Academic Regulations
Program Structure
and
Detailed Syllabus

Master of Technology
in
Computer Science and Engineering

(Two Year Regular Programme)

(Applicable for Batches admitted from 2020)

GOKARAJU RANGARAJU
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)
GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering & Technology - GR20 Regulations are given here under. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes in 2020-21 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech in Computer Science and Engineering, 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 PGCET 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 each course concerned in the semester.

b) Condonation of shortage of attendance 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 attendance is less than 65% in any course are detained and are not eligible to take their end examinations of that course. They may seek re-registration for that course 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 arks**

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 members nominated by Head of the Department. Marks Distribution is as follows:

i.	Internal Exam:	10 Marks
ii.	Record:	05 Marks
iii.	Continuous Assessment:	15 Marks
	Total:	30 Marks

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.

h) For approval and evaluating mini project, Dissertation-I and Dissertation-II, a Project Review Committee (PRC) will be constituted by the Head of the Department. The composition of PRC is as follows

i) Head of the Department

ii) One senior faculty relevant to the specialization

iii) Coordinator of the specialization.

i) **Mini Project:** The Mini Project is to be 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.

Internal Evaluation: For internal evaluation,10 Marks are given by PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15 marks. Tentative presentation dates and marks distribution of the mini project.

S.No	Date	Review	Marks
Internal Marks (30)			
1	First week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and Literature review
2. Schematic/Block diagram which gives the broad idea of the entire project
3. Timeline or milestone of the project. It should clearly indicate deliverables/outcomes of the project.
4. Components required with approximate cost
5. References
6. Plagiarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

External Evaluation: (70 Marks)

The mini project report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the mini project report is evaluated by PRC.

Guidelines to award 70 marks:

S.No	Date	Review/ PRC report	Marks
External Evaluation Marks (70)			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report: Project report should be written as per IEEE guidelines.	Verified by PRC	20
3	Project Deliverables • Hardware prototype • Simulation in any authorized software • Submission of research articles in any Scopus Indexed conference /Journal	Verified by PRC	30
4	Results and Discussion	Verified by PRC	10

j) **Dissertation (Phase I & Phase II):**

Internships/Seminars/Dissertation :

i.Dissertation Phase I:

The Dissertation Phase I, the department help the students to do the projects supported by the industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation.

Internal Evaluation: For internal evaluation,10 Marks are given by the PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15 marks. Tentative presentation dates and marks distribution of the Dissertation Phase I.

S.No	Date	Review	Marks
Internal Marks (30)			
1	lst week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and the literature review.
2. Schematic/Block diagram which gives the broad idea of the entire project.
3. Time line or mile stone of the project. It should clearly indicate deliverables/outcomes of the project.
4. Components required with approximate cost.
5. Possibility to develop Product.
6. Plagiarism check is compulsory for Dissertation Phase I and Phase II as per the plagiarism policy of GRIET.

External Evaluation: (70 Marks)

The Dissertation Phase I report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the Dissertation Phase I report is evaluated by PRC.

Guidelines to award 70 marks:

S.No	Date	Review/ PRC report	Marks
External Evaluation Marks (70)			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report submission- Project report should be written as per IEEE guidelines.	Verified by PRC	20
3	Project Deliverables • Hardware prototype • Simulations in any authorized software • Submission of research articles in any Scopus indexed conference /Journal • Product development • Industry Support	Verified by PRC	30
4	Results and Discussion	Verified by PRC	10

ii. DissertationPhaseII:

The Dissertation Phase II, the department help the students to do the project a industry and is evaluated for 100marks.Outof100marks, 30 marks are for internal evaluation and 70 marks are for external evaluation. It is expected that along with the project he will be placed in the company.

Internal Evaluation: For internal evaluation, 10 Marks are given by the PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15marks.Tentative presentation dates and marks distribution of the Dissertation Phase II.

S.No	Date	Review	Marks
Internal Marks (30)			
1	1st week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and the literature review.
2. Schematic/Block diagram which gives the broad idea of the entire project.
3. Timelineormilestoneoftheproject.Itshouldclearlyindicatedeliverables/outcomes of the project.
4. Components required with approximate cost.
5. Possibility to develop Product and IPR.
6. Plagiarism check is compulsory for Dissertation Phase I and Phase II as per the plagiarism policy of GRIET.

External Evaluation: (70 Marks)

The Dissertation Phase II report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the Dissertation Phase II report is evaluated by PRC.

Guidelines to award 70 marks:

S.No	Date	Review/ PRC report	Marks
External Evaluation Marks (70)			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report submission- Project report should be written as per IEEE guidelines.	Verified by PRC and External Examiner	20
3	Project Deliverables • Hardware prototype • Simulations in any authorized software • Submission of research articles in any Scopus indexed conference /Journal • Product development • Industry Support	Verified by PRC and External Examiner	30
4	Results and Discussion	Verified by PRC and External Examiner	10

Rules and regulations related to Internships/Seminars/Mini Project/Dissertation Phase I and II:

The student must 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 Program Coordinator, where as external guide is allotted by the industrial organization in which the project is undertaken.

- 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 24%.
- Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.
- The thesis shall be adjudicated by one external examiner selected by the Institute out of 3-member panel, submitted by the department.
- In external evaluation, the student shall score at least 40% marks and an aggregate of

50% marks to pass in the project work. If the project report is satisfactory, 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.

- In case the student doesn't pass through the project work, he/she must 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 program 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.
- If a student gets a chance to work in industry for one year (placement through internship) then he/she should take permission from Principal, Dean of examinations, Dean of Placements, Dean Academics, Department HOD and program coordinator. He/she should complete the credits in 3rd semester in consultation with course instructor and program coordinator.

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
O (Outstanding)	10	Marks >= 90
A+ (Excellent)	9	Marks >= 80 and Marks < 90
A (Very Good)	8	Marks >= 70 and Marks < 80
B+ (Good)	7	Marks >= 60 and Marks < 70
B (Above Average)	6	Marks >= 50 and Marks < 60
F (Fail)	0	Marks < 50
Ab (Absent)	0	

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.,

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

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 $k \geq 2$.

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

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 ≥ 7.75**
13.2	**First Class**	**CGPA ≥ 6.75 and CGPA < 7.75**
13.3	**Second Class**	**CGPA ≥ 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 PG degree Programme, may be considered eligible for readmission to the same or equivalent subjects as and when they are offered.

17. **General Rules**

a) The academic regulations should be read as a whole for the purpose of any interpretation.

b) 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

(Autonomous)

Bachupally, Kukatpally, Hyderabad-500090,India

COMPUTER SCIENCE AND ENGINEERING

M.Tech(CSE) GR20 Course Structure

I YEAR - I SEMESTER

Sl. No	Group	Course Code	Subject	Credits			Total Credits	Total Hours	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	PC	GR20D5094	Mathematical Foundation for Computer Science Applications	3	0	0	3	3	30	70	100
2	PC	GR20D5095	Advanced Data Structures	3	0	0	3	3	30	70	100
3	PE I	GR20D5096	Artificial Intelligence and Neural Networks	3	0	0	3	3	30	70	100
		GR20D5097	Data Mining								
		GR20D5098	Information Security								
4	PE II	GR20D5099	Computer System Design	3	0	0	3	3	30	70	100
		GR20D5100	Distributed Computing								
		GR20D5101	Augmented Reality and Virtual Reality								
5	PE	GR20D5102	Data Mining and Python Programming Lab	0	0	2	2	4	30	70	100
6	PC	GR20D5103	Advanced Data Structures Lab	0	0	2	2	4	30	70	100
7	BS	GR20D5011	Research Methodology and IPR	2	0	0	2	2	30	70	100
Total				**14**	**0**	**4**	**18**	**22**	**210**	**490**	**700**
8	AC		Audit course I	2	0	0	2	2	30	70	100

I YEAR - II SEMESTER

Sl. No	Group	Course Code	Subject	Credits			Total Credits	Total Hours	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	PC	GR20D5104	Machine Learning and Applications	3	0	0	3	3	30	70	100
2	PC	GR20D5105	Advanced Algorithms	3	0	0	3	3	30	70	100
3	PE III	GR20D5106	Image Processing	3	0	0	3	3	30	70	100
		GR20D5107	Industrial Internet of Things								
		GR20D5108	Data Analytics								
4	PE IV	GR20D5109	Cloud Computing and Applications	3	0	0	3	3	30	70	100
		GR20D5110	Block Chain Technology								
		GR20D5111	High Performance Computing								
5	PE	GR20D5112	Data Analytics and Internet of Things Lab	0	0	2	2	4	30	70	100
6	PC	GR20D5113	Machine Learning and Applications Lab	0	0	2	2	4	30	70	100
7	PW	GR20D5143	Mini Project	2	0	0	2	2	30	70	100
Total				**14**	**0**	**4**	**18**	**22**	**210**	**490**	**700**
8	AC		Audit course II	2	0	0	2	2	30	70	100

II YEAR - I SEMESTER

Sl. No	Group	Course Code	Subject	Credits			Total Credits	Total Hours	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	PE V	GR20D5135	Natural Language Processing	3	0	0	3	3	30	70	100
		GR20D5114	Information Storage and Retrieval								
		GR20D5115	Social Media Analysis								
2	OE	GR20D5146	1.Cost Management of Engineering Projects	3	0	0	3	3	30	70	100
		GR20D5147	2.Industrial Safety								
		GR20D5148	3.Operations Research								
		GR20D5149	4.Artificial Neural Networks and Fuzzy Systems								
		GR20D5150	5.Cyber Security								
		GR20D5151	6.Internet of Things Architecture and Design Principles								
3	PW	GR20D5144	Dissertation Phase - I	0	0	10	10	20	30	70	100
Total				**6**	**0**	**10**	**16**	**26**	**90**	**210**	**300**

OPEN ELECTIVE				
S. No.	**BOS**	**Group**	**Course Code**	**Course**
1	CE	OE	GR20D5146	Cost Management of Engineering Projects
2	EEE	OE	GR20D5147	Industrial Safety
3	ME	OE	GR20D5148	Operations Research
4	ECE	OE	GR20D5149	Artificial Neural Networks and Fuzzy Systems
5	CS	OE	GR20D5150	Cyber Security
6	IT	OE	GR20D5151	Internet of Things Architecture and Design Principles

II YEAR - II SEMESTER

Sl. No	Group	Course Code	Subject	Credits			Total Credits	Total Hours	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	PW	GR20D5145	Dissertation Phase - II	0	0	16	16	32	30	70	100
Total						**16**	**16**	**32**	**30**	**70**	**100**

Audit Courses I & II

1	GR20D5152	English for Research Paper Writing
2	GR20D5153	Disaster Management
3	GR20D5154	Sanskrit for Technical Knowledge
4	GR20D5155	Value Education
5	GR20D5156	Indian Constitution
6	GR20D5157	Pedagogy Studies
7	GR20D5158	Stress Management by Yoga
8	GR20D5159	Personality Development through Life Enlightenment Skills

I YEAR

I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE APPLICATIONS

Course Code: GR20D5094 **L/T/P/C:3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. To understand the mathematical fundamentals that are prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.
2. To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency.
3. Developing an appreciation for the use of multivariate statistical models like regression and classification problems, principal components analysis, and the problem of over fitting models.
4. To study various sampling and classification problems.
5. Designing and Developing planar Graphs, Euler circuits, Graph Coloring, Hamiltonian graphs and their applications

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

1. Demonstrate the basic notions of distribution functions, discrete and continuous probability.
2. Formulate the methods of statistical inference and the role that sampling distributions play in those methods.
3. Perform correct and meaningful statistical analysis of simple to moderate complexity.
4. Solve mathematical as well as graphical problems in systematic and logical manner and also familiarity in calculating number of possible outcomes of elementary combinatorial processes such as permutations and combinations.
5. Apply discrete structures in computer science for various engineering applications.

UNIT I

Probability mass, density, and cumulative distribution functions, parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains

UNIT II

Random samples, sampling distributions of estimators**,** Methods of Moments and Maximum Likelihood

UNIT III

Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis**,** The problem of overfitting model assessment.

UNIT IV

Graph Theory: Isomorphism, Planar graphs, graph Coloring, Hamilton circuits and Euler cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems

UNIT V

Computer science and engineering applications: Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.

TEXT / REFERENCE BOOKS:

1. John Vince, Foundation Mathematics for Computer Science, Springer.
2. K. Trivedi. Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
3. M. Mitzenmacher and E. Upfal.Probability and Computing: Randomized Algorithms and Probabilistic Analysis.
4. Alan Tucker, Applied Combinatorics, Wiley

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED DATA STRUCTURES

Course Code: GR20D5095 **L/T/P/C:3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. To choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
2. To understand the necessary mathematical abstraction to solve problems.
3. To familiarize students with advanced paradigms and data structure used to solve algorithmic
4. To analyse of efficiency and proof of correctness.
5. Express algorithms in a language independent manner (as pseudo codes), thus exemplifying the professional ethics imbibed through this course.

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

1. Demonstrate the implementation of the symbol table using hashing techniques.
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for computational geometry problems.
5. 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: Sting 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 / 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
ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
(PROFESSIONAL ELECTIVE-I)

Course Code: GR20D5096 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. To expose characteristics of various agents, environment and searching approaches.
2. To describe the different methods of AI learning
3. To understand the concepts of Artificial Neural Networks and basic architecture
4. To analyse Single and multi-layer perceptron
5. To explore the functional architectures and applications of ANN

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

1. Analyse and differentiate various searching approaches in game playing sand other applications
2. Illustrate the different methods of AI learning
3. Model basic architecture of ANN and explore different learning processes of Artificial Neural Network
4. Appreciate Single and multi-layer perceptron concepts
5. Learn the typical NN architectures and apply them to various applications

UNIT I

AI Introduction: AI problems, foundation of AI and history of AI intelligent agents, Agents and Environments. Uninformed search strategies: Breadth first search, depth first Search. Informed search strategies: Greedy best first search, A* search. Game Playing: minimax algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning.

UNIT II

Learning: Learning from Observations: Forms of Learning, inductive learning, Learning decision trees, Ensemble learning. Statistical Learning Methods: Statistical learning, learning with complete data, learning with hidden variables, instance-based learning. Reinforcement learning: Active and passive reinforcement learning

UNIT III

NN introduction: Biological Neuron, Artificial Neural Model, Types of activation functions, Architecture of Feedforward and Feedback NN. Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive Learning, Boltzmann Learning, Supervised and Unsupervised Learning.

UNIT IV

Single &Multi Layer Perceptron: Single layer Perceptron: Learning Algorithm, Perceptron Convergence Theorem. Least Mean Square Learning Algorithm. Multilayer Perceptron: Back Propagation Algorithm, feature detection, Cross validation, Limitations of Back Propagation Algorithm, Convolutional networks.

UNIT V

Applications of ANN: Pattern Association, Pattern Classification, Pattern Mapping, Pattern Storage, Pattern clustering, Direct Applications, Application Areas.

TEXT / REFERENCE BOOKS:

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
2. Neural Networks - A Comprehensive Foundation - Simon Haykin PHI, 2nd edition
3. Artificial Neural Networks B. YagnaNarayana, PHI
4. Artificial Intelligence, 2nd Edition, E. Rich and K. Knight (TMH).
5. Artificial Intelligence and Expert Systems – Patterson PHI.
6. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA MINING

(PROFESSIONAL ELECTIVE-I)

Course Code: GR20D5097 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

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

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

1. Summarize the basic data mining tasks and various types of pattern mining.
2. Apply classification techniques for data mining.
3. Evaluate the performance of different advanced clustering algorithms.
4. Analyse recent trends in data mining such as web mining, text mining and spatial mining.
5. 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

Advanced Classification: Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, and fuzzy set approach.

UNIT III

Advanced 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 / REFERENCE BOOKS:

1. Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber, Jianpei, Morgan Kaufmannn.
2. Data Mining Techniques – Arun K pujari, Universities Press
3. Introduction to Data Mining – Pang - Ning Tan, Vipinkumar, Michael Steinbach, Pearson.
4. Data Mining Principles & Applications – T.V Suresh Kumar, B.Eswara Reddy, Jagadish Kalimani, Elsevier.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION SECURITY
(PROFESSIONAL ELECTIVE-I)

Course Code: GR20D5098 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. To demonstrate the principal concepts, major issues, technologies and basic approaches in information security.
2. To illustrate the concepts of cryptography, how it has evolved and some key encryption techniques used today.
3. To interpret security policies (such as authentication, integrity and confidentiality) as well as digital signatures to perform secure message exchanges.
4. To Interpret network security designs using available secure solutions (such as PGP, S/MIME and IPSec).
5. To implement security protocols and discus about Intruders and firewalls.

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

1. Analyze information security governance, and related issues.
2. Illustrate various cryptography algorithms.
3. Apply authentication mechanisms and Hash functions to provide secure data exchange.
4. Access network security design using available secure solutions (such as PGP, S/MIME and IPSec).
5. Infer advanced security issues and technologies.

UNIT I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT II

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES,Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution, Asymmetric key Ciphers: Principles of public key cryptosystems Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution

UNIT III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm Authentication Applications: Kerberos, X.509 Authentication Service, Public — Key Infrastructure, Biometric Authentication

UNIT IV

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.

UNIT V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

TEXT / REFERENCE BOOKS:

1. Cryptography and Network Security: William Stallings, Pearson Education, 4t" Edition.
2. Cryptography and Network Security: AtulKahate, McGraw Hill, 2nd Edition
3. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1' Edition.
4. Cryptography and Network Security: ForouzanMukhopadhyay, McGraw Hill, 2 Edition.
5. Information Security, Principles and Practice: Mark Stamp, Wiley India.
6. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH.
7. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
8. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER SYSTEM DESIGN

(PROFESSIONAL ELECTIVE-II)

Course Code: GR20D5099 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives: The Objectives of this course is

1. Understand the components of the computer and its working and also basic concepts of the number system.
2. Understand the concepts of Input-Output interface and its organization.
3. Understand the concepts of memory management, i.e cache, associative and virtual, auxiliary memory and its organization.
4. Understand different approaches to memory management.
5. Learn and understand the security aspects of a UNIX

Course Outcomes:

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

1. Demonstrate IA-32 Pentium processor architecture and Computer I/O operations
2. Compare hardwired control and micro programmed control in the processing unit.
3. Illustrate the management of different type of memories in the computer system
4. Determine the reasons for deadlocks and understand the different types of IPC mechanisms.
5. Compare and analyze different file systems being used in different operating systems

UNIT I

Computer structure: Hardware, software, system software, Von-Neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines. Input/output organization, interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers.

UNIT II

Processing Unit: Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control. Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, and RISC architecture introduction.

UNIT III

Memory: Types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies

UNIT IV

Processes and Threads: Processes, threads, inter process communication, classical IPC problems, Deadlocks.

UNIT V

File system: Files, directories, Implementation, UNIX file system Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

TEXT / REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
4. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education.
5. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISTRIBUTED COMPUTING

(PROFESSIONAL ELECTIVE-II)

Course Code: GR20D5100 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. To differentiate among concurrent, networked, distributed, and mobile
2. To study about different computing paradigms
3. To demonstrate the remote method invocation and compare with CORBA
4. To describe and learn about Distributed Document Based systems.
5. To distinguish about Grid computing and Cluster computing.

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

1. Compare and differentiate between different form computing techniques and computing paradigms.
2. Demonstrate the remote method invocation and its comparison with CORBA
3. Define and study the Distributed Document Based systems and distributed multimedia systems.
4. Interpret the characteristics of distributed multimedia systems.
5. Express the outline of Grid computing concept and cluster computing concept.

UNIT I

Introduction: Different forms of computing – Monolithic, Distributed, parallel and cooperative computing, the meaning of Distributed computing, Examples of Distributed systems, the strengths and weaknesses of Distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

UNIT II

Distributed computing Paradigms: Paradigms for Distributed Applications – Message passing Paradigm, The Client-Server Paradigm (JAVA Socket API), The peer-to-peer paradigm, Message System (or MOM) Paradigm – the Point-to-point message model and the publish/subscribe message model, RPC model, The Distributed Objects Paradigms-RMI,ORB, the object space Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The collaborative application (Groupware Paradigm), choosing a Paradigm for an application.

UNIT III

Distributed Objects Paradigm (RMI): Message passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, RPC, RMI, The Java RMI Architecture, Java RMI API, A sample RMI Application, steps for building an RMI application, testing and debugging, comparison of RMI and socket API, Distributed Object Paradigm

(CORBA): The basic Architecture, The CORBA object interface, Inter-ORB Protocols, object servers and object clients, CORBA Object references, CORBA Naming Service and the Interoperable Naming Service, CORBA object services, Object Adapters, Java IDL, An example CORBA application.

UNIT IV

Distributed Document-based Systems: WWW, Lotus Notes, comparison of WWW and Lotus Notes, Distributed Coordination-based systems- Introduction to coordination models, TIB, JINI, comparison of TIB and JINI, Software Agents, Agent Technology, Mobile Agents. Distributed Multimedia Systems – characteristics of multimedia data, QOS of service management, Resource Management, Stream Adaptation.

UNIT V

Grid Computing: Definition of grid, grid types – computational grid, data grid, grid benefits and applications, drawback of grid computing, grid components, grid architecture and its relation to various Distributed Technologies. Cluster Computing, Parallel computing overview, cluster computing – Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

TEXT / REFERENCE BOOKS:

1. Distributed, Computing, Principles and applications, M.L.Liu, Pearson Education
2. Distributed Systems, Principles and paradigms, A.S. Tannenbaum and M.V. Steen, Pearson Education
3. Client-Server Programming with Java and CORBA 2nd edition, R. Orfali& Dan Harkey, John Wiley &Sons
4. Grid Computing, J. Joseph & C. Fellenstein, Pearson Education 5. High Performance cluster computing, RajKumarBuyya, Pearson Education
5. A Networking Approach to grid computing, D.Mimoli, Wiley & Sons
6. Grid Computing: a practical guide to technology and applications, A. Abacus, Firewall media
7. Java Network Programming, E.R. Harold, 2nd Edition, O. Reilly, SPD.
8. Distributed systems, concepts and Design, 3rd edition, G. Coulouris, J. Dollimore, and Tim Kindbirg, Pearson Education.
9. Java programming with CORBA, 3rd Edition, Brose, Vogel, Duddy, Wiley Dreamtech.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AUGMENTED REALITY AND VIRTUAL REALITY
(PROFESSIONAL ELECTIVE-II)

Course Code: GR20D5101 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

1. Detailed understanding of the concepts of augmented & virtual reality and applications.
2. Study about Virtual Hardware and Software.
3. Illustrate geometric modeling and virtual environment
4. Understand the fundamental issues of virtual reality.
5. Prepare the students to develop Virtual Reality applications.

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

1. Identify fundamental techniques, processes, technologies for augmented & virtual reality applications.
2. Analyze the importance of geometric modeling practice.
3. Identify a virtual environment and compelling virtual reality experience.
4. Determine various VR technologies.
5. Design and develop virtual reality based applications.

UNIT I

Introduction to VR and AR: History of VR and AR, Technology and Features of Augmented Reality, Comparison of AR and VR, Challenges with AR, AR Systems and Functionality, Human factors, Human visual system, Perception of depth, color, contrast, resolution, Stereo Rendering, VR Hardware: Head-coupled displays etc. VR Software.

UNIT II

Geometric Modelling: From 2D to 3D, 3D space curves, 3D boundary representation. The Graphics Pipeline and OpenGL, Overview and Transformations, Rotation, translation, scaling, model view matrix, projection matrix, Lighting and Shading, OpenGL Shading Language (GLSL), GLSL vertex and fragment shaders.

UNIT III

Visual Computation in Virtual Reality: 3D Interaction Techniques: 3D Manipulation Techniques and Input Devices, 3D Travel Tasks, Travel Techniques, Theoretical Foundations of Wayfinding, Types of Centred-Wayfinding Support, Evaluating Wayfinding Aids, System Control, Classification, Graphical Menus, Voice Commands, Gestural Commands, Tools, Muti-modal System Control Techniques.

UNIT IV

3D Interaction Techniques: 3D Manipulation Techniques and Input Devices, 3D Travel Tasks, Travel Techniques, Theoretical Foundations of Wayfinding, Types of Centred-Wayfinding Support, Evaluating Wayfinding Aids, System Control, Classification, Graphical Menus, Voice Commands, Gestural Commands, Tools, Muti-modal System Control Techniques.

UNIT V

VR Applications : Pose Tracking I, Tracking with lighthouse, Pose Tracking II. Advanced positional tracking, Panoramic Imaging and Cinematic, VR Spatial Sound and the Vestibular System, VR Engines and Other Aspects of VR, Latency, eye tracking, post-rendering warp.

The Future: Virtual environment, modes of interaction Application of VR in Digital Entertainment: VR Technology in Film & TV Production, Demonstration of Digital, Entertainment by VR.

TEXT / REFERENCE BOOKS:

1. LaValle "Virtual Reality", Cambridge University Press, 2016.
2. Allan B Craig, William R Sherman and Jeffrey D Will, “Developing Virtual Reality Applications: Foundations of Effective Design”, Morgan Kaufmann, 2009.
3. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2007.
4. Anand R., “Augmented and Virtual Reality”, Khanna Publishing H
5. Gerard Jounghyun Kim, “Designing Virtual Systems: The Structured Approach”, 2005.
6. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, “3D User Interfaces, Theory and Practice”, Addison Wesley, USA, 2005.
7. Oliver Bimber and Ramesh Raskar, “Spatial Augmented Reality: Merging Real and Virtual Worlds”, 2005.
8. Burdea, Grigore C and Philippe Coiffet, “Virtual Reality Technology”, Wiley Inte, India, 2003.
9. Howard Rheingold, “Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society”, Simon and Schuster, 1991.
10. William R Sherman and Alan B Craig, “Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)”. Morgan Kaufmann Publishers, San Francisco, CA, 2002
11. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA MINING AND PYTHON PROGRAMMING LAB
(PROFESSIONAL ELECTIVE LAB)

Course Code: GR20D5102 **L/T/P/C: 0/0/2/2**

I YEAR I SEMESTER

Course Objectives:

1. Identify various data mining functionalities and analyze the difference between functionalities.
2. List different kinds of classification and clustering algorithms.
3. Describe and process the data by using various Decision tree algorithms.
4. Illustrate built-in methods and control flow statements in python.
5. Construct logical real time programs using various libraries in Python.

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

1. Summarize different kinds of data mining functionalities and their comparison.
2. Demonstrate and implement the classification and clustering algorithms.
3. Design and implement Decision tree algorithms to classify the data.
4. Compare various methods and decision making statements available in python.
5. Solve and Evaluate real time problems with various Python tools and libraries.

Note:- Implement the Tasks 1- 6 using Weka Tool and Tasks 6 - 7 using Anaconda Python.

TASK 1

(a) Create a data set Bank.arff by adding required data fields. (cust, accno, bank name, location, deposit)

(b) Demonstrate preprocessing techniques on dataset Bank.arff

(c) Apply Association rule mining on dataset Bank.arff (Use Apriori Algorithm)

TASK 2

(a) Create a data set Employee.arff with required data fields.(name, id, salary, gender, phone)

(b) Apply preprocessing techniques on dataset Employee.arff and normalize Employee Table data using Knowledge Flow.

TASK 3

(a) Create a data set Weather.arff with required data fields.(outlook, temp, windy, humidity, play)

(b) Demonstrate Decision Tree Algorithm on dataset weather.arff using j48 algorithm

(c) Write a procedure for cross-validation using the J48 Algorithm for the weather table. Algorithm

TASK 4

(a) Create a data set Sales.arff with required data. (item_name, id, qty, price, year)

(b) Demonstration of classification rule process on dataset Sales.arff using naïve bayes

TASK 5

(a) Write a procedure for Visualization of Banking Table and plot the graphs.

(b) Write a procedure for Visualization of the Weather Table and plot the graphs.

TASK 6

(a) Demonstration of clustering rule process on dataset Weather.arff using simple k-means.

(b) Demonstration of clustering on Bank data using Density Based Cluster Algorithm.

TASK 7

(a) Write a Python program to check that a given year is Leap Year or not.

(b) Write a Python program for generating prime numbers up to a given number.

TASK 8

(a) Write a Python program to find the most frequent words in a text read from a file.

(b) Write a Python program to remove the duplicate words in a given text file.

TASK 9

(a) Write a Python program to create a Data Frame using input values for the Columns 'EMPID', 'Gender', 'Age', 'Sales', 'BMI', 'Income' and display the data.

(b) Write a Python program to plot bar, pie, box using Matplotlib and use different styles for the plots.

TASK 10

Write a Python program for implementation of a Simple Calculator.

TASK 11

Write a Python Program to simulate elliptical orbits in Pygame Task.

TASK 12

Write a Python Program to simulate bouncing balls using Pygame.

TEXT / REFERENCE BOOKS:

1. Data Mining– Concepts And Techniques - Jiawei Han MichelineKamber, Morgan Kaufmann Publishers, Elsevier, Second Edition,2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
3. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff / O‘Reilly Publisher
4. Data Mining Techniques – Arun K. Pujari, Second Edition, UniversitiesPress.
5. Data Warehousing in the Real World, Sam Aanhory and Dennis Murray, Pearson EdnAsia.
6. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED DATA STRUCTURES LAB

Course Code: GR20D5103 **L/T/P/C: 0/0/2/2**

I YEAR I SEMESTER

Course Objectives:

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

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

1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Use linear and non-linear data structures like stacks, queues , linked lists etc.
4. Implement various searching and sorting algorithms
5. Apply the various data structures in real time applications

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

TASK 2: Develop a Java program to implements List ADT using arrays

TASK 3: Develop a Java program to implements List ADT using linked lists

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

TASK 5: Develop a Java program to implement the deque (double ended queue) ADT using Arrays

TASK 6: Develop a Java program to implement the deque (double ended queue) ADT Doubly linked list.

TASK 7: Develop 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: Develop a Java program to perform the following operations

- Insertion into an AVL-tree
- Deletion from an AVL-tree

TASK 9: Develop a Java program to implement all the functions of a dictionary (ADT) using Hashing

TASK 10: Develop a Java program to implement Graph colouring

TASK 11: Develop a Java program to implement the pattern matching algorithms

- Brute Force approach
- Boyer Moore
- Knuth Morris Pratt

TASK 12: Develop a Java program to implement Huffman coding 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

RESEARCH METHODOLOGY AND IPR

Course Code: GR20D5011 **L/T/P/C: 3/0/0/3**

I YEAR I SEMESTER

Course Objectives:

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

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

1. Understand research problem formulation.
2. Analyze research related information and follow research ethics
3. Understand that today's world is controlled by Computer, Information Technology, but tomorrow's world will be ruled by ideas, concepts, and creativity.
4. Understand that when IPR would take such an important place in the growth of individuals & nations, it is needless to emphasise the need for information about Intellectual Property Rights to be promoted among students in general & engineering.
5. Understand the nature of Intellectual Property and IPR in International scenarios.

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.

Unit II

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations, 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 / REFERENCE 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"
3. RanjitKumar, 2 ndEdition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill,1992.
6. Niebel , "Product Design", McGraw Hill,1974.
7. Asimov , "Introduction to Design", Prentice Hall,1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in the New Technological Age",2016. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand,2008

I YEAR

II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE LEARNING AND APPLICATIONS

Course Code: GR20D5104 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

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

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

1. Compare Supervised and Unsupervised Learning methods.
2. Demonstrate various Ensemble methods and apply Statistical Learning Theory to real world problems.
3. Analyse Deep Learning and Feature Representation techniques.
4. Categorize the Scalable Machine Learning techniques.
5. 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 Modelling and Estimation, Modelling 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 / 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) Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED ALGORITHMS

Course Code: GR20D5105 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives :

1. Advanced methods of designing and analyzing algorithms.
2. Learn appropriate algorithms and use it for a specific problem.
3. With basic paradigms and data structures used to solve advanced algorithmic problems.
4. Different classes of problems concerning their computation difficulties.
5. Recent developments in the area of algorithmic design.

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

1. Analyze performance of different algorithms.
2. Determine the appropriate data structure for solving a particular set of problems.
3. Apply algorithmic paradigms for advanced algorithmic problems.
4. Apply various mathematical techniques for solving the problems.
5. Categorize the different problems in various classes according to their complexity.

UNIT I

Sorting: Merge Sort, Quick Sort, Radix sort, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, Amortized analysis .

UNIT II

Matroids : Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting paths.

UNIT III

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, Multithreaded matrix multiplication – divide and conquer method,Multi threadedStrassen’s method.

UNIT IV

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. Examples of dynamic programming- Travelling SalesPerson Problem, Matrix Chain Multiplication, 0/1 Knapsack Problem.

String Matching: Naive String Matching Algorithm, Rabin-Karp Algorithm, Knuth-Morris-Pratt Algorithm.

UNIT V

Linear Programming: **Formulating problems as Linear Programming, Simplex algorithm, Duality**

NP-completeness: NP-hardness and NP completeness Problems Proof. Approximation algorithms, Randomized Algorithms

TEXT / REFERENCE BOOKS:

1. "Introduction to Algorithms" by Cormen, Leiserson, Ripest,Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft,Ullman.
3. "Algorithm Design" by Kleinberg andTardos.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IMAGE PROCESSING

(PROFESSIONAL ELECTIVE III)

Course Code: GR20D5106 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms that perform basic image processing
3. Design and implement algorithms for image compression
4. Design and implement algorithms for image segmentation.
5. Assess the performance of image processing algorithms and systems.

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

1. Analyze general terminology of digital image processing and image transforms.
2. Examine various types of images, Filtering techniques.
3. Examine Image Restoration models.
4. Evaluate the methodologies for image segmentation.
5. Demonstrate image compression techniques

UNIT I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non — Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT / REFERENCE BOOKS:

1. Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2
3. Digital Image Processing using MATLAB — Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
4. Fundamentals of Digital Image Processing — A.K.Jain, PHI, 1989
5. Digital Image Processing with MATLAB VsLabview — Vipula Singh, Elsevier.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL INTERNET OF THINGS

(PROFESSIONAL ELECTIVE - III)

Course Code: GR20D5107 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to the network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT
5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

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

1. Understand the significance of IoT in various industrial domains.
2. Explore various protocols for IoT communication
3. Deploy Python based data handling techniques for IoT applications
4. Exploit the power of Raspberry PI interfacing for IoT devices
5. Use web application framework for IoT

UNIT I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCONF, YANG-NETCONF, YANG, SNMP NETOPEER

UNIT III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling. Python packages - JSON, XML, HTTP Lib, URL Lib, SMTP Lib.

UNIT IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI - Interfaces (serial, SPI, I2C). Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs. Web Server – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API

TEXT / REFERENCE BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA ANALYTICS
(PROFESSIONAL ELECTIVE - III)

Course Code: GR20D5108 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

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

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

1. Illustrate R programming for data analytics
2. Explain connecting of R to NoSQL databases and interpret Summary Statistics.
3. Demonstrate Regression analysis and correlation.
4. Compare various Verticals - Engineering, Financial and others.
5. Apply how to manage our work to meet requirements and choose to work 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.

UNIT II

SQL using R and Statistics

Introduction to NoSQL, Connecting R to NoSQL databases.Excel and R integration with R connector.

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

UNIT III

Regression Analysisand Correlation

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

UNIT IV

R shiny

Introduction to R shiny, developing web applications, web API framework model for Business verticals, Data visualization in Web applications.

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 V

Manage your work to meet requirements

Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

Work effectively with Colleagues

Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc.

TEXT/REFERENCE 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
3. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
4. Data Manipulation with R, JaynalAbedin and Kishore Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
5. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc., 2012
6. 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.
7. 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.
8. Time Series Analysis and Mining with R**,** Yanchang Zhao
9. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
10. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
11. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
12. Introduction to Probability and Statistics Using R, G. jay Kerns, First Edition, 2011

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CLOUD COMPUTING AND APPLICATIONS
(PROFESSIONAL ELECTIVE - IV)

Course Code: GR20D5109 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

1. Understand the emerging area of "cloud computing" and how it is related to the traditional models of computing.
2. Understand various types of cloud services and models of cloud computing.
3. Provide a strong foundation of Cloud computing, so that students will be able to start using and adopting Cloud Computing services and tools in their real life.
4. Develop and Deploy an Application on a Cloud.
5. Understand various Schedules and task managements, collaborating on project management and social networks

.

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

1. Understand the key dimensions, advantages and challenges of Cloud computing.
2. Explain and characterize different types of clouds.
3. Examine the different services offered by cloud and exploring the state of art of major cloud players.
4. Provide cloud computing solutions for individual users as well as enterprises.
5. Present the assessment of the economics, financial, and technological implications for selecting cloud computing for an organization

UNIT I

UNDERSTANDING CLOUD COMPUTING: Cloud Computing –Introduction about Cloud Computing –Cloud Architecture–Cloud Storage–Why Cloud Computing Matters–Advantages of Cloud Computing –Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services

UNIT II

DEVELOPING CLOUD SERVICES: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud service Development –Software as a Service –Platform as a Service –Web Services –On-Demand Computing –Discovering Cloud Services Development
Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds, Virtualization.

UNIT III

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications–Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists –Cloud Computing for the Community –Collaborating on Group Projects and Events –Cloud Computing for the Corporation

UNIT IV

USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications –Exploring Online Planning and Task Management – Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing -Collaborating on Databases –Storing And Sharing Files

UNIT V

OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools – Collaborating via
Social Networks and Groupware –Collaborating via blogs and Wikis.

TEXT / REFERENCE BOOKS:

1. "Cloud Computing: Principles and Paradigms", Raj Kumar Bunya, James Bromberg,
2. Andrej Kosciusko, Wiley, New York, USA.
3. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work ND Collaborate Online, Qu Publishing, August 2008.
4. Kumar Sarah, "Cloud Computing –Insights into New Era Infrastructure", Wiley Indian Edition, 2011.
5. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes For On-demand Computing, Applications and Data Centers in the Cloud with SLAs.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BLOCKCHAIN TECHNOLOGY
(PROFESSIONAL ELECTIVE - IV)

Course Code: GR20D5110 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

1. To understand how blockchain systems (mainly Bitcoin and Ethereum) work,
2. Develop familiarity of current technologies, tools, and implementation strategies
3. Integrate ideas from blockchain technology into their own projects.
4. Design, build, and deploy smart contracts and distributed applications,
5. Introduce application areas, current practices, and research activity using blockchain technology

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

1. Define and Explain the fundamentals of Blockchain
2. Illustrate the technologies of blockchain
3. Describe the models of blockchain
4. Analyze and demonstrate the Ethereum
5. Demonstrate the implementation of Hyperledger fabric

UNIT I

Introduction: Basic Cryptographic primitives used in Blockchain – Secure, Collision-resistant Hash functions, digital signature, public key cryptosystems, and zero-knowledge proof systems. Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, why Nakamoto came up with Blockchain based cryptocurrency?

UNIT II

Technologies Borrowed in Blockchain – hash pointers, Consensus, Byzantine Models of Fault Tolerance, digital cash etc.Bitcoin blockchain - Wallet - Blocks - Merkley Tree - hardness of Mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin. Bitcoin, the challenges, and solutions.

UNIT III

Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as Random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) Based Chains - Hybrid models (PoW + PoS).Bitcoin scripting language and their use.

UNIT IV

Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity – Smart Contracts - The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts. Some attacks on smart contracts.

UNIT V

Hyper ledger fabric, the plug and play platform and mechanisms in permissioned block chain. Beyond Cryptocurrency – applications of block chain in cyber security, integrity of Information, E-Governance and other contract enforcement mechanisms. Limitations of block chain as a technology, and myths vs. reality of block chain technology.

TEXT / REFERENCE BOOKS:

1. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University, Press 2019.
2. Bitcoin and cryptocurrency technologies: a comprehensive introduction Arvind Narayanan et.al. Princeton University, Press, 2016.
3. Research perspectives and challenges for Bitcoin and cryptocurrency, Joseph Bonneau et al, SoK
4. IEEE Symposium, on security and Privacy 2015
5. The bitcoin backbone protocol - analysis and applications, J.A.Garay et al, EUROCRYPT, LNCS VOl 9057, (VOLII), pp 281-310, 2015
6. Analysis of Blockchain protocol in Asynchronous networks R.Pass et al EUROCRYPT 2017
7. Fruitchain, a fair block chain R.Pass et al , PODC 2017
8. Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming' Josh Thompson CreateSpace Independent Publishing Platform 2017

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HIGH PERFORMANCE COMPUTING
(PROFESSIONAL ELECTIVE - IV)

Course Code: GR20D5111 **L/T/P/C: 3/0/0/3**

I YEAR II SEMESTER

Course Objectives:

1. Improvise and recollect in the basic concepts of parallelism and gain the exposure of architectures.
2. Understand and utilize the architecture and design models.
3. Aware of all issues and deploy the shared memory programming models.
4. Comprehend and recall the Distributed memory programming.
5. Manipulate and Illustrate the General-purpose computing on graphics Processing units(GPUs) in digital applications.

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

1. Recall the basic concepts of parallelism such as SIMD,SIMT,SPMD.
2. Analyze the data decomposition techniques such as data level parallelism, task level parallelism and data flow parallelism.
3. Aware and recognize the implementation of shared memory programming and to know the real time design issues.
4. Develop parallel programs using MPI/OMP in a multicore system.
5. Design the General-purpose computing on graphics processing units in real time processing.

UNIT I

Parallel Processing Concepts: Levels of parallelism (instruction, transaction, task, thread, memory, function), Models: SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc., Architectures: N-wide superscalar architectures, multi-core, multi-threaded, Motivating high performance applications

UNIT II

Designing Parallel Programs: Automatic vs. Manual Parallelization, Understand the Problem and the Program, Partitioning, Communications, Synchronization, Data Dependencies, Load Balancing, Granularity, Limits and Costs of Parallel Programming, Performance Analysis and Optimization tuning

UNIT III

Shared memory programming: Fundamentals of Shared Memory Programming, Basic Open MP concepts, PARALLEL directive, Data scoping rules, Basic Open MP constructs/directives/calls, Examples: Parallelizing an existing code using Open MP, More advanced Open MP directives & functions, Open MP Performance issues, Running threaded/Open MP programs on multicore system.

UNIT IV

Distributed memory programming: Fundamentals of message passing concepts, MPI message passing APIs, send, receive, collective operations. Groups, Contexts and Communicators, Topologies, Runtime and Environment Management, MPI profiling interface and tracing, Open MP 3.0 enhancements.

UNIT V

GPGPU Programming with CUDA and Opens – Introduction to GPGPU Programming and CUDA: Programming Model, CUDA API, CUDA Memory Model, Short introduction to Opens. Application case study. Future of Computing: Pataskala computing.

TEXT / REFERENCE BOOKS:

1. Parallel Computer Architecture: A hardware/Software Approach", by David Culler Jaswinder Pal Singh, Morgan Kaufmann, 1999.(I&II)
2. CUDA by Example: An Introduction to General Purpose GPU Programming, by Jason Sanders and Edwards Kandrot, Addison Wesley, 2011.(unit- V)
3. Using MPI - 2nd Edition: Portable Parallel Programming with the Message Passing Interface by, William Gropp, Ewing L. Lusk, and Anthony Skjellum. Scientific and Engineering Computation, 2nd edition, 1999(unit-IV)
4. Using OpenMP: Portable Shared Memory Parallel Programming by Barbara Chapman, Gabriele Jost and Rudvander Pas. Scientific and Engineering Computation, 2nd edition(unit-III)
5. Parallel Programming: Techniques and Application Using Networked Workstations and Parallel Computers, 2nd edition, by B. Wilkinson and M. Allen, Prentice Hall Inc., 2005
6. Heterogeneous Computing with OpenCL. Benedict Gaster, Lee Howes, David R. Kaeli, PerhaadMistry, Dana Schaa, Elsevier, 2011.
7. Scalable Parallel Computing, by Kai Hwang, McGraw Hill 1998.
8. Introduction to Parallel Computing, AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.
9. Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA ANALYTICS AND INTERNET OF THINGS LAB
(PROFESSIONAL ELECTIVE LAB)

Course Code: GR20D5112 **L/T/P/C: 0/0/2/2**

I YEAR II SEMESTER

Course Objectives:

1. Create competitive advantage from both structured and unstructured data.
2. Study and analyze various models and its visualization.
3. Work with R and R Studio to analyze structured data and unstructured data.
4. Understand the principles of IoT, LED, LCD
5. Understand the working principles of sensors.

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

1. Demonstrate proficiency with statistical analysis of data.
2. Apply data modeling techniques to large data sets.
3. Design applications for data analytics using R programming.
4. Implement the IoT programs on Arduino and Node MCU using sensors.
5. Explore IoT Projects using Arduino/Node MCU.

List of Data Analytics Experiments

TASK 1. Load data sets into the R statistical package and perform summary statistics on the data

TASK 2. Plot the data using R using lattice and ggplot

TASK 3. Load the data from an excel sheet and remove outliers from the data

TASK 4. Test a hypothesis about the data using R studio.

TASK 5. Use the R -Studio environment to code OLS models and review the methodology to validate the model and predict the dependent variable for a set of given independent variables. Use R graphics functions to visualize the results generated with the model.

TASK 6. Use R -Studio environment to code Logistic Regression models and review the methodology to validate the model and predict the dependent variable for a set of given independent variables. Use R graphics functions to visualize the results generated with the model.

List of IoT Experiments

TASK 7: Write an ARDUINO Program for

a) Blinking of LED and Serial Lights

b) LED Interface through Switch

c) Take command from PC and glow corresponding LED.

d) Reading analog values from a potentiometer and displaying it on a serial monitor.

TASK 8: Write an ARDUINO Program for

a) Printing character and string on LCD

b) Display digital clock on LCD

c) Scrolling content on LCD

d) Display data received from PC on LCD.

TASK 9: Remote control of blinking of LED using Node MCU.

TASK 10: Implementation of Ultrasonic Sensor for measuring distance using Node MCU

TASK 11: Soil Moisture Sensor implementation for checking moisture level in soil using Node MCU.

TASK 12: DHT Sensor implementation using Node MCU.

TEXT / REFERENCE BOOKS:

1. R Commands - Quick Reference
2. Surviving LINUX - Quick Reference
3. Embedded Controllers using C and Arduino/2E by JmesM.Fiore
4. **Web references:** https://www.arduino.cc

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE LEARNING AND APPLICATIONS LAB

Course Code: GR20D5113 **L/T/P/C: 0/0/2/2**

I YEAR II SEMESTER

Course Objectives:

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

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

1. Illustrate various basic features of python or R-Tool.
2. Implement Python script for simple problems and apply pandas for creation of databases.
3. Design various supervised learning mechanisms.
4. Analyze various unsupervised learning algorithms.
5. 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

TASK11: Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

TASK12: Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using the standard Heart Disease Data Set.

TEXT / 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
MINI PROJECT

Course Code: GR20D5143 **L/T/P/C: 0/0/2/2**

I YEAR II SEMESTER

Course Objectives:

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

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

1. Choose the problem domain in the specialized area under computer science and engineering.
2. Acquire and categorize the solution paradigms with help of case studies
3. Design and code using selected hardware, software and tools.
4. Execute, Implement and demonstrate the problem statement by using the selected hardware, software and tools.
5. 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 TECCHNOLOGY

ENGLISH FOR RESEARCH PAPER WRITING
(AUDIT COURSE)

Course Code: GR20D5152 **L/T/P/C: 2/0/0/2**

Course Objectives:

1. To understand that how to improve their writing skills and level of readability
2. To learn about what to write in each section
3. To understand the skills needed when writing a Title and ensure the good quality of paper at very first-time submission
4. To understand the process of research
5. To write quality research papers

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

1. Will have given a view of what writing is all about
2. Will be able to understand Research and its process
3. Will be able to comprehend the steps and methods involved in research process
4. Will have learned various skills necessary that are necessary for doing research
5. Will have learned how to write quality research papers along with other research areas

Unit 1: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2: Clarifying Who Did What, Highlighting Your Findings, Hedging and Critiquing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts and writing an Introduction

Unit 3: Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.

Unit 4: A. Key skills that are needed when writing a Title, an Abstract, an Introduction, and Review of the Literature,

B. Skills that are needed when writing the Methods, the Results, the Discussion, an the Conclusion

Unit 5: 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 Google Books)
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's book.
4. Ian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISASTER MANAGEMENT
(AUDIT COURSE)

Course Code: GR20D5153 **L/T/P/C: 2/0/0/2**

Course Objectives:

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

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

1. 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.
2. Capacity to describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
3. 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.
4. Capacity to manage the Public Health aspects of the disasters.
5. 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 1: **Introduction:** Disaster: Definition, Factors and Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

Unit 2: 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 3: 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 4: 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 AndCommunity Preparedness.

Unit 5: 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 RiskAssessment. Strategies for Survival. Concept and Strategies of Disaster Mitigation, Emerging Trendsin Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

References:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SANSKRIT FOR TECHNICAL KNOWLEDGE
(AUDIT COURSE)

Course Code: GR20D5154 **L/T/P/C: 2/0/0/2**

Course Objectives:

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

Course Outcomes*:*

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

Unit 1: Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit 2: Order, Introduction of roots, Technical information about Sanskrit Literature

Unit 3: Technical concepts of Engineering-Electrical,Mechanical, Architecture,Mathematics and Applications of OCR for Sanskrit and Indian Languages, Tool and Techniques, Survey

Unit 4: Interactive Sanskrit Teaching Learning Tools: Interactive Sanskrit Learning Tools, Introduction, WhyInteractive Tools for Sanskrit? E-learning, Basics of Multimedia, Web based tools development HTML, Web page etc., Tools and Techniques

Unit 5 : Standard for Indian Languages (Unicode) Unicode Typing in Devanagari Scripts, Typing Tools and Software, Text Processing and Preservation Tools, Text Processing, Preservation, Techniques, Text Processing and Preservation, Tools and Techniques, Survey

Reference Books

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, NewDelhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New DelhiPublication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., NewDelhi.
4. Bharti A., R. Sangal, V. Chaitanya, “NL, Complexity Theory and Logic” in Foundations of Software Technology and Theoretical Computer Science, Springer,1990.
5. Tools developed by Computational Linguistics Group, Department of Sanskrit,University of Delhi, Delhi-110007 available at: http://sanskrit.du.ac.in
6. Basic concept and issues of multimedia:http://www.newagepublishers.com/samplechapter/001697.pdf
7. Content creation and E-learning in Indian languages: a model: http://eprints.rclis.org/7189/1/vijayakumarjk_01.pdf
8. HTML Tutorial - W3Schools: www.w3schools.com/html
9. The Unicode Consortium: http://unicode.org/.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE EDUCATION
(AUDIT COURSE)

Course Code: GR20D5155 **L/T/P/C: 2/0/0/2**

Course Objectives:

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

Course Outcomes: Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human Values
3. Developing the Professionalism Ethics, Risks, Responsibilities and Life Skills.
4. Student will be able to realize the significance of ethical human conduct and self-development
5. Students will be able to inculcate positive thinking, dignity of labor and religious tolerance.

Unit 1: Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Unit 2: Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit 3: Personality and Behaviour 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 4: 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

Unit 5: Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

Reference Books

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi
2. Jagdish Chand, "Value Education"
3. N. Venkataiah, " Value Education", APH Publishing, 1998 - Education

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDIAN CONSTITUTION
(AUDIT COURSE)

Course Code: GR20D5156 **L/T/P/C: 2/0/0/2**

Course Objectives:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional
3. Role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
4. 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.
5. To understand the role and functioning of Election Commission of India.

Course Outcomes: Students will be able to

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. 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.
4. Discuss the passage of the Hindu Code Bill of1956.
5. Discuss the significance of Election Commission of India.

Unit 1: History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)

Unit 2: Philosophy of the Indian Constitution: Preamble Salient Features

Unit 3: 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 4: Organs of Governance and composition of judiciary: Parliament- Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, composition of judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit 5: Local Administration and Election Commission: 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

Suggested reading

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PEDAGOGY STUDIES
(AUDIT COURSE)

Course Code: GR20D5157 **L/T/P/C: 2/0/0/2**

Course Objectives:

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

Course Outcomes: Students will be able to understand

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

Unit 1: 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 2: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit 3: 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 4: 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 5: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Suggested reading

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

STRESS MANAGEMENT AND YOGA
(AUDIT COURSE)

Course Code: GR20D5158 **L/T/P/C: 2/0/0/2**

Course Objective:

- To achieve overall health of body and mind.
- To overcome stress.
- To lower blood pressure and improve heart health.
- Relaxation and Sleeping aid and to become non-violent and truthfulness.
- To increase the levels of happiness and to eliminate all types of body pains.

Course Outcomes: Students will be able to:

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

Unit 1: Definitions of Eight parts of yoga. (Ashtanga)

Ashtanga, the eight limbs of yoga, is Patanjali's classification of classical yoga, as set out in his Yoga Sutras. He defined the eight limbs as yama (abstinences), niyama (observances), asana (postures), pranayama (breathing), pratyahara (withdrawal), dharana (concentration), dhyana (meditation) and Samadhi (absorption).

Unit-2. **Orientation to Patanjala Yoga sutra**:

Introduction to Yoga sutra - Nature of Yoga science, Definition of yoga, the nature of seer in pure and modified state, Vrittis - Nature, classification, definition, method to control of chittavrittis. Samprajnata Samadhi and its classification, Iswarapranidhana - a means to attain Samadhi, definition and quality of Iswara. Astanga yoga-Vama, Niyama, Asana, Pranayama, Ratyahara-Bahiranga Yoga, Dharana, Dhyana, Samadhi-Antaranga Yoga, Powers Introduction.

Unit-3. **Orientation of Hath yoga pradipika** :

Hath yoga - Introduction, relationship of Hath yoga and Raja yoga, greatness of Hath yoga, Hath yogi parampara, importance of Hath and its secrecy, place of Hath yoga Practice, Destructives and constructive of yoga, Yama and Niyama, Asana, methods of Hath yoga Practice, Mitahara, Pathya and Apathya. Rules in food taking, Hath yoga achievements. Paranayama - Benefits of Pranayama, Nadishuddi and Pranayama. Duration and time for pranayama practice, Gradation of Pranayama, Sweat and Pranayama, Food during pranayama practice, Yukta and Ayukta pranayama, Nadishuddi, Satkriya-Neti, Dhouti, Basti, Nauli, Trataka, Kapalbhati, Gajakarani, Importance of Pranayama practice. Symtoms of Nadishuddhi, Manonnani, Varieties of Kumbhaka-Methods of practice, Classification of their benefits, Hathayogasiddhilakshanam. Kundalini as base for all yoga, Results of Kundalini prabyodha, Synonyms for Susumna, Mudras Bandhas-classification, benefits and methods of practice, Nadanusandhana.

Unit 4: Yam and Niyam. Do`s and Don'ts in life. Ahinsa, satya, astheya, bramhacharya & aparigraha Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit 5: Asan and Pranayam - Various yoga poses and their benefits for mind & body. Regularization of breathing techniques and its effects-Types of pranayama

Suggested reading

1. 'Yogic Asanas for Group Training - Part-I" : Janardan Swami YogabhyasiMandal,Nagpur
2. "Rajayoga or conquering the Internal Nature" by SwamiVivekananda, AdvaitaAshrama(Publication Department),Kolkata
3. Rajayoga - Swami Vivekananda - Ramakrishna Ashrama Publications.
4. HathayogaPradipika of Swatmarama - Kaivalyadhama, Lonavala
5. The Science of Yoga - Taimini - Theosophical Publishing House, Adyar, Madras.
6. Yogasutras of Patanjali - HariharanandaAranya, University of Calcutta Press, Calcutta.
7. Patanjal Yoga PradeepaOmananda Tirtha- Geeta Press, Gorakhpur.
8. Gherandasamhita - Bihar School of Yoga, Munger, Bihar.
9. Shivayogadipika - Sadashivabrahmendra, Ananda Ashramagranthavali, Choukhamba Press
10. Yoga Darshan : Swami Niranjanananda-Sri PanchadashanamParamahamsaAlakh Bara, Deoghar.
11. Four chapters on Freedom (commentary on the Yoga sutras of Patanjali), Swami Satyananda (1983), Bihar School of Yoga, Munger.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

(AUDIT COURSE)

Course Code: GR20D5159 **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 wiil 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
- Study of Neethishatakam will help in developing versatile personality of students
- To develop self-developing attitude towards work without self-aggrandizement and to develop suffering free meditative mind
- To develop tranquil attitude in all favorable and unfavorable situations and 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)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

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-IV:

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:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

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, New Delhi.

II YEAR

I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING ANDTECHNOLOGY

NATURAL LANGUAGE PROCESSING

(PROFESSIONAL ELECTIVE V)

Course Code: GR20D5135 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives: The Objectives of this course is

1. Role of natural language processing and language modeling.
2. The analysis of text at word level, syntactic level and semantic level
3. Discourse processing of the text
4. Knowledge in automated natural language generation and machine translation
5. Explanation of information retrieval systems and usage of Lexical resources

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

1. Summarize the role of natural language processing in various applications and explain language modeling
2. Apply word level analysis, syntactic analysis and semantic analysis on natural language processing.
3. Discuss discourse processing of text.
4. Illustrate the automation of natural language generation and machine translation of Indian languages.
5. Infer information retrieval systems and utilize lexical resources for processing natural language text

UNIT I:

Overview: Origins and challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Information Retrieval.

Language Modeling: Introduction, Various Grammar-based Language Models, Statistical Language Model.

UNIT II:

Word Level Analysis: Introduction, Regular Expressions, Finite State Automata, Morphological Parsing, Spelling Error Detection and correction, Words and Word classes, Part of Speech Tagging.

Syntactic Analysis: Introduction, Context-free Grammar, Constituency, Parsing, Probabilistic Parsing.

UNIT III:

Semantic Analysis: Introduction, Meaning Representation, Lexical Semantics, Ambiguity, Word Sense DisambiguationDiscourse Processing: **Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure**

UNIT IV:

Natural Language Generation: Introduction, Architecture of NLG Systems, Generation Tasks and Representations, Application of NLG.
Machine Translation: Introduction, Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages

UNIT V:

Information Retrieval: Introduction, Design features of Information Retrieval Systems, Classical, Non-classical, Alternative Models of Information Retrieval, Evaluation
Lexical Resources: Introduction, WordNet, Frame Net, Stemmers, POS Tagger, Research Corpora

TEXT / REFERENCE BOOKS:

1. TanveerSiddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
2. Daniel Jurafsky and James H Martin,"Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition,2008.
3. James Allen, Benjamin/cummings, "Natural Language Understanding", 2nd edition, 19

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION STORAGE AND RETRIEVAL
(PROFESSIONAL ELECTIVE V)

Course Code: GR20D5114 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

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

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

1. Use IRS capabilities and information visualization technologies.
2. Demonstrate the use of Cataloging and Indexing.
3. Differentiate software text search algorithms and hardware text search systems.
4. Analyze the accuracy for various clustering algorithms.
5. 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 / REFERENCE BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation By Kowalski, Gerald, Mark T Maybury Kluwer Academic Press, 2000.
2. Modern Information Retrieval Ricardo Baeza-Yates, Pearson Education, 2007
3. Information Retrieval: Algorithms and Heuristics By David A Grossman and OphirFrieder, 2nd Edition, Springer International Edition, 2004.
4. Information Retrieval Data Structures and Algorithms By William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
5. Information Storage &RetievalBy Robert Korfhage – John Wiley & Sons.
6. Introduction to Information Retrieval By Christopher D. Manning and PrabhakarRaghavan, Cambridge University Press, 2008.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOCIAL MEDIA ANALYSIS
(PROFESSIONAL ELECTIVE V)

Course Code: GR20D5115 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

1. To understand social networks
2. To understand social media and networking data
3. To study of Social networks Visualization tools
4. To illustrate the social data using graph theoretic computing approach
5. To illustrate virtual communities from social networks and sentiment mining

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

1. Classify social networks
2. Analyze social media and networking data
3. Apply Social networks Visualization tools
4. Analyze the social data using graph theoretic computing approach
5. Identify application driven virtual communities from social networks and apply sentiment mining

UNIT I:

Introduction to social network analysis, Vertex or node, edge, neighbors, degree, shortest path, cycle, tree, complete graph, bipartite graphs, directed graphs, weighted graphs, adjacency matrix, connected components, Games on networks, game theory strategies, dominant strategies, dominated strategies, pure strategies and mixed strategies, Nash equilibrium, multiple equilibria-coordination games, multiple equilibria-the Hawk-Dove game, mixed strategies, Modeling network traffic using game theory.

UNIT II:

Technological networks (internet, telephone network, power grids, transportation networks), social networks (facebook, movie collaboration, paper collaboration), information networks (web), biological networks (neural networks, ecological networks).

UNIT III:

Random models of networks, Erdos-Renyi model of random graph, models of the small world, decentralized search in small-world, random graphs with general degree distributions.

UNIT IV

Models of network formation, Spread of influence through a network, influence maximization in networks, spread of disease on networks.

UNIT V:

Information networks, structure of the web, link analysis and web search, page rank, spectral analysis of page rank and hubs and authorities, random walks, auctions and matching markets, sponsored search markets

TEXT / REFERENCE BOOKS:

1. David Easley and Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World., Cambridge University Press, 2010.
2. Mark Newman, Networks: An Introduction., Oxford University Press, 2010.
3. Hansen, Derek, Ben Sheiderman, Marc Smith., Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.
4. Avinash Kaushik., Web Analytics 2.0: The Art of Online Accounta-bility, Sybex, 2009

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COST MANAGEMENT OF ENGINEERING PROJECTS

(OPEN ELECTIVE)

Course Code: GR20D5146 **L/T/P/C: 3 /0 /0 /3**

II YEAR I SEMESTER

Course Objectives:

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

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

1. Explain the various cost concepts used in decision making.
2. Identify and demonstrate various stages of project execution.
3. Prepare the project schedule by bar charts and network diagrams.
4. Differentiate absorption costing and marginal costing, also conduct breakeven and cost-volume-profit analysis.
5. 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, 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. Projectexecution as conglomeration of technical and non- technical activities.Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts.Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

UNIT III

Cost Behaviour 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. Activity- Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.

UNIT IV

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT V

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

TEXT/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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL SAFETY

(OPEN ELECTIVE)

Course Code: GR20D5147 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

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

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

1. Understanding of Safety principles.
2. Analyze different types of exposure and biological effects, exposure guidelines and basic workplace monitoring Ability to do Hazard analysis.
3. Demonstrate an understanding of workplace injury prevention, risk management, and incident investigations.
4. Understand the acute and chronic health effects of exposures to chemical, physical and biological agents in the workplace.
5. 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. Gravitylubrication,v.Wickfeedlubricationvi.Sidefeedlubrication,vii.Ringlubrication,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.

TEXT/REFERENCE BOOKS:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da InformationServices.
2. Maintenance Engineering, H. P. Garg, S. Chand andCompany.
3. Pump-hydraulic Compressors, Audels, McgrewHillPublication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman &HallLondon.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATIONS RESEARCH

(OPEN ELECTIVE)

Course Code: GR20D5148 **L/T/P/C:3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

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

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

1. The student will formulate and solve problems as networks and graphs for optimal allocation of limited resources such as machine, material and money.
2. The student will able to carry out sensitivity analysis.
3. The student will solve network models like the shortest path, minimum spanning tree, and maximum flow problems.
4. The student will able to distinguish various inventory models and develop proper inventory policies.
5. 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

TEXT/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. Pannerselvam, Operations Research: Prentice Hall of India2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India2010

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS

(OPEN ELECTIVE)

Course Code: GR20D5149 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
2. To know about feedback networks.
3. To learn about the concept of fuzziness involved in various systems
4. To understand the concept of adequate knowledge about fuzzy set theory.
5. To learn about comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm

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

1. To Expose the students to the concepts of feed forward neural networks
2. To provide adequate knowledge about feedback networks.
3. To teach about the concept of fuzziness involved in various systems.
4. To provide adequate knowledge about fuzzy set theory.
5. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

UNIT I:

Introduction To Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT II:

Essentials Of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications

UNIT III:

Multilayer Feed Forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM StabilityTheorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

UNIT IV:

Self-Organizing Maps (Som) And Adaptive Resonance Theory (Art)

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability- Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications. Classical& Fuzzy Sets Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membershipfunctions.

UNIT V:

Fuzzy Logic System Components

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Applications

Neural network applications: Process identification, Function Approximation, control and Process Monitoring, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification

TEXT/REFERENCE BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHIPublication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House,1997.
3. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. YadaiahandS. BapiRaju, PearsonEducation
4. Neural Networks – James A Freeman and Davis Skapura, Pearson,2002.
5. Neural Networks – Simon Hykins , Pearson Education
6. Neural Engineering by C.Eliasmith and CH.Anderson,PHI
7. Neural Networks and Fuzzy Logic System by Bork Kosko, PHIPublications.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CYBER SECURITY

(OPEN ELECTIVE)

Course Code: GR20D5150 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

1. To understand Cyber security challenges and their threats.
2. To understand Cyber attacks and their vulnerabilities.
3. To understand ethical hacking concepts and social engineering targets.
4. To understand cyber forensic investigation process
5. To recognise cyber laws and ethics

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

1. Understand importance and challenges of Cyber security
2. Investigate cybercrime and collect evidences
3. Identify security risks and take preventive steps
4. Able to use knowledge of forensic tools and software
5. Knowledge about Indian IT act and International law

UNIT I:

Introduction to Cyber Security: Introduction to Cyber Security, Importance and challenges in Cyber Security, Cyberspace, Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure, Cyber security - Organizational Implications.

UNIT II:

Hackers and Cyber Crimes: Types of Hackers, Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access, Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks, Worms, Trojans, Viruses, Backdoors.

UNIT III:

Ethical Hacking and Social Engineering: Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modelling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing, Types of Social Engineering, Insider Attack, Preventing Insider Threats, Social Engineering Targets and Defence Strategies.

UNIT IV:

Cyber Forensics and Auditing: Introduction to Cyber Forensics, Computer Equipment and associated storage media, Role of forensics Investigator, Forensics Investigation Process, and Collecting Network based Evidence, Writing Computer Forensics Reports, Auditing, Plan an audit against a set of audit criteria, Information Security Management System Management. Introduction to ISO 27001:2013

UNIT V:

Cyber Ethics and Laws: Introduction to Cyber Laws, E-Commerce and E-Governance, Certifying Authority and Controller, Offences under IT Act, Computer Offences and its penalty under IT Act 2000, Intellectual Property Rights in Cyberspace.

TEXT/REFERENCE BOOKS:

1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., Enterprise Cybersecurity -How to Build a Successful Cyber defense Program Against Advanced Threats, A-press .
2. Nina Godbole, Sumit Belapure, Cyber Security, Willey
3. Hacking the Hacker, Roger Grimes, Wiley
4. Cyber Law By Bare Act, Govt Of India, It Act 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTERNET OF THINGS ARCHITECTURE AND DESIGN PRINCIPLES

(OPEN ELECTIVE)

Course Code: GR20D5151 **L/T/P/C: 3/0/0/3**

II YEAR I SEMESTER

Course Objectives:

1. To assess the vision and introduction of IoT.
2. To Understand Networking & Communication aspects of IOT.
3. To Explore the Application areas of IOT and to analyze the current needs
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Course Outcomes: On successful completion of the course, the student will:

1. Understand the concepts of Internet of Things
2. Analyze basic protocols in wireless sensor network
3. Design IoT applications in different domain and be able to analyze their performance
4. Understand the Hardware concepts of Internet of Things
5. Implement basic IoT applications through python.

UNIT-1

Introduction to IoT :

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs

IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network.

UNIT-II

Network & Communication aspects

Connectivity terminologies-IOT Node, LAN,WAN, Gateway, IOT Stack vs. Web Stack, IOT Identification and Data Protocols-IPV4,IPV6,HTTP,MQTT,COAP

UNIT-III

IOT Applications

Smart Homes-Smart Home Origin, Technologies, Implementation, Smart Grids-Characteristics, Benefits, Architecture, Components, Smart Cities-Characteristics, Frameworks, Challenges,
Industrial IOT- Requirements, Design Considerations, Applications

UNIT-IV

Hardware Platforms

Programming with Arduino-Features of Arduino, Components of Arduino Board, Arduino IDE, Program Elements, Raspberry

UNIT-V

Developing IoTs

Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor based application through embedded system platform, Implementing IoT concepts with python.

Text Books:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"

2. Internet of Things, Jeeva Jose, Khanna Publishing, 2018

3. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".

Reference Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014. (ISBN-13: 978-0124076846).

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",1st st Edition, Apress Publications, 2013. (ISBN-13: 978- 1430257.

3. Internet of Things Challenges, Advances and Applications by Quas F.Hassan, Atta Ur Rehaman Khan, and Sajiad A. Madani