, “*Python 26 Text Processing: Beginners Guide*”, 2010, Packet Publications.
3. Mark Pilgrim, “*Dive into Python* “, 2<sup>nd</sup> edition, 2009, Apress publications.

### Reference Books

**1.** Kent D Lee, "*Python Programming Fundamentals*", 2010, Springer, 2<sup>nd</sup> Edition. John V Guttag, "*Introduction to Computation and Programming Using Python*", Prentice Hall of India.

## MAJOR THEORY – 6

Title of the Course/ Paper	Internet of Things (IoT)		
Major Theory	First Year & Second Semester	Credit: 4	SUB CODE: <b>20PFM2C</b>
Objective of the course	In order to gain knowledge on bases of Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT.		
Course outline	Unit 1: Introduction: Physical Design of IoT- Logical Design of IoT- IoT Enabling Technologies - IoT Levels & Deployment Templates. IoT Architecture: M2M (Machine to Machine) high-level architecture - IETF architecture for IoT - Open Geospatial Consortium (OGC) Architecture.		
	Unit 2: IoT and M2M: Introduction to M2M – Differences between IoT and M2M - SDN and NFV for IoT. Need for IoT System Management – SNMP - Network operator requirements- NETCONF-YANG. Basic IoT Protocols: M2M, WSN, SCADA, RFID, IEEE 802.15.4 and Security.		
	Unit 3: IoT Platforms Design Methodology IoT: Ten steps in IoT design methodology - IoT Physical Devices & Endpoints: RASPBERRY PI - Raspberry Pi Interfaces - Programming Raspberry Pi with Python.		
	Unit 4: Data Analytics for IoT – Software & Management Tools - Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.		
	Unit 5: Case Studies and Real-World Applications: Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation and Smart cities.		
Outcomes	Understanding the IOT concepts and IOT Standards Analyse basic protocols in wireless sensor network Design IoT applications in different domain and be able to analyze their performance Implement basic IoT applications on embedded platform		

### Recommended Texts:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.

### Reference Books:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
2. Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012.

### MAJOR PRACTICAL – 3

Title of the Course/ Paper	<b>Python Programming Lab</b>		
Major Practical	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFM21</b>
Objective of the course	This course gives practical training in various Programming in Python		
Course outline	<ol style="list-style-type: none"><li>1. Simple calculator to do all the arithmetic operations</li><li>2. Programs to use control flow tools like if</li><li>3. Programs to use for loop</li><li>4. Data structures<ol style="list-style-type: none"><li>a. Use list as stack</li><li>b. Use list as queue</li><li>c. Tuple, sequence</li></ol></li><li>5. New module for mathematical operations and use in your program</li><li>6. Programs to read and write files, create and delete directories'</li><li>7. Programs with exception handling</li><li>8. Programs using classes and objects</li><li>9. Connect with MYSQL and create an address book and do the operations Insert, read, updateand delete</li><li>10. Programs for String handling and regular expressions</li><li>11. GUI program using PYGTK</li><li>12. Programs Using Numpy</li><li>13. Programs Using scipy</li><li>14. Programsusing series and data frames</li><li>15. Programs using charts/graphs</li><li>16. Programs using statistics</li><li>17. Programs for data exploration</li></ol>		

## ELECTIVE – 2A

Title of the Course/ Paper	<b>Cloud Computing</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2A</b>
Objective of the course	This course introduces the concepts of Cloud Computing		
Course outline	Unit – 1: UNDERSTANDING CLOUD COMPUTING Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.		
	Unit – 2: DEVELOPING CLOUD SERVICES Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds		
	Unit – 3: CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.		
	Unit – 4: USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.		
	Unit – 5: OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis		
Outcomes	<p>Define Cloud Computing and memorize the different Cloud service and deployment models</p> <p>Describe importance of virtualization along with their technologies.</p> <p>Use and Examine different cloud computing services</p> <p>Design &amp; develop backup strategies for cloud data based on features.</p>		

### Recommended Texts:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008





## ELECTIVE – 2B

Title of the Course/ Paper	<b>Mobile Computing</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2B</b>
Objective of the course	This course introduces the concepts of Mobile Computing		
Course outline	Unit 1: Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.		
	Unit 2: Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.		
	Unit 3: Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.		
	Unit 4: Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies		
	Unit 5: Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.		
Outcomes	Describe wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements Avoid or work around the weaknesses of mobile computing, or to reject mobile computing as a solution. Program applications on a mobile computing system and interact with servers and database systems. Interface a mobile computing system to hardware and networks.		

### Recommended Text

1. J. Schiller, 2003, Mobile Communications, 2nd edition, Pearson Education, Delhi.

### Reference Books

1. Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).
2. Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.
3. Martyn Mallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., New Delhi.
4. W. Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

**ELECTIVE – 2C**

Title of the Course/ Paper	<b>Software Project Management</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2C</b>
Objective of the course	This course introduces the various concepts related to Software Project Management		
Course outline	Unit 1: Introduction to Software Project Management: Project Definition – Contract Management – Activities Covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning.		
	Unit 2: Project Evaluation: Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation		
	Unit 3: Activity Planning: Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.		
	Unit 4: Monitoring and Control: Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back to Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.		
	Unit 5: Managing People And Organizing Teams : Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman–Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.		
Outcomes	<p>Understand the activities during the project scheduling of any software application</p> <p>Learn the risk management activities and the resource allocation for the projects</p> <p>Apply the software estimation and recent quality standards for evaluation of the software projects</p> <p>Acquire knowledge and skills needed for the construction of highly reliable software project</p> <p>Create reliable, replicable cost estimation that links to the requirements of project planning and managing</p>		

**Recommended Texts:**

1. Bob Hughes and MikeCotterell, Software Project Management, Tata McGraw Hill Edition.

**Reference Books:**

1. Ramesh, Gopaldaswamy, Managing Global Projects, Tata McGraw Hill.
2. Royce, Software Project Theory, Pearson Education.
3. P.Jalote, Software Project Management in Practice, Pearson Education.

**ELECTIVE – 3A**

Title of the Course/ Paper	<b>Advanced Computer Networks</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2D</b>
Objective of the course	This course introduces the concepts on Computer networking		
Course outline	Unit 1: Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, ATM, Ethernet and Wireless LANs - Physical layer – guided transmission media		
	Unit 2: Wireless transmission - Communication Satellites – Telephones structure –local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.		
	Unit 3: Elementary data link protocols - sliding window protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.		
	Unit 4: Network layer - design issues - Routing algorithms - Congestion control algorithms – IP protocol – IP Address – Internet Control Protocol.		
	Unit 5: Transport layer - design issues - Connection management - Addressing, Establishing & Releasing a connection – Simple Transport Protocol – Transport Control Protocol (TCP)		
Outcomes	Identify the components required to build different types of networks Choose the required functionality at each layer for given application Identify solution for each functionality at each layer Trace the flow of information from one node to another node in the network		

**Recommended Texts:**

A.S.Tanenbaum,“Computer Networks”Pearson Education, Inc, (Prentice hall of India Ltd), Delhi.

**Reference Books:**

1. B. Forouzan, “Introduction to Data Communications in Networking”, Tata McGraw Hill, New Delhi.
2. Halsall, “Data Communications, Computer Networks and Open Systems”, Addison Wessley

**ELECTIVE – 3B**

Title of the Course/ Paper	<b>Soft Computing</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2E</b>
Objective of the course	<p>To Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.</p> <p>Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.</p>		
Course outline	<p>Unit 1: Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.</p> <p>Unit 2: Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.</p> <p>Unit 3: Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.</p> <p>Unit 4: Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.</p> <p>Unit 5: Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.</p>		
Outcomes	<p>Upon completion of the course, the student are expected to</p> <ul style="list-style-type: none"> <li>Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.</li> <li>Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic</li> <li>To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.</li> <li>Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.</li> <li>Reveal different applications of these models to solve engineering and other problems.</li> </ul>		

**Text Book:**

1. S.N. Sivanandam, S.N. Deepa, “Principles of Soft Computing”, Wiley India, 2007.

**Reference Book**

S. Rajasekaran, G.A.V. Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms", Prentice Hall India, 2004.

**ELECTIVE – 3C**

Title of the Course/ Paper	<b>Embedded Systems</b>		
Elective	First Year & Second Semester	Credit: 3	SUB CODE: <b>20PFE2F</b>
Objective of the course	This course will enable students to: Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. Learn the development life cycle of embedded system		
Course outline	Unit 1: Introduction to Embedded system - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems Unit 2: Elements of an Embedded system - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components Unit 3: Embedded Systems - Washing machine: Application-specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware. Unit 4: RTOS based Embedded System Design: Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - choosing an RTOS. Unit 5: Components in embedded system development environment, Files generated during compilation, simulators, emulators and debugging - Objectives of Embedded product Development Life Cycle - Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.		
Outcomes	Students are able to Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems. Become aware of interrupts, hyper threading and software optimization. Design real time embedded systems using the concepts of RTOS.		

**Text Book:**

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.

**Reference Books:**

1. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", TMH. Second Edition 2009
2. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley. Third Edition 2006
3. Cliff Young, Faraboschi Paolo, and Joseph A. Fisher, "Embedded Computing: A VLIW Approach to Architecture, Compilers and Tools", Morgan Kaufmann Publishers, An imprint of Elsevier, 2005.

## Extra Disciplinary Course (EDC) - 1

Title of the Course/Paper	Hardware and Networking		
EDC	First Year & Second Semester	Credit: 3	SUB CODE :20EDC21
Objective of the course	This course introduces the details about basic concepts of data communication and networking.		
Course outline	Unit 1: Introduction of Hardware and Software/components of computer - Mother boards, Chipsets & Microprocessor concept & latest available in market. Basics & types of Floppy drive/HDD/DVD/RAM /SMPS/ /BIOS etc		
	Unit-2: Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.		
	Unit 3: Parallel and Serial Transmission - Modems - Guided Media - Unguided Media - Performance - Types of Error - Error Detection - Error Corrections.		
	Unit-4: Multiplexing - Types of Multiplexing - Multiplexing Application - Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.		
	Unit-5: Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP - World Wide Web.		
Outcomes	Understanding the basic concepts of I/O Components of Computer Understand Basic concepts of Data Communication and networking Understand good network design: simplicity, scalability, performance, of OSI Reference Model, TCP/IP Understand the concepts of Connection Devices of DCN Understand how the Internet works today		

### Recommended Texts

1. Behrouz and Forouzan,2001, Introduction to Data Communication and Networking, 2<sup>nd</sup>Edition, TMH.

### Reference Books

1. Jean Walrand1998, Communication Networks (A first Course), Second Edition, WCB/McGraw Hill.

2. Behrouz and Forouzan,2006, Data Communication and Networking,3<sup>rd</sup> Edition, TMH.

## SEMESTER – 3

### MAJOR THEORY – 7

Title of the Course/ Paper	<b>Principles of Compiler Design</b>		
Major Theory	Second Year & Third Semester	Credit: 4	SUB CODE: <b>20PFM3B</b>
Objective of the course	This course introduces various steps in the design of a compiler.		
Course outline	Unit 1: Introduction to compiling Compilers-Analysis of the source program- Phases of compiler-Cousins of the compiler-Grouping of phases- Compiler construction tools- Lexical analysis- Role of lexical analyzer- Input buffering - Specification of tokens- DFA-NFA- Conversion of NFA- DFA- Regular Expression and finite automata.		
	Unit-2: Syntax Analysis Role of the parser-Writing Grammars-Context free grammars-Top down parsing-Recursive descent parsing-Predictive parsing-Bottom-up parsing- Shift reduce parsing- Operator precedent parsing – LR parsers- SLR parser- Canonical LR parser- LALR parser		
	Unit 3: Runtime Environment and Intermediate Code Generator Runtime environments- Source language issues- Storage organization- Storage allocation strategies-Symbol Tables-Intermediate languages- Declarations- Assignment statements- Boolean expressions- Case Statements-Back patching- Procedure calls		
	Unit-4: Code Generation Issues in design of code generator- The target machine-Basic blocks and flow graphs- Next use information- A simple code generator-DAG representation of basic blocks- Code Generation using DAG.		
	Unit-5: Code Optimization Basics- Principle source of optimization- Peephole Optimization- Optimization of basic blocks- Loops in flow graph- Introduction to global data flow analysis- Code improving transformations.		
Outcomes	<p>Improve the theory and practice of compilation, in particular, the lexical analysis, Syntax, and semantic analysis, code generation and optimization phases of compilation.</p> <p>Understand and Create lexical rules and grammars for a programming language</p> <p>Demonstrate Flex or similar tools to create a lexical analyser and Yacc/Bison tools to create a parser.</p> <p>Implementation parser such as a bottom-up SLR parser</p>		

#### Recommended Texts:

1. Principles Of Compiler Design: A. A. Puntambekar . First edition Technical Publication..

#### Reference Books:

1. Compilers Principles, Techniques and Tools – Alfred V Aho,Monica S Lam Ravi Sethi,Jeffrey D. Ullman – Pearson – 2 nd Edition – 2011

## MAJOR THEORY - 8

Title of the Course/ Paper	<b>Advanced Java Programming</b>		
Major Theory	Second Year & Third Semester	Credit: 4	SUB CODE: <b>20PFM3C</b>
Objective of the course	This course gives an insight into advanced features of Java		
Course outline	Unit 1: Servlet overview – the Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication.		
	Unit 2: Java Beans: The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.		
	Unit 3: EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope		
	Unit 4: RMI – Overview – Developing applications with RMI:Declaring& Implementing remote interfaces-stubs &skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol		
	Unit 5 : JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions.		
Outcomes	Understand the role of webserver in web applications. Understand Client and server communication. Call procedure available in the remote computer in the distributed environment Write program for server-side computing Develop web related applications.		

### Recommended Texts:

1. J. McGovern,R. Adatia,Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi
2. H. Schildt, 2002, Java 2 Complete Reference, 5<sup>th</sup> Edition, Tata McGraw-Hill, New Delhi.

### Reference Books:

1. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2. D. R.Callaway, 1999, Inside Servlets, Addison Wesley, Boston
3. Joseph O’Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.



4. TomValesky, Enterprise JavaBeans, Addison Wesley.
5. Cay S Horstmann& Gary Cornell, Core Java Vol II Advanced Features, Addison Wesley.

## ELECTIVE – 4A

Title of the Course/ Paper	<b>Information Security</b>		
Elective	Second Year & Third Semester	Credit: 4	SUB CODE: <b>20PFM3A</b>
Objective of the course	This course introduces the basic concepts of Information Security		
Course outline	Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defence Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats		
	Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.		
	Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface-Multilevel database- Proposals for multilevel security		
	Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.		
	Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies-Physical security - Legal- Privacy- and Ethical Issues in Computer Security - Protecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime-Privacy- Ethical issues in computer society- Case studies of ethics.		
Outcomes	Know the foundational theory behind information security Understand the basic principles and techniques when designing a secure system Think adversarially of today's attacks and how defense work in practice. Assess threats for their significance, how to gauge the protections and limitations provided by today's technology.		

### Recommended Text

1. C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Ed, 2003
2. Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

### Reference Books

1. Stallings, Cryptography & N/w Security: Principles and practice, 4th Edition, 2006
2. Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
3. Eric Maiwald, Network Security: A Beginner's Guide, TMH, 1999
4. Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5. Whitman, Mattord, Principles of information security, Thomson, 2nd Edition, 2005

## ELECTIVE – 4B

Title of the Course/ Paper	<b>Cryptography</b>		
Elective	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFE3B</b>
Objective of the course	The concepts of classical encryption techniques and concepts of finite fields and number theory. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms Explore the design issues and working principles of various authentication protocols Comprehend and apply authentication services, Digital Signatures and mechanisms		
Course outline	<b>Unit 1:</b> Conventional encryption model –Security Concepts-Substitution and Transposition Ciphers- DES algorithm –AES algorithm - Random number generation. <b>Unit 2:</b> Number Theory: Modular arithmetic – Euler’s theorem – Euclid’s algorithm – Extended Euclidean Algorithm and its applications- Chinese remainder theorem – Prime numbers and factorization –Discrete Logarithms. <b>Unit 3:</b> Principles of Public key Cryptography– RSA algorithm – Key Management- Diffie – Hellman key exchange <b>Unit 4:</b> Message Authentication and Hash functions: Authentication requirements –Authentication function- Message Authentication codes-Hash functions-Secure Hash Algorithm. <b>Unit 5:</b> Administrating Security: Security planning- Risk analysis- Digital Signature and Authentication Protocols: Digital Signature-Authentication Protocols –Digital Signature Standard.		
Outcomes	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory. Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes		

### TEXT BOOK

1. Stallings, W., “*Cryptography and Network Security Principles and Practice*”, Pearson Education, 2005, Delhi.

### REFERENCE BOOKS

1. Charlie Kaufman, Radia Perlman, Mike specimen, “*Network Security Private Communication in a public world*”.
2. Michael Welsehenbach,”*Cryptography in C & C++*”,2005,John Wiley.

### E-REFERENCES

1. <http://www.webopedia.com/TERM/C/cryptography.html>
2. <http://www.sagemath.org/pdf/en/reference/cryptography/cryptography.pdf>
3. <http://www.freetechbooks.com/lecture-notes-on-cryptography-t565.html>

4. <https://nptel.ac.in/courses/106105031/>
5. <https://nptel.ac.in/courses/106105162/>

#### ELECTIVE – 4C

Title of the Course/ Paper	<b>Internet Security and Computer Forensics</b>		
Elective	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFE3C</b>
Objective of the course	To Provide an understanding computer forensics fundamental. To analyze the various computer forensics technologies To identify methods for data recovery To preserve the digital evidence		
Course outline	Unit 1: Network layer security & Transport layer security: IPSec Protocol – IP Authentication Header – IP ESP – Key Management Protocol for IPSec. Transport layer Security: SSL protocol, Cryptographic Computations – TLS Protocol. 189 CS-Engg&Tech-SRM-2013. Unit 2: E-mail security & firewalls PGP – S/MIME – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology – Types of Firewalls – Firewall designs – SET for E-Commerce Transactions. Unit 3: Introduction to computer forensics: Computer Forensics Fundamentals – Types of Computer Forensics – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition. Unit 4: Evidence collection and forensics tools: Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools. Unit 5: Analysis and validation: Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.		
Outcomes	To understand the definition of computer forensics fundamentals To know the methods for data recovery, evidence collection. To summarize duplication and preservation of digital evidence.		

#### TEXT BOOK

1. Man Young Rhee, “*Internet Security: Cryptographic Principles*”, “*Algorithms and Protocols*” , 2003, Wiley Publications.

#### REFERENCES

1. Nelson, Philips, Enfinger, Steuart, *Computer Forensics and Investigations*, India Edition, 2008, Cengage Learning.
2. John R Vacca, *Computer Forensics*, 2005, Firewall Media.
3. Richard E Smith, *Internet Cryptography*, 3<sup>rd</sup> Edition, 2008, Pearson Education.
4. Marjie T Britz, *Computer Forensics and Cyber Crime: An Introduction*, 1<sup>st</sup> Edition, 2012, Pearson Education.

#### E-REFERENCES

1. <https://www.udemy.com/topic/aspnet/>
2. <https://www.udemy.com/the-complete-c-sharp-developer-course/>

**ELECTIVE – 5A**

Title of the Course/ Paper	<b>Object Oriented Systems Development</b>		
Elective	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFE3D</b>
Objective of the course	<p>Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle. Practice UML in order to express the design of software projects.</p>		
Course outline	<p>Unit 1: Fundamentals of OOSD - Overview of Object-Oriented Systems Development: Two orthogonal view of the software - OOSD methodology - Why an object Object orientation. Object basics: Object Oriented Philosophy- Objects – Attributes – Object respond to messages – Encapsulation and information hiding – class hierarchy – Polymorphism – Object relationship and associations. OOSD life cycle: Software development process – OOSD Use case Driven Approach – Reusability.</p> <p>Unit 2: Methodology, Modeling and UML - Object Oriented Methodologies: Rumbaugh et al.’s object modeling technique – The Booch methodology – The Jacobson et al. methodology – Patterns – Frameworks - The Unified approach. Unified Modeling Language: Static and dynamic models – Why modeling - UML diagrams – UML class diagram – Use case diagram</p> <p>Unit 3: Object Oriented Analysis - Object Oriented Analysis process: Business Object Analysis - Use case driven object-oriented analysis – Business process modeling – Use-Case model – Developing effective documentation. Classification: Classifications theory – Approaches for identifying classes – Noun phrase approach – Common class patterns approach – Use-Case Driven approach – Classes, Responsibilities, and Collaborators - Naming classes. Identifying object relationships, attributes, and methods: Association – Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility.</p> <p>Unit 4: Object Oriented Design - Object Oriented Design Process and Design Axioms - OOD process- OOD axioms – Corollaries – Design patterns. Designing classes: Designing classes – Class visibility – Refining attributes – Designing methods and protocols – Packages and managing classes. Access layer: Object Store and persistence Designing Access layer classes. View Layer: Designing view layer classes – Macro level process – Micro level process – The purpose of view layer interface – Prototyping the user interface.</p> <p>Unit 5: Software Quality - Software Quality Assurance: Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous testing. System Usability and Measuring User satisfaction: Usability Testing – User satisfaction test – A tool for analyzing user satisfaction. System Usability and Measuring User satisfaction: Introduction – Usability Testing.</p>		
Outcomes	<p>On the successful completion of this course, Students will be able to:</p> <ul style="list-style-type: none"> <li>Show how the object-oriented approach differs from the traditional approach to systems analysis and design.</li> <li>Analyze, design, document the requirements through use case driven approach</li> <li>Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.</li> <li>Recognize the difference between various object relationships: inheritance, association and aggregation.</li> <li>Show the role and function of test cases, testing strategies and test plans in</li> </ul>		

**Recommended Texts:**

1. Ali Bahrami, "Object Oriented Systems Development using UML", McGraw-Hill, 2008

**References Books:**

1. Mahesh P.Matha, "Object-Oriented Analysis and Design Using UML", PHI Learning Private Limited, 2012.
2. Rachita Misra, Chhabi Rani Panigrahi, Bijayalaxmi Panda, "Principles of Software Engineering and System Design", Yesdee Publishing 2019.

**ELECTIVE – 5B**

Title of the Course/ Paper	<b>Data Warehousing and Data Mining</b>		
Elective	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFE3E</b>
Objective of the course	This course introduces the basic concepts of data warehousing and data mining		
Course outline	Unit 1: DATAWAREHOUSE: Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools		
	Unit 2: DATAMINING & DATA PREPROCESSING: Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.		
	Unit 3: ASSOCIATION RULE MINING: Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Item sets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.		
	Unit 4: C5 Questions to be answered out of 7 Questions.LASSIFICATION & PREDICTION: Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.		
	Unit 5 : CLUSTERING: Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint- Based Cluster Analysis – Outlier Analysis.		
Outcomes	After completing this course  Students will be familiar with data warehousing and data mining concepts. Students will be able to apply these in real world problems.		

**Recommended Texts:**

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. PRABHU DataWarehousing, PHI Learning Private Limited, New Delhi, 2012, ,

**Reference Books**

1. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
2. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub.Co. Ltd, New Delhi, 2012
3. PONNIAH, PAULRAJ, DataWarehousing Fundamentals, JohnWiley & Sons, New Delhi, 2011

**ELECTIVE – 5C**

Title of the Course/ Paper	<b>Data Science and Big Data Analysis</b>		
Elective	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFE3F</b>
Objective of the course	To provide an overview of an exciting growing field of Big Data analytics. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.		
Course outline	<p>UNIT 1 : Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Analytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.</p> <p>UNIT 2: Introduction to R programming – R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis : Visualization Befor Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation – Statistical Methods of Evaluation : Hypothesis Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA..</p> <p>UNIT 3: Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics – Reasons to choose and cautions – Additional Algorithms - Association Rules: A Priori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing – Diagnostics. Regression: Linear Regression and Logistic Regression: – Use cases – Model Description – Diagnostics - Additional Regression Models.</p> <p>UNIT 4: Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na’ive Bayes – Bayes Theorem – Naïve Bayes Clasifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis : : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis : Text Analysis Steps.</p> <p>UNIT 5: Basics of Hadoop: Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures</p>		
Outcomes	<p>Explain the motivation for big data systems and identify the main sources of Big Data in the real world.</p> <p>Demonstrate an ability to use frameworks like Hadoop, to efficiently store retrieve and process Big Data for Analytics.</p> <p>Implement several Data Intensive tasks using the Map Reduce Paradigm</p> <p>Apply several newer algorithms for Clustering Classifying and finding associations in Big Data</p> <p>Design algorithms to analyze Big data like streams, Web Graphs and Social Media data.</p> <p>Design and implement successful Recommendation engines for</p>		



	enterprises.
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**Recommended Texts:**

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, EMC Education Services Published by John Wiley & Sons, Inc. 2015

**Reference Books:**

1. Noreen Burlingame , “The little book on Big Data”, New Street publishers, 2012.
2. Anil Maheshwari, “ Data Analytics”, McGraw Hill Education, 2017.
3. Sandip Rakshit, “R for Beginners”, McGraw Hill Education, 2017
4. [http://www.johndcook.com/R\\_language\\_for\\_programmers.html](http://www.johndcook.com/R_language_for_programmers.html).
5. <http://bigdatauniversity.com/>.
6. <http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>.

**MAJOR PRACTICAL -4**

Title of the Course/ Paper	<b>Advanced Java Programming Lab.</b>		
Major Practical	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFM31</b>
Objective of the course	This course gives practical training in Advanced java programming		
Course outline	<ol style="list-style-type: none"> <li>1. HTML to Servlet Applications</li> <li>2. Applet to Servlet Communication</li> <li>3. Designing online applications with JSP</li> <li>4. Creating JSP program using JavaBeans</li> <li>5. Working with Enterprise JavaBeans</li> <li>6. Performing Java Database Connectivity.</li> <li>7. Creating Web services with RMI.</li> <li>8. Creating and Sending Email with Java</li> <li>9. Building web applications</li> </ol>		

**Extra Disciplinary Course (EDC) - 2**

Title of the Course/Paper	<b>Internet &amp; Its Applications</b>		
EDC	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20EDC31</b>
Objective of the course	This course gives an exposure to internet concepts		
Course outline	Unit 1: Introduction to Computers Programming Language Types History of Internet Personal Computers History of World Wide Web, Micro software Unit 2: Introduction to Hypertext mark-up language (html), Html Elements,		

	HTML headers, Hyperlinks, tables, web forms, inserting images, Frames.
	Unit 3: Inserting Images, Special characters and Line breaks, List, ordered list, Unordered lists, web forms, Creating Simple HTML programs
	Unit 4: Attaching a file, Electronic mail Creating an E-mail id Sending and Receiving mails attaching a file- Instance messaging - other web browser.
	Unit 5: E-marketing consumer tracking Electronic advertising search engine-CRM- credit card payments Digital cash and e-wallets micro payments- smart card
Outcomes	<p>Understand the basic principles of creating websites and has knowledge about the architecture of web applications.</p> <p>Knowledge of the basic scripting languages used to implement web applications.</p> <p>Able to design and implement a dynamic website using a scripting language and customize the appearance according to the graphic design.</p> <p>Able to use technologies such as CSS, JavaScript, jQuery, etc.</p>

**Text Book:**

1. H.M.Deitel, P.J. Deitel and A.B.Goldberg, "Internet and World Wide Web", PHI

**Reference Book:**

1. Harley hah, "The Internet - Complete Reference", Tata McGraw Hill.
2. "How the Internet works", Techmedia, Preston Gralla Millenium Edition.

## MINI PROJECT

Title of the Course/ Paper	<b>Mini Project</b>		
Core	Second Year & Third Semester	Credit: 3	SUB CODE: <b>20PFI3A</b>
Objective of the course	This course gives practical training in design and implementation of a single mini problem.		
Course outline	Each student will develop and implement individually application software based on any emerging latest technologies.		

## SEMESTER - 4

### MAJOR PROJECT

Title of the Course/Paper	<b>Project &amp; Viva-Voce</b>		
Core	Second Year & Fourth Semester	Credit: 16	SUB CODE: <b>20PFP41</b>
Objective of the course	This course is to train the student in executing a project and preparing the report of work done.		
Course outline	The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.		

5 Questions to be answered out of 7 Questions.

## SOFT SKILL

**Soft Skill-1:**

**Credits - 2**

### Essentials of Language & Communications – Advanced Level

SUB CODE: **20PFS1B**

Language-What is Language? -Phrase, Clause –Sentence

#### Communication Skills

A. Oral communication :

Fluency building techniques-using new channels and newspapers  
Word classes and their interchange  
Telephone strategies-playing models (seeking permission, expressing Gratitude, introducing, greeting, using gender fair language, etiquette polite talking)  
Simplifying and effective speaking  
Using effective vocabulary.

B. Types of Communication:

Functional, situational, verbal, non- verbal, interpersonal, intrapersonal, group, interactive, public, mass-line, dyadic communications with examples

C. Written Communication:

Planning  
Drafting and redrafting  
Presentation  
Writing dialogue, memos, reports, minutes  
Business correspondence  
Persuasive letters  
Writing reviews, analysis and comment

#### Assignment:

- i) Vocabulary learning through newspaper cuttings
- ii) Collecting often use Collocations

#### Seminar:

Political issues in India

#### Reference Books

1. Examine your English By Margaret M.Maison, Orient Longman Ltd.,
2. Reader's Digest- How to write and speak better, Reader's Digest Publications

**Soft Skill-2:**

Credits - 2

### **ESSENTIALS OF SPOKEN AND PRESENTATION SKILLS**

SUB CODE: **20PFS2C**

- 1) Listening
  - (i) Listening to standard models of conversations and comparing and contrasting the varieties of English (American & British or British & Indian)
- 2) Speaking
  - (i) Public Speaking
    - a) Giving welcome address/ Vote of thanks
    - b) Speaking at Parties
  - (ii) Art of Conversation
  - (iii) Interview skills
  - (iv) FAQs in Interviews
  - (v) GD (Group Discussion)
  - (vi) JAM (Just-a-minute)
- 3) Reading

Testing how students give importance to supra-segmental features while reading.
- 4) Writing
  - (i) Writing Job applications
  - (ii) Preparing resume as a fresher
  - (iii) Preparing resume as an experienced candidate

**Soft Skill-3:**

Credits - 2

### **MANAGERIAL SKILLS**

SUB CODE: **20PFS2D**

#### **Unit I- Stress management**

Definitions and Manifestations of stress.

Stress coping ability and stress inoculation training.

Management of various forms of fear (examination fear, stage fear or public speaking anxiety), depression and anger.

#### **Unit II- Conflict Management skills**

Types of conflict (intrapersonal, Intra group and inter group conflicts).

Basic concepts, cues, signals, symbols and secrets of body language.

Significance of body language in communication and assertiveness training.

Conflict stimulation and conflict resolution techniques for effective management.

#### **Unit III- Interpersonal Skills**

Group decision making (strengths and weaknesses).

Developing characteristics of charismatic and transformational leadership.

Emotional intelligence and leadership effectiveness- self awareness, self management, self motivation, empathy and social skills.

Negotiation skills- preparation and planning, definition of ground rules, clarification and justification, bargaining and problem solving, closure and implementation.

#### **Unit IV- Time Management**

Time wasters- Procrastination.  
Time management personality profile.  
Time management tips and strategies.  
Advantages of time management.

#### **Unit V- Towards Empowerment**

Stimulating innovation and change- coping with “temporariness”.  
Network culture.  
Power tactics and power in groups (coalitions).  
Managerial empowerment and entrepreneurship.  
Prevention of moral dwarfism especially terrorism.  
Altruism (prosocial behaviour/helping behaviour).  
Spirituality (clarifications with regard to spirituality)- strong sense of purpose- trust and respect-  
humanistic practices- toleration of fellow human beings expressions.

#### **PRACTICAL TRAINING**

Relaxation exercises- Western (Autogenic Relaxation) and Indian techniques (Shavasana).  
Role-play.  
Transactional Analysis.

#### **SOFT SKILL 4**

#### **LOGICAL AND NUMERICAL APTITUDE SKILLS**

Credits - 2

SUB CODE: **20PFS3B**

#### **Unit – I**

Arithmetic ability – Problems in Numbers – Fractions – Roots

#### **Unit – II**

Basic formulae and problems on boats and streams, simple interest, compound interest

#### **Unit – III**

Permutations and Combinations – simple problems

#### **Unit – IV**

Odd man out series

#### **Unit – V**

Data Interpretation – Bar Graphs, Pie Charts and Line Graphs.

Text Book

1. Quantitative Aptitude for Competitive Exams – R.S. Agarwal

**ANNEXURE – I**

**FORMAT FOR PROJECT AND INTERNSHIP REPORTS**

Name of the Department

Programme

Name of the Student

Register Number

Title of the Dissertation

Address of Organisation/Institution

Name of the External Guide

Designation

Place :

Date :

Signature of External Guide  
(with seal)

Name of the Internal Guide :

Qualifications :

Teaching Experience :

Place :

Date :

Signature of Internal Guide

Head of the Department :

[Approved or not Approved]

[University Use]

## ANNEXURE II

### BONAFIDE CERTIFICATE COMPANY ATTENDANCE CERTIFICATE ACKNOWLEDGEMENT CONTENTS

#### SYNOPSIS

Page No.

#### Chapter

1. INTRODUCTION
    - 1.1 ORGANIZATION PROFILE
    - 1.2 SYSTEM CONFIGURATION
      - 1.2.1 HARDWARE CONFIGURATION
      - 1.2.2 SOFTWARE CONFIGURATION
  2. SYSTEM STUDY
    - 2.1 EXISTING SYSTEM
      - 2.1.1 DEMERITS
    - 2.2 PROPOSED SYSTEM
      - 2.2.1 SYSTEM STUDY
      - 2.2.2 FEATURES/ADVANTAGES
  3. SYSTEM DESIGN AND DEVELOPMETN
    - 3.1 FILE DESIGN
    - 3.2 INPUT DESIGN
    - 3.3 OUTPUT DESIGN
    - 3.4 CODE DESIGN
    - 3.5 DATABASE DESIGN
    - 3.6 SYSTEM DEVELOPMENT
  4. TESTING AND IMPLEMENTATION
- CONCLUSION  
BIBLIOGRAPHY
- #### APPENDICES
- A. DATA FLOW DISGRAM
  - B. TABLE STRUCTURE
  - C. SAMPLE INPUT
  - D. SAMPLE OUTPUT/REPORT



## ANNEXURE III

### A. Format of the title page

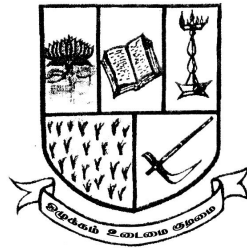
#### TITLE OF THE DISSERTATION

A Dissertation submitted in partial fulfilment of  
The requirements for the degree of

**Master of Computer Science**  
**To the**  
**University of Madras, Chennai – 600 005**

**By**

**Name of the Student followed by initial**  
**University Registration Number**



**Department of Computer Science**  
**LoganathaNarayanasamy Govt. (Autonomous) College,**  
**Ponneri – 601 204**

**MONTH – YEAR**

**B. Format of the Certificate:**

Name and Address of the Internal Guide

Place

Date

**CERTIFICATE**

This is to certify that the dissertation entitled ..... submitted in partial fulfilment of the requirements of the degree of Master of Computer Applications to the University of Madras, Chennai is a record of bonafide work carried out by ..... under my supervision and guidance.

[Name of the internal Guide]

Head of the Department

Date of Viva-voice:

Internal Examiner

External Examiner

Date of Viva-voice:

Internal Examiner External Examiner