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
Software Engineering
(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.
REGULATIONS AND SYLLABUS
OF
Master of Technology
in
Software Engineering
(w.e.f 2015 -16 admitted batch)

A University Committed to Excellence
M.Tech. in Software Engineering
REGULATIONS
(w.e.f. 2015-16 admitted batch)

1. ADMISSION
1.1 Admission into M.Tech. in Software Engineering 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 CSE / IT / ECE / EEE / EI / CSIT 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 Software Engineering 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>
<thead>
<tr>
<th>SNo</th>
<th>Component of Assessment</th>
<th>Marks Allotted</th>
<th>Type of Scheme of Evaluation</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1   | Theory                    | 40             | Continuous Evaluation       | 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.  
   |                            | 60             | Semester-end Examination    | ii) Ten (10) marks for Quizzes, Assignments and Presentations. Sixty (60) marks for Semester-end examinations |
| 2   | Practicals                | 100            | Continuous Evaluation       | 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.  
   |                            |                |                             | 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 Evaluation       | i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
   |                            |                |                             | 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 Evaluation       | i) Twenty (20) marks for Periodic evaluation on originality innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
   |                            |                |                             | ii) Fifteen (15) marks for mid-term evaluation for defending the Project, before a panel of examiners*.
<table>
<thead>
<tr>
<th></th>
<th>50</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>iii) Fifteen (15) marks for interim Report presentation and Viva-voce. Fifty (50) marks for final Report presentation and Viva-voce assessed by external examiners.</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
| 5 Comprehensive Viva-voce (II Semester) | 100 | Continuous Evaluation | 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.

*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>
<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>
<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>
</tbody>
</table>
Pass Class \( \geq 5.0 \)

* 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 Software Engineering  
Department of Computer Science & 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>
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<tbody>
<tr>
<td>1</td>
<td>ECS701</td>
<td>Data Structures and Algorithms</td>
<td>CE</td>
<td>4</td>
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<td>2</td>
<td>ECS703</td>
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### Semester II

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<td>9</td>
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<td>Comprehensive Viva Voce</td>
<td>CE</td>
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27

29
### Semester III

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### Semester IV

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<th>C</th>
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<tr>
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<td>ECS892</td>
<td>Project work-II</td>
<td>CE</td>
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### Number of Credits

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<th>II</th>
<th>III</th>
<th>IV</th>
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<td>8</td>
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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>
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<td>EIE781</td>
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<td>0</td>
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<td>Fundamentals of Digital Signal Processing</td>
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<td>Remote Sensing and Geographic Information Systems</td>
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<td>Human Resource Management</td>
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<td>EME782</td>
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<td>VLSI Design</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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<tbody>
<tr>
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<td>ECS747</td>
<td>Component based software Development</td>
<td>PE</td>
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<tr>
<td>2</td>
<td>ECS749</td>
<td>Software system architecture</td>
<td>PE</td>
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<tr>
<td>3</td>
<td>ECS751</td>
<td>Cloud computing</td>
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## Programme Elective-II

<table>
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<tr>
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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>
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<td>ECS748</td>
<td>Software Metrics</td>
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<tr>
<td>2</td>
<td>ECS750</td>
<td>Software quality &amp; Reliability</td>
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<tr>
<td>3</td>
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## Programme Elective-III

<table>
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<tr>
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<th>Course Title</th>
<th>Category</th>
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<th>T</th>
<th>P</th>
<th>C</th>
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<tbody>
<tr>
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<td>ECS760</td>
<td>Design Patterns</td>
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<td>PE</td>
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<td>Software Verification and Validation</td>
<td>PE</td>
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</tbody>
</table>
ECS701 : DATA STRUCTURES AND ALGORITHMS

Module I 10 hrs

Module II 08 hrs
Introduction to Graphs, Graph Traversal. Introduction to Trees and Tree Traversals, Binary Search Trees, AVL Trees, B-Trees, Priority Queues.

Module III 12 hrs

Module IV 11 hrs
Dynamic Programming: General Method, Matrix Chain Multiplication, Longest Common Subsequence, Reliability Design, Traveling Sales Person Problem. Back Tracking: General Method, 8 Queens Problem, Hamiltonian Cycle, and Graph Coloring Problem.

Module V 11 hrs

Text Book(s)
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, 2/e, Universities Press.

References
5. Web Resources:
   http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
Module I

Module II

Module III

Module IV
FAILURE RECOVERY AND FAULT TOLERANCE: Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Check pointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

Module -V
**Text Book(s)**

**References**
ECS705 : DISTRIBUTED DATA BASES

Module I  

Module II  
Distributed Database design – A frame work, the design of database fragmentation, the allocation of fragments. Translation of global queries into fragment queries, query optimization.

Module III  
Distributed Transaction Management – A framework, transaction atomicity, 2-phase commit, and Concurrency control: foundations, distributed deadlocks, timestamps.

Module IV  
Reliability: Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.

Module V  
Commercial Systems: Tranclem’s Encompass, Distributed database systems, IBM’s Inter system communication, feature of distributed ingres and Oracle. Heterogeneous databases: General problems – brief study of multibase.

Text Book(s)  

References  
ECS711 : SOFTWARE ENGINEERING

Module I

Module II
Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility Studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Module III

Module IV
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Module V
Plans for testing: Snooping for information, coping with complexity through teaming, testing plan focus areas, Testing for recoverability, Planning for troubles. Preparing for the tests: Software Reuse, Developing good test programs, Data corruption, Tools, Test Execution, Testing with a virtual computer, Simulation and Prototypes, Managing the Test, Customer’s role in testing

Text Book(s)
References
Module I

Module II

Module III

Module IV

Module V

Text Book(s)

Reference Book
Module I
Introduction: Stakeholders, Viewpoints, and Perspectives, Software Architecture, Architectural Elements, Stakeholders, Architectural Views, Viewpoints, the Benefits of Using Viewpoints and Views, Viewpoint Pitfalls,

Module II

Module III
Using styles and Patterns: Selection of Stakeholders, Classes of Stakeholders, Proxy Stakeholders, Stakeholder Groups, Stakeholder Responsibilities, Types of Models, Modeling Languages, Guidelines for Creating Effective Models, Agile Modeling Techniques,

Module IV
View Point Catalog: Functional Viewpoint, Information Viewpoint, Concurrency Viewpoint, Development Viewpoint, Deployment Viewpoint, Operational Viewpoint

Module V
Perspective Catalog: Security Perspective, Performance and Scalability Perspective, Evolution Perspective

Text Book(s)

References
ECS751 : CLOUD COMPUTING  

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Module I  
Understand Cloud Computing: Cloud Origins and Influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges  
Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models  

10 hrs

Module II  
Cloud-Enabling Technology: Data Center Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology  

08 hrs

Module III  

08 hrs

Module IV  

12 hrs

Module V  

12 hrs

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


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

Module I
8 Hours

Module II
8 Hours

Module III
8 Hours

Module IV
8 Hours

Module V
8 Hours
Design Of Digital Filters: General Considerations, Design of FIR Filters, Design of IIR Filters From Analog Filters, Frequency Transformations.

Text Book(s)

References
Module I 8 hours
Fundamentals of GIS, Functions and Features of Components, Data Type, Analysis and Modelling, Role of GIS and Applications

Module II 10 hours

Module III 9 hours
Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources and Meteorological Satellites, Microwave Sensors, Data Acquisition and interpretation

Module IV 7 hours

Module V 8 hours
Applications of Remote Sensing in Survey, Mapping, Landuse and Transportation Planning

Text Book(s)

References
2. Engaman, E.T. and Gurney, R.J, Remote Sensing in Hydrology, Springer; Soft cover reprint of the original 1/e, October 8, 2011.
1. Program to perform insertion deletion and search operation on the following:
   a. Single Linked List  
   b. Doubly Linked List  
   c. Circular Linked List

2. Develop programs to demonstrate at least 3 applications of Stacks.

3. Develop a program to demonstrate the concept of double ended queue.

4. Program to represent a graph by using Adjacency Matrix and Adjacency List representation for the given set of Vertices and Edges. Traverse it by using Breadth First Search and Depth First Search Techniques.

5. Develop a program to perform insertion, deletion and search operations on the following Trees
   a. Binary Search Tree  
   b. AVL Tree

6. Develop programs for
   a. Heap Sort  
   b. Merge Sort  
   c. Quick sort by taking random element as pivot  
   d. Selection

7. Implement the code for the following problems by using Greedy Method:
   a. Finding Minimum Cost Spanning Tree by using Kruskal’s Algorithm.  
   b. Single Source Shortest Path Problem.

8. Implement the code for the following problems using Dynamic Programming:
   a. Matrix Chain Multiplication Problem  
   b. String Editing  
   c. Traveling Sales Person Problem

9. Implement code for the following problems by using Back-Tracking:
   a. Hamiltonian Cycle  
   b. 8 Queens Problem

ECS725 : CASE TOOLS LAB

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Note:
Problem Analysis and Project Planning Thorough study of the problem – Identify project scope, Objectives, infrastructure and describe requirement analysis to each phase Software Testing Prepare test plan, perform validation testing, coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.

Mini Project Examples:

1. Online feedback system
2. Quiz System
3. Online ticket reservation system
4. Remote computer monitoring
5. Student marks analysing system
6. Expert system to prescribe the medicines for the given symptoms
7. ATM system
8. Platform assignment system for the trains in a railway station
9. Stock maintenance

Software:

Case Tools: Rational Suite, Win runner, Empirix
Languages: C/C++/JDK 1.3, JSDK, UML
Front End: VB, VC++.
Back End: Oracle, MS-Access, SQL
ECS702 : COMPUTER NETWORKS

Module I

Module II
Direct Link Networks - Reliable Transmission - Stop-and-Wait, Sliding Window, Concurrent Logical Channels; Ethernet (802.3) - Physical Properties, Access Protocol, Experience with Ethernet; Rings - Token Ring Media Access Control, Token Ring Maintenance, FDDI, Resilient Packet Ring (802.17); Wireless - Bluetooth (802.15.1), Wi-Fi (802.11), WiMAX (802.16), Cell Phone Technologies; Sensor Networks; Packet Switching - Switching and Forwarding, Datagrams, Virtual Circuit Switching, Source Routing; Bridges and LAN Switches - Learning Bridges, Spanning Tree Algorithm, Broadcast and Multicast, Limitations of Bridges.

Module III
Internetworking - Simple Internetworking (IP) - What Is an Internetwork? Service Model, Global Addresses, Datagram Forwarding in IP, Address Translation (ARP), Host Configuration (DHCP), Error Reporting (ICMP), Virtual Networks and Tunnels; Routing - Network as a Graph, Distance Vector (RIP), Link State (OSPF), Metrics, Routing for Mobile Hosts; Subnetting - Classless Routing (CIDR), Inter- domain Routing (BGP), Routing Areas, IP Version 6 (IPv6); Multiprotocol Label Switching - Destination-Based Forwarding, Explicit Routing, Virtual Private Networks and Tunnels; Deployment of IPv6.

Module IV
Module V

Applications - Traditional Applications - Electronic Mail (SMTP, MIME, IMAP), World Wide Web (HTTP), Name Service (DNS), Network Management (SNMP); Web Services - Custom Application Protocols (WSDL, SOAP), A Generic Application Protocol (REST), Multimedia Applications, Session Control and Call Control (SDP, SIP, H.323), Resource Allocation for Multimedia Applications; Overlay Networks - Routing Overlays, Peer-to-Peer Networks (Gnutella, BitTorrent), Content Distribution Networks.

Text Book(s)
2. D. Bertsekas, R. Gallager, Data Networks, PHI.

References
2. J. Walrand, P. Varaiya, High Performance Communication Networks, Morgan Kaufmann
6. Darren L Spohn, Data Network Design, TMH.
ECS712 : SOFTWARE PROJECT MANAGEMENT

Module I

Module II

Module III

Module IV

Module V

Text Book(s)
References
3. S.A. Kelkar, Software Project Management: A Concise Study, PHI.
4. Hughes Cotterell, Software Project Management, 2/e, TMH.
ECS714 : SOCIAL NETWORK ANALYSIS

Module I
Network, Relations and Structure
The Social Networks Perspective; Network Data; Boundary Specification and Sampling; Types of Networks; Network Data, Measurement and Collection

Module II
Mathematical Representations of Social Networks
Graph Theoretic Notation; Sociometric Notation; Algebraic Notation; Graphs; Directed Graphs; Signed Graphs; Signed Directed Graphs; Valued Graphs; Valued Directed Graphs; Multi Graphs; Hyper Graphs; Relations; Matrices; Properties

Module III
Structural and Locational Properties
Actor Centrality; Degree Centrality; Closeness Centrality; Betweenness Centrality; Information Centrality; Structural Balance; Clusterability; Generalizations of Clusterability; Transitivity

Module IV
Roles and Positions
Background; Structural Equivalence; Automorphic and Isomorphic Equivalence; Regular Equivalence; Types of Ties; Local Role Equivalence; Ego Algebras

Module V
Dyadic and Triadic Methods
The Dyad Census; The Example and Its Dyad Census; An Index for Mutuality; Simple Distributions on Digraphs; Conditional Uniform Distributions; The Triad Census; The Example and Its Triad Census; Mean and Variance of a Triad Census

Text Book(s)

References
2. David Knoke and Song Yang, Social Network Analysis, SAGE Publications, 2ndEdn.
3. Robert A. Hanneman and Mark Riddle, Introduction to Social Networks.
ECS748 : SOFTWARE METRICS

L  T  P  C
3  1  0  4

Module I 10 hrs

Module II 10 hrs

Module III 10 hrs

Module IV 11 hrs
**Software quality metrics** - Product quality - Process quality - metrics for software maintenance - Case studies of Metrics program - Motorola - Hp and IBM.

Module V 11 hrs
**Management Metrics**: Quality management models - Rayleigh Model - Problem Tracking report (PTR) model - Reliability growth model - model evaluation - Orthogonal classification.

Text Book(s)

References
1. Stephen H. Kan, Metric and models in software quality engineering, 2/e, Addison- Wesley Professional.
Module I


Module II


Module III


Module IV


Module V

Software Reliability Techniques: Reliability Techniques: Trending Reliability Techniques, Predicting Reliability Techniques, Error Seeding, Failure Rate, Curve Fitting, Reliability Growth, Models and Tools: Study of tools like CASRE, SARA, and SMERFS.

Text Book(s)
1. John Musa, Software Reliability Engineering, McGraw-Hill

References
1. Jeff Tian, Software Quality Engineering (SQE), John Wiley
2. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley
ECS752 : BUSINESS INTELLIGENCE

Module I
**Introduction to Business intelligence**: Effective and timely decisions, Data, information and knowledge. The role of mathematical models, Business intelligence architectures, Cycle of a business intelligence analysis, Enabling factors in business intelligence projects, Development of a business intelligence system, Ethics and business intelligence.

Module II
**Decision support systems**: Definition of system, Representation of the decision-making process, Rationality and problem solving, The decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support System, Development of a decision support system

Module III
**Mathematical models for decision making**: Structure of mathematical models, Development of a model, Classes of models.

i.) **Data exploration**: Univariate analysis, Graphical analysis of categorical attributes, Graphical analysis of numerical attributes, Measures of central tendency for numerical attributes, Measures of dispersion for numerical attributes, Measures of relative location for numerical attributes, Identification of outliers for numerical attributes, Measures of heterogeneity for categorical attributes, Analysis of the empirical density, Bivariate analysis, Graphical analysis, Measures of correlation for numerical attributes, Contingency tables for categorical attributes, Multivariate analysis, Graphical analysis, Measures of correlation for numerical attributes.

ii.) **Regression**: Structure of regression models, Simple linear regression, Calculating the regression line, Multiple linear regression, Calculating the regression coefficients, Assumptions on the residuals, Treatment of categorical predictive attributes, Ridge regression, Generalized linear regression, Validation of regression models, Normality and independence of the residuals, Significance of the coefficients Analysis of variance, Coefficient of determination, Coefficient of linear correlation, Multi-collinearity of the independent variables, Confidence and prediction limits.

Module IV
**Time series Data in BI**: Definition of time series, Index numbers, Evaluating time series models Distortion measures Dispersion measures, Tracking signal, Analysis of the components of time series Moving average, Decomposition of a time series, Exponential smoothing models, Simple exponential smoothing, Exponential smoothing with trend adjustment, Exponential smoothing with trend and seasonality, Simple adaptive exponential smoothing, Exponential smoothing with damped trend, Initial values for exponential smoothing models, Removal of trend and seasonality, Autoregressive models, Moving average models,
Autoregressive moving average models, Autoregressive integrated moving average models, Identification of autoregressive models, Combination of predictive models, the forecasting process, Characteristics of the forecasting process, Selection of a forecasting method.

Module–V 10 hrs
Business intelligence applications: Marketing models -Relational marketing, Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Acquisition, Retention, Cross-selling and up-selling, Market basket analysis, Web mining, Sales force management, Decision processes in sales force management, Models for sales force management, Response functions, Sales territory design, Calls and product presentations planning, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry.

Text Book(s)

References
ECS760 : DESIGN PATTERNS

Module I

Introducetion: History and Origin Of Patterns- Design Patterns in MVC-
Describing Design Patterns - How Design Patterns Solve Design Problems -
Selecting a Design Pattern – Using a Design Pattern

Module II

DESIGN PATTERNS-1

Creational -Abstract Factory-Builder-Factory Method-Prototype-Singleton

Module III

DESIGN PATTERNS-2

Structural Patterns: Adapter-Bridge-Composite -Façade -Flyweight -Proxy

Module IV

DESIGN PATTERNS-3

Behavioral Patterns - Chain of Responsibility –Command-Interpreter –Iterator-
Mediator -Memento -Observer –State- Strategy-Template Method-Visitor

Module V

ADVANCED PATTERNS

Pattern Catalogs and Writing Patterns, Patterns and Case Study: Designing a
Document Editor Anti-Patterns - Case Studies in UML and CORBA, Pattern
Community.

Text Book(s)
1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design patterns:
   Elements of Reusable object-oriented software, Addison-Wesley, 1995.

References
to object-oriented Analysis and Design and the unified process, Prentice
2. Thomas Mowbray and RaphelMalveaux, CORBA and Design Patterns , John
3. William J Brown et al., Anti-Patterns: Refactoring Software, Architectures
Module I


Module II


Module III


Module IV

**JAVA WEB SERVICES**

SOA support in J2EE – Java API for XML-based web services (JAX-WS)-Java Architecture for XML binding (JAXB) – Java API for XML Registries (JAXR)-Java API for XML based RPC (JAX-RPC)-Web Services Interoperability-SOA support in .NET – ASP.NET web services – Case Studies-Web Services Enhancements (WSE)

Module V

**WEB SERVICES SECURITY AND TRANSACTION**


**Text Book(s)**

References
1. Thomas Erl, Service Oriented Architecture, Pearson Education, 2005
ECS756 : SOFTWARE VERIFICATION AND VALIDATION

Module I
Software Verification and Validation- Introduction, Verification, Method of Verification, Validation, Level of Validation, Principle of testing, context of testing in producing software, White Box testing- Definition, Static testing, Structural testing, Black box testing.

Module II

Module III
Regression Testing, Internationalization Testing-Introduction, Test Phases of Internationalization testing, Enabling testing, Locale Testing, Language testing, Localization testing, Ad-hoc testing- Overview, Buddy testing, Pair Testing, Exploratory Testing, Iterative testing Agile and Extreme Testing

Module IV
Testing Of Object-oriented systems: Introduction, Primer on object –oriented software, Differences in OO testing. Usability And Accessibility Testing- what is usability testing, approach to usability, when to do usability testing, how to achieve usability, quality factors for usability, accessibility testing, tools for usability.

Module V
Test planning, Test Management, Test Process and reporting, Software Test Automation- Scope of Automation, Design and Architecture of automation, Process Model for Automation, Test matrices and measurement- Type of Metrics, Project Metrics, Productivity Metrics, Progress Metrics, Release Metrics

Text Book(s)
1. Srinivasan D., Gopalswami R, Software testing, Pearson Education

References
1. M G Limaye, Software Testing, TMH.
2. Ian Sommerville, Software Engineering, Pearson Education.
Module I
Introduction: Definition of personnel management, concept of labour, organization and function of the personnel department, personnel policies. Organizational objectives, functions, relationships, organizational structure of formal and organizations, job design.

Module II
Manpower planning: Man power forecasting, mobility and promotion problems, job analysis and job description. Selection: Developing sources, methods of recruitment, alternative selection policies, application blanks and qualification card, interviews, psychological testing. Training: The nature of training, objectives in training, types of training, requirements of effective training conventional training techniques, group training, organization development, evaluating training effectiveness. Performance appraisal: Traditional performance appraisal systems, appraisal programs.

Module III
Wage and Salary Administration: Factors affecting compensation policy, equity and compensation, comparable value, job evaluation, job evaluating systems simple ranking, job grading, point systems, factor comparison system, effects of job evaluation on human relations, Expectancy theory and compensation, variable compensation, supplementary compensations.

Module IV
Human Factor Management: Human factors in management behavioural models, motivation, Maslow's hierarchy of needs theory, hygiene approach to motivation, expectancy theory, reinforcement theory McCleland’s needs theory, motivational techniques.

Module V
Leadership: Definition, trait approaches to leadership, leadership behaviour and styles, situational approach to leadership. Communication and Counselling: Nature and importance of communications, channels and structure, communication process, Management by objectives, counselling.

Text Book(s)
References

EME782 : AUTOMATION & ROBOTICS

Module I

Module II

Module III

Module IV

Module V

Text Book(s)
References
Module I

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


Module III

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


Module V


Text Book(s)

References
1. Write a program to
   a. Print the IP address of a www.yahoo.com
   b. Print the url of 205.163.22.104
   c. Print all the addresses of www.apple.com
   d. Print the IP address of the local machine
   e. Print the hostname of the local machine

2. Write a program to Identify the well known ports on a Remote System
   By trying to listen to the various well known ports by opening client
   connections. If the exception does not occur then the remote port is active
   else the remote port is inactive.

3. Given a URL, write a program to print the parts of URL.
4. Write a program to display the socket’s port and IP address.
5. Write a program to send & Receive data from DatagramPacket
6. Write a program for Multicast Sniffer
7. Write a program for Multicast sender
8. Write a program for a Chat Application
   One-One: By opening socket connection and displaying what is written by
   one party to the other.
   Many-Many (Broadcast): Each client opens a socket connection to the chat
   server and writes to the socket. Whatever is written by one party can be
   seen by all other parties.

9. Write a program for the Data Retrieval from a Remote Database
   At the remote database a server listens for client connections. This server
   accepts SQL queries from the client, executes it on the database and sends
   the response to the client.

10. Write a program for the Mail Client
    POP Client: Gives the server name, user name and password retrieve the
        mails and allow manipulation of mail box using POP commands.
    SMTP Client: Gives the server name, send e-mail to the recipient using SMTP
        commands- (Core Java 2 pg:163.)

11. Write a program for the Simulation of Telnet
    Provide a user interface to contact well-known ports, so that client-server
    interaction can be seen by the user.

12. Write a program for the Simple file transfer between two systems
    By opening socket connection to our server on one system and sending a
    file from one system to another.

13. Write a program for the TFTP-Client
    To develop a TFTP client for file transfer. (Unix Network programming-
        Stevens)

14. Write a program for the HTTP-Server
    Develop a HTTP server to implement the following commands GET, POST,
    HEAD, DELETE. The server must handle multiple clients.
References

1. Java Network Programming, Harold Orielly
2. An Introduction to Computer Networking, Kenneth C. Mansfield Jr and James Antonakos Pearson Education Asia

Web Resource:
Head of the Department and senior faculty identify the topics from Current Trends in Computer Science and Engineering/ Technology.

Every student needs to identify one of the latest topics and prepare a technical paper and the same has to be presented about 45 minutes.

Every student should give at-least 2 seminars on topic in a semester and he/she has to submit report. Each seminar carries a weightage of 50 marks.
Chandrahass Bhavan - Institute of Technology, Visakhapatnam Campus

Institute of Technology, Hyderabad Campus

Sir Visweswaraiah Bhavan - Institute of Technology, Bengaluru Campus