GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
(Deemed to be University, Estd. u/s 3 of UGC Act 1956)
VISAKHAPATNAM ★ HYDERABAD ★ BENGALURU

Accredited by NAAC with ‘A’ Grade

REGULATIONS AND SYLLABUS of

Master of Technology in
Information Technology
(w.e.f 2015-16 admitted batch)

A University Committed to Excellence
VISION
To become a global leader in higher education.

MISSION
To impart futuristic and comprehensive education of global standards with a high sense of discipline and social relevance in a serene and invigorating environment.
GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
(Declared as Deemed to be University U/S 3 of UGC Act, 1956)
VISAKHAPATNAM * HYDERABAD * BENGALURU
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REGULATIONS AND SYLLABUS OF
Master of Technology in
Information Technology
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A University Committed to Excellence
M.Tech. in Information Technology
REGULATIONS
(w.e.f. 2015-16 admitted batch)

1. ADMISSION

1.1 Admission into M.Tech. in Information Technology program of GITAM University is governed by GITAM University admission regulations.

2. ELIGIBILITY CRITERIA

2.1 A pass in B.E./B.Tech./AMIE in any branch of Engineering or its equivalent.

2.2 Admissions into M.Tech. will be based on the following:
   (i) Score obtained in GAT (PG), if conducted.
   (ii) Performance in Qualifying Examination / Interview.

2.3 The actual weightage to be given to the above items will be decided by the authorities before the commencement of the academic year. Candidates with valid GATE score shall be exempted from appearing for GAT (PG).

3. CHOICE BASED CREDIT SYSTEM

3.1 Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:
   • Student Centered Learning
   • Cafeteria approach
   • Students to learn courses of their choice
   • Learning at their own pace
   • Inter-disciplinary learning

3.2 Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

4. STRUCTURE OF THE PROGRAM

4.1 The Program Consists of
   i) Core Courses (compulsory) which give general exposure to a Student in Information Technology and subject related area.
   ii) Programme Electives.
   iii) Open electives.
4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.
- One credit for each Lecture / Tutorial hour per week.
- One credit for two hours of Practicals per week.
- Two credits for three (or more) hours of Practicals per week.

5. MEDIUM OF INSTRUCTION
The medium of instruction (including examinations and project reports) shall be English.

6. REGISTRATION
Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

7. ATTENDANCE REQUIREMENTS
7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end-semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his / her juniors.

7.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8. EVALUATION
8.1 The assessment of the student’s performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical/Project Work/Industrial Training/Viva voce/Seminar etc. course are completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.
### Table 1: Assessment Procedure

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component of Assessment</th>
<th>Marks Allotted</th>
<th>Type of Assessment</th>
<th>Scheme of Evaluation</th>
</tr>
</thead>
</table>
| 1     | Theory                  | 40             | Continuous         | i) Thirty (30) marks for mid Semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration.  
     |                         |                | Evaluation         | ii) Ten (10) marks for Quizzes, Assignments and Presentations. Sixty (60) marks for Semester-end examinations |
|       |                         |                |                    | i) Thirty (30) marks for mid Semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration.  
     |                         |                |                    | ii) Ten (10) marks for Quizzes, Assignments and Presentations. Sixty (60) marks for Semester-end examinations |
|       |                         | 60             | Semester-end       | 60                    |
|       |                         |                | Examination        |                      |
| Total |                         | 100            |                    |                      |
| 2     | Practicals              | 100            | Continuous         | i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the Semester.  
     |                         |                | Evaluation         | ii) Ten (10) marks for case studies.  
     |                         |                |                    | iii) Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the Semester) conducted by the concerned lab Teacher. |
|       |                         |                |                    |                      |
| 3     | Project work (III Semester) | 100        | Continuous         | i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
     |                         |                | Evaluation         | ii) Thirty (30) marks for mid-term evaluation for defending the Project, before a panel of examiners.  
     |                         |                |                    | iii) Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners |
|       |                         |                |                    |                      |
| 4     | Project work (IV Semester) | 50           | Continuous         | i) Twenty (20) marks for Periodic evaluation on originality innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
     |                         |                | Evaluation         | ii) Fifteen (15) marks for mid-term evaluation for defending the Project, before a panel of examiners*.  
     |                         |                |                    | iii) Fifteen (15) marks for interim Report presentation and Viva-voce. |
4 Semester-end Fifty (50) marks for final Report presentation and Viva-voce assessed by external examiners.

<table>
<thead>
<tr>
<th>Total</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Comprehensive Viva-voce (II Semester)</td>
<td>100 Continuous Evaluation</td>
</tr>
<tr>
<td>Through five periodic Viva-voce exams for 20 marks each, conducted by a panel of examiners. The course content for Viva exams shall be announced at the beginning of the Semester.</td>
<td></td>
</tr>
</tbody>
</table>

*Panel of Examiners shall be appointed by the concerned Head of the Department

9. REAPPEARANCE
9.1 A student who has secured ‘F’ grade in a Theory course shall have to reappear at the subsequent Semester end examination held for that course.
9.2 A student who has secured ‘F’ grade in a Practical course shall have to attend Special Instruction Classes held during summer.
9.3 A student who has secured ‘F’ Grade in Project work / Industrial Training etc shall have to improve his/her report and reappear for Viva – voce at the time of Special Examination to be conducted in the summer vacation.

10. SPECIAL EXAMINATION
10.1 A student who has completed his/her period of study and still has “F” grade in a maximum of three theory courses is eligible to appear for Special Examination normally held during summer vacation.

11. BETTERMENT OF GRADES
A student who has secured only a Pass or Second class and desires to improve his/her Class can appear for Betterment Examinations only in Theory courses of any Semester of his/her choice, conducted in Summer Vacation along with the Special Examinations. Betterment of Grades is permitted ‘only once’ immediately after completion of the program of study.

12. GRADING SYSTEM
12.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.
Table 2: Grades & Grade Points

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Grade</th>
<th>Grade Points</th>
<th>Absolute Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O (outstanding)</td>
<td>10</td>
<td>90 and above</td>
</tr>
<tr>
<td>2</td>
<td>A+ (Excellent)</td>
<td>9</td>
<td>80 to 89</td>
</tr>
<tr>
<td>3</td>
<td>A (Very Good)</td>
<td>8</td>
<td>70 to 79</td>
</tr>
<tr>
<td>4</td>
<td>B+ (Good)</td>
<td>7</td>
<td>60 to 69</td>
</tr>
<tr>
<td>5</td>
<td>B (Above Average)</td>
<td>6</td>
<td>50 to 59</td>
</tr>
<tr>
<td>6</td>
<td>C (Average)</td>
<td>5</td>
<td>45 to 49</td>
</tr>
<tr>
<td>7</td>
<td>P (Pass)</td>
<td>4</td>
<td>40 to 44</td>
</tr>
<tr>
<td>8</td>
<td>F (Fail)</td>
<td>0</td>
<td>Less than 40</td>
</tr>
<tr>
<td>9</td>
<td>Ab. (Absent)</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

12.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course, subject to securing a GPA of 5 for a Pass in the semester.

13. GRADE POINT AVERAGE

13.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

\[
\text{GPA} = \frac{\sum [C \times G]}{\sum C}
\]

Where

- \(C\) = number of credits for the course,
- \(G\) = grade points obtained by the student in the course.

13.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student’s performance in all the courses taken, in all the semesters up to the particular point of time.

13.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

<table>
<thead>
<tr>
<th>Class</th>
<th>CGPA Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>(\geq 8.0^*)</td>
</tr>
<tr>
<td>First Class</td>
<td>(\geq 6.5)</td>
</tr>
<tr>
<td>Second Class</td>
<td>(\geq 5.5)</td>
</tr>
<tr>
<td>Pass Class</td>
<td>(\geq 5.0)</td>
</tr>
</tbody>
</table>

* In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.
14. ELIGIBILITY FOR AWARD OF THE M.Tech. DEGREE

14.1 Duration of the program: A student is ordinarily expected to complete the M.Tech. program in four semesters of two years. However a student may complete the program in not more than four years including study period.

14.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the M.Tech. Degree if he / she fulfills all the following conditions.

   a) Registered and successfully completed all the courses and projects.
   b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
   c) Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and
   d) No disciplinary action is pending against him / her.

15. DISCRETIONARY POWER

Not withstanding anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.
### M.Tech. in Information Technology
#### Department of Information Technology

Effective from academic year 2015-2016 admitted batch

#### Semester I

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EIT701</td>
<td>Advanced Data Structures &amp; Algorithms</td>
<td>CE</td>
<td>4</td>
<td>0</td>
<td>0</td>
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<td>2</td>
<td>EES741</td>
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<td>CE</td>
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<td>Advanced Data warehouse and Data mining</td>
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<tr>
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#### Semester II

<table>
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<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
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<td>CE</td>
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<td>EIT792</td>
<td>Technical Seminar II</td>
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<td>2</td>
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<td>9</td>
<td>EIT794</td>
<td>Comprehensive Viva-voce</td>
<td>CE</td>
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27

29
### Semester III

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<tr>
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<td>Project Work</td>
<td>CE</td>
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### Semester IV

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<th>P</th>
<th>C</th>
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<td>EIT892</td>
<td>Project work-II</td>
<td>CE</td>
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### Number of Credits

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<th>Semester</th>
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<th>II</th>
<th>III</th>
<th>IV</th>
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### Open Elective-I

<table>
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<th>Course Title</th>
<th>Category</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
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<tbody>
<tr>
<td>1</td>
<td>EME781</td>
<td>Optimization Techniques</td>
<td>OE</td>
<td>3</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
<td>EEI781</td>
<td>Micro Processors &amp; Interfacing</td>
<td>OE</td>
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<td>EEI783</td>
<td>VLSI Design</td>
<td>OE</td>
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<tbody>
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<td>1</td>
<td>EEC7534</td>
<td>Embedded System Design</td>
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<td>2</td>
<td>EEC789</td>
<td>Fundamentals of Digital Signal Processing</td>
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<td>Remote Sensing and Geographical Information systems</td>
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## PROGRAMME ELECTIVES

### Programme Elective - I

<table>
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<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
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<th>C</th>
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<tbody>
<tr>
<td>1</td>
<td>EIT741</td>
<td>Cryptography &amp; Network Security</td>
<td>PE</td>
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<td>Soft Computing</td>
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### Programme Elective-II

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<td>EIT 752</td>
<td>Bioinformatics</td>
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<td>EIT 754</td>
<td>Digital Image Processing</td>
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<tr>
<td>3</td>
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<td>Internet Technologies and Cyber Laws</td>
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### Programme Elective-III

<table>
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<tr>
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</table>
Module I
Algorithms, performance analysis-time complexity and space complexity, O-notation, Omega notation and Theta notation, review of basic data structures - the list ADT, stack ADT, queue ADT, implementation using template classes in C++, sparse matrix representation.

Module II
Dictionaries, linear list representation, skip list representation, operations-insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

Module III
Search trees - Binary search trees, definition, ADT, implementation, operations-searching, insertion and deletion.
Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching.
Introduction to Red –Black trees and Splay Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, comparison of search Trees.

Module IV
Divide and Conquer - General method, applications – Binary search, merge sort, quick sort, Strassen’s matrix multiplication Efficient non recursive tree traversal algorithms, bi-connected components, disjoint set operations, union and find algorithms.

Module V
Greedy method and Dynamic programming - General method (Greedy), minimum cost spanning trees, job sequencing with deadlines, general method (Dynamic Programming), Optimal binary search trees, 0/1 knapsack problem, ordering matrix multiplications.

Text Book(s)
References

EES741: ADVANCED COMPUTER NETWORKS

Module I  

Module II  
Local Area Network Technologies: MAC techniques, Ethernet, Fast Ethernet, Gigabit Ethernet, Switched Ethernet, IEEE 802.11, WLAN, Bluetooth, Connecting LANs, VLANs, LAN standards: IEEE 802.3, 802.4, 802.5

Module III  
Internetworking: Interdomain routing, BGP, IPv6, multicast routing protocols, multi protocol label switching, virtual private networks, high speed transport protocols, quality of service mechanisms, improving QOS in internet, DIFFSERV and INTSERV architectures, RSVP.

Module IV  
Distributed Systems: Naming, DNS, DDNS, paradigms for communication in internet, caching, issues of scaling in internet and distributed systems, caching techniques for web, protocols to support streaming media, multimedia transport protocols, content delivery networks, overlay and P2P networks.

Module V  
Applications and Other Networking Technologies: RTP, RTSP, SIP, VOIP, security systems, SSH, PGP, TLS, IPSEC, DDOS attack, mitigation in internet, security in MPLS, introduction to cellular, satellite and ad hoc networks.

Text Book(s)

References
Module I  
**Introduction to Parallel Processing:** Trends towards Parallel Processing, Parallelism in Uniprocessors systems, Parallel computer structures, architectural classification schemes, Parallel Processing applications. Memory and Input-Output Subsystem: hierarchical memory architecture, virtual memory system, memory allocation and management, cache memories and managements, input-output sub-systems.

Module II  
**Principles of Pipelining and Vector Processing:** Pipelining operations: Principles of linear pipelining, classification of pipeline processors, general pipelines and reservation tables, interleaved memory organization, instruction and arithmetic pipe lines, principles of designing pipelined processors, vector processing requirements.

Module III  
**Vector Processor:** The architecture of CRAY-1, pipeline chaining and vector loops, The architecture of CYBER-205, vector processing in CYBER-205. Structures and Algorithms for Array Processors: SIMD array processors, SIMD interconnection networks parallel algorithms for array processors, Associative array processing. **Case Study:** BSP system architecture.

Module IV  
**Multiprocessors Architecture and Programming:** Functional structures, interconnection networks, parallel memory organization, multiprocessors operating system, exploiting concurrency for multiprocessing.

Module V  
**Multiprocessing Controls and Algorithms:** Inter process communication mechanism, system dead locks and protections, scheduling strategies. **Case Study:** CRAY: XMP

Text Book(s)

References
EIT707: ADVANCED DATABASE AND DATA MINING

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Module I

Module II
Enhanced Data Bases for Advanced Applications: Active Database Concepts and Triggers. Spatial Databases, Deductive databases. Data Warehousing: Introduction, definitions and terminology, characteristics of data warehouse, building a data warehouse, typical functionality of data warehouse, data warehouse versus views, problems and open issues in data warehouse.

Module III

Module IV
Clustering: Introduction, similarity and distance measures, outliers, hierarchal algorithms, partitional algorithms, clustering large data bases, clustering with categorical attributes. Association Rules: Introduction to large item sets, basic algorithms, parallel and distributed algorithms, comparing approaches, incremental rules, advanced association rule techniques, measuring the quality of rules.

Module V

Text Book(s)
References
2. Sam Anahory, Dennis Murry, Data Warehousing in the real world, Pearson Education 2003.
EIT741: CRYPTOGRAPHY AND NETWORK SECURITY

Module I
Introduction: Security goals, Attacks, Services and mechanism, techniques, Symmetric key encipherment -Integer arithmetic, modular arithmetic, Traditional symmetric key ciphers-substitution cipher, transposition cipher, stream and block cipher, Modern symmetric key cipher- modern block cipher and stream cipher.

Module II
DES structure , DES analysis, multiple DES, security of DES, AES, transformation, key expansion, cipher, analysis of AES, Encipherment using modern symmetric key ciphers-use of modern block cipher and stream cipher.RC4, key management, key generation.

Module III
Asymmetric Key Cryptography: Introduction, RSA cryptosystem, RABIN cryptosystem, ELGAMAL cryptosystem, Message integrity, message authentication. Cryptographic hash functions- introduction, SHA512.

Module IV
Digital Signature: Comparison, process, services, Digital process scheme- RSA digital signature scheme, Elgamal digital signature scheme, Digital Signature Standards (DSS), Key management- symmetric key distribution, Kerberos symmetric key agreement, public key distribution.

Module V

Text Book(s)
Module I  8 Hours
Introduction: Basic concepts, applications, fundamental problems in pattern recognition system design, design concepts and methodologies, examples of automatic pattern recognition systems, simple pattern recognition model.

Module II  10 Hours
Decisions and Probability: Linear and generalized decision functions, pattern space and weight space, geometrical properties, implementations of decision functions, minimum, distance pattern classifications, random variables, joint distributions and densities, movements of random variables, estimation of parameter from samples.

Module III  10 Hours
Statistical Decision Making: Introduction, Baye’s theorem, multiple features, conditionally independent features, decision boundaries, unequal cost of error, estimation of error rates, the leaving one out techniques, characteristic curves, estimating the composition of populations, Baye’s classifier for normal patterns.

Module IV  10 Hours
Clustering and Partitioning: Hierarchical Clustering- Introduction, agglomerative clustering algorithm, the single, linkage, complete linkage and average linkage algorithm. Ward’s method Partition clustering, Forg’s algorithm, K-means algorithm, Isodata algorithm.

Module V  10 Hours
Pattern Preprocessing and Feature Selection: Introduction, distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

Text Book(s)

References
Module I
Introduction: Neural Networks, applications, scope of Neural Networks, Fuzzy Logic, Genetic algorithm, hybrid systems, soft computing. Artificial Neural Network: Fundamental Concepts, evolution of Neural Networks, basic models of Artificial Neural Networks, important terminologies of ANNs, McCulloh, Pitt Neuron, Linear Separability, Hebb Network.

Module II

Module III

Module IV

Module V

Text Book(s)
References
1. Write C++ programs to implement the following using an array.
   a) Stack ADT b) Queue ADT.
2. Write C++ programs to implement the following using a singly linked list.
   a) Stack ADT b) Queue ADT
3. Write C++ program to implement the deque (double ended queue) ADT using
   a doubly linked list.
4. Write a C++ program to perform the following operations:
   a) Insert an element into a binary search tree.
   b) Delete an element from a binary search tree.
   c) Search for a key element in a binary search tree.
5. Write a C++ program to implement circular queue ADT using an array.
6. Write C++ programs that use non-recursive functions to traverse the given
   binary tree in a) Preorder b) inorder and c) postorder.
7. Write a C++ programs for the implementation of bfs and dfs for a given
   graph.
8. Write C++ programs for implementing the following sorting methods:
   a) Quick sort b) Merge sort c) Heap sort
9. Write a C++ program to perform the following operations
   a) Insertion into a B-tree b) Deletion from a B-tree
10. Write a C++ program to perform the following operations
    a) Insertion into an AVL-tree b) Deletion from an AVL-tree
11. Write a C++ program to implement Kruskal's algorithm to generate a
    minimum spanning tree.
12. Write a C++ program to implement Prim's algorithm to generate a minimum
    spanning tree.
13. Write a C++ program to implement all the functions of a dictionary (ADT)
    using hashing.
Module I

Introduction: Introduction to distributed system, goals of distributed system, hardware and software concepts, design issues. Communication in distributed system: layered protocols, ATM networks, client – server model, remote procedure calls and group communication. Middleware and distributed operating systems.

Module II

Synchronization in Distributed System: Clock synchronization, mutual exclusion, election algorithm, the bully algorithm, a ring algorithm, atomic transactions, deadlock in distributed systems, distributed deadlock prevention, distributed deadlock detection.

Module III

Processes and Processors in Distributed Systems: Threads, system models, processors allocation, scheduling in distributed system, real time distributed systems.

Module IV

Distributed File Systems: Distributed file system design, distributed file system implementation, trends in distributed file systems. Distributed shared memory - what is shared memory, consistency models, page based distributed shared memory, shared variables distributed shared memory.

Module V

Fault Tolerance: Concepts, failure models, failure masking by redundancy. Case Study: MACH, process management, memory management, communication, UNIX emulation

Text Book(s)

References
**EIT704: MOBILE TECHNOLOGIES**

**Module I**

**Introduction to Mobile Communications and Computing:** Introduction to MC, novel applications, a simplified reference model, cellular systems. Introduction to adhoc and infrastructure networks and their comparison. Medium Access Control - Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA, comparison of S/T/F/CDMA.

**Module II**

**GSM:** Mobile services, System architecture, radio interface, protocols, localization and calling, handover, security, and new data services. Mobile Adhoc Networks (MANETs) - Overview, properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**Module III**

**Mobile Network Layer:** Mobile IP (goals, assumptions, requirements entities and terminology, IP packet delivery, agent discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**Module IV**

**Mobile Transport Layer:** Traditional TCP (congestion control, slow start, Fast retransmit/fast recovery implications on mobility, classical TCP improvements (indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission /time out freezing, selective retransmission, transaction oriented TCP), TCP over 2.5/3G wireless networks

**Module V**

**Wireless Application Protocols:** Architecture, wireless data gram protocol, wireless transport layer protocol, wireless transaction layer protocol, wireless session layer protocol, wireless application environment. IEEE802.11- System architecture, protocol architecture.

**Text Book(s)**


**References**


EIT706: MIDDLEWARE TECHNOLOGIES

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Module I
Introduction to Client Server Computing: Evolution of corporate computing models from centralized to distributed computing, client server models, benefits of client server computing, pitfalls of client server programming. CORBA with Java- Review of java concept like RMI, RMI API, JDBC, Client/Server CORBA style, the object web-CORBA with Java.

Module II

Module III
Core CORBA/Java: Two types of Client/Server invocations, static, dynamic, the static CORBA, first CORBA program, CORBlets with Applets, Dynamic CORBA, the portable count, the dynamic count multicounty. Existential CORBA-CORBA initialization protocol, CORBA activation services, CORBAIDL mapping CORBA java to IDL mapping, the introspective CORBA/Java object.

Module IV
Java Bean Component Model: Events, properties, persistency, introspection of beans, CORBA Beans.

Module V
EJBS and CORBA: Object transaction monitors CORBA OTM’s, EJB and CORBA OTM’s, EJB container framework, session and entity Beans, The EJB client/server development process, the EJB container protocol, support for transaction EJB packing EJB design guidelines.

Text Book(s)
Module I 10 Hours
Introduction: Basic biology, genetic material, genes, what molecules code for genes, structure of DNA, what carries information between DNA and proteins, proteins, analysis of DNA, why bioinformatics.

Module II 10 Hours
Exhaustive Search: Restriction mapping, impractical restriction mapping algorithm, practical Restriction mapping algorithm, Regulatory motifs in DNA sequences, profiles, the motif finding problem, search trees, finding motifs, finding a median string.

Module III 8 Hours
Greedy Algorithms: Genome rearrangement, sorting by reversals, approximation algorithm, breakpoints, greedy approach for motif finding.

Module IV 10 Hours
Dynamic Programming Algorithm: Edit distance and assignments, longest common subsequence, global sequence alignment, scoring alignment, local sequence alignment, alignment with gap penalties, multiple alignment, gene prediction, statistical approach to gene prediction, Similarity based approach to gene prediction.

Module V 10 Hours
Clustering and Trees: Gene expression analysis, hierarchical clustering, K-mean clustering, clustering and corrupted cliques, evolutionary tree, distance based tree construction, reconstructing tree for additive matrices, evolutionary tree and hierarchical clustering, character based tree clustering.

Text Book(s)


References

EIT754: DIGITAL IMAGE PROCESSING

Module I

Module II
Image Enhancement in the Spatial Domain: Basic gray, level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

Module III
Image Restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function. Color Image Processing- Color fundamentals, color models.

Module IV
Image Compression: Fundamentals, image compression models, Lossless Compression- Huffman coding, Run length coding contour coding, a brief discussion on Lossy Compression Image compression standards. Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms.

Module V
Image Segmentation: Detection of discontinuous, edge linking and boundary detection, threshold, region–based segmentation.

Text Book(s)

References
3. Adrian Low, Computer Vision and Image Processing, 2/e, B.S. Publications, 2008.
EIT756: INTERNET TECHNOLOGY AND CYBER LAWS

L T P C
3 1 0 4

Module I
Crimes of this millennium, checks and balances against arbitrary arrests, concept of cyber crime and the it act, hacking, teenage web vandals, cyber fraud and cyber cheating, virus on the internet, other IT act offences, network service providers, criminal justice in India and implications.

Module II
Contracts in the InfoTech world, click wrap and shrink wrap contracts, contract formation under the Indian context, contract formation on the internet, terms and conditions of the contract, jurisdiction and information technology act, foreign judgments in India, IPR disputes – misuse of the law of jurisdiction, jurisdictional disputes with respect to the internet in USA.

Module III
Concept of domain name and reply to cyber squatters, meta-tagging, copyright ownership and assignment, license of copyright, copyright term and respect for foreign works, copyright infringement remedies and offences, copyright protection of content on the internet, computer software piracy.

Module IV
Concept of permanent Establishment, PE in cross border E-Commerce, the moduled nations model tax treaty, law of double taxation avoidance agreements, tax Agents of non residents under the income tax act and the relevance to E-Commerce, impact of the internet on customs duties, taxation policies in India.

Module V
Digital signatures, digital signature certificate, certifying authorities and liability in the event of digital signature compromise, status of electronic records as evidence, proving digital signatures, proof of electronic agreements, proving electronic messages, goods and services, consumer complaint, defect in goods and deficiency in services, restrictive and unfair trade, practices, reliefs under CPA, consumer forums, jurisdictions and implications on cyber consumers in India.

Text Book(s)

References
EIT762: BIGDATA ANALYTICS

Module I 10 Hours
INTRODUCTION TO BIG DATA: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop - open source technologies, cloud and big data.

Module II 10 Hours
HDFS: Hadoop distributed file system, HDFS design and architecture, HDFS concepts, interacting HDFS using command line, interacting HDFS using Java APIs, dataflow, blocks, replica, Hadoop processes, name node, secondary name node, job tracker, task tracker, data node.

Module III 10 Hours
MAPREDUCE APPLICATIONS: MapReduce workflows, MODULE tests with MRMODULE, test data and local tests, anatomy of MapReduce job run, classic MapReduce, YARN, failures in classic MapReduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output.

Module IV 10 Hours
MAP REDUCE PROGRAM: Introduction to writing a MapReduce program, the MapReduce flow, examining a sample MapReduce program, basic MapReduce API concepts, the Driver Code, the Mapper, the Reducer, Hadoop’s Streaming API, using Eclipse for Rapid Development, Hands on exercise, the New MapReduce API, Word Co-Occurrence, Hands on Exercise.

Module V 10 Hours
HADOOP TOOLS: HIVE -Introduction and interacting HDFS using HIVE, MapReduce programs through HIVE, HIVE commands, sample programs in HIVE, PIG basics, commands, NOSQL Databases Concepts, Pig – Grunt – pig data model, Pig Latin, developing and testing Pig Latin scripts, Hive – data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries, SQOOP, FLUME

Text Book(s)
References
2. David Loshin, BigDataAnalytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL and Graph, Morgan Kaufmann Publishers, 2013
Module I  
**Centralized and Distributed Computing:** Overview of Distributed Computing, cluster computing, grid computing, utility computing technologies for network based systems, system models for distributed and cloud computing, software environments for distributed systems and clouds.

Module II  
**Introduction to Cloud Computing:** History of Cloud Computing, Cloud issues and challenges, properties, characteristics, service models, deployment models. Cloud resources- Network and API , virtual and physical computational resources, data storage. Virtualization concepts- Types of Virtualization, introduction to various Hypervisors, High Availability (HA)/Disaster Recovery (DR) using virtualization, moving VMs.

Module III  
**Service models:** Infrastructure as a Service (IaaS)-Resource Virtualization- Server, storage and network, Case studies. Platform as a Service (PaaS) - Cloud platform & Management Computation, Storage, Case studies. Software as a Service (SaaS) - Web services, Web 2.0 ,Web OS, case studies, Anything as a service (XaaS).

Module IV  

Module V  
**Cloud Programming and Software Environments:** Parallel and Distributed Programming paradigms, programming on Amazon AWS and Microsoft Azure, programming support of Google App Engine, Emerging Cloud software environment.

**Text Book(s)**

**References**
Module I 10 Hours
Introduction to Social Networks: Fundamental concepts in Network analysis, features.

Social Network Data: Network data, boundary specification and sampling, types of networks, network data, measurement and collection.

Module II 8 Hours
Mathematical Representations of Social Networks: Notations for Social Network data, sociometric notation, algebraic notation, two sets of actors, graphs and matrices.

Module III 10 Hours
Network Centrality and Prestige: Prominence, non directional relations, directional relations, structural balance and transitivity, structural balance, clusterability.

Module IV 10 Hours
Cohesive Subgroups: Sub Groups based on complete mutuality, reachability and diameter, Subgroups based on nodal degree, measures of Subgroup cohesion, directional relations, valued relations, interpretation of cohesive Subgroups.

Module V 10 Hours

Text Book(s)

References
PART A: RMI PROGRAMMING
1. Communication: Create a server that accepts the requests from client and client displays the server system information.
2. File transfer: Create a server that asks for a password, then opens a file and sends the file over the network connection. Create a client that connects to this server, gives the appropriate password, then captures and saves the file.
3. Calculator: Create a remote server that implements a calculator with basic functionalities like addition, subtraction, division, multiplication and client, which uses the remote calculator.
4. Stockmarket: Create a remote stock server that accepts the company name and gives the share value. Stock client that retrieves the company share value and displays by giving the company name.
5. Phone book server: Create a remote phone book server that maintains names and phone numbers. Phone book client should provide a user interface that allows the user to scroll through entries, add a new entry, modify an existing entry and delete an existing entry. The client and the server should provide proper error handling.

PART B
1. Working with callbacks and delegates in C#: Demonstrates the use of delegates, callbacks, and synchronous and asynchronous method invocation, including how Microsoft .NET Framework classes provide explicit asynchronous support using the Begin XXXX and End XXXX naming conventions and how you can make use of this support in your own code.
2. Code access security with C#: Demonstrates the use of .NET Framework Code Access Security, in which code can have permissions independent of the person executing the code.
3. Creating a COM+ component with C#: Demonstrates how to create a COM+ component, that takes advantage of Transaction management service within COM+, then assign a strong name to the assembly, register the assembly in the Global Assembly Cache, and register the component with COM+.
4. Creating a Windows Service with C#: Demonstrates how to create a Microsoft Windows Service that uses a File System Watcher object to monitor a specific directory for changes in files.
EME781 : OPTIMIZATION TECHNIQUES

Module I
Introduction to Optimization: Introduction, engineering applications of optimization, statement of an optimization problem-design vector, design constraints, constraint surface, objective function, classification of optimization problems, optimization techniques. Classical optimization techniques: Introduction, single variable optimization, multi variable optimization with no constraints, multi variable optimization with equality and inequality constraints-Kuhn-tucker conditions, constraint qualification.

Module II

Module III
Non linear programming II: Introduction, classification of unconstrained minimization methods, random search methods, univariate method, pattern direction, Hooke and Jeeves method, Powell’s method, indirect search methods-steepest descent method (Cauchy’s method).

Module IV

Module V
Integer Programming: Introduction, Graphical Representation, Gomory’s cutting plane method, Bala’s algorithm for zero-one programming, Branch-and-bound method, generalized penalty function method.

Text Book(s)

References
Module I
8085 Microprocessors and Architecture
Microprocessors historical perspective, 8085 pin diagram, architecture, addressing modes, Overview of 8085 instruction set, microprocessor communication and bus timings, 8085 functional block diagram.

Module II
The Processor 8086:
Register organization of 8086, architecture, signal description of 8086, physical memory organization, I/O addressing capability, Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

Module III
Instruction Set and Programming: Machine language instruction format, addressing modes of 8086, instruction set of 8086, assembler directives and example programs (assembly programs).

Module IV
Interrupts and Programming: Interrupts and interrupt service routines, interrupt cycle of 8086, Non mask able interrupt, maskable interrupt (INTR), interrupt programming. Programmable Interrupt Controller 8259A.

Module V
Interfacing of Peripherals to 8086: Interfacing I/O ports, PIO 8255, [Programmable I/O ports], modes of operation of 8255, Interfacing Digital to Analog converters-DAC 0800, Interfacing Analog to Digital Data converters- ADC0808/0809, Programmable Interval Timer 8253, Programmable Communication interface 8251 USART.

Text Book(s)

References
| Module I | 8 hours |
| Introduction to MOS Technology: | |
| Semiconductor Materials, Enhancement mode MOS transistor, Depletion mode MOS transistor, nMOS fabrication, CMOS fabrication, Comparison of NMOS, CMOS, BICMOS, GaAs Technologies. | |

| Module II | 10 hours |
| Basic Electrical Properties of MOS and BiCMOS Circuits: | |
| Drain-to-Source Current vs Voltage relationships, Aspects of MOS transistor threshold voltage, MOS transistor transconductance and output conductance, The Pass Transistor, The NMOS inverter, Determination of Pullup to Pulldown ratio of NMOS transistor driven by another nmos transistor, Alternate forms of Pullup. The CMOS inverter. MOS transistor circuit model. Latch up in CMOS circuits. | |

| Module III | 10 hours |
| MOS and BICMOS circuit design process: | |
| MOS layers, stick diagrams, design rules and layout, 2µ.meter, 1. 2µ.meter CMOS rules. Layout diagrams, Symbolic diagrams. Basic circuit concepts: Sheet resistance, Area capacitance of layers, delay Module, wiring capacitances, choice of layers. Scaling of MOS circuits: Scaling models, Scaling function for device parameters, Limitation of Scaling | |

| Module IV | 8 hours |
| Sub system design and Layout: | |

| Module V | 8 hours |
| Test and Testability: | |

**Text Book(s)**
References
EIE783 : ECOMMERCE

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Module I

Module II
Electronic payment systems, digital token based smart cards, credit cards, risks in electronic payment systems, interorganizational commerce, EDI, EDI implementation, value added networks.

Module III
Intraorganizational commerce, work flow, automation customization and internal commerce, supply chain management, corporate digital library, document library, digital document types, corporate data warehouses, advertising and marketing, information based marketing, advertising on internet, online marketing process, market research.

Module IV
Consumer search and resource discovery, information search and retrieval, commerce catalogues, information filtering.

Module V
Multimedia, key multimedia concepts, digital video and electronic commerce, desktop video processing, desktop video conferencing.

Text Book(s)

References
Module I 8 Hours
Introduction: Features of embedded systems, design metrics, embedded system design flow, ARM microcontroller, structure of ARM7, ARM pipeline, instruction set architecture, thumb instructions, exceptions in arm, programming examples.

Module II 8 Hours
Digital Signal Processors: Architecture of digital signal processors, high speed data access, fast computation, higher accuracy, C6000 family of DSPs. Field programmable gate arrays: Field programmable devices, programmability of FPGAs, FPGA logic block variations, FPGA design flow, modern FPGAs.

Module III 8 Hours
Interfacing: Serial peripheral interface (SPI), inter integrated circuit (IIC), RS232c, RS422, RS485, universal serial bus, infrared communication, controller area network, bluetooth.

Module IV 8 Hours
Real-Time Operating System: Type of real-time tasks, task periodicity, task scheduling, classification of scheduling algorithms, clock driven scheduling, event driven scheduling, resource sharing, features of RTOS, commercial RTOS.

Module V 8 Hours

Text Book(s)

References
## EEC789: FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING

### L T P C

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### Module I


### Module II

**Frequency Analysis Of Signals And Systems**:

### Module III

**The Discrete Fourier Transform**:

### Module IV

**Implementation Of Discrete-Time Systems**:

### Module V

**Design Of Digital Filters**:
- General Considerations, Design of FIR Filters, Design of IIR Filters From Analog Filters, Frequency Transformations.

### Text Book(s)


### References

ECE71 : REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

Module I
Fundamentals of GIS, Functions and Features of Components, Data Type, Analysis and Modelling, Role of GIS and Applications

Module II

Module III
Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources and Meteorological Satellites, Microwave Sensors, Data Acquisition and interpretation

Module IV

Module V
Applications of Remote Sensing in Survey, Mapping, Landuse and Transportation Planning

Text Book(s)

References
Module I

Module II
Project Implementation: Development of project network, Dummy activities, Activity on node networks, Cyclic network, Forward pass and backward pass computations, Algorithm for critical path, Total slacks, free slacks and their interpretations. Time-cost Trade off Procedure: Schedule related project costs, Time cost trade off, lowest cost schedule. PERT Network: Three time estimates for activities, Estimation of mean and variance of activity times, Event oriented algorithm for critical path, Probability of meeting a schedule date.

Module III

Module IV
Linear Programming Formulation of Network Problems: A flow network interpretation for determination of critical paths, Time cost trade off and maximal flow, Chance constrained linear programming for probabilistic durations of activities in PERT network.

Module V
Project Scheduling with Limited Resources: Complexity of project scheduling with limited resources, leveling the demands on key resources, A simple heuristic program for resource allocation

Text Book(s)
References
Chandras Bhavan - Institute of Technology, Visakhapatnam Campus

Institute of Technology, Hyderabad Campus

Sir Visveswaraiah Bhavan - Institute of Technology, Bengaluru Campus