GOVERNMENT ARTS COLLEGE (AUTONOMOUS),

SALEM-7.

M.Sc (Computer Science)

SYLLABUS

(Effective from the academic year 2017-2018)

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) SALEM-7

NAAC REACCREDITED WITH B

Master of Science (M.Sc) COMPUTER SCIENCE DEGREE PROGRAMMES

CHOICE BASED CREDIT SYSTEM (CBCS) – REGULATIONS AND SYLLABUS

(Effective from the Academic Year: 2017 – 2018 onwards)

1. PROGRAMME SPECIFIC OBJECTIVES

- To develop and implement solution based systems and / or processes that address issues in improving existing systems in computing industries.
- To exhibit the computing expertise within the computing community through corporate leadership, entrepreneurship, and / or advanced graduate study.
- To enable students to recognize the professional, legal, social, and ethical issues associated with the exploitation of Web and Internet based Computing and ICT.

PROGRAMME SPECIFIC OUTCOMES

- Recognise the impact of systems and software modeling and implementation on an organisation.
- Analyse a well-defined business requirement, using basic modeling techniques and system thinking to propose an appropriate technology-oriented solution.
- Demonstrate competence in simple procedural programming/ software Development.
- Develop an initial understanding of the motivations, strengths and weaknesses of other people and start to use these insights to work more effectively in team situations.

2. CONDITIONS FOR ADMISSION

A candidate, who has passed the B.Sc Degree Examination in Computer Science and BCA Degree Examination of the Periyar University or an equivalent examination of any other Universities accepted by the Syndicate of the Periyar University as equivalent there to, shall be permitted for admission and to appear and qualify for the Master of Science (M.Sc) Computer Science Degree Examination.

3. DURATION OF THE PROGRAMMES

The duration of the Degree of Master of Science in Computer Science shall consist of two consecutive academic years composed of four semesters.

4. COURSE OF STUDY AND SCHEME OF EXAMINATION

The detailed course of study and scheme of examination is provided in Table 1.

5. EXAMINATIONS

The Theory Examination shall be of three hours duration conducted at the end of each semester. The Practical Examinations for M.Sc Computer Science programme shall be of three hours duration and will be conducted at the end of all the semester along with the Theory courses. **The maximum mark for each Theory course and practical is 100.** The candidate failing to get the minimum marks required for pass in any theory Course(s) shall be permitted to appear for each failed subject(s) in the subsequent semester/examination. Candidates may apply to appear for instant or supplementary examinations for Theory course(s) only. The candidate failing to get the minimum marks required for pass in any practical, may be permitted to appear in the subsequent semesters. **There is no statutory provision to conduct instant or supplementary examinations for the practical courses.**

6. PASSING MINIMUM

For Theory Examination

The breakup of marks shall be: 75 by written examinations [Semester External or S.E.] and 25 by Internal Assessment [I.A.]. The passing minimum for all Theory courses (semester external) shall be 38 out of 75. The break up for internal assessment marks for Theory courses will be as follows: Attendance: 5 + Assignment: 5 + Seminar: 5 + Test: 10 = 25 Marks. There is no passing minimum for internal assessment. The passing minimum mark for all Theory courses shall be 50 marks with both internal and external marks added together under the mandatory requirement that the candidate has secured not less than 38 out of 75 in the written examination. Candidates who score less than 38 out of 75 in the Theory courses and secure 25 in internal assessment (out of 25), have NOT secured the passing minimum and are required to reappear for those courses in the subsequent semesters. Revaluation of Theory courses, re-totaling of

marks, supplementary and instant examination, and transparency of Theory courses is allowed as per Government Arts College (Autonomous), Salem-7 and Periyar University norms and guidelines. Candidates need to apply to the Controller of the Examinations, through the Principal with proper endorsement and recommendation by the concerned tutor and head of department.

For Practical Examination

The breakup of marks shall be 60 marks and Internal Assessment - 40 marks. The breakup for internal assessment marks shall be Practical Class Attendance 10 Marks + Observation Note Book 15 Marks + Practical Tests 15 Marks = 40 Marks. There is no passing minimum for internal assessment for the courses. The passing minimum mark for all practical courses shall be 50 marks with both internal and external marks added together under the mandatory requirement that the candidate has secured not less than 30 out of 60 in the Practical examinations. Candidates who score less than 30 out of 60 in the practical courses and secure 40 in internal assessment (out of 40), have NOT secured the passing minimum and are required to reappear for those practical in the subsequent semesters.

Revaluation of practical courses, re-totaling of marks, supplementary or instant examination, and transparency of all practical courses are NOT permitted as per Government Arts College (Autonomous), Salem-7 and Periyar University norms/guidelines. The candidate has to apply and re-appear for the practical examination at the subsequent semester .

Project/Dissertation

A candidate shall be declared to have passed the Project / Dissertation Examination if he/she obtains not less 100 marks out of 200. A candidate who has not obtained the required minimum marks for a pass in his or her dissertation/project shall be required to appear for and pass the same at the next or subsequent even semester only.

7. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The performance of the student is indicated by the Grades and the corresponding Grade Point (GP), Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA). A student is deemed to have completed a course successfully and earned the appropriate credit,

only if, the candidate has earned a grade of D and above. RA denotes the candidate should Re-Appear for the examination.

A student is deemed to have completed a course successfully and earned the appropriate credit, only if, the candidate has earned a grade of D and above. RA denotes that the candidate should Re-Appear for the examination.

Grade	Cumulative Grade Points Average	Grade Description	Range of Marks
O	9.0-10	Outstanding	90-100
D+	8.0-8.9	Excellent	80-89
D	7.5-7.9	Distinction	75-79
A+	7.0-7.4	Very Good	70-74
A	6.0-6.9	Good	60-69
B	5.0-5.9	Satisfactory	50-59
RA	0	Re-Appear	0-49
ABSENT	0.0	ABSENT	ABSENT

GP = Marks obtained in a course x Credits / 10

GPA = Total Grade points earned in a semester / Total Credits registered in a semester

CGPA = Sum of Grade Points earned / Sum of Credits registered

Classification of CGPA

9 and Above	I CLASS-OUTSTANDING
8 and 8.9	I CLASS-EXCELLENT
7. 5 and 7.9	I CLASS-DISTINCTION
6. 0 and 7.4	I CLASS
5. 0 and 5.9	II CLASS

The above classification is based on the marks secured by a candidate in the Major Subjects, Major Electives and Non Major Electives.

8. RANKING

Candidates who have passed all the examinations prescribed for the programme **in their first appearance,** within the period of two academic years / four semesters from their year of admission **ONLY are eligible for ranking**. A candidate who is **absent** for one or more courses in a semester examination and who later appears for the same course or courses in the subsequent semester examination **is NOT eligible for ranking** even though he/she has completed the course within two academic years / four semesters from their year of admission.

9. ATTENDANCE REQUIREMENT & CONDONATION OF ATTENDANCE

The attendance shall be calculated on the basis of 90 days / 450 instructional hours per semester. Candidates are mandatorily required to have 75% or above in attendance to apply and appear for their semester theory examinations without condonation of attendance. Those candidates whose attendance ranges from 65% to 74% may appear for the theory examination after payment of the appropriate condonation fee (Rs 800) through proper channel. A candidate who is absent for the theory examinations after paying the condonation fees has to repay the condonation fees for appearing in the next or subsequent semester. **Candidates whose attendance percentage for theory courses is below 65% in a semester are NOT allowed to appear for the theory examinations and mandatorily have to redo or repeat the particular semester(s) in which they lack the necessary attendance. They will be permitted to redo or repeat the lapsed semester(s) only after the completion of their second/final year of the course as per Government Arts College (Autonomous) and Periyar University norms/guidelines**. Redo or repeat candidates have to apply through proper channel to the Principal and COE for permission to redo their lapsed semesters. **For practical examinations the attendance for practical shall be calculated on the basis of 180 days / 900 instructional hours per year combining the odd and even semesters**. Candidates are mandatorily required to have 75% or above in attendance to apply and appear for the practical examinations without condonation of attendance. Those candidates whose attendance ranges from 65% to 74% may appear for the practical examination after payment of the appropriate condonation fee (Rs 800) through proper channel. **Candidates whose attendance percentage for the practical is below 65% are NOT allowed to appear for the practical examinations and mandatorily have to redo or repeat the particular practical(s) in which they lack the necessary attendance. They will be permitted to redo or repeat the lapsed practical(s) only after the completion of their**

second/final year of the course as per Government Arts College (Autonomous) and Periyar University norms/guidelines. Redo or repeat candidates have to apply through proper channel to the Principal and COE for permission to redo their lapsed practical(s).

A candidate who is absent for the practical examinations after paying the condonation fees has to repay the condonation fees for appearing in the next even or subsequent semester.

A candidate whose attendance for theory and practical classes are calculated separately is within 65% to 74%, has to pay condonation fees separately for theory and practical examinations as Rs 800 + 800 = Rs 1600. Condonation fees are separate for theory and practical examinations and are NOT to be combined as a single fee of Rs 800. The candidate will be allowed to appear for both theory and practical examinations under the condition that the condonation fees have been paid for both theory and practical examinations.

10. QUESTION PATTERN

The question pattern shall be as follows

Time: 3 Hours **Maximum Marks: 75**

Part A - 5 x 5 = 25 Marks

No. of questions = 5 (With internal choice)

All questions will carry equal marks. All questions are compulsory

Two questions will be set from each unit with internal choice

Part B - 5 x 10 =50 Marks

No. of questions = 5 (With internal choice)

All questions will carry equal marks. All questions are to be answered

Two questions will be set from each unit

The question pattern for practical courses shall be as follows:

Duration of examination: 3 Hours **Maximum Marks: 60**

No. of questions = 2 (without internal choice)

No. of experiments 2 x 25 = 50 Marks

Record = 10 Marks

Total Marks = 60 Marks

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11. PROJECT/DISSERTATION

- Students should do their five months (December to April) Project Work in a company / institution.
- Each Internal guide shall have maximum of five students.
- The project should be reviewed three times periodically.
- The students should prepare two copies of the dissertation and submit the same at the end of the semester for evaluation by examiners. After evaluation one copy is to be retained in the Department and the student can hold one copy.

Marks for Project/Dissertation:

The total marks for project/dissertation shall be 200, of which 150 marks are for dissertation work and 50 marks for Viva-Voce conducted as a part of the Main Practical examination in the IV semester. **A candidate who has not obtained the required minimum marks for a pass in his or her dissertation/project shall be required to appear for and pass the same at the next or subsequent even semester only. A candidate who has not completed the project/dissertation or fails to complete or submit the project/dissertation before the main practical exam and viva voce will forfeit evaluation of the project/dissertation and will be awarded zero(0) marks. Revaluation of Project/Dissertation, re-totaling of Project/Dissertation marks, supplementary or instant viva voce for Project/Dissertation is NOT permitted as per Government Arts College (Autonomous), Salem-7 and Periyar University norms/guidelines.** The candidate has to pay the condonation fee (Rs 800) and resubmit the project/dissertation in the next or subsequent even semester only.

12. TRANSITORY PROVISION:

Candidates who were admitted to the M.Sc Computer Science Programme from year 2017 – 2018 are **permitted to appear for the examination under this regulation for a period of 4 years or eight consecutive semesters from their year of admission to the programme.** Thereafter they shall be permitted to appear for examination only under the syllabus and regulations then in force.

13. ACADEMIC COUNCIL RATIFICATION AND APPROVAL.

These guidelines and regulations will be effective from the academic year 2017 – 2018. Any changes to these guidelines and regulation will be subject to the ratification and written approval of the Academic Council. Any subsequent changes may be done by the BOS after written permission / communication from the Academic Council. The changes are to be put up with justification for ratification and written approval of the Academic Council.

GOVERNMENT ARTS COLLEGE(AUTONOMOUS), SALEM - 7

PG UNDER CBCS

M.Sc(Computer Science)

For the candidates admitted from the academic year 2017-2018

S. No	Course Code	Title of the Course	Hours to be handled	Credits	Marks		
					I.A.	S.E.	Max
SEMESTER I							
1	17PCS01	Core Course – I : Discrete Structures	5	3	25	75	100
2	17PCS02	Core Course – II : Design and Analysis of Algorithms	5	4	25	75	100
3	17PCS03	Core Course – III : Distributed Operating Systems	5	4	25	75	100
4	17PCS04	Core Course – IV : Advanced Computer Architecture	5	4	25	75	100
5	17PCS05	Core Course – V :Principles of Information Security	4	4	25	75	100
6	17PCSP1	Core Practical - I : Implementation of Algorithms	3	3	40	60	100
7	17PCSP2	Core Practical - II :DOS and Linux Shell Programming	3	3	40	60	100
Total Credits and Marks			**30**	**25**	**205**	**495**	**700**
SEMESTER II							
1	17PCS06	Core Course – VI : Operations Research	5	4	25	75	100
2	17PCS07	Core Course – VII : Advanced Java Programming	4	3	25	75	100
3	17PCS08	Core Course – VIII :.Net Programming	4	3	25	75	100
4	17PCS09	Core Course – IX : Data Mining	4	3	25	75	100
5	17PCSM1	Major Based Elective Course-I:Network Security and Cryptography	5	3	25	75	100
6	17PCSP3	Core Practical - III : .Net Programming	3	3	40	60	100
7	17PCSP4	Core Practical - IV : Advanced Java Programming	3	3	40	60	100
8	17PGN01	Non Major Elective Common Course - I : Human Rights	2	3	25	75	100
Total Credits and Marks			**30**	**25**	**230**	**570**	**800**

S. No.	Course Code	Title of the Course	Hours to be handled	Credits	Marks		
					I.A.	S.E.	Max
SEMESTER III							
1	17PCS10	Core Course – X: Data Science	5	4	25	75	100
2	17PCS11	Core Course – XI : Web Application Development	4	3	25	75	100
3	17PCS12	Core Course – XII : Professional Ethics	4	3	25	75	100
4	17PCS13	Core Course – XIII : Mobile Communications	4	3	25	75	100
5	17PCSM2	Major Based Elective Course-II: Internet of Things	5	3	25	75	100
6	17PCSP5	Core Practical –V : R Programming	3	3	25	75	100
7	17PCSP6	Mini Project	3	3	40	60	100
8	17PGN02	Non Major Elective Common Course - II : General Studies for Competitive Examinations	2	3	25	75	100
Total Credits and Marks			**30**	**25**	**215**	**585**	**800**
SEMESTER IV							
1	17PCSPR	Project Work and Viva - Voce	20	15	---	200	200
Total Credits and Marks				**15**	**--**	**--**	**200**
Grand Total of Credits and Marks				**90**			**2500**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Course – I : DISCRETE STRUCTURES

Course Code : 17PCS01

A. Objectives

- It brings out the relation between mathematics and computer science, in the way how it could be applied. The need of discrete structure is how we apply the mathematics in computer science.
- It will be applied not only in computer science and also how mathematics will be applied in engineering.

B. Learning Outcomes

Students who successfully complete the course will provide the following outcomes:

- Have an idea of mathematical logics and how to write principle of conjunctive normal form and disjunctive normal form.
- It brings the idea of how the functions and relations will be applied in computer science.
- To know the idea of Lattices and Boolean algebra.
- It helps to understand the concepts of Language and Grammar.

C. Syllabus

UNIT –I

Introduction: Statements and Notations – **Connectives:** Negation – Conjunction – Disjunction – Statement Formulas and Truth Tables – Conditional and Bi-Conditional – Well Formed Formulas – Tautologies – Equivalence of Formula – Duality law – Tautological implications. **Normal Forms:** Disjunctive Normal Forms – Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms.

UNIT – II

Theory of inference for the Statements Calculus – **The Predicate Calculus:** The Statement, function, variables and quantifiers – Predicate formula – Free and Bound Variables – The Universe of discourse. **Inference Theory of the Predicate Calculus:** Valid Formulas and equivalences – Some valid formula involving quantifiers – Theory of inference for the predicate calculus – Formulas involving more than one quantifiers.

UNIT – III

Relations and Functions: Relations and ordering – Properties and Binary relations in a Set-Relation Matrix and Graph of a relation – Partition and covering of a set – Equivalence Relations – Compatibility relations – Composition of Binary Relations – Functions. Definition and Introduction – Composition of function – Inverse functions – Binary and n-nary operations – Hashing functions – Natural numbers – Recursion.

UNIT – IV

Lattices and Boolean Algebra: Lattices as partially ordered sets – Some Properties of Lattices – Boolean Algebra – Boolean Functions.

UNIT – V

Grammars and Languages: Discussion of Grammars – Formal Definition of Languages – Notions of syntax Analysis – Polish Expression and their compilation – Simple Precedence Grammars.

TEXT BOOK:

TREMBLEY J.P AND MANOHAR.R., "**Discrete Mathematical Structures with Applications to Computer Science**", Tata McGraw Hill Publications Co. Ltd., New Delhi 2003".

REFERENCE BOOKS:

1. *KOLMAN, BUSY AND ROSS*, "**Discrete Mathematical Structures**", PHI.
2. *K.D. JOSHI*, "**Foundations of Discrete Mathematics**", Wiley, Eastern Limited.

D. Web References:

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

E. Assignments:

Assignments can be given from the following topics:

1. How to write PCNF, PDNF with and without using truth table.
2. Method of writing Polish Expressions and their compilation.
3. Problems to use Recursion and Equivalence.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Course – II : DESIGN AND ANALYSIS OF ALGORITHMS

Course Code : 17PCS02

A. Objectives

- To inculcate the ability to analyze the asymptotic performance of algorithms.
- To introduce rigorous correctness proofs for algorithms.
- To bring in a familiarity with major algorithms and data structures.
- To demonstrate important algorithmic design paradigms and methods of analysis.
- To synthesize efficient algorithms in common engineering design situations.

B. Learning Outcomes

Students who complete the course will have the ability to

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Demonstrate the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Discuss the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.

C. Syllabus

UNIT- I

Introduction: Algorithm - Algorithm Specification - Performance Analysis - Divide-And-Conquer**:** General Method - Binary Search - Finding the Maximum and Minimum - Merge Sort- Quick Sort – Selection.

UNIT –II

The Greedy Method: The General Method - Knapsack Problem - Job Sequencing with Deadlines – Minimum-Cost Spanning Trees – Optimal Storage on Tapes – Single Source Shortest Paths.

UNIT- III

Dynamic Programming: The General Method- Multistage Graphs – All Pairs Shortest Path – Single-Source Shortest Paths: General Weights – Optimal Binary Search Trees –0/1- Knapsack - The Traveling Salesperson Problem.

UNIT -IV

Backtracking: The General Method – The 8-Queens Problem – Some of Subsets – Graph Coloring – Hamiltonian Cycles - Knapsack Problem. **Branch-And -Bound:** The Method – 0/1 Knapsack Problem – Travelling Salesperson .

UNIT -V

NP-Hard and NP-Complete Problems: Basic Concepts - Cooks 'Theorem - Np-Hard Scheduling Problems - Np Hard Code Generation Problems.

TEXT BOOKS

Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran. 2007. Fundamentals of Computer Algorithms. [First Edition]. Galgotia Publication Pvt. Ltd. New Delhi

REFERENCE BOOKS

1. *Anany Levitin*, 2005, **Introduction to the Design and Analysis of Algorithms. [First Edition]** Pearson Education Asia. Beijing.
2. *Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein*. 2009, **Introduction to Algorithms. [Third Edition]** . PHI Pvt. Ltd. New Delhi.
3. *Sara Baase and Allen Van Gelder.* 2006. **Computer Algorithms – Introduction to Design and Analysis [Third Edition],** Pearson Education Asia. Beijing.

D. Web References

1. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/
2. https://www.coursera.or g/specializations/algorithms
3. https://ocw.mit.edu/courses/.../6...design-and-analysis-of-algorithms.../lecture- notes

E. Assignments

1. Comparative study on various algorithms associated with the Divide and Conquer and justifications have to be produced in the form of Time and Space Complexities
2. Memory Management Vs Algorithms.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Course - III : DISTRIBUTED OPERATING SYSTEMS

Course Code : 17PCS03

A. Objectives

- To provide deep understanding on Distributed Operating System design and implementation.

B. Learning Outcomes

Students who have successfully completed this course will have unambiguous understanding of the following concepts:

- Hardware and software concepts, client server model, Remote Procedure call
- Distributed clock synchronization Concepts and Algorithms, thread and system models, processor allocation, fault tolerance and shared memory.

C. Syllabus

UNIT I

What is a Distributed System – Hardware Concepts – Software Concepts – Design Issues – The Client – Server Model.

UNIT II

Remote Procedure Call – Clock Synchronization – Mutual Exclusion – Election Algorithms – Deadlocks in Distributed Systems.

UNIT III

Threads – System Models – Processor Allocation – Fault Tolerance.

UNIT IV

Real-Time Distributed systems – Distributed File System Design - Distributed File System Implementation -Trends in Distributed File Systems.

UNIT V

What is Shared Memory – Consistency Models – Page based Distributed Shared Memory – Case Study: MACH.

TEXT BOOK:

Andrew S.Tanenbaum, "**Distributed Operating Systems** ", Pearson Education, 2002.

REFERENCE BOOKS:

1. *George coulouris, Jean Dollimore, Tim Kindberg*, "**Distributed Systems Concepts and Design**", Third Edition, Pearson Education Asia, 2002.
2. *Hagit Attiya and Jennifer Welch*, "**Distributed Computing: Fundamentals, Simulations and Advanced Topics** ", Wiley, 2004.
3. *Mukesh Singhal*," **Advanced Concepts in Operating Systems**", McGrawHill Series in Computer Science, 1994.
4. *A.S.Tanenbaum, M.Van Steen*," **Distributed Systems**", Pearson Education, 2004.
5. *M.L.Liu*, "**Distributed Computing Principles and Applications**", Pearson Addison Wesley, 2004.

D. Web References

1. https://www.peterindia.net/DistributedOperatingSystem.html
2. https://www.microsoft.com/en-us/research/group/systems-research-group-redmond/
3. www.hpcs.cs.tsukuba.ac.jp/~tatebe/lecture/h23/dsys/dsd-tutorial.html

E. Assignments

1. Discuss a situation where a proxy can be used.
2. Difference between a local call and a remote call with example.
3. Demonstrate shared memory concept in distributed system.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Course – IV : ADVANCED COMPUTER ARCHITECTURE

Course Code : 17PCS04

A. Objectives

- To understand the fundamental knowledge in architecture design, pipelined processor design, and their impacts on performance
- To inculcate knowledge in types of memory and their hierarchy.
- To insist the communication and the computing possibilities of Multithreading architecture
- To develop the foundations for analyzing the benefits of design options in computer architecture.

B. Learning Outcomes

Students are expected to possess the ability to:

- Evaluate performance of different computer structures
- Understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
- Know about Principles, Linear Pipelining, Design and Characteristic.

C. Syllabus

UNIT- I

Instruction Level Parallelism: Pipelining – Instruction Level Parallelism – Hardware and Software Approaches – Dependence – Dynamic Scheduling – Software and Hardware Solution to ILP: – Introduction – Extracting Parallelism with Hardware Support – Performance Issues – Branch Prediction – Branch – Target Buffer – The First Intel Pentium.

UNIT- II

Multiple Instruction Processor: Superscalar – Very Long Instruction Word – More of Multiple Instruction Issue Processor: Hardware Support for Exposing Parallelism – Hardware vs Software Speculation Mechanism – The Intel IA-64 Itanium Processor – Itanium – Limits of Instruction-Level Parallelism.

UNIT-III

Multiprocessors With Shared Memory Architecture: Parallel Processing – Parallel Architecture Taxonomy – Performance Metrics for Communication Mechanism – Advantages of Communication Mechanism – Cache Coherence – Directory-based Cache Coherence Protocols – Synchronization – Cache Wire Strategies – Cache Performance.

UNIT- IV

Main Memory and its Performance: Main Memory – Virtual Memory – Semiconductor RAM – ROM – I/O Device and their Performance: Introduction – Type of Storage Devices – Other Storage Device – Buses – Bus Standards – I/O Data Transfer Methods by using Memory Bus – Disk Arrays – Disk Performance Benchmarks.

UNIT –V

Multi-threading Architecture: Software and Hardware Multithreading – Types of Multithreading – Transparent Software and Hardware Multithreading – Support for Extended Multithreading – Multithreading Case Study – SMT and CMP Architecture.

TEXT BOOK

K A Parthasarathy, "**Advanced Computer Architecture**", Third Edition, Vijay Nicole Imprints Private Limited, 2012.

REFERENCE BOOKS

1. *Kai Hwang and Faye A Briggs*, "**Computer Architecture and Parallel Processing**", McGraw-Hill International Editions, 1985.
2. *Kai Hwang*, "**Advanced Computer Architecture**", McGraw-Hill International Editions, 1993.
3. *Michael J Quinn*," **Parallel Computing Theory and Practice**" [Second Edition], TMH, 2009.

D. Web Resources

1. http://lecturesppt.blogspot.in/2011/10/computer-organization-and-architecture.html
2. http://engineeringppt.blogspot.in/2010/01/advanced-computer-architecture.html
3. http://engineeringppt.blogspot.in/2011/12/computer-architecture-ppt.html

E. Assignment

1. Analyze parallel processing in Industrial scenario.
2. Compare memory mapping techniques.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Course - V : PRINCIPLES OF INFORMATION SECURITY

Course Code : 17PCS05

A. Objectives

- To introduce the importance of Information Security.
- To inculcate Legal and ethical issues of Information Security
- To classify various Security Technologies to protect Information against threats.
- To motivate the Systematic Project Management principles to ensure Security in an organization.

B. Learning Outcomes

Students who complete the course will have the ability to:

- Understand the common threats against Information and determine the solutions in the form of security.
- Incorporate the basic principles and techniques when designing a secure system.
- Acquire the technologies for protecting information in today's communication era.

C. Syllabus

UNIT-I

Information Security: Introduction – The History of Information Security – What is Security? – Components of an Information System – The System Development Life Cycle- The Security System Development Life Cycle. **Why Security is needed ? :** Introduction - Business needs first – Threats – Attacks – Secure Software Development.

UNIT-II

Professional, Legal, and Ethical issues in Information Security: Introduction – Law and Ethics in Information Security- Relevant U.S. Laws – International laws and legal bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations. **Managing IT Risk:** Introduction – An Overview of Risk Management
– Risk Identification – Risk Assessment – Risk Control Strategies.

UNIT – III

How to Plan for Security: Introduction **-** Information Security Planning and Governance - Information Security Policy, Standards, and Practices – The Information Security Blueprint – Security Education, Training , and Awareness Program. **Security Technology : Wireless VPNs, and Firewalls :** Introduction – Access Control – Firewalls – Protecting Remote Connections.

UNIT – IV

Security Technology: Prevention Systems , Intrusion Detection, and Other Security Tools : Introduction – Intrusion Detection and Prevention systems – Honeypots, Honeynets, and Padded cell systems – Scanning and Analysis Tools – Biometric Access Control. **Using Encryption :** Attacks on Crypto Systems.

UNIT-V

Implementing Information Security : Introduction – Information Security Project Management – Technical Aspects of Implementation – Nontechnical Aspects of Implementation - Information Systems Security Certification and Accreditation. **Maintenance of Information Security and eDiscovery :** Introduction – Digital Forensics.

TEXT BOOK:

Michael E.Whitman and Herbert J.Mattord . 2014. **Principles of Information Security. [Seventh Impression]** Cengage Learning India Private Limited, Delhi.

REFERENCE BOOKS:

1. *Calabrese*. 2006. **Information Security Intelligence: Cryptographic Principles and Applications.** [India Edition]. Thomson Delmar Learning Publications.
2. *Bhaskar, S.M. and Ahson. S.I.* 2008. **Information Security – A Practical Approach**. Narosa Publishing House, New Delhi.

D. Web References

1. www.sans.org/security-resources
2. www.securityforum.com
3. www.cte.unt.edu/information-technology

E. Assignments

1. Detailed Survey on Major security threats against Information and its consequences.
2. Plan for security by Industries and Institutions.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – I

Core Practical – I : IMPLEMENTATION OF ALGORITHMS

Course Code : 17PCSP1

List of Practical Exercises (using C language)

1. Write a program to Merge Sort using Divide and Conquer strategy and evaluate the efficiency of its algorithm in terms of Best, Worst and Average cases.
2. Write a program to perform Knapsack problem using Greedy solution and evaluate the efficiency of its algorithm in terms of Best, Worst and Average cases.
3. Write a program to perform Travelling Salesman Problem using Dynamic Programming and evaluate the efficiency of its algorithm in terms of Best, Worst and Average cases.
4. Write a program to perform BFS and DFS using traversal and searching strategies.
5. Write a program to implement 8 Queens problem using backtracking and estimating the efficiency for N Queens.
6. Write a program to implement graph coloring problem using backtracking.

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SEMESTER – I

Core Practical – II : DOS AND LINUX SHELL PROGRAMMING

Course Code : 17PCSP2

Practical List:

1. Write a Shell script
   i) Create directory.
   ii) Changing directory.
   iii) Current working directory.
   iv) Listing files with various options.
2. Write a Shell script to check the status of file using test command.
3. Write a Shell script to find the grade of student's Marks.
4. Write a Shell script to check the given string is palindrome or not.
5. Write a Shell script
   i) To perform case conversion
   ii) Comparison of strings
   iii) To find the Sum of digits
6. Write a Menu driven Shell program to count number of words, lines and characters.
7. Write a Shell script
   i) To search a word in a given sentence using grip command.
   ii) To find the biggest of three numbers using command line arguments. Check for sufficient number of command line arguments.
8. Write a Shell script for manipulating a given string
   i) To copy
   ii) Delete
   iii) Renaming a file
   iv) Concatenation
9. Write a Shell script
   i) Compression Techniques
   ii) Paragraph Formatting
10. Write a Shell script program using FILTERS to create a Batch file.

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SEMESTER – II

Core Course - VI : OPERATIONS RESEARCH

Course Code : 17PCS06

A. Objective:

This module aims to introduce students to use quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems. Operations research helps in solving problems in different environments that needs decisions. The Syllabus module covers topics that include: Linear programming and Dynamic Programming, Inventory Models, Queuing Theory and Project Scheduling by PERT and CPM.

B. Learning Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework.

- An ability to solve linear programming, some applications of linear programming, and Dynamic Programming, DP models, problem of dimensionality in dynamic programming.
- An ability to predict the Transportation cost.
- Knowledge of inventory models like ABC Inventory System, A Generalized Inventory Model-Deterministic models, Single Item static model with price breaks and Single Item N-period dynamic model.
- An ability to use the basic elements of the queuing model, Roles of the Poisson and exponential distributions and queues with combined arrivals and departures.
- An exposure to Project Scheduling by PERT and CPM.

C. Syllabus:

UNIT –I

Operations Research: A Tool for Decision Support System – **Linear Programming:** Graphical Method – Simplex Method – Big M Method – Two-Phase Method.

UNIT – II

Transportation Problem: Balanced Transportation Problem – Unbalanced Transportation Problem – Assignment Problem.

UNIT – III

Dynamic Programming: Introduction – The recursive equation approach – Characteristics of Dynamic Programming – Computational Procedure – tabular method of solution.

UNIT – IV

Queuing Theory: Introduction – Terminologies of Queuing System – Empirical Queuing Models: (M/M/1): (GD/∞/∞) Model - (M/M/C): (GD/∞/∞) Model - (M/M/1): (GD/N/∞) Model - (M/M/C): (GD/N/∞) Model for C ≤ N.

UNIT – V

Project Scheduling by PERT/CPM: Network – Critical Path Method (CPM) – PERT calculations – PERT Algorithm – Solved Problems.

TEXT BOOK:

KantiSwarup, P.K. Gupta, Man Mohan, "Operations Research", Sultan Chand and Sons Educational Publishers, New Delhi.

REFERENCE BOOKS:

1. *Taha.H.A.*, "Operations Research", Pearson Education.
2. *Sharma J.K.*, "Mathematical Models in Operations Research", TMH, 1989.
3. *R. Panneerselvam*, "Operations Research", Prentice Hall of India Private Limited, 2002

D. Any other additional Web Resources/ tools/ tutorials/ audio/ video/ story/ journals /article

1. en.wikipedia.org/wiki/Wikipedia 2. mathworld.wolfram.com
3. wiki.answers.com/help/asking questions**.**

E. Assignments:

Three Assignments can be given from the following topics

1. Project Scheduling 2. Inventory Models 3. Queuing Theory

F. Group Task:

Two Group Tasks can be given in the form of Seminar, Group Discussion, Quiz etc. in the topics

1. Linear Programming and Dynamic Programming
2. Inventory Problems

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SEMESTER – II

Core Course – VII : ADVANCED JAVA PROGRAMMING
Course Code : 17PCS07

A. Objectives:

- Understand to construct simple Java user interfaces and identify where data structures are appearing in those user interfaces.
- Understand the basic approaches and tools of collaborating programming and study their usage through group programming projects.

B. Learning Outcomes:

- Developing distributed applications using RMI.
- To implement RMI on a remote and local host.
- Understand the BDK and to learn the tools for bean development.
- Developing component based java software using java beans.

C. Syllabus

UNIT I

Collections – I/O Streams – Networking – Multithreading – Event Handling.

UNIT II

AWT: Windows, Controls, Layout Managers and Menus – Swing. Multimedia: Images, Animation and Audio –JDBC.

UNIT III

Java Servlets: Design – Life Cycle – Constituents of javax.Servlet package – cookies – Session Tracking – Java Server Pages: Overview – Implicit Objects – Scripting – Standard actions – Directives.

UNIT IV

Remote Method Invocation: Remote Interface – The Naming Class – RMI Security Manager Class – RMI Exceptions – Creating RMI Client and Server classes – RMI- IIOP.

UNIT V

Java Bean: Events – Customization – Introspection – Persistence – EJB: Introduction – EJB Container – Classes – Deployment description – Session Bean – Entity Java Bean – JAR file.

TEXT BOOKS:

1. *Herbert Schildt*, "The Complete Reference Java 2", Fifth Edition, Tata McGraw-Hill Publishing Company, 2008

2. *C Muthu*, "Programming with Java", Second Edition, Vijay Nicole Imprints Private Limited, Collaboration with Tata McGraw Hill, 2011.

3. *Tom Valsky*, "Enterprise Java Beans – Developing Component Based Distributed Applications, Pearson, 1999.

REFERENCE BOOKS:

1. *Steven Holzner et al*., "Java 2 (JDK 5 Edition) Programming - New Black Book", dreamtech press, 2011.

2. *Cay S Horstmann and Gary Cornell*, "Core Java Volume II – Advanced Features", Eighth Edition, Pearson, Twelfth Impression, 2013.

3. *Stephen Asbury, Scott R Weiner*, " Developing Java Enterprise Applications" , Second Edition, Wilely-dream-tech India Pvt.Ltd , 2004.

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SEMESTER – II

Core Course – VIII : .NET PROGRAMMING

Course Code : 17PCS08

A. Objectives :

- Gain a comprehensive understanding of the philosophy and architecture of .NET Framework.
- Acquire a working knowledge of creating a rich internet Web application using the .NET Framework.
- Attain a detailed knowledge of the building blocks of Web application, including C-Sharp, ASP.NET, ADO.NET, Web Services and Ajax.

B. Learning Outcomes:

- Able to design web applications using VB .NET.
- Able to use VB .NET controls in web applications.
- To create data base driven VB .NET web applications and web services

C. Syllabus

UNIT I

Understanding .Net – The .Net Strategy – Origin of .Net Technology - Features - .Net Languages – Benefits of .Net approach - .Net framework – Architecture – Common Language Runtime – Common Type System – Common Language Specification –Base Class Library – Intermediate Language - MSIL code – Assemblies – manifest – meta data – managed execution – automatic memory management - .Net Security Model.

UNIT II

Visual Basic.Net Development Environment – Data types – Operators –conditional structures and control flow – methods – function overloading - structures and enumerations – classes – various methods in class - inheritance and polymorphism – interfaces – exceptions – name spaces.

UNIT III

Overview of C# - Literals, Variables, and Data Types – Operators and Expressions – Decision making and Branching – Decision making and Looping – Methods in C# - Handling Array – Manipulating Strings – Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism – Interfaces - Operator Overloading – Delegates and Events – Managing Errors and Exceptions.

UNIT IV

Application Development on .Net - Building Windows Applications – Creating a simple window form – Creating a window forms application using Tree view control- Accessing Data with ADO.NET – Working with Data Bound Controls.

UNIT V

Web Based Application Development on .Net – Understanding Web forms – Creating a Web form – Adding Controls – Data binding – Database connectivity in Web Forms using ADO.Net - Web Services – SOAP, WSDL and Discovery – Building a Web Service – Creating the proxy.

TEXT BOOKS:

1. *Jeffrey R. Shapiro*, "Visual Basic.Net – The Complete Reference", Tata Mc-Graw Hill, New Delhi, Thirteenth Reprint, 2008.
2. *V.R. Kavitha*, "C# and .Net Framework", Sree Magnus Publications, 2011.
3. *E. Balagurusamy*, "Programming in C#", Tata McGraw-Hill, 2004.
4. *J. Liberty*, "Programming C#", 2nd ed., O'Reilly, 2002.

REFERENCE BOOKS:

1. *Steven Holzner*, "Visual Basic.Net Programming-Black book", Dreamtech Press, USA, Paraglyph Press, New Delhi, Reprint Edition, 2008.
2. *Herbert Schildt*, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
3. *Robinson et al*, "Professional C#", 2nd ed., Wrox Press, 2002.
4. *Andrew Troelsen*, "C# and the .NET Platform", A! Press, 2003.
5. *Thamarai Selvi, R. Murugesan*, "A Textbook on C#", Pearson Education, 2003.

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SEMESTER – II

Core Course - IX : DATA MINING

Course Code : 17PCS09

A. Objectives :

- To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.

B. Learning Outcomes:

- Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.
- Understand the mathematical foundations of the algorithms outlined above.

C. Syllabus

UNIT I

Introduction – Data mining as a subject – Data warehousing: Introduction – Definition – Multidimensional data model – OLAP operations – Warehouse schema – Data Warehousing architecture – Warehouse server – Meta data – OLAP engine – Data Warehouse Backend process – Other features - Data mining: Introduction – Definitions – KDD vs. Data Mining – DBMS vs. DM – DM techniques.

UNIT II

Association Rules: Concepts – Methods to discover Association rules – A priori algorithm – Partition algorithm – Pioneer search algorithm – Dynamic Item set Counting algorithm – FP-tree growth algorithm – Incremental algorithm – Border algorithm – Generalized association rule – Classification

UNIT III

Classification and Prediction: Issues Regarding Classification And Prediction Classification By Decision Tree Induction-Bayesian Classification-Other Classification Methods-Prediction.

UNIT IV

Clustering techniques: Clustering paradigms – Partitioning algorithm – K-Medoid algorithms – CLARA – CLARANS – Hierarchical clustering DBSCAN – BIRCH – CURE – Categorical clustering algorithms – STIRR – ROCK – CACTUS – Other techniques.

UNIT V

Recent Trends: Web mining – Text mining - Temporal mining - Spatial mining – Multimedia mining – Tools: Rapid Miner and Weka - Case studies: Business, Agriculture and Information Retrieval.

TEXT BOOKS:

1. *Arun K. Pujari*, "Data mining Techniques", Universities Press (India) Limited, Hyderabad, Reprint, 2006.
2. *Jiawei Han, Micheline Kamber*, "Data Mining: Concepts and Techniques", Harcourt India / Morgan Kauffman, 2006.

REFERENCE BOOKS:

1. *Margaret H. Dunham, S. Sridhar*, "Data Mining: Introductory and Advanced Topics", Pearson Education, Fifth Edition, New Delhi, 2007.
2. *Pang-Ning Tan, Michael Steinbach and Vipin Kumar*, "Introduction to Data Mining", Pearson Education, 2007.
3. *G. K. Gupta* "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. *M.Awad, Latifur Khan, Bhavani, Lei Wang*,"Design and Implementation of Data Mining Tools", Auerbach Publications, Taylor and Francis Group,LLC, 2009.

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SEMESTER – II

Major Based Elective Course – I : NETWORK SECURITY AND CRYPTOGRAPHY

Course Code : 17PCSM1

A. Objectives:

- To understand the potential threats against data communication over Network.
- To understand the impact of security issues and security techniques to overcome the issues.

B. Learning Outcomes:

- Able to identify some of the factors driving the need for network security
- To have a basic knowledge on the fundamentals of cryptography such as symmetric / asymmetric encryption, digital signatures, and hash functions.

C. Syllabus

UNIT I

Types of Physical Medium – Topologies – Wireless Networking: Wireless Protocols, Data Link Layer : Layered Data Link Protocols – SLIP and PPP – MAC and ARP, Network Layer: Routing Risks – Addressing – Fragmentation.

UNIT II

Internet Protocol : IP Addressing – ICMP – Security options. Transport Layer: Common Protocols – Transport Layer Functions – Gateways. TCP: Connection Oriented Protocols – TCP Connections – UDP. SSL: SSL Functionality – Certificates. SSH : SSH and Security – SSH Protocols. STMP : E-Mail Goals – Common Servers.

UNIT III

Security : Threat Models – Concepts – Common Mitigation Methods. Network Theory : Standards Bodies – Network Stacks – Multiple Stacks – Layers and Protocols – Common Tools. Cryptography : Securing Information – Authentication and Keys – Cryptography and Randomness- Hashes – Ciphers – Encryption – Steganography.

UNIT IV

Data Encryption Techniques – Data Encryption Standards – Symmetric Ciphers. Public Key Cryptosystems – Key Management.

UNIT V

Authentication – Digital Signatures – E-Mail Security – Web Security – Firewall.

TEXT BOOKS:

1. *Neal Krawetz*, "Introduction Network Security", India Edition, Thomson Delmar Learning,2007.
2. *V.K. Pachghare*, "Cryptography and Information Security", PHI Learning Private Limited 2009.

REFERENCE BOOKS:

1. *William Stallings*," Cryptography and Network Security", Prentice – Hall of India, 2008.
2. *Lincoln D.Stein*, "Web Security", Addison Wesley 1999.

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SEMESTER – II

Core Practical – III : .NET PROGRAMMING

Practical Code : 17PCSP3

Practical List

1. C# Program to Display Cost of a Rectangle Plot Using Inheritance.
2. C# Program to Implement Delegates.
3. C# Program to Display the Student Details using Select Clause LINQ
4. Create an application which will the user to input his name and a message, display the two items concatenated in a label, and change the format of the label using radio buttons and check boxes for selection, the user can make the label text bold, underlined or italic and change its color. Include buttons to display the message in the label, clear the text boxes and label and exit.
5. Program using Language Integrated query in C#
   Create the table with the given fields EmpNo (number), EmpName (varchar), EmpSal(number), EmpJob (varchar), EmpDeptNo (number). For the given table design a web page to display the employee information from table to grid control. Use LINQ TO ADO.NET
6. Disable the Context Menu for a Text Box using GUI applications in VB.Net.
7. Using the mouse event to draw on a form in VB.Net.
8. Program to implement Polymorphism in VB.Net.
9. Develop a windows application in C# to display customer information in a Tree View control.
10. Building Web applications using ASP.Net/Web Services.
11. Establishing Data base connectivity using ADO.Net. in VB.Net.

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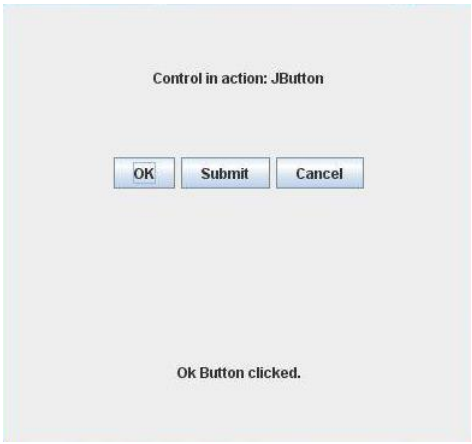
SEMESTER – II

Core Practical – IV : ADVANCED JAVA PROGRAMMING

Course Code : 17PCSP4

Practical List

1. Demonstrate the necessity of Thread Synchronization.
2. Demonstrate Java Swing control with the following output.



3. Implement a dynamic HTML using Servlet (user name and password should be accepted using HTML and displayed using a servlet).
4. Implement and demonstrate get() and post() methods (using Http Servlet class).
5. Mark List Processing in Servlet with Records Taken from MS-Access (Servlet and JDBC connectivity).
6. Use RMI to interact with server method for IO operation.
7. Create an animated beam object residing in B is invoked from system A.

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SEMESTER – III

Core Course – X : DATA SCIENCE

Course Code : 17PCS10

A. Objectives:

- Understand the Big Data Platform and its Use cases
- Apply analytics on Structured, Unstructured Data.
- Exposure to Data Analytics with R.

B. Learning Outcomes:

The students will be able to:

- Identify Big Data and its Business Implications
- Perform Statistical Analysis of Datasets.

A. Syllabus

UNIT I

Digital data: Types of Digital Data - Classification of Digital Data - Big Data: Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - Volume, Velocity, Variety - Other Characteristics of Data - Need for Big Data - Information Consumer or Information Producer - Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - Coexistence of Big Data and Data Warehouse - Changing in the Realms of Big Data

UNIT II

Big Data Analytics : Big Data Analytics - Sudden Hype Around Big Data Analytics - Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Importance of Big Data Analytics - Technologies to Meet the Challenges Posed by Big Data - Data Science - Data Scientist - Terminologies Used in Big Data Environments - Basically Available Soft State Eventual Consistency (BASE) .

UNIT III

Data Analytics Lifecycle: Data Analytics Lifecycle Overview-Phase 1: Discovery-Phase 2: Data Preparation-Phase 3: Model Planning-Phase 4: Model Building-Phase 5: Communicate Results-Phase 6: Operationalize.

UNIT IV

Review of Basic Data Analytic Methods Using R: Introduction to R-Exploratory Data Analysis-Statistical Methods for Evaluation-Hypothesis Testing-Difference of Means-Wilcoxon Rank-Sum Test-Type I and Type II Errors-Power and Sample Size-ANOVA.

UNIT V

Advanced Analytical Theory and Methods: Clustering: Overview of Clustering-K-means - Classification: Decision Trees - Naive Bayes.

TEXT BOOKS:

1. *Seema Acharya, Subhasini Chellappan*, "Big Data and Analytics" Wiley 2015.
2. *EMC Education services*, "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley 2015.

REFERENCE BOOKS:

1. *Michael Berthold, David J. Hand*, "Intelligent Data Analysis", Springer, 2007.
2. *Jay Liebowitz*, "Big Data and Business Analytics" Auerbach Publications, CRC press, 2013
3. *Bill Franks*, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
4. *Pete Warden*, "Big Data Glossary", O'Reily, 2011.

B. Web References

1. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
2. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
3. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

C. Assignments:

1. Applications of Big data.
2. Big data with high-powered analytics can accomplish business-related tasks – How?
3. Perform ADD, MUL and SUB operations using matrices using R.

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SEMESTER – III

Core Course – XI : WEB APPLICATION DEVELOPMENT

Course Code : 17PCS11

A. Objectives:

- To understand the basics of HTML.
- To learn the fundamentals of Php.
- To understand the importance of server side programming and web development.

B. Learning Outcomes:

Upon completion of this course, the students should be able to:

- Create, translate, and process HTML information.
- Describe and use the features and syntax of programming language PHP.
- Retrieve, insert, update, and delete data from the relational database MySQL.

C. Syllabus

UNIT I

HTML and CSS: Structure-Tables- Form- Introducing CSS- Lists, Tables and Forms- HTML5 Layout.

UNIT II

PHP: Introduction to PHP– Language Basics: variables – constants – data types – operators – Statements – Functions –Strings- Arrays.

UNIT III

Objects – Web Techniques – Databases – Graphics – PDF – Security – Debugging PHP - Dates and Times.

UNIT IV

MySQL: MySQL Installation and Configuration – SQL Basics – MySQL Data types - MySQL Operators – MySQL functions – Working with Databases and Tables – Working with Data – Joins – Subqueries – Transactions.

UNIT V

Working with Strings – Working with Dates and Times – Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and PHP – WAMP- 000WEBHOST.

TEXT BOOKS:

1. Jon Duckett, "**HTML and CSS: Design and Build Websites**", John Wiley & Sons, Inc.
2. Rasmus Lerdorf, Kevin Tatroe and Peter MacIntyre, "**Programming PHP**", O'Reilly, 2nd Edition/3rd Indian Reprint, 2009.(Unit II and III)
3. Vikram Vaswani, "**MYSQL: The Complete Reference**", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.(Unit IV)
4. Paul DuBois **, MySQL Cookbook** , O'Reilly, Third Edition.(Unit V).

REFERENCE BOOKS:

1. *Brian P. Hogan*, "**HTML5 and CSS3, Level Up with Today's Web Technologies**, The Pragmatic Programmers, Second Edition, 2013.
2. *Steven Holzner*, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3. *Steve Suchring*, "MySQL Bible", John Wiley, 2002.
4. *Jesús M. González-Barahona et al*, "Introduction to Free Software", Free Technology Academy, Europe, 2009.

D. Web References:

1. https://www.opensourse.org
2. https://www.w3schools.com/php/default.asp
3. www.mysqltutorial.org
4. https://www.w3schools.com/php/php_mysql_intro.asp

E. Assignments:

1. Write a program to illustrate the use of conditional statements in PHP.
2. Write a PHP program to upload a file to the server.
3. Write a PHP program using classes to create a table.
4. Write MySql query to: Find out the names of the cities where the people live whose age is less than 40 years Display the last names and the pin code of the people who age is more than 50 years where the last names and first names match.
5. Create a website using Word press.

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SEMESTER – III

Core Course – XII : PROFESSIONAL ETHICS

Course Code : 17PCS12

A. Objectives

- To appreciate the innate and inseparable relationship between values and skills.
- To facilitate the development of a holistic perspective in their minds towards life profession and personal happiness.
- To give importance of Global Issues.

B. Learning Outcomes

Students who complete the course will have the ability to

- Identify and analyse an ethical issue in the subject matter under investigation or in a relevant field.
- Idetify and analyse ethical challenges expressed in their professional practice.
- Articulate what makes a particular course of action ethically defensible.

C. Syllabus

UNIT- I

Basic Concepts: Introduction - Terminology - Governing Edicts - Contextual Aspects-Personal Ethics-Professional Ethics-Ethical Dilemmas -Life Skills-Emotional Intelligence -Thoughts on Ethics - Value Education - Dimensions of Ethics- Setting Goals in Life.

UNIT –II

Profession and Professionalism: Introduction- Profession - Professional –professionalism-Professional Associations- Role of Professional- Professional Risks-Professional Accountability-Professional Success -Ethics and Profession - Image of Profession-**Ethical Theories:** Introduction-Basic Ethical Principles-Moral Development Theories-Some Basic Theories.

UNIT- III

Engineering as Social Experimentation: Comparison with Standard Experiments-Knowledge Gained- Conscientiousness – Relevant Information -Learning from the Past – Engineers as Managers, Consultants, and Leaders- Accountability - Role of Codes-Codes and Experimental Nature of Engineering-**Responsibilities and Rights:** Collegiality-Two Senses of Loyalty-Professional Rights-Professional Responsibilities-Conflict of Interest-Self Interest, Customs and Religion-Collective Bargaining-Confidentiality- Acceptance of Bribes/Gifts-Occupational Crimes-Whistle Blowing.

UNIT -IV

Global Issues: Globalization–Cross Cultural Issues-Environmental Ethics-Computer Ethics-Weapons Development-Ethics and Research-Analyzing Ethical Problems in Research Intellectual Property Rights(IPRs)-**Ethical Audit:** Aspects of Project Realization-Ethical Audit Procedure-The Decision Makers-Variety of Interests-Formulation of the Brief-The Audit Statement-The Audit Reviews.

UNIT -V

Human Values and Attitudes: Introduction-Terminology-Domains of Learning-Human Values-Value System-Degeneration of Values-Acquiring Values-Attitudes-Values, Attitudes, and Professionals-**Ethical Living:** Introduction-Needs of Life.

TEXT BOOKS

1. *Subramaniyan.R.* "Professional Ethics" Oxford University Press,2013**.(Unit I,II and V)**
2. *Govindarajan.M,Natarajan.S and Senthilkumar V.S.* " Engineering Ethics" PHI Learning Private Limited, 2017**.(Unit III and IV).**

REFERENCE BOOKS

1. *Merunandan, K.B. and Venkatesh, B.R.* "Introduction to the Constitution of India &
2. *Professional Ethics for All Engineering Courses*" Meragu Publication, 2011.
3. *Diana Dwyayer.*" *Interpersonal Relationship*" Routledge Taylor and Franeis, 2011 .
4. *Apar Gupta.* "*Commentary on Information Technology Act*" Kindle Publications, 2011.

D. Web References

1. https://www.worldcat.org
2. https://www.ulektz.org
3. www.faadooengineers.com
4. www.nspe.org

E. Assignments

1. Professional Ethics vs Conventional Ethics
2. IT act vs Cyber Crime
3. Human Values leads Nation Building

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SEMESTER – III

Core Course – XIII : MOBILE COMMUNICATIONS

Course Code : 17PCS13

A. Objective:

- To make students familiar with fundamentals of mobile communication systems.
- To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
- To identify the requirements of mobile communication as compared to static. Communication.

B. Learning Outcomes:

- To make students familiar with various generations of mobile communications.
- To understand the concept of cellular communication.
- To understand the basics of wireless communication.
- Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
- To differentiate various Wireless LANs.

C. Syllabus

UNIT I

Introduction: Applications - A short history of wireless communication - A market for mobile communication - some open research topics - A simplified reference model - **Wireless transmission:** Cellular systems.

UNIT II

Medium access control: Motivation for specialized MAC - SDMA – FDMA – TDMA – CDMA - Comparison of S/T/F/CDMA. **Telecommunication systems:** GSM - DECT.

UNIT III

Satellite Systems: History – Applications – Basics – Routing – Localization - Handover. **Wirless LAN:** Infra-red vs radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 - Bluetooth.

UNIT IV

Mobile Network Layer: Mobile IP - Dynamic host configuration protocol - Mobile ad-hoc networks.

UNIT V

Mobile Transport Layer: Traditional TCP - Classical TCP improvements - TCP over 2.5/3G wireless network.

TEXT BOOK:

Jochen Schiller, "Mobile Communication", Pearson Education, 2nd Edition.

REFERENCE BOOKS:

1. *Raj Kamal*, "Mobile Computing", Second Edition , Oxford University Press
2. *Asoke K Talukder, Roopa R Yavagal* "Mobile Computing-Technology, Applications and Service Creation.
3. *Kavch Pahlavan, Prasanth Krishnamoorthy*, "Principles of Wireless Networks", First Edition, Pearson Education,2003.
4. *Uwe Hansmann, Lothar Merk, Martin S.Nicklons and Thomas Stober*, " Principles of Mobile Computing ", Springer, 2003.
5. *C.K.Toh*, "AdHoc Mobile Wireless Networks", First Edition,Pearson Education, 2002.

D. Web References

1. http://nptel.ac.in/courses/117102062/.
2. http://nptel.ac.in/courses/117102062/36.
3. http://www.nptelvideos.in/2012/12/wireless-communication.html.
4. http://www.pearsoned.co.in/prc/book/jochen-schiller-mobile-communications-2e-2/9788131724262.
5. https://www.tutorialspoint.com/umts/umts_history_of_mobile_communication.htm.

E. Assignments:

1. Applications of mobile communications.
2. Comparison of S/T/F/CDMA.
3. Advantages and disadvantages of WLAN.
4. Mobile ad-hoc networks.
5. TCP over 2.5/3G wireless networks.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – III

Major Based Elective Course - II : INTERNET OF THINGS

Course Code : 17PCSM2

A. Objectives:

- To introduce the vision of IoT from a global context.
- To determine the market perspectives of IoT.
- To understand the IoT protocols and web of things.
- To understand the IoT- Architecture and various applications of IoT

B. Learning Outcomes

Students who complete the course will have the ability to

- Explain in a concise manner how the general Internet as well as Internet of Things work.
- Demonstrate Knowledge and understanding the importance of Python to develop applications associated with IoT.
- Use of Devices, Gateways and Data Management of IT.

C. Syllabus

UNIT – I

Introduction: Definition and Characteristics of IoT – **Physical Design of IoT:** Things in IoT – IoT Protocols – **Logical Design of IoT**: Iot Functional Blocks – IoT Communication Models – IoT communication APIs – **IoT Enabling Technologies:** Wireless Sensor Networks – Cloud Computing – Big Data Analytics – Communication Protocols – Embedded Systems – **IoT Levels & Deployment Templates:** IoT Levels (1 to 6).

UNIT – II

Domain Specific IoTs: Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle. **IoT and M2M:** Introduction – M2M – Difference between IoT and M2M – Software Defined Networking for IoT – Network Function Virtualization for IoT.

UNIT – III

IoT System Management With NETCONF-YANG: Need for Systems Management – Simple Network Management Protocol – Network Operator Requirements – NETCONF – YANG – IoT Systems Management with NETCONF-YANG **- Developing Internet of Things: IoT Platforms Design Methodology:** Introduction – IoT Design Methodology - Case Study on IoT System for Weather Monitoring – Motivation for Using Python.

UNIT – IV

IoT Systems – Logical Design using Python: Introduction – Installing Python – Python Data Types & Data Structures – Control Flow - **IoT Physical Devices & Endpoints:** What is an IoT Device? – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.

UNIT – V

Case Studies Illustrating IoT Design : Introduction – **Home Automation:** Smart Lighting - **Environment:** Air Pollution Monitoring – **Agriculture:** Smart Irrigation.

TEXT BOOK:

1. *Vijay Madisetti and ArshdeepBahga*, "Internet of Things (A Hands-on- Approach)", Reprinted, University Press,2017.

REFERENCE BOOKS:

1. *Olivier Hersent*, *Omar Elloumi and David Boswarthick*, "The Internet of Things: Applications to the Smart Grid and Building Automation‖", Wiley, 2012.

2. *Olivier Hersent, David Boswarthick and Omar Elloumi*, —"The Internet of Things – Key applications and Protocols", Wiley, 2012.

D. Web References:

1. https://www.iitk.ac.in .
2. https://iot-analytics.com .
3. https://www.mendix.com.

E. Assignments:

1. Study on Python Web Application Framework.
2. Study on Amazon Web Services for IoT.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM -7

MASTER OF SCIENCE (M.Sc) IN COMPUTER SCIENCE

SEMESTER – III

Core Practical – V : R PROGRAMMING

Course Code : 17PCSP5

Practical List

1. Import data from docx, xls, txt and other formats
2. Write a R program to
    a. create a 5 × 4 matrix , 3 × 3 matrix with labels and fill the matrix by rows and 2 × 2 matrix with labels and fill the matrix by columns.
    b. create two 2x3 matrix and add, subtract, multiply and divide the matrixes.
    c. access the element at 3rd column and 2nd row, only the 3rd row and only the 4th column of a given matrix
    d. concatenate two given matrices of same column but different rows
    e. find row and column index of maximum and minimum value in a given matrix.
3. Write a R program to create a data frame from four given vectors
    a. get the structure of a given data frame
    b. get the statistical summary and nature of the data of a given data frame.
    c. extract specific row / column from a data frame using column name
    d. add a new row / column in a given data frame
    e. Set operations with data frames
4. Create different types of graphs using ggplot for a Dataset
5. Perform min-max normalization for a dataset and show the result using ggplot
6. Calculate Mean, Median and Standard deviation for a data set and perform t-test
7. Handling missing values in a dataset : Count NA, Replace NA
8. Perform statistical correlation test for comparing two variables
9. Perform various Data Transformation operations using
    a. filter()
    b. arrange()
    c. select()
    d. mutate()
    e. summarize()
10. Explore the distribution of each of the x, y, and z variables in diamonds. What do you learn? Explore the distribution of price. Do you discover anything unusual or surprising?