

ACADEMIC REGULATIONS  
PROGRAM STRUCTURE  
and  
DETAILED SYLLABUS

Master of Technology

**(Software Engineering)**

(Two Year Regular Programme)

(Applicable for Batches admitted from 2018)



GokarajuRangaraju Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad- 500 090

## Academic Regulations

### GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD For all Post Graduate Programmes (M.Tech) GR18 REGULATIONS

Gokaraju Rangaraju Institute of Engineering & Technology - 2018 Regulations (GR 18 Regulations) are given hereunder. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes in 2018-19 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech, a two-year regular programme in that discipline.
2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.
3. **Admissions:** Admission into the M.Tech Programme in any discipline shall be made subject to the eligibility and qualifications prescribed by the University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in PG CET conducted by the APSCHE for M. Tech Programmes or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.
4. **Programme Pattern:**
  - a) A student is introduced to “Choice Based Credit System (CBCS)” for which he/she has to register for the courses at the beginning of each semester as per the procedure.
  - b) Each Academic year of study is divided into two semesters.
  - c) Minimum number of instruction days in each semester is 90.
  - d) The total credits for the Programme is 68.
  - e) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
  - f) A student has a choice of registering for credits from the courses offered in the programme.
  - g) All the registered credits will be considered for the calculation of final CGPA.
5. **Award of M.Tech Degree:** A student will be declared eligible for the award of the M. Tech Degree if he/she fulfills the following academic requirements:
  - a) A student shall be declared eligible for the award of M.Tech degree, if he/she pursues the course of study and completes it successfully in not less than two academic years and not more than four academic years.
  - b) A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the date of admission, shall forfeit his/her seat in M.Tech course.
  - c) The Degree of M.Tech shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

## 6. Attendance Requirements

- a) A student shall be eligible to appear for the semester end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.
- c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.
- d) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

## 7. Paper Setting, Evaluation of Answer Scripts, Marks and Assessment

- a) Paper setting and Evaluation of the Answer Scripts shall be done as per the procedures laid down by the Academic Council of the College from time to time.
- b) The following is the division of marks between internal and external evaluations.

Particulars	Internal Evaluation	External Evaluation	Total
Theory	30	70	100
Practical	30	70	100
Mini Project	30	70	100
Dissertation	30	70	100

- c) The marks for internal evaluation per semester per theory course are divided as follows:

i. Mid Examinations:	20 Marks
ii. Tutorials/Assignment:	5 Marks
iii. Continuous Assessment:	5 Marks
Total:	30 Marks

- d) **Mid Examination:** There shall be two mid examinations during a semester. The first mid examination shall be conducted from the first 50 per cent of the syllabus and the second mid examination shall be conducted from the remaining 50 per cent of the syllabus. The mid examinations shall be evaluated for **20 marks** and average of the marks scored in the two mid examinations shall be taken as the marks scored by each student in the mid examination for that semester.
- e) **Assignment:** Assignments are to be given to the students and marks not exceeding 5 (5%) per semester per paper are to be awarded by the teacher concerned.
- f) **For Internal Evaluation in Practical/Lab Subjects:** The marks for internal evaluation are 30. Internal Evaluation is done by the teacher concerned with the help of the other staff member nominated by Head of the Department. Marks Distribution is as follows:

i. Writing the program/Procedure:	10 Marks
ii. Executing the program/Procedure:	10 Marks

iii. Viva:	05 Marks
iv. Continuous Assessment:	05 Marks
Total:	30Marks

- g) **For external Evaluation in Practical/Lab Subjects:** The Semester end examination shall be conducted by an external examiner and a staff member of the Department nominated by Head of the Department. Marks distribution is as follows:

i. Writing the program/Procedure:	20 Marks
ii. Executing the program/Procedure:	20 Marks
iii. Viva:	15 Marks
iv. Lab Record:	15 Marks
Total:	15 Marks

- h) **Mini Project:** The Mini Project is to taken up with relevance to Industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation. The supervisor continuously assesses the students for 20 marks (Continuous Assessment-15 marks, Report-5 marks).At the end of the semester. At the end of the semester the mini project report is evaluated by Project Review Committee. The mini project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 70 marksman Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor.
- i) **Dissertation-I and Dissertation-II:** A Project Review Committee (PRC) is to be constituted by Principal/Director with Head of the Department as the Chairman and two other senior faculty members of the department.
- i. **Registration for Project work:** A candidate is permitted to register for the project work after satisfying the attendance requirements of all the courses (theory and practical courses) up to III Semester.
  - ii. After satisfying the registration requirements, a candidate is permitted to register for the project work after satisfying, the title, objectives and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee of the Department, the student can initiate the project work. Any changes thereafter in the project are to be approved by PRC. The student has to work under the guidance of both internal guide (one faculty member of the department) and external guide (from Industry not below the rank of an officer). Internal guide is allotted by the Head of the Department or Coordinator of the Project Work whereas external guide is allotted by the industrial organization in which the project is undertaken.
  - iii. The candidate shall submit status of the report in two stages at least with a gap of 20 days between them.
  - iv. The work on the project shall be initiated in the beginning of the fourth semester and the duration is one semester. A candidate is permitted to submit project report only after successful completion of theory and practical courses with the approval of PRC and not earlier than 40 days from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of the thesis to the Head/Coordinator (through internal research guide) and shall make an oral presentation before the PRC.

- v. After approval from the PRC, the final thesis is to be submitted along with ANTI-PLAGIARISM report from the approved agency with a similarity index not more than 30%.
  - vi. Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.
  - vii. The thesis shall be adjudicated by one external examiner selected by the Institute out of 5-member panel, submitted by the department.
  - viii. **The marks allotted for project work review are 100, out of which 30 are for internal and 70 for external.** Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner.
  - ix. **The marks allotted for dissertation are 100, out of which 30 are for internal and 70 for external.** Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner. In both internal and external evaluations the student shall score at least 40% marks and an aggregate of 50% marks to pass in the project work. If the report of the examiner is favourable, Viva-voce examination shall be conducted by a Board consisting of the Supervisor, Head and the External Examiner who adjudicated the project work. The Board shall jointly evaluate the student's performance in the project work.
  - x. In case the student doesn't pass through the project work, he/she has to reappear for the viva-voce examination, as per the recommendations of the Board. If he fails succeed at the second Viva-voce examination also, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit the Project by the Board. Head of the Department and Project coordinator shall coordinate and make arrangements for the conduct of viva-voce examination. When one does get the required minimum marks both in internal and external evaluations the candidate has to revise and resubmit the dissertation in the time frame prescribed by the PRC. If the report of the examiner is unfavorable again, the project shall be summarily rejected.
  - xi. If the report of the viva-voce is not satisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit.
8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting of his/her answer book on payment of a prescribed fee.
  9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.
  10. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.
  11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/End-examinations as per the rules framed by the Academic Council.
  12. **Academic Requirements:**

- a) A student shall be deemed to have secured the minimum academic requirement in a subject if he / she secures a minimum of 40% of marks in the Semester-end Examination and a minimum aggregate of 50% of the total marks in the Semester-end examination and Internal Evaluation taken together.
- b) A student shall be promoted to the next semester only when he/she satisfies the requirements of all the previous semesters.
- c) In order to qualify for the award of M.Tech Degree, the student shall complete the academic requirements of passing in all the Courses as per the course structure including Seminars and Project if any.
- d) In case a Student does not secure the minimum academic requirement in any course, he/she has to reappear for the Semester-end Examination in the course, or re-register for the same course when next offered or re-register for any other specified course, as may be required. However, one more additional chance may be provided for each student, for improving the internal marks provided the internal marks secured by a student are less than 50% and he/she failed finally in the course concerned. In the event of taking another chance for re-registration, the internal marks obtained in the previous attempt are nullified. In case of re-registration, the student has to pay the re-registration fee for each course, as specified by the College.
- e) **Grade Points: A 10- point grading system with corresponding letter grades and percentage of marks, as given below, is followed:**

Letter Grade	Grade Points	Percentage of marks
<b>O (Outstanding)</b>	<b>10</b>	<b>Marks <math>\geq</math> 90</b>
<b>A+ (Excellent)</b>	<b>9</b>	<b>Marks <math>\geq</math> 80 and Marks <math>&lt;</math> 90</b>
<b>A (Very Good)</b>	<b>8</b>	<b>Marks <math>\geq</math> 70 and Marks <math>&lt;</math> 80</b>
<b>B+ (Good)</b>	<b>7</b>	<b>Marks <math>\geq</math> 60 and Marks <math>&lt;</math> 70</b>
<b>B (Above Average)</b>	<b>6</b>	<b>Marks <math>\geq</math> 50 and Marks <math>&lt;</math> 60</b>
<b>F (Fail)</b>	<b>0</b>	<b>Marks <math>&lt;</math> 50</b>
<b>Ab (Absent)</b>	<b>0</b>	

**Earning of Credit:**

**A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range O-C. Letter grade 'F' in any Course implies failure of the student in that course and no credits earned. Computation of SGPA and CGPA:**

**The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):**

- i)  $S_k$  the SGPA of  $k^{th}$  semester(1 to 4) is the ratio of sum of the product of the number of credits and grade points to the total credits of all courses registered by a student, i.e.,

$$SGPA (S_k) = \sum_{i=1}^n (C_i * G_i) / \sum_{i=1}^n C_i$$

Where  $C_i$  is the number of credits of the  $i^{th}$  course and  $G_i$  is the grade point scored by the student in the  $i^{th}$  course and  $n$  is the number of courses registered in that semester.

- ii) The CGPA is calculated in the same manner taking into account all the courses  $m$ , registered by a student over all the semesters of a programme, i.e., upto and inclusive of  $S_k$ , where  $k \geq 2$ .

$$CGPA = \sum_{i=1}^m (C_i * G_i) / \sum_{i=1}^m C_i$$

iii) The SGPA and CGPA shall be rounded off to 2 decimal points.

13. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of M. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes:

	Class Awarded	CGPA Secured
13.1	First Class With Distinction	CGPA $\geq 7.75$
13.2	First Class	CGPA $\geq 6.75$ and CGPA $< 7.75$
13.3	Second Class	CGPA $\geq 6.00$ and CGPA $< 6.75$

14. **Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he will not be allowed to go into the next Semester. The award or issue of the Degree may also be withheld in such cases.
15. **Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities:** Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.
16. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for readmission to the same or equivalent subjects as and when they are offered.

#### 17. General Rules

- The academic regulations should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

- c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
- d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.





**Gokaraju Rangaraju Institute of Engineering and Technology**  
**Department of Computer Science Engineering**  
**Software Engineering**

**I YEAR - I SEMESTER**

Sl. No	Group	Course Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Core	GR18D5029	Software Requirements & Estimation	3	0	0	3	3	30	70	100
2	Core	GR18D5002	Advanced Data Structures	3	0	0	3	3	30	70	100
3	Program Elective I	GR18D5030 GR18D5031 GR18D5014	1. Advanced Software Engineering 2. Component oriented Programming Languages 3. Machine Learning and Applications	3	0	0	3	3	30	70	100
4	Program Elective II	GR18D5021 GR18D5032 GR18D5027	1. Advanced Computer Networks 2. Software Process and Project Management 3. Information Storage and Retrieval	3	0	0	3	3	30	70	100
5	Core	GR18D5012	Research Methodology and IPR	0	0	4	4	2	30	70	100
6	Core	GR18D5013	Advanced Data Structures Lab	0	0	4	4	2	30	70	100
7	Core	GR18D5033 GR18D5034 GR18D5025	<b>PE Lab-I</b> 1. Software Engineering Lab 2. Component Oriented Programming Languages Lab 3. Machine Learning and Applications Lab	2	0	0	2	2	30	70	100
<b>Total</b>				<b>14</b>	<b>0</b>	<b>8</b>	<b>22</b>	<b>18</b>	<b>210</b>	<b>490</b>	<b>700</b>
8	Audit		<b>Audit course -1</b>	2	0	0	2	2	30	70	100

## I YEAR - II SEMESTER

Sl. No	Group	Course Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Core	GR18D5035	Advances in Software Testing	3	0	0	3	3	30	70	100
2	Core	GR18D5036	Model Driven Software Engineering	3	0	0	3	3	30	70	100
3	Program Elective III	GR18D5003 GR18D5018 GR18D5037	1. Advanced Data Mining 2. Data Analytics 3. Server Side Scripting Languages	3	0	0	3	3	30	70	100
4	Program Elective IV	GR18D5038 GR18D5039 GR18D5040	1. Service Oriented Architecture 2. Software Patterns 3. Distributed Databases	3	0	-0	3	3	30	70	100
5	Core	GR18D5042	Advances in Software Testing Lab	0	0	4	4	2	30	70	100
6	Core	GR18D5009 GR18D5024 GR18D5041	<b>PE Lab –II</b> 1. Advanced Data Mining Lab 2. Data Analytics Lab 3. Server Side Scripting Languages Lab	0	0	4	4	2	30	70	100
7	Core	GR18D5190	Mini-Project	2	0	0	2	2	30	70	100
<b>Total</b>				<b>14</b>	<b>0</b>	<b>8</b>	<b>22</b>	<b>18</b>	<b>210</b>	<b>490</b>	<b>700</b>
8	Audit		<b>Audit course – 2</b>	2	0	0	2	2	30	70	100

## II YEAR - I SEMESTER

Sl. No	Group	Course Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Program Elective V	GR18D5043 GR18D5044 GR18D5045	1. Software Quality Assurance 2. Multimedia Rich Internet Development 3. Software Configuration Management	3	0	0	3	3	30	70	100
2	Open Elective I	GR18D5201 GR18D5202 GR18D5203 GR18D5204 GR18D5205 GR18D5206	<b>Open Elective</b> 1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy	3	0	0	3	3	30	70	100
3	Dissertation	GR18D5191	Dissertation Phase – I	0	0	20	20	10	30	70	100
<b>Total</b>				<b>6</b>	<b>0</b>	<b>20</b>	<b>26</b>	<b>16</b>	<b>90</b>	<b>210</b>	<b>300</b>

## II YEAR - II SEMESTER

Sl. No	Group	Course Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Dissertation	GR18D5192	Dissertation Phase – II	0	0	32	32	16	30	70	100
<b>Total</b>						<b>32</b>	<b>32</b>	<b>16</b>	<b>30</b>	<b>70</b>	<b>100</b>

## **Audit course -1 & 2**

1. English for Research Paper Writing (GR18D5207)
2. Disaster Management (GR18D5208)
3. Sanskrit for Technical Knowledge (GR18D5209)
4. Value Education (GR18D5210)
5. Indian Constitution (GR18D5211)
6. Pedagogy Studies (GR18D5212)
7. Stress Management by Yoga (GR18D5213)
8. Personality Development through Life Enlightenment Skills. (GR18D5214)

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SOFTWARE REQUIREMENTS AND ESTIMATION**

**Course Code: GR18D5029**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Understanding about good practices of requirements development and management and elements of risk management.
- Identification of various techniques for requirements modeling.
- Understanding about Change Control Process and manage requirements and requirement documents using various requirement management tools.
- Learning of various estimation methods for sizing of software.
- Appraise about various automated tools for software estimation.

**Course outcomes**

- Identify and examine the good practices of requirement engineering
- Create various models for requirement modeling.
- Identify practices and tools for software requirements management.
- Apply various techniques for software size estimation.
- Apply tools for software estimation.

**Unit I**

**Software Requirements: What and Why** Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

**Unit II**

**Software Requirements Engineering** Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality,

**Software Requirements Modeling:** Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

**Unit III**

**Software Requirements Management** Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain **Requirements Management Tools:** Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation,

## **Unit IV**

**Software Estimation** Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation.

**Size Estimation**-Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

## **Unit V**

**Effort, Schedule and Cost Estimation** What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation

**Software Estimation Tools:** Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools

## **Text Books**

1. Software Requirements and Estimation by *Rajesh Naik and Swapna Kishore*, Tata McGraw Hill
2. Software Requirements by Karl E. Weigers, Microsoft Press.

## **Reference Books**

1. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
2. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.
3. Estimating Software Costs, Second edition, Capers Jones, Tata McGraw-Hill, 2007.
4. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.
5. Measuring the software process, William A. Florac & Anita D. Carleton, Pearson Education, 1999.

## **ADVANCED DATA STRUCTURES**

**Course Code: GR18D5002**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Students should be able to understand the necessary mathematical abstraction to solve problems.
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.
- Express algorithms in a language independent manner (as pseudo codes), thus exemplifying the professional ethics imbibed through this course.

### **Course outcomes**

- Implementation of symbol table using hashing techniques.
- Analyze algorithms for red-black trees, B-trees and Splay trees.
- Develop algorithms for text processing applications.
- Identify suitable data structures and develop algorithms for computational geometry problems.
- Compare and contrast various computational geometry methods for efficiently solving new evolving problems.

### **Unit I**

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries, Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

### **Unit II**

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

### **Unit III**

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees.

### **Unit IV**

Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding

Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

## **Unit V**

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k-D Trees.

Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem.

## **Text Books**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.

## **Reference Books**

1. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **ADVANCED SOFTWARE ENGINEERING**

**Course Code: GR18D5030**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- A broad and critical understanding of all the processes for engineering high quality software and the principles, concepts and techniques associated with software development
- An ability to analyze and evaluate problems and draw on the theoretical and technical knowledge to develop solutions and systems
- A range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle
- An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.
- Being an autonomous and reflective learner who takes the initiative and responsibility for acquiring new knowledge and skills, employment and further study opportunities.

### **Course outcomes**

- Distinguish various software process models such as waterfall model, evolutionary models, etc.
- Compose the requirements document by understanding the software requirements.
- Relate the software architectural styles to the suitable applications.
- Design the software testing approaches in order to obtain good quality software.
- Analyze, design and maintain software systems.

### **Unit I**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

### **Unit II**

**Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**Requirements Modeling:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

### **Unit III**

**Design Concepts:** Design within the Context of Software Engineering, Design Process, Design



Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

**Component-Level Design:** What is a Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps, Designing Traditional Components, Component-Based Development.

#### **Unit IV**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.

#### **Unit V**

**Verification and Validation:** Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods.

**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance cost.

#### **Text Books**

1. Software Engineering A Practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw-Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.

#### **Reference Books**

1. Software Engineering, Ian Somerville, Eighth Edition, Pearson education.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press
5. Software Engineering: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition, 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3<sup>rd</sup> edition, John Wiley & Sons Ltd.
9. Software Engineering 3: Domains, Requirements, and Software Design, D. Bjorner, Springer International Edition.
10. Introduction to Software Engineering, R.J. Leach, CRC Press.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**COMPONENT ORIENTED PROGRAMMING LANGUAGES**

**Course Code : GR18D5031**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Insights of the Internet programming and how to design and implement complete applications over the web.
- Insight into Database Connectivity to web applications
- Analysis of Dynamic content to web applications, Programming the User Interface for the web applications.
- Usage of recent platforms used in developing web applications such as the .Net environment like C#
- Ability to Query Data by Using LINQ

**Course outcomes**

- Design and implement C# application using Object oriented programming concepts.
- Analyze and use basic C# constructs, delegates and events.
- Design and implement server-side software that interacts with a database for the purposes of performing insert, update, and delete operations on the database; test and debug the software; deploy the software.
- Design program to link and publish Visual Studio.Net® applications to reflect a web application.
- Comprehends, analyzes and exposed to the Common Language Runtime (CLR), Garbage Collection and assemblies.

**Unit I**

**Introduction To C# :**Introducing C#, Understanding .NET, Features of .Net, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

**Unit II**

**Object Oriented Aspects Of C# :**Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions

**Unit III**

**Application Development On .NET :**Building Windows Applications, Web browser controls, Accessing Data with ADO.NET.

**Unit IV**

**ADO.NET- LINQ** :History and background, From DAO to ADO.NET, ADO.NET LINQ, ADO.NET design goals, The ADO.NET architecture and its components, ADO.NET in relation to the other .NET tools (Windows azure)

## **Unit V**

**Web Based Application Development On .NET** :Programming Web Applications with Web Forms, Windows forms library – WinForms, Layout Enhancements, Forms and controls – Hierarchy, Creating simple GUI by hand, Event handling, Basic controls, Windows forms – buttons, check boxes, radio buttons, panels, group boxes, list boxes, picture boxes, Programming Web Services.

### **Text Books**

1. E.Balaguruswamy, "Programming in C#", Tata McGraw Hill, 2004
2. J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002.

### **Reference Books**

1. Jennifer Greene, Andrew Stellman O'Reilly Media Head First C#, 3rd Edition
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. S. ThamaraiSelvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MACHINE LEARNING AND APPLICATIONS**

**Course Code: GR18D5014**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Understand Supervised and Unsupervised Learning methods with a modern outlook focusing on recent advances.
- Discuss the Statistical Learning Theory and Ensemble methods.
- Explore Deep learning techniques and various feature extraction strategies.
- Describe Scalable machine Learning and Bayesian Learning.
- Understand the recent trends in various machine learning methods for IOT applications

**Course outcomes**

- Compare Supervised and Unsupervised Learning methods.
- Demonstrate various Ensemble methods and apply Statistical Learning Theory to real world problems.
- Analyze Deep Learning and Feature Representation techniques.
- Categorize the Scalable Machine Learning techniques.
- Summarize the recent trends in various machine learning methods for IOT applications.

**Unit I**

Supervised Learning (Regression/Classification), Basic methods: Distance-based methods, Nearest-Neighbors, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

**Unit II**

Unsupervised Learning Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models).

**Unit III**

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

**Unit IV**

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

## **Unit V**

Scalable Machine Learning (Online and Distributed Learning), A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference. Recent trends in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.

### **Text Books**

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning,

### **References Books:**

1. Springer 2009 (freely available online)
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **ADVANCED COMPUTER NETWORKS**

**Course Code: GR18D5021**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- Understanding about the Network Technologies and to know the differences between wired and wireless technologies.
- Analysis of different types of Wireless Networks, IP Addressing Schemes and Routing Protocols at Network Layer
- To differentiate between Intra-domain, Inter-domain and Cellular Network and Mobile Ad hoc Networks
- Clear idea about Optical Networks and how to allocate wavelengths in Optical Networks
- Capability to distinguish between Ad hoc Networks and Wireless Sensor Networks

### **COURSE OUTCOMES:**

- Find the difference, advantages, disadvantages between Wired and Wireless Networking Technologies and different transmission technologies
- Set-up IP addresses in different systems and practically realize the path of routing.
- Differentiate between Uni-casting, Broadcasting and Multicasting and develop the routing protocols.
- Implement virtual Cellular communication and Ad hoc communication and measure the performance of the network using Network Simulators.
- Demonstrate the Optical Network and Wireless Sensor Network.

### **Unit I**

**Computer Networks and the Internet:** What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet

**Foundation of Networking Protocols:** 4-layer TCP/IP model, 7-layer OSI model, Internet Protocols and addressing, Equal-sized Packets model: ATM

**Networking Devices:** Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

### **Unit II**

**The Link Layer and Local Area Networks:** Introduction and Services, Error-Detection and Error-Correction techniques, Multiple access protocols, Link layer addressing, Ethernet, **Interconnections:**

Hubs and Switches, The Point-to-Point protocol(PPP), Link Virtualization, **Routing and Internetworking:** Network layer routing, Least-cost-Path algorithms, Non-least-cost-path algorithms.

### Unit III

**Logical Addressing:** IPv4 addressing, IPv6 addressing **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6, **Multicasting Techniques and Protocols:** Basic definitions and techniques, Intra-domain multicast protocols, Inter-domain multicast protocols, Node-level multicast algorithms, **Transport and end-to-end protocols:** Transport layer, TCP, UDP, Mobile Transport Protocol, TCP Congestion control **Application Layer:** Principles of Network applications, the web and HTTP, File transfer:FTP, Electronic Mail in the Internet. DNS, P2P File sharing,

### Unit IV

**Wireless Networks and Mobile IP:** Infrastructure of wireless Networks, Wireless LAN technologies, IEEE 802.11 wireless standard, Cellular Networks, Mobile IP, Wireless mesh networks (WMNs). **Optical Networks and WDM Systems:** Overview of Optical Networks, Basic optical networking devices, Large-Scale Optical Switches, Optical Router, Wavelength Allocation in Networks, Case study- An all Optical switch.

### Unit V

**VPNs, Tunneling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label switching (MPLS), Overlay Networks, **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signaling Protocols, Real-time transport protocols, Distributed multimedia networking, Stream control Transmission protocol.

**Mobile Ad-Hoc Networks:** Overview of wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing protocols for Ad-Hoc Networks. **Wireless sensor networks:** Sensor Networks and Protocol structures, Communication Energy Model, Clustering Protocols, Routing Protocols.

### Text Books

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kuros, Third Edition, Pearson Education, 2007.
2. Computer and Communication Networks, Nader F Mir, Pearson Education, 2007

### Reference Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw-Hill.
2. An Engineering Approach to Computer Networking, S. Keshave, Pearson Education
3. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, PEARSON, Prentice Hall.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**SOFTWARE PROCESS AND PROJECT MANAGEMENT**

**Course Code: GR18D5032**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Understanding about the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
- Knowledge about various principles of Software Process improvements and factors influencing software quality and productivity.
- Familiarity with the different methods and techniques used for project management activities.
- To provide a framework that enables the manager to make reasonable estimates of Resource, cost & schedule.
- Awareness of the areas closely related to quality management which forms an integral part of the management task.

**Course outcomes**

- Apply software engineering principles to develop a system and test them to ensure quality.
- Analyze a problem and identifies the requirements.
- Identify the various characteristics of a project and help in developing a new product or service.
- Identify the different Project Planning activities, Manage changes in the project and helps in improving quality of the project.
- Recognize the leadership and management activities , career development , performance management , leading and managing changes.

**Unit I**

**Software Process Maturity:** Software maturity Framework, Principles of Software Process Change, Software Process Assessment, Introduction to the Initial Process, the Repeatable Process, the Defined Process, the Managed Process, The Optimizing Process.

**Unit II**

**Project management Framework:** Introduction, Project life cycle and organization Project Management Processes for a project, project Integration Management, project scope management

**Unit III**

**Project planning:** understanding the work, estimating, scheduling and resourcing, monitoring progress, Reporting Progress.



## **Unit IV**

**Delivering Success:** Managing quality, Managing risk, selling the project, Managing the stakeholders, Managing the change.

## **Unit V**

**Project Human Resource management:** leadership and performance, Managing the team, the project manager.

### **Text Books**

1. Managing the Software Process, *Watts S. Humphrey*, Pearson Education, 1999
2. A Guide to the Project Management Body of Knowledge, Project Management Institute, 2008.
3. Cadle, J., Yeates, D., Project Management for Information Systems, Prentice Hall, 2006.

### **Reference Books**

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TataMc-Graw Hill, 2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
7. Agile Project Management, Jim Highsmith, Pearson education, 2004.
8. Quality Software Project Management, R.F. Futrell, D.F. Shafer, L.I. Shafer, Pearson.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **INFORMATION STORAGE AND RETRIEVAL**

**Course Code: GR18D5027**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- Learn various data structures involved in IRS
- Describe Information Retrieval System capabilities.
- Compare and contrast software text search algorithms and hardware text search systems.
- Illustrate measures used in system evaluation.
- Demonstrate Document and term clustering, Cataloging and Indexing.

### **Course outcomes**

- Use IRS capabilities and information visualization technologies.
- Demonstrate the use of Cataloging and Indexing.
- Differentiate software text search algorithms and hardware text search systems.
- Analyze the accuracy for various clustering algorithms.
- Construct multimedia retrieval systems.

### **Unit I**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses,

**Information Retrieval System Capabilities - Search, Browse, Miscellaneous.**

### **Unit II**

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction

**Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

**Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure

### **Unit III**

**Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters

**User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext

**Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

#### **Unit IV**

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems.

**Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

#### **Unit V**

**Multimedia Information Retrieval:** Models and Languages – Data Modeling, Query Languages, Indexing and Searching

**Libraries and Bibliographical Systems:** Online IR Systems, OPACs, Digital Libraries.

#### **Text Books**

1. Information Storage and Retrieval Systems: Theory and Implementation By Kowalski, Gerald, Mark T Maybury Kluwer Academic Press, 2000.
2. Modern Information Retrieval By Ricardo Baeza-Yates, Pearson Education, 2007.

#### **Reference Books:**

1. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir Frieder, 2<sup>nd</sup> Edition, Springer International Edition, 2004.
2. Information Retrieval Data Structures and Algorithms By William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
3. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
4. Introduction to Information Retrieval By Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**RESEARCH METHODOLOGY AND IPR**

**Course Code: GR18D5012**

**L/T/P/C: 2/0/0/2**

**Course objectives:**

- To familiarise students with the different aspects of research.
- To provide an idea of good scientific writing and proper presentation skills.
- To provide an understanding of philosophical questions behind scientific research.
- To provide a brief background on the historical legacy of science.
- To provide an insight of nature of Intellectual Property and new developments in IPR.

**Course Outcomes:** At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information and follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering.
- Understand the nature of Intellectual Property and IPR in International scenario.

**Unit I**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

**Unit II**

Effective literature studies approaches, analysis Plagiarism, Research ethics.

**Unit III**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

**Unit IV**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario:

International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

## **Unit V**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

### **Text Books**

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

### **Reference Books:**

1. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall , "Industrial Design", McGraw Hill,1992.
4. Niebel , "Product Design", McGraw Hill,1974.
5. Asimov , "Introduction to Design", Prentice Hall,1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age",2016.T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand,2008

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

**ADVANCED DATA STRUCTURES LAB**

**Course Code : GR18D5013**

**L:0 T:0 P:4 C:2**

**Course Objectives:**

- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.
- To improve the logical ability

**Course Outcomes:**

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to use linear and non-linear data structures like stacks, queues , linked list etc..
- Students will be able to Implement various searching and sorting algorithms
- Students will be able to apply the various data structures in real time applications

**Task 1:** Implement a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer

**Task 2:** Implement a Java program to implements List ADT using arrays

**Task 3:** Implement a Java program to implements List ADT using linked lists

**Task 4:** Implement a java program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression.

**Task 5:** Implement a Java programs to implement the deque (double ended queue) ADT using Arrays

**Task 6:** Implement a Java programs to implement the deque (double ended queue) ADT Doubly linked list.

**Task 7:** Implement a Java program to perform the following operations:

- Insert an element into a binary search tree.
- Delete an element from a binary search tree.
- Search for a key element in a binary search tree

**Task 8:** Implement a Java program to perform the following operations  
Insertion into an AVL-tree  
Deletion from an AVL-tree

**Task 9:** Implement a Java program to implement all the functions of a dictionary (ADT) using Hashing

**Task 10:** Implement a Java programs for implementing Graph colouring

**Task 11:** Implement a Java programs for implementing the following sorting methods:

- Bubble sort
- Selection sort
- Insertion sort
- Quick sort

**Task 12:** Implement a Java program for implementing KMP pattern matching algorithm

**Text/Reference Books:**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SOFTWARE ENGINEERING LAB**

**Course Code: GR18D5033**

**L/T/P/C: 0/0/4/2**

**Course objectives**

- Practice software engineering principles for real world applications.
- Understanding about good practices of requirements development and management.
- Design various types of diagrams for software applications.
- Learn test case generation.
- Learn various metrics.

**Course outcomes**

- Analyze and identify requirements for complex problems.
- Design and implement various software models.
- Use modern engineering tools for specification, design, implementation and testing.
- Realize design practically, using an appropriate software engineering methodology.
- Evaluate project metrics for validation of software applications.

**Task 1**

Prepare problem statement for any application (project).

**Task 2**

Develop requirements specification for a given problem.

(The requirements specification should include both functional and non-functional requirements.)

**Task 3**

Develop DFD model (Level 0, Level 1 DFD and data dictionary) for the sample problem.

**Task 4**

Develop structured design for the DFD model developed.

**Task 5**

Develop E-R Model for the sample problem.

**Task 6**

Develop Class diagrams for a problem.

**Task 7**

Develop Use case model for a problem.

**Task 8**



Develop Sequence Diagrams for a problem.

**Task 9**

Develop State chart Diagrams for a problem.

**Task 10**

Develop activity Diagrams for a problem.

**Task11**

Perform Unit testing using testing tool.

**Task 12**

Estimate effort and development time for a project using COCOMO.

**Text Books:**

1. Fundamentals of Software Engineering, Rajib Mall, Prentice-Hall of India, 3rd Edition, 2009.
2. Software Engineering: A Practioner's Approach, Roger S. Pressman, McGraw Hills, 7th Edition, 2009.

**Reference Books**

1. Bernd Bruegge& Allen H. Dutoit, “Object-Oriented Software Engineering”, 2009.
2. Ivar Jacobson, “Object-Oriented Software Engineering”, Pearson Education, 2009.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**COMPONENT ORIENTED PROGRAMMING LANGUAGES LAB**

**Course Code: GR18D5034**

**L/T/P/C: 0/0/4/2**

**Course objectives**

- Design, document, code and test small C# console and GUI applications.
- Use the Visual Studio IDE to create and debug application and class library solutions and projects.
- Create and use new types (enumerations, classes, and structures), and understand the differences between reference types and value types.
- Query in-memory data by using LINQ.
- Creating web applications using Web Forms and Windows based applications.

**Course outcomes**

- Understand programming language concepts particularly C# and object-oriented concepts
- Write, debug, and document well-structured .NET applications
- Understand, analyze and use basic C# constructs, delegates and events
- Design and implement server-side software that interacts with a database for the purposes of performing insert, update, and delete operations on the database; test and debug the software; deploy the software.
- Learn how to link and publish Visual Studio.Net® applications to reflect a web application.

**Task1**

Program to display the addition, subtraction, multiplication and division of two number using console applications.

**Task2**

Simple application using web controls

- a) Finding factorial Value
- b) Money Conversion
- c) Quadratic Equation
- d) Temperature Conversion
- e) Login control

**Task3**

Program to display the first 10 natural numbers and their sum using console application.

**Task4**

Program in C# to demonstrate Boxing and unBoxing.

**Task5**

Program to find the sum of all the elements present in a jagged array of 3 inner arrays.

**Task6**

Implement a program to display the addition using the windows application.

**Task7**

Implement a program to convert input string from lower to upper and upper to Lower case.

**Task8**

Implement a Program to illustrate the use of different properties in C#.

**Task9**

Implement Linked Lists in C# using the existing collections name space.

**Task10**

Implement a program to simple calculator using windows application.

**Task11**

Implement a program for Tree view control

- a) Tree view control and data list                      b)Tree view operations

**Task12**

Implement a program for Validation controls

**Task13**

Implement a program to connectivity with Oracle database.

**Task14**

Implement a program to access data source through ADO.NET.

**Task15**

Implement a program to manage the session

**Text Books**

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
2. J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002.

**Reference Books**

1. Jennifer Greene, Andrew StellmanO'ReillyMediaHead First C#, 3rd Edition

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MACHINE LEARNING AND APPLICATIONS LAB**

**Course Code: GR18D5025**

**L/T/P/C: 0/0/4/2**

**Course Objectives:**

- Learn the basic concepts of python / R-Tool
- Understand Python script and Pandas.
- Describe various supervised learning algorithms.
- Discuss different unsupervised learning algorithms
- Explore various ensemble methods

**Course Outcomes:** After completion of course, students would be able to

- Illustrate various basic features of python or R-Tool.
- Implement Python script for simple problems and apply pandas for creation of databases.
- Design and analyze various supervised learning mechanisms.
- Design and analyze various unsupervised learning algorithms.
- Illustrate Random Forest Ensemble method.

**Note:** Implement the following Machine Learning Tasks using Python / R-Tool

Task 1: Implement a Python script for creating and sorting of array elements

Task 2: Apply Python pandas for creation of student database.

Task 3: Plot the graphs for Bank database using Matplotlib

Task 4: Implement Simple Linear Regression

Task 5: Implement Logistic Regression

Task 6: Construct Decision Tree for classification of any data set

Task 7: Design non-linear model using Support Vector Machines

Task 8: Implement K-means Clustering Algorithm

Task 9: Implement Principle Component Analysis for Dimensionality Reduction and plot the graph.

Task 10: Implement Random Forest ensemble method

Task-11: Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Task-12: Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

**Reference Books:**

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning,
3. Springer 2009 (freely available online)
4. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ADVANCES IN SOFTWARE TESTING**

**Course Code: GR18D5035**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Study the significance of testing.
- Study the testing to be done at various levels.
- Understand the procedure for designing test cases.
- To understand types of reviews.
- To understand the essential characteristics of tool used for test automation

**Course Outcomes**

- Illustrate life cycle models for testing.
- Design test cases and analyse test design process.
- Identify issues in test documentation.
- Analyse various reviews.
- Illustrate various testing tools effectively.

**Unit I**

**Test Basics:** Introduction, Testing the Software Lifecycle, Sequential Lifecycle Models, Iterative or Incremental Lifecycle Models, Spiral Lifecycle Models, Test Levels, Specific Systems, Metrics and Measurement, Ethics.

**Unit II**

**Testing Processes:** Introduction, Test Process Models Test Planning and Control, Test Analysis and Design, Test Implementation and Execution, Evaluating Exit Criteria and Reporting, Test Closure Activities.

**Unit III**

**Test Management:** Test Management Documentation and Test Plan Documentation Templates, Test Estimation, Test Management Issues, Non Functional Testing Issues.

**Unit IV:**

Test Techniques, Test of Software Characteristics, Reviews, Types of Reviews, Introducing Reviews, Success Factors for Reviews.

## **Unit V:**

**Test Tools and Automation:** Introduction, Test Tool Concepts, Test Automation Cost, Test Automation Risks, Test Automation Benefits, Test Automation Strategies, Case Study in Test Automation Strategy, Test Tool Classification, Test Tool Categories,

### **Text Books**

1. Rex Black “Advanced Software Testing”, 2<sup>nd</sup> edition, Shroff Publishers, 2009.
2. Aditya P Mathur, Foundations of software testing, 2<sup>nd</sup> edition, Pearson, 2013.

### **References:**

1. Boris Beizer, “Software Testing Techniques”, 2nd Edition, Dream tech press, 2003.
2. M G Limaye, “Software Testing – Principles, Techniques and Tools”, Tata McGraw Hill, 2009.
3. Edward Kit, “Software Testing in the Real World - Improving the Process”, Pearson Education, 2004.
4. William E. Perry, “Effective methods for software testing”, 2<sup>nd</sup> Edition, John Wiley, 2000.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MODEL DRIVEN SOFTWARE ENGINEERING**

**Course Code: GR18D5036**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Develop enabling technologies for supporting model driven engineering approaches to software development.
- Develop improved techniques and tool support for using executable specifications.
- Develop model-based testing to better capture, manage and test software against its requirements.
- Better integrate social networking tools and techniques into the software development process to improve the efficiency and development of software.
- Study the understand various MDSD tools.

**Course outcomes**

- Analyse the importance of model driven technology in software development.
- Apply Meta modeling techniques in software development life-cycle.
- Identify general purpose modeling languages and domain specific modeling languages.
- Apply best practices for model driven software application for development.
- Analyse MDSD tools and version management for model driven software applications.

**Unit I**

**MDSD Basic Terminology**

Goals of MDSD, MDSD Approach, Overview of MDA concepts, Architecture-Centric MDSD, Common MDSD concepts and terminology, Model-Driven Architecture, Generative Programming, Software factories, Model-Integrated computing, Language-Oriented Programming, Domain specific modeling.

**Unit II**

**Meta modeling**

What is Meta modeling?, Meta levels vs. Level of Abstraction, MOF and UML, Extending UML, UML profiles, Meta modeling and OCL, Examples, Tool-supported Model validation, Meta modeling and Behavior, Pitfalls in Meta modeling, MDSD classification.

**Unit III**

**Model Transformation with QVT**

History, M2M language requirements, Overall Architecture, An Example Transformation, The OMG



standardization Process and Tool Availability, Assessment.

### **MDSD Tools: Roles, Architecture, Selection Criteria, and Pointers**

Role of Tools in the Development Process, Tool Architecture and selection criteria, pointers.

**The MDA Standard:** Goals, Core concepts

## **Unit IV**

### **MDSD Process Building Blocks and Best Practices**

Introduction, Separation between Application and domain Architecture Development, Two track Iterative Development, Target Architecture Development Process, Product-line Engineering.

### **Testing**

Test Types, Tests in Model-driven Application Development, Testing the Domain Architecture

## **Unit V**

### **Versioning**

What is Versioned? Projects and Dependencies, The structure of Application Projects, Version management and Build Process for mixed files, modeling in a team and versioning of partial models

**Case study:** Embedded Component Infrastructures

Overview, Product-Line Engineering, Modeling, Implementation of Components, Generator Adaptation, Code Generation.

### **Text Books**

1. Model-Driven Software Development-Technology, Engineering, Management by Thomas Stahl, Markus Volter, Jul 2006, John Wiley & Sons.
2. Model-Driven Software Development: Integrating Quality Assurance by Jörg Rech, Christian Bunse, 2008, Information Science Publishing.

### **Reference Books**

1. Model-Driven Software Development by Sami Beydeda Matthias Book, Volker Gruhn, Springer.
2. Model Driven Systems Development with Rational Products By Brian Nolan, Barclay Brown, Dr. Laurent Balmelli, Et Al Tim Bohn, 2008, IBM.
3. Model Driven Development with Executable UML by Dragan Milicev, 2009, Wiley India Pvt Ltd.
4. Model Driven Software Development by Kevin Lano, Apr 2009, Cengage Business Press.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ADVANCED DATA MINING**

**Course Code: GR18D5003**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Understand data mining functionalities and pattern mining.
- Learn different classification techniques for mining patterns.
- Describe advanced clustering methods with real time applications.
- Discuss types of web mining and text mining techniques.
- Understand spatial and temporal mining applications in data mining,

**Course outcomes**

- Summarize the basic data mining tasks and various types of pattern mining.
- Apply classification techniques for data mining.
- Evaluate the performance of different advanced clustering algorithms.
- Analyse recent trends in data mining such as web mining , text mining and spatial mining.
- Construct temporal association rules and sequence mining algorithms.

**UNIT I**

Data mining Overview and Advanced Pattern Mining Data mining tasks – mining frequent patterns, associations and correlations, classification and regression for predictive analysis, cluster analysis , outlier analysis; advanced pattern mining in multilevel, multidimensional space – mining multilevel associations, mining multidimensional associations, mining quantitative association rules, mining rare patterns and negative patterns.

**UNIT II**

Advance Classification, Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughset approach, fuzzy set approach.

**UNIT III**

Advance Clustering Density - based methods –DBSCAN, OPTICS, DENCLUE; Grid - Based methods – STING, CLIQUE; Expectation – maximization algorithm; clustering High - Dimensional Data; Clustering Graph and Network Data.

## **UNIT IV**

Web and Text Mining Introduction, web mining, web content mining, web structure mining, web usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

## **UNIT V**

Temporal and Spatial Data Mining Introduction; Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis, Spatial Mining – Spatial Mining Tasks, Spatial Clustering, Data Mining Applications.

### **Text Books**

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jianpei, Morgan Kaufmann.
2. Data Mining Techniques – Arun K. Pujari, Universities Press.

### **Reference Books**

1. Introduction to Data Mining – Pang-Ning Tan, Vipinkumar, Michael Steinbach, Pearson.
2. Data Mining Principles & Applications – T.V. Suresh Kumar, B. Eswar Reddy, Jagadish Kalimani, Elsevier.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **DATA ANALYTICS**

**Course Code: GR18D5018**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle
- To Master the R programming and understand how various statements are executed in R
- Understand and use linear, non-linear regression models, and classification techniques for data analysis.

### **Course outcomes**

- Understand the introduction of R programming for data analytics, develop and analyze Summary Statistics.
- Analyze connecting of R to SQL databases and identify suitable Regression analysis and correlation.
- Compare and contrast various Verticals - Engineering, Financial and others.
- Apply how to manage our work to meet requirements.
- Come up with analysis of working effectively with Colleagues.

### **Unit I**

**Introduction to Analytics and R programming :** Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt,.csv etc. Outliers, Combining Datasets, R Functions and loops.

Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

### **Unit II**

**SQL using R & Correlation and Regression Analysis:** Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector.

Regression Analysis, Assumptions of OLS Regression, Regression Modeling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

### Unit III

**Understand the Verticals - Engineering, Financial and others:** Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc.

Understanding Business problems related to various businesses

### Unit IV

**Manage your work to meet requirements:** Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

### Unit V

**Work effectively with Colleagues:** Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc.

### Text Books

1. Student's Handbook for Associate Analytics.
2. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014

### Reference Books

1. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
2. Data Manipulation with R, JaynalAbedin and Kishor Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
3. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc, 2012.
4. Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook written for an undergraduate course in probability and statistics.
5. An Introduction to R, by Venables and Smith and the R Development Core Team. This may be downloaded for free from the R Project website (<http://www.r-project.org/>, see Manuals). There are plenty of other free references available from the R Project website.
6. Time Series Analysis and Mining with R, Yanchang Zhao
7. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
8. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
9. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
10. Introduction to Probability and Statistics Using R, G. Jay Kerns, First Edition, 2011
11. The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and Elizabeth Matsui, Leanpub Publications, 2014
12. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers. John Wiley & Sons, 2010. The Basic Concepts of Time Series Analysis. <http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf>

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SERVER SIDE SCRIPTING LANGUAGES**

**Course Code: GR18D5037**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Knowledge of designing, planning, implementation of software using scripting languages.
- Capability to programming skills in constructing a complete end to-end information system solution.
- Insight into Developing Web sites using php&mysql.
- Capability to Design and implement Python software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification.
- To understand effectively, use, and develop modern data storage, interpretation, analytical and simulation technologies

**Course outcomes**

- Analyze a problem, identify and define the computing requirements appropriate to its solution.
- Develop web applications and scripts using PHP and Python
- Design secure and sophisticated web application for the world
- Develop a form containing several fields and be able to process the data provided on the form by a user in a PHP-based script.
- Ability to develop secure login web applications and application to connect with the database

**Unit I**

**Introduction to Scripting:** Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages.

**PHP Basics**

PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function ,Creating a Function, Function Libraries, Arrays, Strings and Regular Expressions.

**Unit II**

**MySQL Basics**

Introduction to MySQL: Database Concepts, General Overview of MySQL database, Installing and Configuring MySQL, Working with Data bases and Tables- Working with databases, tables, Database Queries, Stored Routines, Securing MySQL, SQL Injection.

**Unit III**

**Advanced PHP Programming:** PHP and Web Forms, Files, PHP Authentication and Methodologies - Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP.

#### **Unit IV**

Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World – Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

#### **Unit V**

##### **Python**

Introduction to Python language, Python-syntax, statements, functions, Built-in-functions and methods, Modules in Python, Exception Handling, Integrated Web Applications in Python – Building small, efficient Python Web Systems, Web Application Framework.

#### **Text Books**

1. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, press Publications (Dreamtech.).
2. The World of Scripting Languages, David Barron, Wiley India.

#### **Reference Books:**

1. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
2. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, Lee and B. Ware (Addison Wesley) Pearson Education.
3. Programming Python, M. Lutz, SPD.
4. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
5. PHP 5.1, I. Bayross and S. Shah, The X Team, SPD.
6. Core Python Programming, Chun, Pearson Education.
7. Guide to Programming with Python, M. Dawson, Cengage Learning.
8. [www.w3schools.com](http://www.w3schools.com)

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SERVICE ORIENTED ARCHITECTURE**

**Course Code: GR18D5038**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Design models for SOA.
- Understanding about the model and gain the Knowledge.
- Capability to Design SOA models.
- Capability to build the Web Service Extensions.
- Understanding about the SOA integration and performance.

**Course outcomes**

- Ability to gain knowledge for a organization to set services.
- Develop a SOA modeling use cases.
- Develop the web services Extensions.
- Design the service message to facilitate integration and performance.
- Build the Business planning of a SOA.

**Unit I**

**SOA and Web Services Fundamentals: Introducing SOA-**Fundamental SOA, Common characteristics of Contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA.

**Evolution of SOA-** an SOA timeline, the continuing evolution of SOA, The roots of SOA.

**Web Services and primitive SOA-** the Web Services frame work, Services, Service descriptions, messaging.

**Unit II**

**Web Services Extensions: Web Services and Contemporary SOA--** Message exchange patterns, Service Activity, Coordination, Atomic transactions, Business Activities, Orchestration, Choreography, Addressing, Reliable messaging, Correlation, Policies, Metadata exchange and Security.

**Unit III**



**SOA and Services – Orientation: Principles of Service Orientation** -- Anatomy of SOA, Common Principles of Service-Orientation, interrelation between Principles of Service-Orientation, Service-Orientation and Object Orientation, Native Web Services support for Principles of Service-Orientation.

**Service Layers** - Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

#### **Unit IV**

**Building SOA (Planning and Analysis): SOA Delivery Strategies**-- SOA delivery lifecycle phases, the top-down strategy, The bottom-up strategy, The agile strategy.

**Service Oriented Analysis**-- Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Service, Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.

#### **Unit V**

**Building SOA (Technology and Design): Service Oriented Design**--Introduction to Service-Oriented design, WSDL related XML schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.

**Service Design**--Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines.

**SOA Platforms**--SOA Platform basics, SOA support in J2EE and .NET, Integration Considerations.

#### **Text books**

1. Service-Oriented Architecture-Concepts, Technology, and Design, Thomas Erl, Pearson Education.
2. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, Pearson Education.

#### **Reference Books**

1. The Definitive guide to SOA, Jeff Davies& others, Apress, Dreamtech.
2. Java SOA Cook book, E.H Hewitt, SPD.
3. SOA in practice, N.M.Josuttis,SPD.
4. SOA for Enterprise Applications, Shankar.K, Wiley India Edition.
5. SOA-Based Enterprise Integration, W.Roshen, TMH.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SOFTWARE PATTERNS**

**Course Code: GR18D5039**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Capability to analyse a software development problem and express its essence succinctly and precisely;
- Implementing a module so that it executes efficiently and correctly.
- Understanding the design patterns that are common in software applications.
- Understanding the design patterns are standard solutions to common software design Problems.
- Ability to use systematic approach that focus and describe abstract systems of interaction between classes, objects, and communication flows.

**Course outcomes**

- Identify various attributes for creating software architecture for implementing software systems.
- Select appropriate patterns in solving software related issues.
- Identify categories of design patterns.
- Identify and apply structural patterns for solving design issues.
- Analyse appropriate behavioral patterns to solve design problems.

**Unit I**

**Envisioning Architecture** - What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views and the Architecture Business Cycle.

**Creating an Architecture** - Quality Attributes, Achieving qualities, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

**Unit II**

Introduction to Patterns - What is a Pattern? What makes a Pattern? Pattern Categories, Relationships between Patterns, Pattern Description, Patterns and Software Architecture.

**Architectural Patterns**

Layers, Pipes and Filters, Blackboard, Broker, Microkernel, MVC, PAC, Reflection.

### **Unit III**

What is Design Pattern, Organizing catalogs, Role in solving design problems, Selection and Usage?

**Case Studies** – Designing a Document Editor - Design issues of Lexi Editor in Design Patterns, The World Wide Web - a case study in interoperability

**Creational Patterns** - Abstract factory, builder, factory method, prototype, singleton.

### **Unit IV**

**Structural Patterns** - Adapter, bridge, composite, decorator, façade, flyweight, Proxy, Decorator, façade, flyweight, Proxy.

### **Unit V**

**Behavioral Patterns** - Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, and visitor.

### **Text Books**

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Pattern-Oriented Software Architecture”, A System of Patterns, Frank BuschmannRegineMeunier, Hans Rohnert, Peter Sommerlad and Michael Stal, WILEY.

### **Reference Books**

1. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Pearson Education.
2. AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis, by William J. Brown, Raphael C. Malveau, Hays W. "Skip" McCormick , Thomas J. Mowbray (Author) 1st Edition, Java testing patterns, John Thomas etc, wiley.
3. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.  
Design Patterns in Java, Steven John Metsker& William C. Wake, Pearson education, 2006.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**DISTRIBUTED DATABASES**

**Course Code: GR18D5040**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Ability to understand the difference between centralized and distributed systems.
- Ability to analyze the key characteristics and the architecture of distributed databases.
- Transactional and Reliability aspect of the distributed environment.
- Introduction to the object oriented distributed environment.
- Ability to understand database integration aspect.

**Course Outcomes**

- Demonstrate a view of the Distributed Database environment
- Applicability to solve the fragment queries
- Capable of understanding the architecture of the distributed database environment.
- Analyse the Transaction, reliability and the Concurrency issues
- Describe the outline of the object databases, data integration issues

**Unit I**

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

**Unit II**

Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries. Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

**Unit III**

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions Concurrency Control, Foundation of Distributed Concurrency

Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

#### **Unit IV**

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection.

#### **Unit V**

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multi database Concurrency Control, Multi database Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

#### **Text Books**

1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.

#### **Reference Books:**

2. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez , Pearson Education, 2nd Edition.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **ADVANCES IN SOFTWARE TESTING LAB**

**Course Code: GR18D5042**

**L/T/P/C: 0/0/4/2**

### **Course objectives**

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
- To understand software test automation problems and solutions.
- To learn how to write software testing documents, and communicate with engineers in various forms.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

### **Course outcomes**

- Apply software testing knowledge and engineering methods.
- Design test cases for software applications.
- Differentiate manual and automation testing.
- Demonstration of testing tools.
- Identify the needs of software test automation, and define and develop a test tool to support test automation.

#### **Task1**

Implement programs in C Language to demonstrate the working of the following constructs:

- i) do...while (ii) while....do (iii) if...else (iv) switch (v) for

#### **Task2**

Implement a program written in C language for Matrix Multiplication fails. Introspect the causes for its failure and write down the possible reasons for its failure.

#### **Task3**

Consider ATM System and Study its system specifications and report the various bugs.

#### **Task4**

Design test cases for banking application.

#### **Task5**

Create test plan document for Library Management System.

### **Working with Tool's:**

Understand the Automation Testing Approach, Benefits, Workflow, Commands and Perform

Testing on one application using the following Tool's.

**Task 6**

Demonstrate any one software application on any one open source testing tools.

**Task 7**

Using Selenium IDE, design a test suite containing minimum 4 test cases.

**Task 8**

Design a test suite for any two web sites.

**Task 9**

Install Selenium server and demonstrate it using a script in Java/PHP.

**Task 10**

- a. Implement and test a program to login a specific web page.
- b. Implement and test a program to update 10 student records into table into Excel file.

**Task 11**

- a. Implement and test a program to select the number of students who have scored more than 60 in any one subject. (or all subjects).
- b. Implement and test a program to provide total number of objects present / available on the page.

**Task 12**

- a. Implement and test a program to get the number of list items in a list / combo box.
- b. Implement and test a program to count number of items present on a desktop.

**Text Books**

1. M G Limaye, "Software Testing – Principles, Techniques and Tools", Tata McGraw Hill, 2009.
2. Edward Kit, "Software Testing in the Real World - Improving the Process", Pearson Education, 2004.

**Reference Books:**

1. William E. Perry, "Effective methods for software testing", 2<sup>nd</sup> Edition, John Wiley, 2000.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **SERVERSIDE SCRIPTING LANGUAGES LAB**

**Course Code: GR18D5041**

**L/T/P/C: 0/0/4/2**

### **Course objectives**

- Ability to use scripting languages like PHP, Python to develop applications.
- To become proficient PHP/MySQL web developers.
- Ability to program Python programs using subset of data types and using assignment, method calls, while loops, for loops, and conditionals.
- Ability to read data from text files, and write formatted text files and to manipulate data from one format into another.
- Ability to use the Python Regular Expression capabilities for data verification

### **Course outcomes:**

- Evaluate the process of executing a PHP-based script on a web server.
- Summarize different Data Base languages, and debug and run complete web applications using PHP and MySQL.
- Analyze the web technology for various application using PHP and Python.
- Construct simple graphical user interfaces that drive their programs.
- Choose appropriate paradigm for dealing with form-based data.

### **PHP**

#### **Task1**

- a. Design a form using PHP to accept the details of 5 different items, such as item code, item name, and units sold, rate. Display the bill in the tabular format. Use only 4 text boxes. (Hint: Use of explode function.)
- b. Create a form to accept customer information (name, address, ph-no). Once the customer information is accepted, accept product information in the next form (Product name, qty, rate). Display the bill for the customer in the next form. Bill should contain the customer information and the information of the products entered.

#### **Task2**

- a. Implement a PHP script to create an associative array with book details and display.
- b. Implement a PHP script to create an array and try with all array functions.

#### **Task3**

- a. Implement a PHP script to create Cookie, store a value "Ganesh" in the cookie.
- b. Implement a PHP script to store, retrieve and delete data using session variables.
- c. Implement a program for Cinema Ticketing. All the age should be over 18 years, if less than, don't allow getting ticket. (Apply the exception handling).



d. Create a login form with a username and password. Once the user logs in, the second form should be displayed to accept user details (name, city, phoneno). If the user doesn't enter information within a specified time limit, expire his session and give a warning.

#### **Task 4**

- a. Implement a PHP program to display the contents of a file using fgets, fgetc, fread functions.
- b. Implement a PHP program to upload a file and display the contents in server.
- c. Design a PHP script to accept user name and password. If in the first three chances, username and password entered is correct, then display second form, otherwise display error message.

#### **Task 5**

- a. Create a registration form which contains fields name, Roll No, Gender and a submit button. All the details should be displayed in the server page when the user clicks the submit button.
- b. Write a PHP script for the following: Design a form to accept a string. Write a function to count the total number of vowels (a,e,i,o,u) from the string. Show the occurrences of each vowel from the string. Check whether the given string is a palindrome or not, without using built-in function.(Use radio buttons and the concept of function. Use 'include' construct.)

#### **Task6**

- a. Design a database in MYSQL using PHP. Create table in database. Store, Update, Delete and Retrieve data from the table. Display the data from the table.
- b. Design a PHP application that will provide a form containing fields to fill book detail (Booktitle, Author, Publication, ISBN, Price and category). Display filled details to the user.

#### **Task7**

Implement a PHP script that will demonstrate POSIX regular expressions for validating  
i)Name ii) Pin Code iii) Date iv) Email-id.

#### **Task8**

Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

#### **Task9**

**Develop a PHP script for the following:**

Design a form to accept two strings from the user. Find whether the small string appears at the start of the large string. Provide a text box to accept the string that will replace all occurrences of small string present in the large string. Also split the large string into separate words. (Use regular expressions).

## **PYTHON**

### **Task10**

- a. Implement a Python script to test built in methods of Strings.
- b. Implement a Python script to test various functions of List and Tuple.
- c. Implement a Python script to test various functions of Dictionary.

### **Task11**

- a. Develop a program to perform various operations on array using Python Script.
- b. Write a Python Script to get the current memory address and the length in elements of the buffer used to hold an array's contents and also find the size of the memory buffer in bytes

### **Task 12**

Develop a two player TIC Tac Toe Game applications using Python Script.

### **Text Books**

1. Beginning.PHP.and.MySQL.3rd.Edition W. Jason Gilmore-Third Edition Apress publications

### **Reference Books:**

1. Python-Standard Library by FrederikLuth- O'Relly
2. Practical Programming in Python by Jeffery Elkener

# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## ADVANCED DATA MINING LAB

Course Code: GR18D5009

L/T/P/C: 0/0/4/2

**Course Objectives:** Students undergoing this course are expected to

- Differentiate On-line Transaction Processing and On-line Analytical processing
- Learn Multidimensional schema suitable for data warehousing
- Understand various data mining functionalities
- Understands the various classification and clustering algorithms
- Understands the Analysis Procedure by using various Decision tree algorithms.

**Course Outcomes:** At the end of the course, the student will be able to

- Adapt to new data mining tools.
- Explore recent trends in data mining such as web mining, spatial-temporal mining
- To understand the basic principles, concepts and applications of data warehouse and data mining.
- Ability to create training data set using data mining tools.
- Explores knowledge on Clustering and Classification analysis.

### Case Study1:

**Hospital Management System** Data Warehouse consists of Dimension Table and Fact Table. REMEMBER the following Dimension the dimension object (Dimension): \_ Name\_ Attributes (Levels), with one primary key \_ Hierarchies One time dimension is must. About Levels and Hierarchies Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels: H1: YearL>QuarterL>MonthL>WeekL>DayL H2: YearL>WeekL>DayL The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth. About Unique Key Constraints When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level) Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE. Assume the Relational database (SOURCE) table schemas as follows TIME (day, month, year), PATIENT (patient\_name, Age, Address, etc.,) MEDICINE ( Medicine\_Brand\_name, Drug\_name, Supplier, no\_units, Uinit\_Price, etc.,) SUPPLIER :( Supplier\_name, Medicine\_Brand\_name, Address, etc., ) If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably. Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

### Case Study2:

#### Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of

crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the bank's profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

**Knowledge Engineering.** Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules. **Books.** Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form. **Common sense.** Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant. **Case histories.** Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

**List of Tasks:** (Turn in your answers to the following tasks )

**Task 1.** List all the categorical (or nominal) attributes and the real-valued attributes separately.

**Task 2.** What attributes do you think might be crucial in making the credit assessment. Come up with One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. some simple rules in plain English using your selected attributes.

**Task 3.** Report the model obtained after training.

**Task 4.** Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?

**Task 5.** Is testing on the training set as you did above a good idea? Why or Why not?

**Task 6.** One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?

**Task 7.** Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.

**Task 8.** Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

**Task 9.** Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results

obtained in problem 6 (using equal cost)?

**Task 10.** Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

**Task 11.** You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

**Task 12.** (Extra Credit): How can you convert a Decision Tree into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules.PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

#### **Task Resources**

- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)

#### **Weka Resources**

- Introduction to Weka (html version) (download ppt version)
- Download Weka
- Weka Tutorial
- ARFF format
- Using Weka from command line

**Course Objectives:**

- Create competitive advantage from both structured and unstructured data.
- Study and analyse various models and its visualization.
- Imparting the R programming concepts
- Work with R and R Studio to analyze structured data.
- Work with R and R Studio to analyze unstructured data

**Course Outcomes:** Student is able to

- Demonstrate proficiency with statistical analysis of data.
- Construct and assess data-based models.
- Apply data modelling techniques to large data sets.
- Design applications for data analytics using R programming.
- Identify tools for data analytic solution.

**List of Tasks:**

**Basic Statistics, Visualization, and Hypothesis Tests**

**Task 1.** Reload data sets into the R statistical package

**Task 2.** Perform summary statistics on the data

**Task 3.** Remove outliers from the data

**Task 4.** Plot the data using R

**Task 5.** Plot the data using lattice and ggplot

**Task 6.** Test a hypothesis about the data

**Linear Regression**

**Task 7.** Use the R -Studio environment to code OLS models

**Task 8.** Review the methodology to validate the model and predict the dependent variable for a set of given independent variables

**Task 9.** Use R graphics functions to visualize the results generated with the model

**Logistic Regression**

**Task 10.** Use R -Studio environment to code Logistic Regression models

**Task 11.** Review the methodology to validate the model and predict the dependent variable for a set of given independent variables

**Task 12.** Use R graphics functions to visualize the results generated with the model

### **Reference Books**

- R Commands - Quick Reference
- Surviving LINUX - Quick Reference

**MINI PROJECT**

**Course Code: GR18D5190**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- To improve the technical presentation skills of the students.
- To train the students to do literature review.
- To impart critical thinking abilities for problem solutions.
- To learn different implementation techniques.
- To prepare technical reports

**Course Outcomes:** At the end of the course, the student will be able to

- Choose the problem domain in the specialized area under computer science and engineering.
- Acquire and categorize the solution paradigms with help of case studies
- Design and code using selected hardware, software and tools.
- Execute, Implement and demonstrate the problem statement by using the selected hardware, software and tools.
- Document the thesis and publish the final work in a peer reviewed journal.

**Syllabus Contents:**

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution. Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the Departmental committee.



**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SOFTWARE QUALITY ASSURANCE**

**Course Code: GR18D5043**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Design models for SOA.
- Understanding about the model and gain the Knowledge.
- Capability to Design SOA models.
- Capability to build the Web Service Extensions.
- Understanding about the SOA integration and performance.

**Course outcomes**

- Ability to gain knowledge for a organization to set services.
- Develop a SOA modeling use cases.
- Develop the web services Extensions.
- Design the service message to facilitate integration and performance.
- Build the Business planning of a SOA.

**Unit I**

**FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE**

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management

**Unit II**

**MANAGING SOFTWARE QUALITY**

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management.

**Unit III**

**SOFTWARE QUALITY ASSURANCE METRICS**

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis

**Unit IV**

**SOFTWARE QUALITY PROGRAM**

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

## **Unit V**

### **SOFTWARE QUALITY ASSURANCE STANDARDIZATION**

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 –Comparison of ISO 9000 Model with SEI's CMM.

The models orientations, ISO 9000 weaknesses, CMM weaknesses, the capability model enjoys some important strengths, SPICE-software Process Improvement and capability determination.

#### **Text Books**

1. Gordon G Schulmeyer, “Handbook of Software Quality Assurance”, Third Edition, Artech House Publishers 2007
2. Nina S Godbole, “Software Quality Assurance: Principles and Practice”, Alpha Science International, Ltd, 2004

#### **Reference Books**

1. Mordechai Ben-Menachem / Garry S Marliss, “Software Quality”, Vikas Publishing House, Pvt, Ltd., New Delhi.(UNIT III to V)
2. Watts S Humphrey, “Managing the Software Process”, Pearson Education Inc.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MULTIMEDIA AND RICH INTERNET DEVELOPMENT**

**Course Code: GR18D5044**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- Understanding the difference between Multimedia Communication and Multimedia Networks
- Analysis of different compression and decompression techniques for Multimedia communication such as Text, Image, Audio and Video.
- Knowledge about Web 2.0 and rich Internet applications.
- Visualization of the Rich Internet Application through Adobe Flash and Flex
- Distinction between Traditional Web based Applications vs Ajax based web applications and to design applications using DOJO Tool kit.

**Course outcomes**

- Find the difference between Multimedia Communication and Multimedia Networks
- Implement some of the compression and decompression algorithms by using different media such as Text, Image, Audio and Video
- Develop Web 2.0 with rich Internet features
- Implement multimedia animation movie through Adobe Flash and Flex
- Design a Ajax based web application by using DOJO Tool kit

**Unit I**

**Introduction to Multimedia:** Internet and Multimedia communications, Multimedia Networks, Multimedia Applications, Multimedia Information representation-Digitization Principles, Text, Images, Audio and Video, Compression Methods-Basic Coding Methods-Run Length coding, Huffman coding, Arithmetic coding, Discrete Cosine Transform, Differential PCM, Motion Compensated Prediction, Video Compression- JPEG, H.261, MPEG-1 Video, MPEG 2 and 3 Video, H.263, Wavelet and Fractal Image Compression, Audio Compression.

**Unit II**

**Multimedia Applications in Networks:** Introduction, Application Level Framing, Audio/Video Conferencing-Session Directories, Audio/Video Conferencing, Adaptive Applications, Receiver Heterogeneities, Real Time Application with Resource Reservation, Video Server, Applications requiring reliable multicast-White Board, Network Text Editor for Shared Text Editing, Multi Talk, Multicast file transfer, Multimedia Applications on the World Wide Web-Multicast web Page sharing, Audio/Video Streams in the www, Interactive Multiplayer Games.

### **Unit III**

**Web 2.0:** What is Web 2.0, Search , Content Networks, User Generated Content, Blogging, Social Networking, Social Media, Tagging, Social Marking, Rich Internet Applications, Web Services, Mashups, Location Based Services, XML, RSS, ATOM , JSON, and VoIP, Web 2.0 Monetization and Business Models, Future of the Web.

### **Unit IV**

**Rich Internet Applications (RIAs) with Adobe Flash and Flex:** Adobe Flash-Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, Publish your Flash Movie, Creating Special Effects with Flash, Creating a website splash screen, action script, Web Sources. Adobe Flex 2-Introduction, Flex Platform Overview, Creating a Simple User Interface, Accessing XML data from your Application, Interacting with server side Applications, Customizing your User Interface, Creating Charts and Graphs, Connection Independent RIAs on the Desktop-Adobe Integrated Run Time(AIR), Flex 3 Beta.

### **Unit V**

**Ajax-enabled Rich Internet Application:** Introduction, Traditional Web Applications vs Ajax Applications, Rich Internet Application with Ajax, History of Ajax, Raw Ajax example using xml http request object, Using XML, Creating a full scale Ajax Enabled application, Dojo Toolkit.

### **Text Books**

1. Multimedia Communications Protocols and Applications, Franklin F Kuo, JJoquin Garcia, Wolfgang Effelsberg, Prentice Hall Publications.
2. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison Wesley Publications.

### **Reference Books**

3. Ajax, Rich Internet Applications, and Web Development for Programmmers,Paul J Dietel and Harvey M Deitel, Deitel Developer Series, Pearson education.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **SOFTWARE CONFIGURATION MANAGEMENT**

**Course Code: GR18D5045**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- To learn the changing nature of software and need for change management.
- To study the different phases involved in software configuration management.
- To learn about the SCM plans, audits and reviews.
- To study the various SCM tools and implementation techniques.
- To study the SCM different scenarios and future directions.

### **COURSE OUTCOMES**

At the end of the course the student will be able to:

- Identify items that need to be controlled for changes and systematically controlling changes to them.
- Establishing & maintaining integrity of these items and providing accurate status of items to relevant stakeholders (like developers, end users, and customers) throughout the Software Development Lifecycle.
- Understanding Configuration audits and management plans.
- Understand Software configuration management tools and their implementation.
- Familiarity of SCM in different scenarios for future directions.

### **Unit I**

**OVERVIEW :**SCM: Concepts and definitions – SCM Plan – Software development life cycle models – SDLC Phases – Need and importance of Software configuration management – Increased complexity and demand – Changing nature of software and need for change management – Lower maintenance costs and better quality assurance – Faster problem identification and bug fixes - SCM: Basic concepts – Baselines – Check-in and Check-out- Versions and Variants –System Building – Releases.

### **Unit II**

**Different phases of software configuration management:** Different Phases of SCM – SCM System design - SCM Plan preparation – SCM Team organization – SCM Infrastructure organization – SCM Team training – Project team training – Configuration identification – Configuration Control – Configuration status accounting – Configuration audits.

### **Unit III**

**CONFIGURATION AUDITS AND MANAGEMENT PLANS :** When, what and who of auditing - Functional Configuration audit – Physical Configuration audit – Auditing the SCM System – Role of SCM Team in configuration audits – SCM plan and the incremental approach – SCM Plan and SCM Tools – SCM Organization.

#### **Unit IV**

**SOFTWARE CONFIGURATION MANAGEMENT TOOLS AND IMPLEMENTATION :** Advantages of SCM tools – Reasons for the increasing popularity of SCM tools – SCM Tools and SCM Functions – SCM tool selection – Role of Technology – Selection criteria – Tool implementation – SCM implementation plan – implementation strategy – SCM Implementation team.

#### **Unit V**

**TRENDS IN SCM: FUTURE DIRECTIONS** SCM in different scenarios – SCM and project size – SCM in integrated development environments – SCM in distributed environments – SCM and CASE Tools - Trends in SCM. Hardware and Software Management – Better integration with IDE'S and CASE environments – Customization – Better decision making capabilities – Reduction in SCM Team size – Market snapshot.

#### **Text Books**

1. Jessica Keyes, Software Configuration Management, Auerbach Publications, 2008.
2. Alexis Leon, Software Configuration Management Handbook, Artech Print on Demand; 2 edition, 2009

#### **Reference Books**

1. Robert Aiello and Leslie Sachs Configuration Management Best Practices: Practical Methods that work in Real World, , Addison-Wesley Professional; 1 edition, 2010.
2. Stephen P. Berczuk, Brad Appleton and Kyle Brown , “Software Configuration Management Patterns: Effective Teamwork and Practical Integration”, Addison-Wesley, 2003.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **BUSINESS ANALYTICS**

**Course Code: GR18D5201**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- Understand the role of business analytics and statistical tools used within an organization.
- Discuss Trendiness and Regression Analysis and different visualization techniques to explore data.
- Describe the organization structures and different type of business analytics.
- Know Forecasting Techniques, Monte Carlo Simulation and Risk Analysis.
- Understand decision analysis and recent trends in business intelligence.

### **Course outcomes**

- Demonstrate business analytics process and use statistical tools for implementation of business process.
- Design relationships and trends to explore and visualize the data.
- Examine the organization structures of business analytics and Categorize types of analytics.
- Apply Forecasting Techniques, Monte Carlo Simulation and Risk Analysis.
- Formulate decision analysis and summarize recent trends in business intelligence.

### **Unit I**

**Business analytics:** Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics.

**Statistical Tools:** Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

### **Unit II**

**Trendiness and Regression Analysis:** Modelling Relationships and Trends in Data, simple Linear Regression, Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

### **Unit III**

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes, Descriptive Analytics, predictive analytics, predicative Modeling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modeling, nonlinear Optimization.

## **Unit IV**

**Forecasting Techniques:** Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

**Monte Carlo Simulation and Risk Analysis:** Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

## **Unit V**

**Decision Analysis:** Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making, Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

## **Reference Books**

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## INDUSTRIAL SAFETY

**Course Code: GR18D5202**

**L/T/P/C: 3/0/0/3**

### Course objectives

- To understand the importance of maintaining a safe workplace.
- To maintain safety standards in compliance with regulatory requirements and within engineering limits understand personal safety and industrial safety.
- To create a job safety analysis (JSA) for a given work project.
- To follow safety recordkeeping and management, and the role of the safety manager.
- To utilize personal proactive equipment.

### Course outcomes

- Understanding of Safety principles.
- Analyze different types of exposure and biological effects, exposure guidelines and basic workplace monitoring Ability to do Hazard analysis.
- Demonstrate an understanding of workplace injury prevention, risk management, and incident investigations.
- Understand the acute and chronic health effects of exposures to chemical, physical and biological agents in the workplace.
- Demonstrate knowledge of the types of hazards, planning, organization and training needed to work safely with hazardous materials.

### Unit I

**Industrial safety:** Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

### Unit II

**Fundamentals of maintenance engineering:** Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

### Unit III

**Wear and Corrosion and their prevention:** Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

## **Unit IV**

**Fault tracing:** Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

## **Unit V**

**Periodic and preventive maintenance:** Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

## **Reference Books**

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**OPERATIONS RESEARCH**

**Course Code: GR18D5203**

**L/T/P/C: 3/0/0/3**

**Course objectives**

- To define and formulate linear and Non-linear programming problems and appreciate their limitations arising from a wide range of applications.
- To perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.
- To distinguish various inventory models and develop proper inventory policies.
- To solve the scheduling and sequencing models.
- To understand how to model and solve problems using dynamic programming, Game Theory.

**Course outcomes**

- The student will formulate and solve problems as networks and graphs for optimal allocation of limited resources such as machine, material and money.
- The student will be able to carry out sensitivity analysis.
- The student will solve network models like the shortest path, minimum spanning tree, and maximum flow problems.
- The student will be able to distinguish various inventory models and develop proper inventory policies.
- The student will also propose the best strategy using decision making methods under uncertainty and game theory.

**Unit I**

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex techniques, Sensitivity Analysis, Inventory Control Models

**Unit II**

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

**Unit III**

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

**Unit IV**

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

## **Unit V**

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

### **Reference Books**

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Panner selvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **COST MANAGEMENT OF ENGINEERING PROJECTS**

**Course Code: GR18D5204**

**L/T/P/C: 3/0/0/3**

### **Course objectives**

- To provide the student with a clear understanding of strategic cost management process.
- To describe the various stages of project execution.
- To prepare the project schedule by bar charts and network diagrams.
- To conduct breakeven and cost-volume-profit analysis.
- To make students understand various budgets and quantitative techniques used for cost management.

### **Course outcomes**

- The student will be able to explain the various cost concepts used in decision making.
- To be able to identify and demonstrate various stages of project execution.
- The student will be able to prepare the project schedule by bar charts and network diagrams.
- The student will be able to differentiate absorption costing and marginal costing, also conduct breakeven and cost-volume-profit analysis.
- The student will be able to prepare various budgets and quantitative techniques used for cost management.

### **Unit I**

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

### **Unit II**

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance.

### **Unit III**

Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

### **Unit IV**

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing,

Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.

## **Unit V**

Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

## **Reference Books**

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

## COMPOSITE MATERIALS

Course Code: GR18D5205

L/T/P/C: 3/0/0/3

### Course objectives

- To understand the concepts of fundamental science and engineering principles relevant to materials engineering.
- To expose the various methods to test mechanical properties on materials.
- To categorize the various equilibrium diagrams and describe the changes which occurs on metals.
- To explain the concepts on various heat treatment operations.
- To categorize the various ferrous and non-ferrous metals with their properties and applications.

### Course outcomes

- Relate crystal structures and identify the relation between different materials.
- Test the various mechanical properties of metal by suitable method.
- Relate the equilibrium transformation diagrams for various ferrous and Non- ferrous metals.
- Utilize appropriate techniques in treating a metal with proper heat treatment operations.
- Evaluate the behaviour of material when it is subjected to heat treatment process.

### UNIT I

**Introduction:** Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

### UNIT II

**Reinforcement:** Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

### UNIT III

**Manufacturing of Metal Matrix Composites:** Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix, Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

### UNIT IV

**Manufacturing of Polymer Matrix Composites:** Preparation of Moulding compounds and prepreps – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

## **UNIT V**

Strength, Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygro thermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

### **Text Books**

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

### **Reference Books**

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.



# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **ENGLISH FOR RESEARCH PAPER WRITING**

**Course Code: GR18D5207**

**L/T/P/C: 2/0/0/2**

### **Course objectives:**

- To state how to put research on paper
- To demonstrate how to write an abstract
- To apply the process of research
- To appraise the key skills involved in writing the title, abstract, introduction and review of literature
- To compose a paper which is good and has the qualities of acceptance and publication

### **Course Outcomes:**

- Will be able to understand how to write a research paper
- Will outline the drafting of an abstract
- Will acquire the skills of various elements of research
- Will be in a position to write a good paper
- Will result in increasing the chance of publication

### **Unit I**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

### **Unit II**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction.

### **Unit III**

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

### **Unit IV**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

### **Unit V**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusion.

### **Unit VI**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

### **Reference Books:**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Ian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**DISASTER MANAGEMENT**

**Course Code: GR18D5208**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches,
- Planning and programming in different countries, particularly their home country or the countries they work in.

**Course Outcomes:**

- Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- Capacity to describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
- Capacity to manage the Public Health aspects of the disasters.
- Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

**Unit I**

**Introduction:** Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

**Unit II**

**Repercussions of Disasters and Hazards: Economic Damage,** Loss of Human and Animal Life, Destruction of Ecosystem. **Natural Disasters:** Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

**Unit III**

**Disaster Prone Areas in India:** Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

**Unit IV**

**Disaster Preparedness and Management:** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

**Unit V**

**Risk Assessment:** Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National

Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

## **Unit VI**

**Disaster Mitigation:** Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

### **Reference Books:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company
2. Sahni, Pardeep Et. Al. (Eds.), "Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies" ,Deep & Deep Publication Pvt. Ltd., New Delhi.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**SANSKRIT FOR TECHNICAL KNOWLEDGE**

**Course Code: GR18D5209**

**L/T/P/C: 2/0/0/2**

**Course objectives:**

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects
- Enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

**Course Outcomes:**

- Understanding basic Sanskrit alphabets and Understand tenses in Sanskrit Language.
- Enable students to understand roots of Sanskrit language.
- Students learn engineering fundamentals in Sanskrit.
- Students can attempt writing sentences in Sanskrit.
- Ancient Sanskrit literature about science & technology can be understood

**Unit I.** Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

**Unit II.** Order, Introduction of roots, Technical information about Sanskrit Literature

**Unit III.** Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

**Reference Books:**

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**VALUE EDUCATION**

**Course Code: GR18D5210**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- Understand value of education and self-development
- Imbibe good values instudents
- Let the should know about the importance of character
- To understand the significance of human conduct and self-development
- To enable students to imbibe and internalize the value and Ethical behaviour in personal and professional lives.

**Course outcomes:** Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality
- Student will be able to realize the significance of ethical human conduct and self-development
- Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.

**Unit I**

Values and self-development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgment.

**Unit II**

Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truth fulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

**Unit III**

Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature.

**Unit IV**

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

**Reference Books:**

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi.

**INDIAN CONSTITUTION**

**Course Code: GR18D5211**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
- To understand the role and functioning of Election Commission of India.

**Course Outcomes:** Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.
- Discuss the significance of Election Commission of India.

**Unit I**

**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working).

**Unit II**

**Philosophy of the Indian Constitution:** Preamble Salient Features.

**Unit III**

**Contours of Constitutional Rights & Duties:** Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

**Unit IV**

**Organs of Governance:** Parliament-Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

**Unit V**



**Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

**Election Commission:** Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

### **Reference Books:**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

**PEDAGOGY STUDIES**

**Course Code:GR18D5212**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- Review existing evidence on the review topic to inform Programme design and policy making
- Undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.
- Establishing coordination among people in order to execute pedagogy methods.
- To study pedagogy as a separate discipline.

**Course Outcomes:** Students will be able to understand

- What pedagogical practices are being used by teachers in formal classrooms in developing countries?
- What pedagogical practices are being used by teachers in informal classrooms in developing countries?
- Synergy from the work force.
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

**Unit I**

**Introduction and Methodology:** Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

**Unit II**

**Thematic overview:** Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

**Unit III**

**Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage:** quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

**Unit IV**

Professional development: alignment with classroom practices and follow- up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes

## **Unit V**

**Research gaps and future directions:** Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

### **Reference Books:**

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, *Compare*, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, *Journal of Curriculum Studies*, 36 (3):361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London:DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? *International Journal Educational Development*, 33 (3):272–282.
5. Alexander RJ (2001) *Culture and pedagogy: International comparisons in primary education*. Oxford and Boston:Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.
7. [www.pratham.org/images/resource%20working%20paper%202.pdf](http://www.pratham.org/images/resource%20working%20paper%202.pdf).

**STRESS MANAGEMENT BY YOGA**

**Course Code: GR18D5213**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- To achieve overall Good Health of Body and Mind.
- To lower blood pressure and improve heart health.
- To become non-violent and truthfulness.
- To increase the levels of happiness.
- To eliminate all types of body pains.

**Course Outcomes:** Students will be able to

- Develop healthy mind in a healthy body thus improving social health also improve efficiently.
- Develop body awareness. Learn how to use their bodies in a healthy way. Perform well in sports and academics.
- *Will balance, flexibility, and stamina, strengthen muscles and connective tissues enabling good posture.*
- Manage stress through breathing, awareness, meditation and healthy movement.
- Build concentration, confidence and positive self-image.

**Unit I**

Definitions of Eight parts of yog. (Ashtanga)

**Unit II**

Yam and Niyam. Do's and Don't's in life. Ahimsa, satya, astheya, bramhacharya and aparigraha Shaucha, santosh, tapa, swadhyay, ishwar pranidhan

**Unit III**

AsanandPranayam, Various yog poses and their benefits for mind & body. Regulaization of breathing techniques and its effects-Types of pranayam

**Reference Books:**

1. 'Yogic Asanas for Group Tarining-Part-I' : Janardan Swami YogabhyasiMandal,Nagpur
2. "Rajayoga or conquering the Internal Nature" by SwamiVivekananda, AdvaitaAshrama(Publication Department),Kolkata

**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**

**Course Code: GR18D5214**

**L/T/P/C: 2/0/0/2**

**Course Objectives:**

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students
- To differentiate three types of happiness ( Sukham)
- To describe the character traits of a spiritual devotee

**Course Outcomes:**

- Study of Shrimad- Bhagwad-Gita will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- To develop self-developing attitude towards work without self-aggrandizement
- To develop tranquil attitude in all favorable and unfavorable situations
- To develop high spiritual intelligence

**Unit I**

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride &heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (don'ts)
- Verses- 71,73,75,78 (do's)

**Unit II**

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta : Chapter 2-Verses 41,47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23,35,
- Chapter 18-Verses 45, 46,48.

**Unit III**

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62,68
- Chapter 12 -Verses 13, 14, 15, 16,17,18
- Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses36,37,42,
- Chapter 4-Verses 18,38,39
- Chapter18 – Verses37,38,63

**Reference Books:**

1. “Srimad Bhagavad Gita” by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, NewDelhi.

# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **WASTE TO ENERGY**

**Course Code: GR18D5206**

**L/T/P/C: 2/0/0/2**

### **Course objectives**

- To find or recall the non-Hazardous secondary materials from waste.
- To compare precisely to overcome the cost and most economically attractive course of action for CH<sub>4</sub> emission.
- To demonstrate the techno-economic feasibility of replacing.
- To extend the students for possible future activity in a biomass plant.
- To utilization in spark-ignited internal combustion engine.

### **Course outcomes**

- Students are able to make use of energy installation and the small of household bio-waste incineration.
- To develop actual dimension must of course, fit requirement of the masonry block.
- To become capable of analyze and design of energy conversion system.
- Students are to estimate the possibility of invest in biomass generation.
- Students will be able to explain the biogas its uses and benefits.

### **Unit I**

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

### **Unit II**

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

### **Unit III**

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

### **Unit IV**

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

### **Unit V**

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

### **Reference Books**

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.