ACADEMIC REGULATIONS PROGRAMME STRUCTURE AND DETAILED SYLLABUS

GR20

Bachelor of Technology
(Computer Science and Engineering)

(Effective for the students admitted from the Academic Year 2020-21)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Bachupally, Kukatpally, Hyderabad-500090,Telangana

Tel: +91 7207344440

URL: www.griet.ac.in, E-Mail: info@griet.ac.in

ACADEMIC REGULATIONS
PROGRAMME STRUCTURE
&
DETAILED SYLLABUS

Bachelor of Technology
Computer Science and Engineering
(Four Year Regular Programme)
(Applicable for Batches Admitted from 2020-21)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
Bachupally, Kukatpally, Hyderabad, Telangana, India- 500090

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2020 Regulations (GR20 Regulations) are given here under. These regulations govern the programmes offered by the Department of Computer Science and Engineering with effect from the students admitted to the programmes in

2020- 21 academic year.

1. **Programme Offered:** The programme offered by the Department is B. Tech in Computer Science and Engineering, a four-year regular programme.

2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.

3. **Admissions:** Admission to the B. Tech in Computer Science and Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. **Programme Pattern:**

   a) Each Academic year of study is divided in to two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) 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).
   d) The total credits for the Programme is160.
   e) Student is introduced to "Choice Based Credit System (CBCS)".
   f) A student has a choice to register for all courses in a semester / one less or one additional course from other semesters provided the student satisfies prerequisites.
   g) All the registered credits will be considered for the calculation of final CGPA.
   h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
   i) **Subject / Course Classification:** All subjects/ courses offered for the under graduate programme in E & T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	BS	Basic Science Courses	Basic Science Courses
2	ES	Engineering Science Courses	Includes Engineering subjects
3	HS	Humanities and Social sciences	Includes Management courses
4	PC	Professional Core Courses	Includes core subjects related to the parent discipline/department/ branch of Engineering
5	PE	Professional Elective Courses	Includes elective subjects related to the parent discipline/ department/ branch of Engineering
6	OE	Open Elective Courses	Electives from other technical and/or emerging subjects
7	LC	Laboratory Courses	Laboratory Courses
8	MC	Mandatory Courses	Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge
9	PW	Project Work	Project work, seminar and internship in industry or elsewhere

5. **Award of B. Tech Degree:** A student will be declared eligible for the award of B. Tech Degree if he/she fulfills the following academic requirements:

a) He/She pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.

b) A student has to register for all the 160 credits and secure all credits.

c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B. Tech course.

The Degree of B. Tech in Computer Science and Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. Attendance Requirements:

a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.

c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.

d) Shortage of Attendance more than 10% (attendance less than 65% in aggregate) shall in no case becondoned.

e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek reregistration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

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

a) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council from time to time.

b) Distribution and Weightage of marks

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Engineering Graphics	30	70	100
4	Mini Project	30	70	100
5	Project Work	30	70	100

c) Continuous Internal Evaluation and Semester End Examinations: The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure:

S. No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	30	Internal Examination & Continuous Evaluation	1) Two mid semester examination shall be conducted for 20 markseach for a durationof 2 hours. Average of the two mid exams shall be considered **i) Subjective - 15marks** **ii) Objective - 5marks** **2) Tutorials - 5marks** **3) Continuous Assessment– 5 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours
2	Practical	30	Internal Examination & Continuous Evaluation	**i) Internal Exam-10marks** **ii) Record - 5marks** **iii) ContinuousAssessment - 15 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours

d) Mini Project with Seminar: 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. The supervisor continuously assesses the students for 20 marks (Continuous Assessment – 15 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committee for 10 marks. The mini project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 70 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor. Plagarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

e) Summer Internship: Summer Internship shall be done by the student in the summer break after III B. Tech II Semester and shall be evaluated in IV B. Tech I Semester along with the Project Work (Phase I).

Project Work (Phase–I and Phase-II): The project work is evaluated for 100 marks. Out of 100, 30 marks shall be for internal evaluation and 70 marks for the external evaluation. The supervisor assesses the student for 20 marks (Continuous Assessment – 15 marks, Report –5 marks). At the end of the semester, projects shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by the Project Review Committee for 10 marks. The external evaluation for Project Work is a Viva-Voce Examination which is conducted by the Project Review Committee in the presence of external examiner and is evaluated for 70 marks, Project Review Committee consists of HOD, Project Coordinator and Supervisor. These rules are applicable for both Phase I and Phase II.

Plagiarism check is compulsory for project work report (Phase I and PhaseII) as per the plagiarism policy of GRIET.

f) EngineeringGraphics:

- Two internal examinations, each is of 10 marks. The average of the two internal tests shall be considered for the award of marks.
- Submission of day to day work - 15marks.
- Continuous Assessment - 5marks.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for recounting 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 to secure the required credits can appear for a supplementary examination, as per the schedule announced by the College.

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 and PromotionRules:**

a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end Examination taken together.

b) A student shall be promoted to the next year only when he/she satisfies the requirements of all the previous semesters.

	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year secondsemester. (ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether thestudent takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year secondsemester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether thestudent takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third yearsecond semester. (ii) Must have secured at least 60% credits up to third year second semester fromall the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

13. **Grade Points: A 10 - point grading system with corresponding letter grades and percentage of marks, as given below, is followed**

Letter Grade	Grade Point	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 (Average)	6	Marks >= 50 and Marks < 60
C (Pass)	5	Marks >= 40 and Marks < 50
F (Fail)	0	Marks < 40
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-P. 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 8) is the ratio of sum of the product of the number of credits and grade points to the total credits of all courses registered by a student, i.e.,

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

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

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

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

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

14. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the160 credits.

	Class Awarded	CGPA Secured
14.1	First Class With Distinction	CGPA >= 8.00 with no F or below grade/ detention anytime during the programme
14.2	First Class	CGPA >= 8.00 with rest of the clauses of 14.1 not satisfied
14.3	First Class	CGPA ≥ 6.50 and CGPA < 8.00
14.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
14.5	Pass Class	CGPA ≥ 5.00 and CGPA < 5.50

15. **Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against the student, the result of the student (for that Semester) may be with held and the student will not be allowed to go into the next semester. The award or issue of the Degree may also be withheld in such cases.

16. **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.

17. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for readmission/re-registration to the same or equivalent subjects as and when they are offered.

18. **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.

Academic Regulations for B.Tech (Lateral Entry) under GR20

(Applicable for Batches Admitted from 2021-2022)

1. All regulations as applicable for B.Tech Four year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme) except for the following rules

a) Pursued programme of study for not less than three academic years and not more than six academic years.

b) A student should register for all 120 credits and secure all credits. The marks obtained in all 120 credits shall be considered for the calculation of the final CGPA.

c) Students who fail to fulfil all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Tech programme.

2. Academic Requirements and Promotion Rules:

a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end Examination taken together.

b) A student shall be promoted to the next year only when he/she satisfies the requirements of all the previous semesters.

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester.	Regular course of study of second year first semester.
2	Second year second semester to third year first semester.	(i) Regular course of study of second year second semester. (ii) Must have secured at least 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester.	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester.	(i) Regular course of study of third year second semester. (ii) Must have secured at least 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

	Fourth year first semester to fourth year second semester.	**Regular course of study of fourth year first semester.**

3. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the 120 credits.

	Class Awarded	CGPA Secured
3.1	**First Class With Distinction**	**CGPA >= 8.00 with no F or below grade/ detention anytime during the Programme**
3.2	**First Class**	**CGPA >= 8.00 with rest of the clauses of 3.1 not satisfied**
3.3	**First Class**	**CGPA ≥ 6.50 and CGPA < 8.00**
3.4	**Second Class**	**CGPA ≥ 5.50 and CGPA < 6.50**
3.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Bachupally, Kukatpally, Hyderabad–500090, India.

B. Tech Computer Science and Engineering GR20 Course Structure

I B. Tech (CSE) - I Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	Maths	BS	GR20A1001	Linear Algebra and Differential Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Physics	BS	GR20A1003	Applied Physics	3	1	0	4	3	1	0	4	30	70	100
3	English	HS	GR20A1006	English	2	0	0	2	2	0	0	2	30	70	100
4	CSE	ES	GR20A1007	Programming for Problem Solving	2	1	0	3	2	1	0	3	30	70	100
5	ME	ES	GR20A1010	Engineering Graphics	1	0	2	3	1	0	4	5	30	70	100
6	Physics	BS	GR20A1012	Applied Physics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	CSE	ES	GR20A1016	Programming for Problem Solving Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	English	HS	GR20A1015	English Language and Communication Skills Lab	0	0	1	1	0	0	2	2	30	70	100
TOTAL					**11**	**3**	**6**	**20**	**11**	**3**	**12**	**26**	**240**	**560**	**800**
9	Mgmt	MC	GR20A1020	Design Thinking	1	0	0	1	2	0	0	2	30	70	100

I B. Tech (CSE) - II Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	Maths	BS	GR20A1002	Differential Equations and Vector Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Chemistry	BS	GR20A1005	Engineering Chemistry	3	1	0	4	3	1	0	4	30	70	100
3	EEE	ES	GR20A1008	Basic Electrical Engineering	2	1	0	3	2	1	0	3	30	70	100
4	CSE	ES	GR20A1011	Data Structures	2	1	0	3	2	1	0	3	30	70	100
5	Chemistry	BS	GR20A1014	Engineering Chemistry Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
6	EEE	ES	GR20A1017	Basic Electrical Engineering Lab	0	0	1	1	0	0	2	2	30	70	100
7	CSE	ES	GR20A1018	Data Structures Lab	0	0	1	1	0	0	2	2	30	70	100
8	ME	ES	GR20A1019	Engineering Workshop	1	0	1.5	2.5	1	0	3	4	30	70	100
TOTAL					**11**	**4**	**5**	**20**	**11**	**4**	**10**	**25**	**240**	**560**	**800**
9	Mgmt	MC	GR20A1021	Life skills and Personality Development	1	**0**	0	1	**2**	**0**	0	2	30	70	100

II B.Tech (CSE) - I Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	IT	ES	GR20A2067	Digital Logic Design	3	0	0	3	3	0	0	3	30	70	100
2	IT	PC	GR20A2076	Java Programming	3	0	0	3	3	0	0	3	30	70	100
3	Maths	BS	GR20A2005	Probability and Statistics	3	0	0	3	3	0	0	3	30	70	100
4	CSE	BS	GR20A2069	Discrete Mathematics	2	1	0	3	2	1	0	3	30	70	100
5	IT	PC	GR20A2070	Database Management Systems	3	0	0	3	3	0	0	3	30	70	100
6	CSE	PC	GR20A2071	Scripting Languages Lab	0	0	2	2	0	0	4	4	30	70	100
7	IT	PC	GR20A2080	Java Programming Lab	0	0	2	2	0	0	4	4	30	70	100
8	IT	PC	GR20A2073	Database Management Systems Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
TOTAL					**14**	**1**	**5.5**	**20.5**	**14**	**1**	**10**	**25**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2002	Value Ethics and Gender Culture	2	0	0	2	2	0	0	2	30	70	100

II B. Tech (CSE) - II Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	IT	PC	GR20A2074	Computer Organization	3	0	0	3	3	0	0	3	30	70	100
2	CSE	PC	GR20A2075	Operating Systems	2	1	0	3	2	1	0	3	30	70	100
3	Mgmt	HS	GR20A2004	Economics and Accounting for Engineers	3	0	0	3	3	0	0	3	30	70	100
4	CSE	PC	GR20A2068	Python Programming	3	0	0	3	3	0	0	3	30	70	100
5	IT	PC	GR20A2077	Design and Analysis of Algorithms	3	0	0	3	3	0	0	3	30	70	100
6	CSE	PC	GR20A2078	Python Programming Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	CSE	PC	GR20A2079	Operating Systems Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	CSE	PC	GR20A2072	Visual Programming using C# and .Net Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
TOTAL					**14**	**1**	**4.5**	**19.5**	**14**	**1**	**10**	**25**	**240**	**560**	**800**
9	Chemistry	MC	GR20A2001	Environmental Science	2	0	0	2	2	0	0	2	30	70	100

III B. Tech (CSE) - I Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	CSE	PC	GR20A3043	Computer Networks	3	0	0	3	3	0	0	3	30	70	100
2	CSE	PC	GR20A3044	Data Warehousing and Data Mining	3	0	0	3	3	0	0	3	30	70	100
3	CSE	PC	GR20A3045	Micro Controllers and Internet of Things	2	1	0	3	2	1	0	3	30	70	100
4	CSE	PE		Professional Elective-I	3	0	0	3	3	0	0	3	30	70	100
5	CSE	OE		Open Elective-I	3	0	0	3	3	0	0	3	30	70	100
6	CSE	PC	GR20A3051	Data Warehousing and Data Mining Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	CSE	PC	GR20A3052	Web Technologies Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	CSE	PC	GR20A3053	Micro Controllers and Internet of Things Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
TOTAL					**14**	**1**	**4.5**	**19.5**	**14**	**1**	**9**	**24**	**240**	**560**	**800**

PROFESSIONAL ELECTIVE – I				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	PE	GR20A3046	Artificial Intelligence
2	CSE	PE	GR20A3047	Principles of Programming Languages
3	CSE	PE	GR20A3048	IT Infrastructure Management
4	CSE	PE	GR20A3049	Graph Theory

OPEN ELECTIVE – I				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	OE	GR20A3050	Principles of E-Commerce

III B. Tech (CSE) - II Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	IT	PC	GR20A3123	Machine Learning	2	1	0	3	2	1	0	3	30	70	100
2	CSE	PC	GR20A3117	Formal Language and Automata Theory	3	0	0	3	3	0	0	3	30	70	100
3	IT	PC	GR20A3054	Software Engineering	3	0	0	3	3	0	0	3	30	70	100
4	CSE	PE		Professional Elective-II	3	0	0	3	3	0	0	3	30	70	100
5	CSE	OE		Open Elective-II	3	0	0	3	3	0	0	3	30	70	100
6	CSE	PC	GR20A3122	Machine Learning Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	IT	PC	GR20A4064	Unified Modeling Language Lab	0	0	2	2	0	0	4	4	30	70	100
8	CSE	PW	GR20A3141	Mini Project with Seminar	0	0	2	2	0	0	6	6	30	70	100
TOTAL					**14**	**1**	**5.5**	**20.5**	**14**	**1**	**13**	**28**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2003	Constitution of India	2	0	0	2	2	0	0	2	30	70	100

PROFESSIONAL ELECTIVE – II				
S. No.	BOS	Group	Course Code	COURSE
1	CSE	PE	GR20A3061	Data Science with R programming
2	CSE	PE	GR20A3118	Cloud Computing
3	CSE	PE	GR20A3119	Neural Networks and Deep Learning
4	CSE	PE	GR20A3120	Software Architecture

OPEN ELECTIVE – II				
S. No.	BOS	Group	Course Code	COURSE
1	CSE	OE	GR20A3121	Business Analytics

IV B. Tech (CSE) - I Semester

S. No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T				T	P	Total			
1	CSE	PC	GR20A4047	Cryptography and Network Security	2	1	0	3	2	1	0	3	30	70	100
2	CSE	PC	GR20A4048	Compiler Design	3	0	0	3	3	0	0	3	30	70	100
3	CSE	PE		Professional Elective-III	3	0	0	3	3	0	0	3	30	70	100
4	CSE	PE		Professional Elective-IV	3	0	0	3	3	0	0	3	30	70	100
5	CSE	OE		Open Elective- III	3	0	0	3	3	0	0	3	30	70	100
6	CSE	PC	GR20A4054	Cryptography and Network Security Lab	0	0	2	2	0	0	4	4	30	70	100
7	CSE	PC	GR20A4055	Compiler Design lab	0	0	2	2	0	0	4	4	30	70	100
8	CSE	PW	GR20A4129	Project Work - Phase I	0	0	6	6	0	0	12	12	30	70	100
TOTAL					**14**	**1**	**10**	**25**	**14**	**1**	**20**	**35**	**240**	**560**	**800**

PROFESSIONAL ELECTIVE – III				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	PE	GR20A4049	Network Routing Algorithms
2	CSE	PE	GR20A4050	Image and Video Processing
3	CSE	PE	GR20A4051	Natural Language Processing
4	IT	PE	GR20A3128	Agile Methodologies

PROFESSIONAL ELECTIVE – IV				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	PE	GR20A4052	Information Storage and Management
2	CSE	PE	GR20A4053	Multimedia Applications
3	CSE	PE	GR20A3131	Big Data Analytics
4	IT	PE	GR20A4058	Software Testing Methodologies
OPEN ELECTIVE – III				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	OE	GR20A3067	Augmented Reality and Virtual Reality

IV B.Tech (CSE) - II Semester

1	Mgmt	HS	GR20A3140	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	0	0	3	30	70	100
2	CSE	PE		Professional Elective-V	3	0	0	3	3	0	0	3	30	70	100
3	CSE	PE		Professional Elective-VI	3	0	0	3	3	0	0	3	30	70	100
4	CSE	PW	GR20A4130	Project Work- Phase II	0	0	6	6	0	0	12	12	30	70	100

PROFESSIONAL ELECTIVE – V				
S. No.	**BOS**	**Group**	**Course Code**	**Course**
1	CSE	PE	GR20A4114	Real Time Operating Systems
2	CSE	PE	GR20A4115	Cyber Security
3	CSE	PE	GR20A4116	Green Computing
4	IT	PE	GR20A4124	Design Patterns

PROFESSIONAL ELECTIVE - VI				
S. No.	**BOS**	**Group**	**Course Code**	**Course**
1	CSE	PE	GR20A4067	Human Computer Interaction
2	IT	PE	GR20A3057	Computer Graphics
3	CSE	PE	GR20A4117	Data Analytics using Open Source Tools
4	CSE	PE	GR20A4118	Software Product Development and Management

PROFESSIONAL ELECTIVES - 4 THREADS

S. No.	Theory and Algorithms	Applications	Data Science and Machine Intelligence	Software and Technology
1	Graph Theory	Principles of Programming Languages	Artificial Intelligence	IT Infrastructure Management
2	Data Science with R programming.	Cloud Computing	Neural Networks and Deep Learning	Software Architecture
3	Network Routing Algorithms	Image and Video Processing	Natural Language Processing	Agile Methodologies
4	Information Storage And management	Multimedia Applications	Big Data Analytics	Software Testing Methodologies
5	Real Time Operating Systems	Cyber security	Green Computing	Design Patterns
6	Human Computer Interaction	Computer Graphics	Data Analytics using Open Source Tools	Software Product Development and Management

OPEN ELECTIVES FOR GR20 REGULATIONS

THREAD 1	THREAD 2	OFFERED BY
1. Soft Skills and Interpersonal Communication 2. Human Resource Development and OrganizationalBehavior 3. Cyber Law andEthics 4. Economic Policiesin India	1. Principles of E-Commerce 2. Business Analytics 3. Augmented Reality and Virtual Reality	**CSE**
	1. Internet of Things 2. Augmented Reality and Virtual Reality 3. Distributed Database and Systems	**CSE (AIML)**
	1. Augmented Reality and Virtual Reality 2. Internet of Things 3. Human Computer Interaction	**CSE (DS)**
	1. Services Science and Service Operational Management 2. IT Project Management 3. Marketing Research and Marketing Management	**CSBS**
	1. Artificial Intelligence 2. Introduction to Data Science 3. Human Computer Interaction	**IT**
	1. Non-Conventional Energy Sources 2. Machine Learning 3. Artificial Intelligence Techniques	**EEE**
	1. Principles of Communication 2. Sensor Technology 3. Cellular and Mobile Communications	**ECE**
	1. Robotics 2. Composite Materials 3. Operations Research	**ME**
	1. Engineering Materials for Sustainability 2. Geographic Information Systems and Science 3. Environmental Impact Assessment and Life CycleAnalyses	**CE**

I YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS

Course Code: GR20A1001 **L/T/P/C: 3/1/0/4**
I Year I Semester

Course Objectives:
1. Apply ideas to solve linear systems, at the core of many engineering concepts.
2. Apply concept of latent values of a matrix which is critical in many engineering applications.
3. Take part in, function approximation using the tools of mean value theorems.
4. Compose optimal values of multi-variable functions.
5. Utilize definite integral concept for various geometrical applications.

Course Outcomes:
At the end of the course, the student will be able to:
1. Compile the rank of a matrix to determine the existence of solutions of a linear algebraic system
2. Determine the eigenvalues and eigenvectors of a square matrix which arise in several engineering applications
3. Determine approximate solution of over determined systems using the pseudo inverse.
4. Develop the skill of determining optimal values of multivariable functions using classical method**s.**
5. Apply the definite integral concept for various computational problems in geometry.

UNIT I
VECTOR AND MATRIX ALGEBRA

Vector space (definition and examples), linear independence of vectors, orthogonality of vectors, projection of vectors, Symmetric, Hermitian, skew-symmetric, skew-Hermitian, orthogonal and unitary matrices; Rank of a matrix by echelon reduction, Solution of a linear algebraic system of equations (homogeneous and non-homogeneous).

UNIT II
MATRIX EIGENVALUE PROBLEM AND QUADRATIC FORMS

Determination of eigenvalues and eigenvectors of a matrix, properties of eigenvalues and eigenvectors (without proof), diagonalization of a matrix, orthogonal diagonalization of symmetric matrices, Similarity of matrices. Quadratic Forms: Definiteness and nature of a quadratic form, reduction of quadratic form to canonical form by orthogonal transformation.

UNIT III
MATRIX DECOMPOSITION AND PSEUDO INVERSE OF A MATRIX

Spectral decomposition of a symmetric matrix, L-U decomposition,Gram-Schmidt orthonormalization of vectors, Q-R factorization, Singular value decomposition, Moore-Penrose pseudo inverse of a matrix, least squares solution of an over determined system of equations using pseudo inverse.

UNIT IV
MULTIVARIABLE DIFFERENTIAL CALCULUS AND FUNCTION OPTIMIZATION

Partial Differentiation: Total derivative. Jacobian; Functional dependence. Unconstrained optimization of functions using the Hessian matrix, constrained optimization using Lagrange multiplier method.

UNIT V
SINGLE VARIABLE CALCULUS

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem and Taylor's theorem (without proof), their geometrical interpretation, approximation of a function by Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (for Cartesian coordinates).

TEXT BOOKS

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa publishing house, Fourth edition 2014
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thedition,Pearson, Reprint.

REFERENCES:

1. GRIET reference manual
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
APPLIED PHYSICS

Course Code: GR20A1003 **L/T/P/C: 3/1/0/4**
I Year I Semester

Course Objectives:

1. Understand the dualistic nature of radiation and matter waves with experimental validation.
2. Outline the properties of semiconductor materials for specific applications.
3. Develop basic understanding of optoelectronic devices.
4. Discuss the use of lasers as light sources in optical fiber applications.
5. Study the properties of dielectric, magnetic and superconducting materials for various applications.

Course Outcomes:

At the completion of this course, students will be able to:

1. Solve engineering problems involving quantum nature of radiation and matter waves.
2. Comprehend the characteristics of semiconductor devices such as transistors and diodes.
3. Familiarize with operation of optoelectronic devices and its applications.
4. Analyze the properties of Laser and its propagation in different types of optical fibers.
5. Identify dielectric, magnetic and superconducting materials based on their properties for specific applications.

UNIT I

Quantum Mechanics: Introduction, Black body radiation, Planck's law, Photoelectric effect- Einstein's Photoelectric equation, Compton effect (Qualitative), Wave-Particle duality, de Broglie hypothesis, Davisson and Germer experiment, Heisenberg's uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional infinite potential box.

UNIT II

Semiconductor Physics: Intrinsic and extrinsic semiconductors, Estimation of carrier concentration, Dependence of Fermi level on carrier concentration and variation with temperature,Carrier transport: diffusion and drift, Hall Effect, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar Junction Transistor (BJT): Construction and principle of operation (n-p-n and p-n-p) in common base configuration.

UNIT III

Optoelectronics: Radiative transitions: Absorption, Spontaneous and Stimulated emission, Non-radiative transitions: Auger recombination, Surface recombination and recombination at defects, Generation and recombination mechanism in semiconductors, LED and Semiconductor lasers: Device structure, Materials, Characteristics, Semiconductor photo-detectors: PIN and Avalanche detectors and their structure, Materials, Working principle and Characteristics, Solar cell: Structure and Characteristics.

UNIT IV

Lasers: Introduction, Characteristics of lasers, Einstein coefficients, Resonating cavity, Active medium-Meta stable state, Pumping, Population inversion, Construction and working of Ruby laser and He-Ne laser, Applications of lasers.

Fiber Optics: Introduction, Principle and Structure of an optical fiber, Basic components in optical fiber communication system, Comparison of optical fibers over conventional cables, Acceptance angle-Numerical aperture, Types of optical fibers, Losses associated with optical fibers, Applications of optical fibers.

UNIT V

Dielectric Materials: Introduction, Types of polarizations (Electronic, Ionic and Orientational Polarizations) and calculation of Electronic and Ionic polarizability.

Magnetic Materials: Introduction, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of anti-ferro and ferri magnetic materials.

Superconducting materials: Introduction to superconductors, General properties, Meissner effect, Type I and Type II superconductors, Applications of superconducting materials.

Teaching methodologies:

- White board and marker
- Power Point Presentations
- Video lectures

Text books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - CengageLearing.
2. Halliday and Resnick, Physics - Wiley.
3. Engineering Physics, P.K Palanisamy, Scitech Publishers.
4. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand.
5. Applied Physics, T. Bhīma Sankaram, BSP Publishers.

References;

1. Richard Robinett, Quantum Mechanics
2. Fundamentals of Semiconductor Devices, Second Edition, Anderson and Anderson, McGraw Hill.
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Inc.(1995)
4. Semiconductor Physics and Devices, 4e, Neamen and Biswas, McGraw Hill.
5. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupthaon NPTEL.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGLISH

Course Code: GR20A1006 **L/T/P/C: 2/0/0/2**
I Year I Semester

Course Objectives:
1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.
4. Understand the importance of defining, classifying and practice the unique qualities of professional writing style.
5. Employ the acquired knowledge in classroom with reference to various social and professional spheres thus leading to a life-long learning process

Course Outcomes:
Students will be able to
1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect others point of view

UNIT I
Where the Mind is without Fear poem by Rabindranath Tagore
Vocabulary Building: The Concept of Word Formation-- The Use of Prefixes and Suffixes. **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT II
The Last Leaf by O. Henry
Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Sub-skills of Reading- Skimming and Scanning
Writing: Note Making, PrécisWriting, Writing an Abstract, Nature and Style of Sensible Writing- **Defining-Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence

UNIT III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English toform Derivatives-Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers-Verbs and Tenses.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-Writing Formal LettersE.g. Letter of Complaint, Letter of Requisition, Use of phrases for formal and informal letter writing.

UNIT IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Standard Abbreviations in English and Phrasal Verbs
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension**-** Intensive Reading and Extensive Reading
Writing: Writing Introduction and Conclusion -Essay Writing-Types of Essays- Picture Composition

UNIT V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Technical Vocabulary and their usage
Vocabulary: One Word Substitutes, Technical vocabulary and their usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROGRAMMING FOR PROBLEM SOLVING

Course Code: GR20A1007 **L/T/P/C: 2/1/0/3**
I Year I Semester

Course Objectives:
1. To interpret the various steps in program development.
2. To recall and recite the fundamentals, syntax and semantics of C programming language.
3. To illustrate problem solving using arrays, strings, structures and pointers.
4. To demonstrate using of structured and modular programming approach in solving problems.
5. To code, Interpret and debug the given program using files.

Course Outcomes:
1. To write algorithms and to draw flowcharts and remember and reuse the fundamentals of C language.
2. To apply decision making statements and arrays to solve problems.
3. To illustrate the need for strings and functions in problem solving.
4. To implement pointers and structures in writing programs.
5. To illustrate working with files and preprocessor directives in c.

UNIT I
Introduction to Programming: Introduction to Algorithms: Representation of Algorithm, Flowchart, Pseudo code with examples, Compiling &executing program, Syntax and logical errors.
Introduction to C Programming Language: Structure of c program, Variables, Data types, Constants, Operators, Expressions and precedence, Expression evaluation, Type conversion.
I/O: Simple input and output with formatted I/O and unformatted I/O.

UNIT II
Decision Making and Arrays: Conditional Branching and Loops: Conditional branching with if, if-else, nestedifelse, else if ladder, switch-case, Loops: for, while, do-while, jumping statements: goto, break, continue.
Arrays: One- and Two-dimensional arrays, creating, Accessing and manipulating elements of arrays
Searching: Basic searching in an array of elements, Linear and Binary search.

UNIT III
Strings and Functions: Strings: Introduction to strings, Operations on characters, Basic string functions available in C (strlen, strcat, strcpy, strrev, strcmp), String operations without string handling functions, Arrays of strings.
Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function (categories of functions), call by value, call by reference, passing arrays to functions, recursion, merits and demerits of recursive functions, Storage classes.

UNIT IV
Pointers and Structures: Pointers: Idea of pointers, Defining pointers, Pointer to pointer, void pointer, Null pointer, Pointers to Arrays and Structures, Function pointer.

Structures and unions: Defining structures, Initializing Structures, Array of structures, Arrays within structures, Nested structures, Passing structures to functions, Unions, typedef.

UNIT V

File handling and Preprocessor in C:

Files: Text and Binary files, Creating and Reading and writing text and binary files, Random access to files, Error Handling in files, Command line arguments, Enumeration data type.

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef, elif.

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4th Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING GRAPHICS

Course Code: GR20A1010 **L/T/P/C: 1/0/4/3**
I Year I Semester

Course Objectives:
1.Provide basic conventions and standards used in Engineering Graphics.
2.Impart knowledge on various Engineering curves and their significance.
3.To draw orthographic, sectional and pictorial views of a given solid.
4.To develop skills in three-dimensional visualization of engineering components.
5.To inculcate CAD packages on modelling and drafting.

Course Outcomes:
1.Familiarize with BIS standards and conventions used in engineering graphics.
2.Draw various engineering curves e.g., ellipse, parabola, cycloids and involutes etc and construct various reduced scales e.g., plain, diagonal and Vernier scales.
3.Differentiate between first angle and third angle methods of projection and distinguish parallel and perspective projection.
4.Visualize different views like elevation and plan for a given line, plane figures or solid objects.
5.Apply drafting techniques and use 2D software e.g., AutoCAD to sketch 2D plane figures.

Unit I
Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance; **Conic Sections-** ellipse, parabola and hyperbola – General method only. **Cycloidal curves** –cycloid**,** epi-cycloid and hypo-cycloid; **Scales**– plain and diagonal.

Unit II
Projections of Points, Lines and Planes: Introduction to principal planes of projections, **Projections of the points** located in same quadrant and different quadrants, **Projections of line** with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes. **Projections of regular planes** (polygons, circle and Square etc.,) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane.

Unit III
Projections of solids (regular and right solids only) - Classification of solids, Projections of solids (Cylinder, Cone, Pyramid and Prism) **Intersection of solids** – concept of lines of intersection and curves of intersection, intersection of solids (Prism Vs Prism and Cylinder Vs Cylinder) with their axes perpendicular to each other.

Unit IV
Section of solids – Sectional views of solids (Cylinder, Cone, Pyramid and Prism) and the true shape of the section, **Development of surfaces-** Development of surfaces of solids (Cylinder, Cone, Pyramid and Prism).

Unit V

Orthographic Projections: Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method;

Isometric Projections and Isometric View: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts, Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions

Introduction to CAD: (**For Internal Evaluation Weightage only**): Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

Text /Reference Books:

1. Engineering Drawing by N.D.BHATT/CHAROTAR PUBLISHING HOUSE PVT LTD
2. Engineering Drawing by Basanth Agrawal/ C M Agrawal/ McGraw Hill Education
3. Engineering Drawing by K.Venu Gopal/New Age Publications.
4. Engineering Graphics Essentials with AutoCAD 2018 Instruction by Kirstie Platenberg/SDC Publications.
5. Computer Aided Engineering Drawing / K Balaveera reddy et al-CBS publishers
6. Engineering Graphics and Design by Kaushik Kumar / Apurba kumar Roy / Chikesh

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
APPLIED PHYSICS LAB

Course Code: GR20A1012 **L/T/P/C: 0/0/3/1.5**
I Year I Semester

Course Objectives:
1. Outline the characteristics of various semiconducting devices.
2. Identify the behavioral aspects of magnetic and electric fields.
3. Demonstrate the quantum nature of radiation through photoelectric effect.
4. Apply the theoretical concepts of Lasers and optical fibers in practical applications.
5. Recall the basic concepts of LCR and RC circuits through hands on experience.

Course Outcomes: At the completion of this course, students will be able to:
1. Compare the behavior of p-n junction diode, Solar cells and LED.
2. Analyze the behavior of magnetic and electric fields with the help of graphs.
3. Determine the work function of a material through photoelectric effect.
4. Asses the characteristics of Lasers and infer the losses in optical fibers.
5. Estimate the time constant of RC circuit and resonance phenomenon in LCR circuit.

LIST OF EXPERIMENTS:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material and Planck's constant.
7. LASER: To study the V-I and P-I characteristics of LASER sources.
8. Optical fiber: To determine the bending losses of Optical fibers.
9. LCR Circuit: To determine the resonant frequency and Quality factor of LCR Circuit in series and parallel.
10. R-C Circuit: To determine the time constant of R-C circuit during charging and discharging.

Note: Any 8 experiments are to be performed.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROGRAMMING FOR PROBLEM SOLVING LAB

Course Code: GR20A1016 **L/T/P/C: 0/0/3/1.5**
I Year I Semester

Course Objectives:

1. To work with an IDE to create, edit, compile, run and debug programs.
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To write programs to create, read from and write to text and binary files.

Course Outcomes:

1. Formulate the algorithms for simple problems and translate algorithms to a working and correct program.
2. Identify, analyse and correct syntax and logical errors encountered during coding.
3. Interpret and implement programs using branching and looping statements.
4. Represent and manipulate data with arrays, strings and structures and use pointers.
5. Create, read and write to and from simple text and binary files and modularize the code with functions so that they can be reused.

TASK 1

1. Write a C program to implement operators in c?
2. Write a C program to find greatest and smallest among three numbers using conditional operator.
3. Write a C program to implicit and explicit type conversion in c?

TASK 2

a. Write a C program to swap two numbers using the following .
   i. Using third variable
   ii. Without using third variable
   iii. Using bitwise operators
b. Write a C program to add two numbers without using arithmetic operators in c?

TASK 3

a. Write a C program to find the roots of a quadratic equation using if-else.
b. The program should request the user to input two numbers and display one of the following as per the desire of user. (a). Sum of numbers (b) difference of numbers (c) product of the numbers (d)division of the numbers. Write a C program using switch statement to accomplish the above task.

TASK 4

a. Write a C Program check whether a given number is perfect number or not.
b. Write a C Program check whether a given number is palindrome number or not.
c. Write a C Program check whether a given number is Armstrong numberor not.

.

TASK 5

a. Write a C program to display the following patterns.

i)
```
        1
      2   3
    4   5   6
  7   8   9   10
```

ii.
```
    1
      2     3
        4       5       6
          7       8       9       10
```

b. Write a C program to generate the prime numbers between x and y where x and y are starting and ending values to be supplied by the user.

c. Write a C program to calculate the following Sum:

a. Sum=1+x/1!-x2/2!+x3/3!-x4/4!+…..xn/n!

TASK 6

a. Write a C program to find sum, average and minimum and maximum in a list of numbers.
b. Write a C program to implement linear search.
c. Write a C program to implement binary search.

TASK 7

a. Write a C program to implement matrix addition .
b. Write a C program to implement matrix multiplication.

TASK 8

a. Write a C program to implement the following string handling functions.
i.strlen() ii.strcpy() iii.strcmp() iv.strcat()
b. Write a C program to read first name , middle name and last name of a student and display a string full name without using string handling functions.

TASK 9

a. Write a C program to determine if a String is Palindrome or not.
b. Write a C program to sort the names of n students in the alphabetical order.

TASK 10

a. Write a C program to implement the following using recursive and non-recursive functions to find the factorial of a given integer.
b. Write a C program to implement the following using recursive and non-recursive functions to find the GCD (greatest common divisor) of two given integers.

TASK 11

a. Write a C program to implement transpose of a matrix using functions.
b. Write a C program to display binary equivalent of a given decimal number.

TASK 12

a. Create a structure student with name ,rollno,marks of 3 subjects as members . Write a c program to sort student details based on total using structures and functions .
b. Write a C program that uses structures and functions to perform the following operations:
   i. Addition of two complex numbers
   ii. Subtraction of two complex numbers
   iii. Multiplication of two complex numbers

TASK 13

a. Write a C program using functions and pointers that compares two strings to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.
b. Write a C program to sort list of numbers using pointers.

TASK 14

a. Write a C program to implement following pre-processor directives.
   i. define ii. ifdef iii. undef iv. ifndef.
b. Write a C program to create a user defined header file to find sum, product and greatest of two numbers ?

TASK 15

a. Write a C program to merge two files into a third file.
b. Write a C program to find some of n numbers using command line arguments.

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. HerbertSchildt, C: The Complete Reference, McGraw Hill, 4th Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course Code: GR20A1015 **L/T/P/C: 0/0/2/1**
I Year I Semester

Course Objectives:
The course will help to
1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. Sensitize students to the nuances of English speech sounds, word accent, intonation rhythm and Neutralization of accent for intelligibility
3. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. Improve the fluency of students in spoken English and neutralize their mother tongue influence
5. Train students to use language appropriately for public speaking and interviews

Course Outcomes:
Students will be able to
1. Interpret the role and importance of various forms of communication skills.
2. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect others point of view.
3. Utilize various media of verbal and non-verbal communication with reference to various professional contexts.
4. Recognise the need to work in teams with appropriate ethical, social and professional responsibilities.
5. Evaluate and use a neutral and correct form of English.

English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Exercise I
CALL Lab:
Understand: Introduction to Phonetics – Speech Sounds – Consonant and Vowel Sounds.
Practice: Introduction to Phonetics– Speech Sounds – Vowels and Consonants.
ICS Lab:
Understand: Ice Breaking and JAM.
Practice: Ice-Breaking Activity and JAM Session. Introducing oneself and others

Exercise II
CALL Lab:
Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab:
Understand: Features of Good Conversation – Non-verbal Communication.
Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and

Seeking Permissions- Telephone Etiquette

Exercise III
CALL Lab: -Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Understand: Intonation--Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:
Understand: Debates- argumentative vs persuasive - Public Speaking – Exposure to Structured Talks.
Practice: Debates- Making a Short Speech – Extempore.

Exercise IV
CALL Lab:
Understand: Listening Skills and its importance-– Purpose- Process- Types- Barriers of Listening.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: How to make informal and Formal Presentations
Practice: Collages / Poster Presentations-Power point presentations

Exercise V
CALL Lab:
Understand: Listening for General/Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Story Telling – Narrating a story – Using appropriate language elements
Practice: Weaving Stories

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN THINKING

Course Code: GR20A1020 **L/T/P/C: 2/0/0/1**
I Year I Semester

Course Objectives:
1. Study a problem from multiple perspectives
2. Learn how to frame the design challenge properly.
3. Learn how to ideate, prototype and Iterate solutions.
4. Learn from the overall design process how to create value as entrepreneurs
5. Learn how to design successful products or enterprises

Course Outcomes:
1. Students will be able to identify an Opportunity from a Problem
2. Students will be able to frame a Product/Service Idea
3. Students will be able to empathize with the customers
4. Students will be able to design and develop a Prototype
5. Students will be able to pitch their idea

UNIT-I: Introduction to Design Thinking: LRI Assessment, Introduction to Design Thinking, Understanding the Mindsets-Empathy, Optimism, Embrace Ambiguity, Make it, Learn from Failure, Iterate, Create Confidence, Creativity Convergent & Divergent Thinking

UNIT-II: Design Thinking Methodology: The 5 Stages of the Design Thinking Process-Empathise, Define (the problem), Ideate, Prototype, and Test,

UNIT-III: Ideation tools & exercises. Sample Design Challenge, Introduction to the Design Challenge Themes,Story telling and Tools for Innovation

UNIT-IV: Empathize-Understand customers, Empathy Maps, Empathise-Step into customers shoes-Customer Journey Maps, Define- Analysis & Drawing Inferences from Research

UNIT-V: The Design Challenge: Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing-Documentation and the Pitch

TEXT BOOK :
Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School - IdrisMootee.

REFERENCE BOOKS:
1. Zero to One: Note on Start-Ups, or How to Build the Future
2. The Lean Startup: How Constant Innovation Creates Radically Successful Businesses

3. Start With Why: How Great Leaders Inspire Everyone To Take Action

I YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Code: GR20A1002 **L/T/P/C: 3/1/0/4**
I Year II Semester

Course Objectives:
1. Knowledge to solve engineering problems governed by differential equations
2. The skill of evaluating multiple integrals needed for applications in mechanics and electro-magnetic field theory
3. The knowledge to interpret the functions arising in vector field theory and utilize mathematical tools for some computations
4. The skill of evaluating work done by a field and flux across a surface
5. The skill of utilizing specialized theorems for fast evaluation of work and flux

Course Outcomes: After learning the contents of this paper the student must be able to
1. Classify the differential equations of first order and solve them analytically by suggested methods
2. Solve linear differential equations of higher order under various forcing functions
3. Evaluate double and triple integrals and apply them to some problems in geometry and mechanics
4. Apply vector differential operators on scalar and vector fields and apply them to solve some field related problems
5. Apply classical vector integral theorems for fast evaluation of work done around closed curves and flux across closed surfaces

UNIT I
ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER
LDE of the first order: Solution of Exact, Linear and Bernoulli equations, modeling Newton's law of cooling, growth and decay models, modeling of R-L circuit

UNIT II
ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER
LDE with constant coefficients: Complementary function, over damping, under damping and critical damping of a system, Particular integrals for *f(x)* of the form $e^{ax}, x^n, cosax, sinax, e^{ax}V(x)$ *and* $x\,V(x)$where $V(x) \equiv cosax\ and\ sinax,$ the method of variation of parameters, LDE with variable coefficients: Cauchy's homogeneous equation, Legendre's homogeneous equations

UNIT III
MULTIPLE INTEGRALS
Double integrals: Evaluation of Double Integrals, change of order of integration (only Cartesian form), change of variables (Cartesian and polar coordinates)
Triple Integrals: Evaluation of triple integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates)
Applications: Area using the double integral –Volume of a solid using the double and triple integral- Mass, Center of mass and Center of gravity using double and triple integrals

UNIT IV

VECTOR DIFFERENTIATION AND LINE INTEGRATION

Vector differentiation: Scalar and vector point functions, Concepts of gradient, divergence and curl of functions in cartesian framework, solenoidal field, irrotational field, scalar potential

Vector line integration: Evaluation of the line integral, concept of work done by a force field, Conservative fields

UNIT V

SURFACE INTEGRATION AND VECTOR INTEGRAL THEOREMS

Surface integration: Evaluation of surface and volume integrals, flux across a surface

Vector integral theorems: Green's, Gauss and Stokes theorems (without proof) and their applications

TEXT BOOKS

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa publishing house, Fourth edition 2014
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
4.. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

1. GRIET reference manual
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING CHEMISTRY

Course Code: GR20A1005 **L/T/P/C: 3/1/0/4**
I Year II Semesters

Course Objectives:

1. To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
2. To distinguish the ranges of electromagnetic spectrum and its interaction with matter and to develop knowledge of various spectroscopic techniques at atomic and molecular levels.
3. To identify and apply various principles of electrochemistry, corrosion and water treatment which are essential for an engineer in industry
4. To acquire knowledge of existence of different organic molecules in different stereo chemical orientations useful for understanding reaction pathways.
5. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

Course Outcomes:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Relate electromagnetic spectra used for exciting different molecular energy levels in various spectroscopic techniques and their application in medicine and other fields.
3. Recognize various problems related to electrochemistry and corrosion in industry and is able to explain different prevention techniques and apply concepts of chemistry in engineering.
4. `technology and Interpret different problems involved in industrial utilization of water.
5. Understand the processing of fossil fuels for the effective utilization of chemical energy.

Unit I

Atomic and Molecular Structure: (8 Lectures)

Atomic and molecularorbitals, Linear Combination of AtomicOrbitals (LCAO), Molecularorbitals of homo-nuclear diatomic molecules, MO energy diagrams of N_2, and O_2.

Metallic bonding, Valence Bond Theory, Crystal Field Theory, Crystal Field Splitting of transition metal ion d-orbitals in tetrahedral, octahedral, and square planar geometries.

Unit II

Spectroscopic Techniques and Applications: (10 Lectures)

Regions of electromagnetic spectrum, Molecular spectroscopy Rotational Spectroscopy: Rotation of molecules, rotational spectra of rigid diatomic molecules, selection rules.

Vibrational Spectroscopy: The vibrating diatomic molecule, simple and an harmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy.

NMR Spectroscopy: criteria for NMR activity (Magnetic and nonmagnetic nuclei), basic concepts and principle of 1H NMR spectroscopy, Chemical shift, Magnetic Resonance Imaging.

Unit III

Electrochemistry and Corrosion: (12 Lectures)

Electrochemistry**:** Electrode potential, types of electrodes: calomel and glass electrodes- construction and working, electrochemical series and applications, electrochemical cells: Galvanic & electrolytic cells, Nernst equation- applications, numerical problems, Batteries: primary and secondary types, lithium metal, lithium ion and lead acid batteries. Types of Fuel cells: hydrogen-oxygen fuel cell - applications and advantages, microbial fuel cell.

Corrosion: Definition ,causes and effects of corrosion, The ories of chemical and electro chemical corrosion with mechanism, Types of corrosion - Galvanic, concentration cell and pitting corrosions, factors affecting corrosion (Nature of metal & Nature of Environment), corrosion control methods: Proper designing, cathodic protection (sacrificial anodic and impressed current cathodic protection), Metallic coatings: Hot dipping- Galvanization and tinning, electroplating, electroless plating of nickel.

Unit IV

Engineering Materials and Water Technology: (8 Lectures)

Semiconductors: Si and Ge, preparation, purification and crystal growth by zone refining and Czochralski pulling methods, doping.

Polymeric Materials: plastics-classification, types of polymerization, properties of polymers- crystallinity, Compounding and fabrication by compression moulding and injection moulding, conducting polymers – definition, classification, applications of conducting polymers in mobile phones and displays.

Water: impurities, hardness-causes of hardness, types, Units, Total Dissolved Solids (TDS), Boiler troubles-scales and sludges, caustic embrittlement, water purification by reverse osmosis (RO)method.

Unit V

Stereochemistry and Energy Resources (8 Lectures)

Stereo chemistry: Representations of 3D structures for organic molecules, stereo isomers: Conformational and Configurational isomers. Conformational isomers: conformational analysis of n-butane. Configurational isomers: geometrical isomers (E, Z isomers) and optical isomers. Optical isomers: symmetry, chirality, enantiomers, diastereomers, optical activity. Structure, synthesis and pharmaceutical applications of aspirin and ibuprofen.

Energy sources: Fossil Fuels: Coal –types, analysis of coal- proximate and ultimate analysis and their significance, Petroleum-its composition-synthetic petrol – Fischer Tropsch's process, cracking - Definition and its significance, knocking and its mechanism in Internal Combustion engine, Octane rating, Composition and Uses of Natural gas, LPG and CNG, biodiesel synthesis, biogas.

Text Books:

1. Engineering chemistry by P.C. Jain and M. Jain; DhanpatRai Publishing Company (P) Ltd., NewDelhi.
2. Textbook of Engineering Chemistry by A. Jayashree, Wiley Publications

References:

1. Organic Chemistry by Morrison, Boyd &Bhattacharjee (Pearson Pubs)
2. Solomons' Organic Chemistry, Wiley pubs
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell. McGraw Hill Publication
4. ATextbookofEngineeringChemistrybyShashiChawla, Dhanpat Rai Publishing Company (P) Ltd., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL ENGINEERING

Course Code: GR20A1008 **L/T/P/C: 2/1/0/3**
I Year II semester

Course Objectives:
1. Introduce the fundamentals of Electrical Engineering.
2. Understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. Provide foundation in theory and applications of Transformers and DC machines
4. Understand the basic principles of AC Electrical machinery and their applications.
5. Impart the knowledge of Electrical Installations.

Course Outcomes:
At the end of this course, students will able to
1. Understand and analyze basic electric circuits with suitable theorems.
2. Solve 1-phase and 3-phase balanced sinusoidal systems.
3. Interpret the working principle of Electrical machines.
4. Appraise the applications of Induction motors and synchronous generators used in Industries.
5. Identify the components of Low Voltage Electrical Installations.

Unit I:
D.C. CIRCUITS
Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Thevenin's and Norton'stheorems, Superposition and Reciprocity theorems. Time - domain analysis of first-order RL and RC circuits.

Unit II:
A.C. CIRCUITS
Representation of sinusoidal waveforms, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series RLC circuit. Locus Diagram. Three-phase balanced circuits, voltage and current relations in star and delta connections.

Unit III:
DC MACHINES ANDTRANSFORMERS
DC Motor and Generator: Construction, Principle of operation and Applications.Ideal and practical transformer, equivalent circuit, losses in transformers and efficiency, regulation. Auto-transformer and three-phase transformer connections.

Unit IV:

AC MACHINES
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, Loss components and efficiency. Single-phase induction motor,

Construction, working, torque-speed characteristics. Construction and working of synchronous generators.

Unit V: ELECTRICAL INSTALLATIONS

Power system overview. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata
2. McGraw Hill.
3. D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
4. L.S. Bobrow, Fundamentals of Electrical Engineering”, Oxford University Press, 2011
5. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
6. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall
7. India, 1989

Reference Books:

1. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education,
2. 2004.
3. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.
4. Circuit Theory (Analysis and Synthesis) by A.Chakrabarti-Dhanpat Rai & Co.
5. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA STRUCTURES

Course Code: GR20A1011 **L/T/P/C: 2/1/0/3**
I Year II Semester

Course Objectives:
1. To impart the basic concepts of data structures, algorithms and various searching and sorting techniques.
2. To demonstrate operations of linear data structures like stacks and queues.
3. To develop algorithms to implement operations on linked lists.
4. To demonstrate operations of non-linear data structures trees and graphs.
5. To realize the merits and demerits and applications of various data structures.

Course Outcomes:
After completion of the course, the student will be able to
1. Analyze basic concepts of data structures, computation complexity and implement various searching and sorting techniques.
2. Apply various operations on linear data structures Stack and Queue and their applications.
3. Develop algorithms for operations on linked lists and convert them to programs.
4. Apply various operations on non-linear data structure tree.
5. Implement various graph traversals techniques and idea of hashing.

UNIT I
Sorting: Bubble sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort (Algorithms and implementation)
Algorithms: Analysis of algorithms, Basic concept of order of complexity, Asymptotic Notations: Big Oh notation, Omega notation, Theta notation, Little oh notation and Little omega notation.

UNIT II
Stacks: Introduction to Data Structures: Basic Stack Operations-pop, push, display, delete. Representation of a Stack, Implementation of stack using Arrays, Stack Applications: Recursion, Infix to postfix Transformation, Evaluating Post-fix Expressions
Queues: Basic Queue Operations-enqueue, dequeue, Representation of a Queue using array, Implementation of Queue Operations using arrays, Applications of Queues, Circular Queue.

UNIT III
LIST: Introduction, Dynamic memory allocation, single linked list, Advantages and disadvantages of Single linked list ,Single linked list VS Arrays, Representation of a linked list in memory, Operations-insertion, deletion, display, search, Implementation of stack, queue using linked list. Circular linked list, Double linked list.

UNIT IV
TREES: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, Operations on a Binary Search Tree, Binary Search Tree Traversals (recursive), Creation of binary tree from traversals.

UNIT V

Graphs: Definition, Basic Terminology, Representation of Graphs, Graph Traversal Techniques –Breadth First Traversal, Depth First Traversal. Introduction to Hashing (no implementation).

TEXT BOOKS:

1. Data Structures, 2/e, Richard F, Gilberg, Forouzan, Cengage
2. Data Structures and Algorithms, 2008, G. A. V. Pai, TMH

REFERENCE BOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. Classic Data Structures, 2/e, Debasis, Samanta, PHI, 2009
3.Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Prees

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING CHEMISTRY LAB

Course Code: GR20A1014 **L/T/P/C: 0/0/3/1.5**
I Year II Semesters

Course Objectives:
1. Introduce practical applications of chemistry concepts to solve engineering problems.
2. To determine the rate constant of reactions from concentrations as a function of time.
3. Measure the molecular or ionic properties such as conductance, redox potentials
4. Synthesize a drug molecule to learn how organic compounds are prepared in industry.
5. Know the laboratory practices implemented in a research and industrial chemistry laboratory setting.

Course Outcomes:
1. Ability to perform experiments illustrating the principles of chemistry relevant to the study of science and engineering.
2. Determination of parameters like hardness and chloride content in water, measurement of redox potentials and conductance.
3. Understand the kinetics of a reactions from a change in concentrations of reactants or products as a function of time.
4. Synthesize a drug molecule as an example of organic synthesis methods widely used in industry.
5. Determination of physical properties like adsorption and viscosity.

List of Experiments: (any 12 experiments out of 14)
1. Determination total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Redox titration: Estimation of ferrous iron using standard KMnO4
4. Estimation of HCl by Conduct ometrictitrations
5. Estimation of Acetic acid by Conduct ometrictitrations
6. Estimation of Ferrous iron by Potentiometry using dichromate
7. Determination of rate constant of acid catalyzed reaction of methylacetate
8. Determination of acid value of coconutoil.
9. Adsorption of acetic acid by charcoal
10. Determination of surface tension of liquid by using stalagmometer
11. Determination of viscosity of liquid by using Ostwald'sviscometer.
12. Determinationofpartitioncoefficientofaceticacidbetweenn-butanolandwater.
13. Synthesis of Aspirin
14. Synthesis of Paracetamol.

Reference Books:
1. Vogel's text book of Practical organic chemistry, 5thEdition.
2. Senior Practical Physical Chemistry, B.D. Khosala, A. Gulati and V. Garg (R. Chand & Co.,Delhi)
3. Text book on experiments and Calculations in Engineering Chemistry-S.S.Dara.
4. An introduction to practical chemistry, K.K. Sharma and D.S. Sharma (Vikas Publications, NewDelhi)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL ENGINEERING LAB

Course Code: GR20A1017 **L/T/P/C: 0/0/2/1**
I Year II Semester

Course Objectives:
1. Introduce the use of measuring instruments.
2. Analyze a given network by applying various electrical laws
3. Measure and know the relation between basic electrical parameters.
4. Understand the response of electrical circuits for different excitations
5. Summarize the performance characteristics of electrical machines.

Course Outcomes:
At the end of this course, students will able to
1. Get an exposure to common electrical components and their ratings.
2. Get an exposure to basic electrical laws.
3. Understand the measurement and relation between the basic electrical parameters
4. Understand the response of different types of electrical circuits to different excitations.
5. Compare the basic characteristics of Electrical machines

TASK-1: Verification of Ohms Law , KVL and KCL
TASK-2: Verification of Thevenin's and Norton's Theorems
TASK-3: Verification of Superposition and Reciprocity Theorems.
TASK-4: Transient Response of Series RL, RC and RLC circuits using DC excitation ,
TASK-5: Resonance in series RLC circuit
TASK-6: Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
TASK-7: Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
TASK-8: Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
TASK-9: Measurement of Active and Reactive Power in a balanced Three-phase circuit
TASK-10: Performance Characteristics of a Separately Excited DC Shunt Motor
TASK-11: Torque-Slip Characteristics of a Three-phase Induction Motor
TASK-12: No-Load Characteristics of a Three-phase Alternator

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA STRUCTURES LAB

Course Code: GR20A1018 **L/T/P/C: 0/0/2/1**
I Year II Semester

Course Objectives:
1. To work with sorting techniques.
2. To translate algorithms to programs.
3. To develop programs to implement basic data structures.
4. To develop modular, reusable and readable C Programs.
5. To implement tree and graph traversals.

Course Outcomes:
1. Formulate the algorithms for sorting problems and translate algorithms to a working and correct program.
2. Implement stack and queue data structures and their applications.
3. Interpret linked list concept to produce executable codes.
4. Develop working procedure on trees using structures, pointers and recursion.
5. Implements graph traversal techniques

TASK 1
a. Implement Bubble sort using a C program.
b. Implement Selection sort using a C program.
c. Implement Insertion Sort using a C program.

TASK 2
a. Implement Quick sort using a C program.
b. Implement Merge sort using a C program.

TASK 3
a. Implementation of Stack operations using arrays in C.
b. Implementation of Queue operations using arrays in C.

TASK 4
a. Write a c program to convert Infix to Postfix expression.
b. Write a c program to evaluate a Postfix expression

TASK 5
a. Implement Circular Queue operations in C.

TASK6
a. Implement Single Linked List operations in C.

TASK 7
a. Implement Circular Linked List operations in C.

TASK 8

a. Implement Double Linked List operations in C.

TASK 9

a. Implement the following operations on Binary Search Tree.

i. Create

ii. Insert

iii. Search

TASK 10

a. Implement Preorder, Inorder and Postorder traversals of Binary Search Tree using recursion in C.

TASK 11

a. Implement Depth First Traversal on graphs in C.

TASK 12

a. Implement Breadth First Traversal on graphs in C.

Teaching methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:

1. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage

2. Data Structures and Algorithms, 2008, G. A.V.Pai, TMH

References:

1. Data Structure with C, Seymour Lipschutz, TMH

2. Classic Data Structures, 2/e, Debasis,Samanta,PHI,2009

3. Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Press

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING WORKSHOP

Course Code: GR20A1019 **L/T/P/C: 1/0/ 3/2.5**
I Year II Semester

Course objectives:
1. To prepare and practice of scientific principles underlying the art of manufacturing in workshop/manufacturing practices.
2. To demonstrate basic knowledge of various tools and their use in different sections.
3. To make students to execute applications of various tools in carpentry.
4. To make students recognize applications of manufacturing methods casting, forming machining, joining and advanced manufacturing methods.
5. To develop generate safety rules, safe practices and workshop dress code.

Course Outcomes:
At the end of the course students will be able to
1. Develop various trades applicable to industries / Manufacturing practices.
2. Create Hands on experience for common trades.
3. Improve to fabricate components with their own hands.
4. Develop practical knowledge on the dimensional accuracies and dimensional tolerances possible with various manufacturing processes.
5. To build the requirement of quality of work life on safety and organizational needs.

TRADES FOR EXERCISES: At least two exercises from each trade:

1. Carpentry
2. Fitting Shop
3. Tin-Smithy
4. Casting
5. Welding Practice
6. House-wiring
7. Black Smithy
8. **VIDEO LECTURES:** Carpentry, Fitting operations, Tin-Smithy, Casting, Welding, Electrical and Electronics, Black Smithy, Plumbing, Power tools in construction and Wood Working, Manufacturing Methods,

Text/ Reference Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal /Anuradha.
3. Work shop Manual - P. Kannaiah/ K. L. Narayana/SciTech
4. Workshop Manual / Venkat Reddy/BSP
5. Workshop Manual/K. Venugopal/Dr.V. Prabhu Raja/G.Sreekanjan

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
LIFE SKILLS AND PERSONALITY DEVELOPMENT (LSPD)

Course Code: GR20A1021 **L/T/P/C: 2/0/0/1**
I Year II Semester

Course Objectives:
Students undergoing the course are expected to

1. Understand the concepts such as "Time Management", "Managing Information Overload" and "How to cope with Peer pressure".
2. Become familiar with concepts like how to master "English Language Skills" and "Communication skills".
3. Be thorough with the '"science behind personal health management and addictions" and stress management.
4. Appreciate the importance of cultivating good hobbies, need for forming good habits and discarding bad habits and how to hold difficult conversations in crisis situations.
5. Understand the importance of creative thinking, continuous and lifelong learning and cross culture sensitization. They will know what is meant by collaboration and team working.

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

1. Apply the concept of Time Management to his own day to day life. They will also learn to cope with Information Overload, which has become a serious problem for the digital generation. They will be in a position to withstand harmful peer pressure, and steer themselves towards attaining their own objectives in the four years time they spend in the college.
2. Apart from understanding the importance of English language skills in a globalized world, they will leart the methodologies as to how they can master English Language skills. They will become familiar with the communication skills and etiquette, body language, non-verbal communication and they will start applying these concepts in their day to day life. This will help them to become thorough professionals in their career.
3. Large number of students are ignorant about the need for personal health management and the need to stay away from addictions. After this course, they will get a complete understanding of the biological basis behind these concepts. This will help them to maintain a robust health trough out their life and it will also keep them away from addictions like drug addiction, alcohol addiction & video games addiction. They will learn the techniques of stress management as well.
4. They would start cultivating some good hobbies which will help them to maintain ideal work-life balance throughout their life. The students would start discarding bad habits & will start picking up good habits. Further, they will learn the techniques of holding difficult conversations and negotiations, which is an important skill set in the 21st century world.
5. They will develop the aptitude for finding creative solutions to problems and they will come to realize the importance of continuous and lifelong learning in a fast changing technological landscape. They will appreciate why collaboration and team working skills are important for success in a modern world.

UNIT I
Introduction to life skills: Why life skills are important for students. Highly competitive job market; companies test not only Engineering knowledge but also life skills; Fast paced changes in technologies; proliferation of electronic gadgets and harmful online content; Even to perform well in B.Tech, students need basic life skills.

Time management: What is meant by time management; Impulsive behaviorVs goal directive behavior; The concept of time log; What are the usual time wasters for students; How to minimize time wasters.
Information overload and how to cope with it: ICT revolution; proliferation of electronic media; Exponential growth in online content; Impact of information overload on human brain; How information overload interferes with student learning.

UNIT II
How to master English Language Skills: Importance of English in a globalized world; For any engineer, the whole world is his job market; Companies conduct exams, interviews & group discussions in English; Interdependence of communication skills & language skills; Entrance exams to foreign universities test English language skills; What are the various language skills; Practical strategies to improve one's English language skills.
Communication Skills: What is communication; Various types of communication's; Why communication skills are important in the modern world; Importance given to communication by companies during recruitment; Barriers to effective communication; Practical strategies to improve one's communication skills.
Body language, Etiquette and Non-Verbal communication: What is etiquette, grooming, attire & body language? Why these are important in the modern world; What kind of etiquette is expected by companies; How success in career & life is interlinked to etiquette, grooming, attire & body language; practical steps to improve one's etiquette, grooming, attire & body language.

UNIT III
Science behind personal health management: Widespread ignorance in society on health issues; WHO definition of Health; Human evolution; Hunting & Gathering lifestyle; Importance of physical work for human body & mind; Dangers of sedentary lifestyle; Germ diseases Vs Lifestyle diseases; How to integrate physical exercise into daily life.
Science behind Addictions: What is an addiction? Neurology and hormonal basics of addictive behavior; How addictions are formed; Harmful effects of addictions on physical health & mental health; How to recognize the addictions in oneself; How to come out of addictions.
Stress management: What is stress; Various stressors faced by a student; Fight & Flight response of humans; Harmful effects of chronic stress; Symptoms of poor coping skills of stress; Stress & Psychiatric problems; Easy coping strategies for stress.

UNIT IV
Need for cultivating good hobbies: Why hobbies are important for maintaining work-life balance; how hobbies help in maintaining good physical and mental health, what are various hobbies.
What is habit? Why it is so important. How to cultivate good habits & discard bad habits: Why habits are critical for successful life; How habits forms; How to analyze one's own habits; How to recognize useless & harmful habits; How to cultivate & Sustain useful habits; Difference between hobby & habit.
Peer pressure and how to cope with it: Human being is a social animal; Physical pain & social pain; How to be aware of harmful social pressure; Role of prefrontal cortex in judgment and decision making; why teenagers are vulnerable to peer pressure; strategies to overcome harmful peer pressure.

UNIT V
Continuous & lifelong learning: Accelerated change in technology landscape; shorter & shorter life cycles of technologies; Need for continuous learning ; Engineering knowledge alone is not enough to solve the real-life problems.

Cross culture sensitization: What is culture; why there are different cultures; How to understand culture; Today all workplaces are multi-cultural; How stereotypes develop in the mind about other cultures; Dangersof stereotypes & culture hatred prevailing society; How to overcome the culture prejudices.

Collaboration & team working skills. Why collaboration is important to succeed in one's own career, Today's workplace is all about teams, what is team working, what are various team working skills, how to be a good team member.

Textbooks:

1. The story of the human body by Daniel E Lieberman, Published by Pantheon Books, 2013
2. Spark by Dr. John J Ratey, *Publisher* Little Brown *Spark* 01-01-2013.
3. Creative thinking by Edward De Bono, Publisher: Penguin UK (25 October 2016).

Reference:

1. The power of positive confrontation by Barbara Pachter; Publisher: Da Capo Lifelong Books (November 28, 1999) ...
2. Habit by Charles Duhigg, Publisher: Random House Trade Paperbacks,2012
3. Communication skills for engineers and scientists by Sangeetha Sharma and Binod Mishra, PHI Learning, 2009.
4. Time management by Brian Tracy, Publisher: AMACOM, 2014

II YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER ORANIZATION

Course Code: GR20A2074 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. Comprehend operational concepts and understand register organization within a basic computer system
2. Analyze the basic computer organization and understand the concepts of Micro programmed control
3. Understand the design aspects of Central processing unit organization
4. Understand various algorithms for arithmetic operations within a computer system and communication with I/O devices and standard I/O interfaces.
5. Study the hierarchical memory system including cache memory and virtual memory along with the design of Multiprocessor systems using various interconnection structures.

Course Outcomes:

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

1. Demonstrate knowledge of register organization of a basic computer system
2. Incorporate In-depth understanding of control unit organization and micro programmed control.
3. Understand the performance of central processing unit of a basic computer system.
4. Apply various algorithms to perform arithmetic operations and propose suitable hardware and appraise various methods of communications with I/O devices.
5. Analyze and emphasize various communication media in the basic computer system using design of various memory structures and Multiprocessor systems.

UNIT I

Basic Structure of Computers: Computer Types, Functional unit, Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

Register Transfer Language and Micro operations: Register Transfer language. Register Transfer, Bus and memory transfers, Micro Operations and its types, Arithmetic logic shift unit.

UNIT II

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

Micro Programmed Control: Control memory, Address sequencing, Micro program example, Design of control unit, Micro program Sequencer, Hard wired control Vs Micro programmed control.

UNIT III

Central Processing Unit Organization: General Register Organization, STACK organization. Instruction formats, Addressing modes. DATA Transfer and manipulation, Program control. Reduced Instruction set computer.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Floating – point Arithmetic operations, BCD Adder.

UNIT IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP).

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Dependencies, Vector Processing.

UNIT V

Memory Organization: Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map, Auxiliary memory – Magnetic Disks, Magnetic Tapes, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative mapping, Direct mapping, Set associative mapping, Writing into cache and cache initialization, Cache Coherence, Virtual memory – Address Space and Memory Space, Address mapping using pages, Associative Memory page table, Page Replacement.

Multi Processors: Characteristics or Multiprocessors, Interconnection Structures, Cache Coherence, Shared Memory Multiprocessors.

Teaching Methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:

1. Computer Systems Architecture – M.Moris Mano, 3rd Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.

References:

1. Computer Organization and Architecture – William Stallings 7th Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 6th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 5th Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS

Course Code: GR20A2075 **L/T/P/C: 2/1/0/3**

II Year II Semester

Course Objectives:

1. Understand main concepts of OS and to analyze the different CPU scheduling policies.
2. Understand process synchronization and deadlock management.
3. Understand memory management and virtual memory techniques.
4. Appreciate the concepts of storage and file management.
5. Study OS protection and security concepts.

Course Outcomes:

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

1. Explain different functions and types of operating system and implement various process management concepts for maximization of CPU throughput
2. Analyse synchronization problems and design a deadlock management scheme.
3. Optimize memory management for improved system performance.
4. Demonstrate disk management, implement disk scheduling and file system interface
5. Describe and frame protection and security policy for OS.

UNIT I

Operating System Overview: Objectives and functions, Computer System Architecture, Evolution of Operating Systems, System Services, System Calls, System Programs, OS Structure, Virtual machines.

Process Management: Process concepts, CPU scheduling-criteria, algorithms with evaluation, Preemptive / Non-Preemptive Scheduling, Threads, Multithreading Models.

UNIT II

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors.

Deadlocks: Principles of deadlock–system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

UNIT III

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

Virtual Memory: Demand paging, page replacement algorithms, Allocation of Frames, Thrashing.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

File System implementation: Access Methods, File system structure, file system implementation, directory implementation, allocation methods, free-space management.

UNIT V

Protection: Goals and Principles of Protection, Implementation of Access Matrix, Access control, Revocation of Access Rights.
Security: The Security problem, program threats, system and network threats, implementing security defenses.

TEXT / REFERENCE BOOKS:

1. Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison- Wesley
5. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
6. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
7. Operating Systems in depth, T. W. Doeppner, Wiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ECONOMICS AND ACCOUNTING FOR ENGINEERS

Course Code: GR20A2004 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
2. To provide the insight on theory of production and cost analysis.
3. To describe different types of markets and competition and to elaborate the different forms of organisation and different methods of pricing.
4. To make the students understand various capital budgeting techniques
5. To Provide an insight of fundamental of accounting and emphasis on describe final accounts preparation

Course Outcomes:

After studying this course, students will be in a position to:

1. The student will be able to understand the concepts of economics and Demand concepts, elasticity and techniques for forecast demand of products
2. The student will be able to plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability.
3. To understand the types of markets, types of competition and to estimate the cost of products and decide the price of the products and services produced
4. The student will be able to analyze the profitability of various projects using capital budgeting techniques and
5. The student is able will be able prepare the financial statements and more emphasis on preparation of final accounts.

Unit-I:

Introduction & Demand Analysis: ***Definition and Scope:*** Introduction to Economics, Nature and Scope of Managerial Economics. ***Demand Analysis***: Demand Determinants, Law of Demand and its exceptions. ***Elasticity of Demand***: Definition, Types, Measurement and Significance of Elasticity of Demand. ***Demand Forecasting***, Factors governing demand forecasting, methods of demand forecasting.

Unit-II:

Production & Cost Analysis: ***Production Function*** – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. ***Cost Analysis*****:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit-III:

Markets and Forms of Business organizations: ***Types of competition and Markets***, Features of Perfect competition, Monopoly and Monopolistic Competition. ***Pricing*:** Objectives and Policies of Pricing. Methods of Pricing. ***Business:*** Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types.

Unit-IV:

Capital Budgeting: Capital and its significance, Types of Capital, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value (NPV) Method and Internal Rate of Return (IRR) (simple problems) and Profitability Index (PI)

Unit-V:

Introduction to Financial Accounting: ***Accounting Concepts and Conventions*** - Double-Entry Bookkeeping. ***Accounting Cycle:*** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Text Books

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Managerial Economics: Analysis, Problems and Cases - P. L. Mehta, Edition, 13. Publisher, Sultan Chand, 2007.
3. Financial Accounting -1: S P Jain and K. L. Narang, Kalyani Publishers,2005.

Reference Books

1. Peterson, Lewis and Jain: Managerial Economics, Pearson, 2009
2. Mithani : Managerial Economics , HPH, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
5. Horngren : Financial Accounting, Pearson, 2009.
6. Dr. S. N. Maheswari and Dr. S.K. Maheshwari: Financial Accounting, Vikas, 2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PYTHON PROGRAMMING

Course Code: GR20A2068 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

1. Know the basic features , control flow , functions and data structures in Python
2. Learn the file operations, exception handling mechanism and functional programming
3. Understand the concepts of object oriented and multi threaded programming
4. Learn the GUI programming and create GUI based applications
5. Understand the Django framework for website development

Course Outcomes:

1. Demonstrate the concepts of control flow, data structures and Functions in Python
2. Implement the file handling operations , exception handling mechanism and functional programming
3. Design python programs using object oriented programming and multithreaded programming concepts
4. Develop GUI based applications using Tkinter
5. Design quality web applications using open source Django framework

UNIT I

Basic features of Python-Interactive execution, comments, types, variables, operators, expressions, Statements-assignment, input, print, Control flow-Conditionals, Loops, break statement, continue statement, pass statement, Functions, definition, call, scope and lifetime of variables, keyword arguments, default parameter values, variable length arguments, recursive functions, Sequences-Strings ,Lists and Tuples-basic operations and functions, iterating over sequences , Sets and Dictionaries- operations and functions, Python program examples.

UNIT II

Files-operations-opening, reading, writing, closing, file positions. Exceptions – raising and handling exceptions, try/except statements, finally clause, standard exceptions, custom exceptions. Functional programming-mapping, filtering and reduction, Lambda functions, List comprehensions. Scope, namespaces and modules, import statement, creating own modules, avoiding namespace collisions when importing modules, iterators and generators, Python program examples.

UNIT III

Object oriented programming- classes, constructors, objects, class variables, class methods, static methods, operator overloading. Inheritance-is-a relationship, composition, polymorphism, overriding, multiple inheritance, abstract classes, multithreaded programming, Python program examples.

UNIT IV

GUI Programming with Tkinter, Widgets (Buttons, Canvas, Frame, Label, Menu, Entry, Text, Scrollbar, Combobox, Listbox, Scale), event driven programming-events, callbacks, binding, layout management- geometry managers: pack and grid, creating GUI based applications in Python.

UNIT V

Introduction to Django Framework

Model Template View (MTV) framework, Creating a Project and Application, Configuring database, Defining a model, Defining a view, Defining a template,Defining a URL pattern, Enabling Admin site, Designing a RESTful API

TEXT BOOKS

1) Exploring Python, Timothy A. Budd, McGraw Hill Publications.
2) Introduction to Programming using Python, Y.Daniel Liang, Pearson.
3) Python Programming, R.Thareja, Oxford University Press.
4) Python Programming, Sheetal Taneja and Naveen Kumar, Pearson.
5) Core Python Programming, Wesley J.Chun, second edition, pearson.

REFERENCE BOOKS

1) Introduction to Computer Science using Python, Charles Dierbach, Wiley India Edition.
2) Internet of Things - A hands on approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015.
3) Fundamentals of Python, K. A. Lambert, B.L. Juneja, Cengage Learning.
Think Python, how to think like a computer scientist, Allen B. Downey,SPD, O'Reilly.
4) www.python.org web site.
5) Official Django Document (https://buildmedia.readthedocs.org/media/pdf/django/1.5.x/django.pdf)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN AND ANALYSIS OF ALGORITHMS

Course Code: GR20A2077 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. Recall algorithm definition, its properties & performance analysis.
2. Demonstrate a familiarity with major algorithms and data structures.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Evaluate efficient algorithms in common engineering design situations.
5. Understanding performances of various techniques.

Course Outcomes:

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

1. Distinguish various performances of algorithms.
2. Illustrating Divide and Conquer Design Paradigm algorithms.
3. Examining various algorithms based on Dynamic programming paradigm.
4. Discriminate greedy approach and back tracking algorithms.
5. Demonstrate branch and bound problems and Distinguish problems related to various complexity classes.

UNIT I

Introduction to Algorithms: Definition of an algorithm, properties of an Algorithm, performance analysis--space complexity & time complexity, amortized analysis

UNIT II

Disjoint sets: Disjoint set Representation, Operations, union and find algorithms.

Divide and Conquer: General method, applications, binary search, Quick sort, merge sort, Strassen's matrix multiplication.

UNIT III

Dynamic Programming: General method, applications, optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, travelling salesperson problem, optimal rod-cutting-Top down approach and bottom up approach.

UNIT IV

Greedy Method: General method, applications-- job sequencing with deadlines, 0/1 knapsack problem, minimum cost spanning trees, single source shortest path problem, activity selection problem.

Backtracking: General method, applications, n-queen problem, sum of subsets problem, Hamiltonian cycles.

UNIT V

Branch and Bound: General method, applications, travelling sales person problem, 0/1 knapsack problem: LC branch and bound solution, FIFO branch and bound solution

Complexity Classes: Non deterministic algorithms, deterministic algorithms, relationship between P and NP, NP-completeness, circuit-satisfiability problem, 3-CNF satisfiability.

Teaching Methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books/ References:

1. Ellis Horowitz, SatrajSahni and S Rajasekharam, Fundamentals of Computer Algorithms, Galgotia publishers 2. T H Cormen, C E Leiserson, and R L Rivest, Introduction to Algorithms, 3rdEdn, Pearson Education

2. Cormen, Thomash H., Leiserson, Charles E., Rivest, Ronald L., & Stein, Clifford. Introduction to Algorithms. 3rd Edition. 2010.

3. Goodrich, Michael T. & Roberto Tamassia, Algorithm Design, Wiley Singapore Edition, 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PYTHON PROGRAMMING LAB

Course Code: GR20A2078 **L/T/P/C: 0/0/3/1.5**
II Year II Semester

Course Objectives:
1. Identify logical ability in programming.
2. Discuss the use of Lists, tuples and Dictionaries in Python
3. Illustrate step by step approach in solving problems with thehelp of strings, functions, modules and Files in Python programming.
4. Learn the concepts such as Exception handling, functions, modules and classes
5. Learn GUI programming and Django framework for developing web applications

Course Outcomes:
1. Demonstrate the use of control statements, Lists, Tuples and Dictionaries in Python.
2. Develop programs using files,exception handling, functionsinPython.
3. Illustrate the concepts such as modules, classes and multithreading in python
4. Design GUI applications for sample applications using python
5. Develop python web applications using Django framework.

TASK 1 (Control Statements & Lists)
a. Write a python program to find factorial of a given number.
b. Write a Python program to find GCD of two numbers.
c. Write a Python program that reads a list of names and ages, then prints the list sorted by age.

TASK 2 (Tuples & Dictionaries)
a. Write a program to demonstrate working with tuples in python.
b. Write a program to demonstrate working with dictionaries in python.

TASK 3 (Files)
a. Write a Python program that will prompt the user for a file name, read all the lines from the file into a list, sort the list, and then print the lines in sorted order.
b. Write a Python program that asks the user for a filename, and then prints the number of characters, words, and lines in the file.

TASK 4(Exception Handling)
a. Write a python program to create user defined exception.
b. Write a program to demonstrate ‘finally’ keyword in python.

TASK 5 (Lambda function)

a. Write a Python program to create a lambda function that adds 15 to a given number passed in as an argument, also create a lambda function that multiplies argument x with argument y and print the result.
b. Write a Python program to square and cube every number in a given list of integers using Lambda.

TASK 6 (Modules)

a. Write a Python program to shuffle the elements of a given list
b. Write a Python program to read and display the content of a given CSV file

TASK 7(Classes)

a. Create a class Rectangle. The constructor for this class should take two numeric arguments, which are the length and breadth. Add methods to compute the area and perimeter of the rectangle, as well as methods that simply return the length and breadth. Add a method 'isSquare' that returns a Boolean value if the Rectangle is a Square.
b. Write a class Complex for performing arithmetic with complex numbers. The constructor for this class should take two floating-point values. Add methods for adding, subtracting, and multiplying two complex numbers.

TASK 8 (Multithreading)

a. Write a program to demonstrate working with multiple threads in python.
b. Write a python program to illustrate synchronization in multithreading.

TASK 9 (GUI Applications)

a. Write a Python program that works as a simple calculator. Use a grid to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.
b. Develop a Python GUI application that receives an integer in one text field, and computes its factorial Value and fills it in another text field, when the button named "Compute" is clicked.

TASK 10 (GUI Applications)

a. Write a Python program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer Num2 is Zero, the program should Display an appropriate message in the result field in Red color.
b. Write a Python program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.

TASK 11 (Django Framework)

a. Create a Django web application for a simple calculator with basic operations (+, -, * and /) with two numbers.
b. Create a Django web application that implements Library MIS, which has the features like

1. Add/Delete a book
2. Issue a book to a person
3. Collect a book from a person
4. Search for a title or author

TASK 12 (Django Framework)

Create a Django web application that implements a bus reservation system, where a new bus can be added/removed with a given source and destination. A user should be able to reserve or cancel a seat.

Text Books/ References:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Allen B. Downey,"Think Python: How to Think Like a Computer Scientist‘‘, 2ndedition, updated for Python 3, Shroff O‘Reilly Publishers, 2016http://greenteapress.com/wp/thinkpython/)
3. 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
OPERATING SYSTEMS LAB

Course Code: GR20A2079 **L/T/P/C: 0/0/3/1.5**
II Year II Semester

Course Objectives:
The Objectives of this course is to provide the student to
1. Learn different types of CPU scheduling algorithms.
2. Demonstrate the usage of semaphores for solving synchronization problems.
3. Understand Banker's algorithm used for deadlock avoidance.
4. Understand memory management techniques and various page replacement policies.
5. Learn various disk scheduling algorithms and different file allocation methods.

Course Outcomes:
At the end of the course, the student will be able to
1. Evaluate the performance of different types of CPU scheduling algorithms
2. Implement producer-consumer problem, reader-writers problem, and Dining philosophers' problem using semaphores.
3. Simulate Banker's algorithm for deadlock avoidance
4. Implement paging techniques and page replacement policies, memory allocation techniques in memory management.
5. Implement disk scheduling techniques and file allocation strategies .

TASK 1
Practice the following commands in UNIX environment
a) cp b) rm c) mv d) chmod e) ps f) kill

TASK 2
Write a program that makes a copy of a file using standard I/O and system calls.

TASK 3
Simulate the following Scheduling algorithms.
a) FCFS b)SJF c)Priority d)Round Robin

TASK 4
Simulate the Producer Consumer problem using semaphores.

TASK 5
Simulate the Readers – Writers problem using semaphores.

TASK 6

Simulate the Dining Philosophers problem using semaphores

TASK 7

Simulate Bankers Algorithm for Deadlock Avoidance.

TASK 8

Simulate First Fit and Best Fit algorithms for Memory Management.

TASK 9

Simulate paging technique of memory management.

TASK 10

Simulate page replacement Algorithms.

a)FIFO b)LRU

TASK 11

Simulate following Disk Scheduling algorithms.

a)FCFS b)SSTF c)SCAN d)C-SCAN

e)LOOK f)C-LOOK

TASK 12

Simulate file allocation strategies.

a)Sequential b)Indexed c)Linked

Text Books/ References:

1. Operating System Concepts- Abraham Silberchatz , Peter B. Galvin, Greg Gagne 7th Edition, JohnWiley.
2. Operating Systems– Internal and Design Principles Stallings, Fifth Edition–2005, Pearsoneducation/PHI.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
VISUAL PROGRAMMING USING C# AND .NET LAB

Course Code: GR20A2072 **L/T/P/C: 0/0/3/1.5**
II Year II Semester

Course Objectives:
1. To provide hands on experience on .Net framework.
2. To appreciate the asynchronous event handling feature in .Net.
3. To offer end-to-end program model for web application development.
4. To develop applications for the .NET Framework using C#
5. To learn C# debugging techniques

Course Outcomes:
1. Create Event Driven Applications.
2. Develop asynchronous applications
3. Deploy Web services
4. Build database applications using ADO.NET
5. Understand the Language Integrated Query (Linq) library

TASK 1
Write a program to check weather a given number is palindrome using C#

TASK 2
Create a program to implement a concept of Overloading using C#.Net.

TASK 3
Write a program to store the employee details using class and methods in C# .NET

TASK 4
Create a program to implement the concepts of OOPS for creating class, inheritance

TASK 5
Create a Window Form using HTML Controls

TASK 6
Perform String Manipulation with the String Builder and String Classes and C#: Demonstrates some basic string manipulation using both the String Builder and String classes.

TASK 7
Demonstrate the concept of
a) Creating a Thread
b) Managing a Thread
c) Deleting a Thread

TASK 8
Create a Sample program to Demonstrate Insertion of data intodatabase.

TASK 9
Create a Program to Demonstrate ColorDialog in C#.

TASK 10
Create a program to perform validation using validation controls.

TASK 11
Create a Sample program to Demonstrate creation and usage of Dynamic Link Libraries in C#.

TASK 12
Student Management System application development with required details: Use ADO.NET for storing and manipulating the data. Develop the necessary forms for the better user interface.

Text Books:

1. Professional C# 5.0 and .NET 4.5.1, Christian Nagel, Jay Glynn and Morgan Skinner, John Wiley & Sons Inc.
2. Beginning ASP.net 4.5.1 in C# and VB, Imar Spaanjaars, Wrox Publication, 2014.

References:

1. Microsoft Visual C# Step by Step, John Sharp, O'Reilly Media, Inc., 2013.
2. A Tester's Guide to .NET Programming, Randal Root and Mary Romero Sweeney, Apress

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENVIRONMENTAL SCIENCE

Course Code: GR20A2001 **L/T/P/C: 2/0/0/2**
II Year II Semester

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations
4. Integrate human ecology and science of environmental problems.
5. The effect of human activities on atmospheric pollution

Course Outcomes:

Based on this course, the Engineering graduate will

1. Understand the harmonious co-existence in between nature and human being
2. Recognize various problems related to environment degradation.
3. Develop relevant research questions for environmental investigation.
4. Generate ideas and solutions to solve environmental problems due to soil, air and water pollution.
5. Evaluate and develop technologies based on ecological principles and environmental regulations which in turn helps in sustainable development.

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem resources and resilience, ecosystem value, services and carrying capacity.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, natural capital & Resources water resources: use and over utilization of surface and ground water, conflicts over water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution:

Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Waste water Treatment methods: Primary, secondary and Tertiary.
Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. Anthropogenic activities, influence on the occurrence of COVID-19 Pandemic? How environment benefitted due to global lockdown arising out of corona outbreak.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Life cycle analysis (LCA), Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Resource exploitation, Crazy Consumerism, Environmental Education, Environmental Ethics, Concept of Green Building.

TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International Publishers.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

REFERENCE BOOKS:

1. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
5. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.
6. Environmental Studies by R. Rajagopalan, Oxford University Press.

III YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER NETWORKS

Course Code: GR20A3043 **L/T/P/C: 3/0/0/3**
III Year I Semester

Pre-requisites:
Students are expected to have knowledge in

- Basic computer hardware
- Multi user Operating systems
- Types of Ports and their purpose

Course Objectives:

1. Learn various Network topologies and Network models and transmission media.
2. Describe error detection, Flow control mechanisms and Multiple access protocols.
3. Understand different Routing technologies involved to route packets
4. Distinguish the standard Internet Protocol (IP), Transport Control Protocol (TCP) and User Datagram Protocol for Internet.
5. Analyze and understand application layer protocols.

Course Outcomes:

1. Define basic terminologies of Computer Networks and to apply various networking configurations and transmission media to build a network for an organization.
2. Summarize error correction and detection techniques and MAC Protocols for specific networks.
3. Illustrate various routing algorithms and outline their applications.
4. Distinguish TCP and UDP protocols.
5. Make use of various application layer protocols in Internet based Applications.

UNIT I

Computer Networks: Uses of Computer Networks, Network Hardware, Network Software, Types of networks, Network topologies, Layered architecture. Reference Models: OSI, TCP/IP, ARPANET, Internet, and ATM header, Reference model, QoS.

Physical Layer: Guided Transmission Media, Wireless Transmission Media, Communication Satellites. Switching and Multiplexing, Mobile Telephone Network, GSM.

UNIT II

Data link layer: Design Issues, Framing, Error Detection, Elementary Data Link Protocol, and Sliding Window Protocols.

Medium Access sub layer: Static vs. Dynamic, Multiple Access Protocols: ALOHA, CSMA and Collision Free Protocols. Ethernet (IEEE 802.3), wireless LANS (IEEE 802.11), Bluetooth (IEEE 802.15), The Network and internetwork devices.

UNIT III

Network Layer: Routing Algorithms, Flooding, Broadcasting and Multicasting. Congestion Control Algorithms: General Principles of Congestion Control, Prevention Policies, Congestion Control in Virtual and Datagram Subnets, QoS in the Internet.

The Network Layer in the Internet: IPv4 Addressing Scheme, Subnetting and Masking, CIDR, NAT, Intra and Inter domain routing protocols, Mobile IP, IPv6 Header Format and Transmission Methods.

UNIT IV

Transport Layer: Transport Services, Elements of Transport Protocols.

Transport Layer Protocols: TCP & UDP protocols, TCP Connection Establishment and Release, TCP Congestion Control, TCP Fast Retransmit and Recovery, Slow start Mechanism in TCP, Transaction Oriented TCP.

UNIT V

Application Layer: DNS, Electronic Mail, the World Wide Web, FTP, HTTP, TELNET.

MultiMedia: Audio and video compression techniques, streaming audio and video, VOIP.

Teaching Methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:

1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education/PHI
2. Data Communications and Networking-Behrouz A. Forouzan, Third Edition TMH.

References:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks- 3rd Edition, W.A. Shay,Thomson
3. Computer Networks – Dr.G.S.Bapiraju, 2nd Edition GRIET Publications.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA WAREHOUSING AND DATA MINING

Course Code: GR20A3044 **L/T/P/C: 3/0/0/3**
III Year I Semester

Prerequisites:
Students are expected to have knowledge in transactional and relational data bases, probability and statistics.

Course Objectives:

1. Understand the basic principles, concepts and applications of data warehousing and data mining
2. Obtain an idea of designing a data warehouse or data mart to present information needed by end user
3. Acquire knowledge on various data mining functionalities and pre-processing techniques.
4. Implement various data mining algorithms
5. Identify appropriate data mining algorithm for solving practical problems.

Course Outcomes:

1. Learn the concepts of database technology evolutionary path which has led to the need for data mining and its applications.
2. Design a data mart or data warehouse for any organization
3. Apply pre-processing statistical methods for any given raw data.
4. Extract knowledge and implementation of data mining techniques
5. Explore recent trends in data mining such as web mining, spatial-temporal mining.

UNIT I
Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining, CRISP model
Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction.

UNIT II
Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Marts, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining, Data Cube Computation and Data Generalization, Attribute-Oriented Induction.

UNIT III
Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Market Basket Analysis,

Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Prediction, Regression techniques, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor.

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Outlier Analysis - Distance-Based Outlier Detection, Density-Based Local Outlier Detection.

UNIT V

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases.

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Teaching Methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:

1. Data Mining– Concepts and Techniques - Jiawei Han &Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition,2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

References:

1. Data Mining Techniques – Arun K. Pujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory and Dennis Murray, Pearson Edn Asia.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICRO CONTROLLERS AND INTERNET OF THINGS

Course Code: GR20A3045 **L/T/P/C: 2/1/0/3**
III Year I Semester

Pre requisites:
Digital Logic Design, Computer Organization

Course Objectives:
1. Expose to 8 bit/16 bit micro controllers.
2. Understand ATMEGA 328 Controller architecture.
3. Learn sensors and their controlling operations.
4. Understand raspberry pi architecture.
5. Understand Python web application frame work for IoT.

Course Outcomes:
1. Explore to Micro controllers.
2. Finalize with sensors, actuators and communication devices for IoT.
3. Introducing design aspects of IoT.
4. Apply python packages for IoT applications.
5. Use cloud integration for IoT applications.

UNIT I
Introduction: Introduction to microprocessors and micro controllers, differences between microprocessor and micro controllers.
AVR ATMEGA 328Controller: architecture of ATMEGA 328.
ARDUINO: Introduction, Arduino Functions Libraries: Input and output functions, operators, control statements, loops, arrays, strings.

UNIT II
Integration of Sensors and Actuators with Arduino:
Sensors: Temperature, Light, Sound, Accelerometer, DHT, Distance Sensor, Soil Moisture Sensor.
Actuators: DC Motor, Servomotor, Stepper Motor, Solenoid, Relay
Communication Devices: Bluetooth, RF433, Wi Fi Module

UNIT III
Introduction To Internet of Things: Introduction, Physical Design of IoT, Logical Design of IoT, IoT enabling Technologies, IoT Levels and Deployment Templates

Domain Specific IoTs: Introduction, Home Automation, Smart Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle

UNIT IV
IoT Platforms Design Methodology: Introduction, Stages of IoT Design Methodologies.
IoT Systems- Logical Design Using Python: Introduction, Installing python, Python data types and data

structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time operations, Classes, Python Packages of Interest for IoT.
IoT Physical Devices and End Points: IoT Device, Exemplary Device: Raspberry Pi, About the board, Raspberry Pi Interfaces, Programming Raspberry Pi with Python

UNIT V
IoT Physical Server and Cloud Offerings: Introduction to cloud storage models and communication APIs, WAMP-Auto Bahn for IoT.
ESP32 & Google cloud services for IoT: Introduction to ESP32 functional diagram and programming, Firebase cloud operations, Integration of firebase with ESP32.

Text Books:

1. Arshdeep Bahga, Vijay Madisetti " Internet of Things(A hands on approach)" 1ST edition, VPIpublications,2014
2. Embedded Controllers using C and Arduino/2E by Jmes M.Fiore

Reference Books:

1. Simon Monk, "Programming the Raspberry Pi™ Getting Started with Python", McGraw-Hill Publications.
2. Website:https://medium.com/firebase-developers/getting-started-with-esp32-and-firebase-1e7f19f63401
3. Muhammad Ali Mazidi, Sepher Naimi, Sarmad Naimi, "The AVR MicrocontroIIer and Embedded Systems using assembly and C",Second Edition, Pearson Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ARTIFICIAL INTELLIGENCE
(PROFESSIONAL ELECTIVE – I)

Course Code: GR20A3046 **L/T/P/C: 3/0/0/3**
III Year I Semester

Prerequisites:
A course in Artificial Intelligence would require the knowledge of following concepts:

- Logic Theory
- Probability Theory
- Numerical Analysis
- Operations on Matrices

Course Objectives:

1. Understand both the achievements of AI and the theory underlying those achievements. Infer different searching strategies that are suitable for the problem to be solved
2. Recognize the ways to represent knowledge and infer resolution using prepositional and first order logic.
3. Understand the representation of uncertain knowledge and conditional distributions using Bayesian networks.
4. Comprehend the principles of temporal models, hidden markov models, decision trees.
5. Enable the student to apply artificial intelligence techniques in applications which involve perception, reasoning and learning.

Course Outcomes:

1. Select an appropriate searching strategy for developing intelligent agents to find solution in optimized way using building blocks ofAI.
2. Apply prepositional and first order logic methods to resolve decisions for knowledge based agents.
3. Practice uncertain knowledge and reasoning handling using Bayesian networks
4. Analyze the working of temporal models, hidden markov models, decision trees.
5. Write AI programs and construct small robots capable of performing perception and movement based on techniques learnt in the course.

UNIT I

Introduction to AI: Introduction, Foundation of AI, History of Intelligent Agents, Agents and environments, Concept of Rationality, Nature of environments & Structure of Agents, Problem solving agents and formulation, Searching For Solutions and Strategies, Uninformed search strategies BFS, DFS, Heuristic approach, Greedy best search, A* Search, Game Playing: Adversal search, Games, Min-Max algorithm, Optimal decisions in multiplayer games, Alpha Beta pruning.

UNIT II

Knowledge Representation & Reasons: Logical agents, Knowledge based agents, The Wumpus world, Logic: Proportional logic, Resolution patterns in proportional logics, Resolution: Forward and Backward chaining, First order logic: Inference in First order logic, Proportional vs first order inference, Unification & Lifting, forward chaining, Resolution, Practice problems.

UNIT III

Uncertain Knowledge and Reasoning: Uncertainty-Acting under uncertainty ,Basic probability notion, the axioms of probability, inference using full joint distribution, Independence, Bayes' rule.

Probabilistic Reasoning: Representing Knowledge in uncertain domain, the semantics of Bayesian networks, efficient representations of conditional distributions, exact inference in Bayesian networks, approximate inference in Bayesian networks.

UNIT IV

Probabilistic reasoning over time: Time and uncertainty, inference in temporal model, Hidden Markov models.

Learning: Learning from observations: Forms of learning, inductive learning, learning decision trees, ensemble learning, why learning works.

UNIT V

Perception: Introduction, Early Image Processing operations- Edge detection, image segmentation. Object recognition, Using vision for manipulation and navigation.

Robotics: Introduction, Robot hardware, robotic perception, planning to move, Robotic software architectures, application domains.

Text Books:

1. Artificial Intelligence-A modern approach-by Staurt Russel, Peter Norvig, 2nd edition, PHI/Pearson

References:

1. Artificial Intelligence – Riche & K.Night, 2nd editionTMH.
2. Paradigms of Artificial intelligence programming, case studies in common lisp-Peter. Norvig, Morgan Kaufmann.ISBN-13:978-1558601918.
3. Robotics: Fundamental Concepts and Analysis –Ashitava Goshal, oxford.
4. A Textbook of Robotics 1-Basic Concepts-M. Shoham-Springer US.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF PROGRAMMING LANGUAGES
(PROFESSIONAL ELECTIVE – I)

Course Code: GR20A3047 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

1. Understand the language constructs in different programming languages.
2. Compare and contrast syntax and semantics of a programming language.
3. Articulate different data types and control structures in different programming language.
4. Outline abstract data types, concurrency and exception handling
5. Summarize the logic programming language and functional programming language.
6.

Course Outcomes:

1. Discuss the criteria for evaluating programming languages and language constructs including programming paradigms.
2. Describe formal methods of syntax.
3. Illustrate the data types and control structures in different programming languages
4. Construct abstract data types, concurrency and exceptions
5. Compare functional and imperative languages.

UNIT I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, Influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, Functional Programming , Logic Programming.

Programming Language Implementation: Compilation and Virtual Machines, Programming environments.

UNIT II

Syntax and Semantics: General Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming language features, parse trees, ambiguous grammars, attribute grammars, denotation semantics and axiomatic semantics for common programming language features.

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types, Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants and variable initialization.

UNIT III

Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation, mixed mode assignment, Assignment Statements, Control Structures– Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub- program names, design issues for functions, user defined overloaded operators, co routines.

UNIT IV

Abstract Data types: Abstractions and encapsulation, Introduction to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in C++, Java, C#,Python

Concurrency: Subprogram level concurrency, semaphores, monitors, message passing, Java threads, Examples: Java RMI, Parallel Java, Parallel C

Exception handling: Exceptions, Exception propagation, Exception handler in C++ and Java and PHP.

Logic Programming Language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

UNIT V

Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative languages.

Lambda Calculus: Lambda expressions, Variables, Substitutions, Arithmetic, Conditionals, Recursion, Lambda Reduction, Type Assignment, Polymorphism, Lambda Calculus and Computability.

Text Books:

1. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education.
2. Programming Languages –Louden, Second Edition,Thomson.

References:

1. Programming languages –Ghezzi, 3/e, JohnWiley
2. Programming Languages Design and Implementation – Pratt and Zelkowitz, Fourth Edition PHI/Pearson Education

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
IT INFRASTRUCTURE MANAGEMENT
(PROFESSIONAL ELECTIVE – I)

Course Code: GR20A3048 **L/T/P/C: 3/0/0/3**
III Year I Semester

Pre requisites:
Computer Networks, Operating Systems

Course Objectives:

1. To acquire the knowledge in fundamentals of design factors and challenges
2. To identify the service delivery and processes associated with this.
3. To interpret the need of storage and security management for IT infrastructure
4. To Understand and analysis the performance factors and tuning
5. To Note the experimental analysis from the case studies

Course Outcomes

1. Comprehend the design factors and challenges in IT Infrastructure Management
2. Recognise the service delivery and associated processes
3. Apprehend the storage and security management related to IT Infrastructure
4. Realise and apply the performance and tuning processes
5. Emphasis the process of IT infrastructure management from case studies

UNIT I
ITINFRASTRUCTURE
Introduction, Challenges in IT Infrastructure Management, Design Factors for IT Organizations and IT Infrastructures, IT Systems and Service Management Process, Information systems Design Process, IT Infrastructure Library

UNIT II
SERVICE DELIVERY AND SUPPORT PROCESS
Service Level Management, Financial Management, IT Service Continuity Management, Capacity Management, Configuration Management, Availability management, Release Management

UNIT III
STORAGE AND SECURITY MANAGEMENT
Backup and Storage, Disaster Recovery, Space Management, Bare Machine Recovery (BMR), Data Retention ,Computer Security, Identity Management- Access control system- Intrusion Detection

UNIT IV
PERFORMANCE AND TUNING
PERFORMANCE: Introduction, Difference between Performance and Tuning processes and other Infrastructure processes,

TUNING: Definition, Preferred Assessing an Infrastructure's performance and tuning process, Measuring and streamlining the P and T processed characteristics, Performance and tuning applied to major resource environments,

UNIT V
CASE STUDIES
Asset Network Corporation case, RadioShack case, Business Process Outsourcing (BPO) Infrastructure Planning and Management, e-Commerce Business Infrastructure Planning and Management, Enron case, Tycocase, Worldcom case

TextBook:

1. Rich Schiesser, " IT Systems Management", 2nd edition, 2010, Pearson Education, ISBN: 978-0137025060

Reference Books:

1. P.Gupta, " IT Infrastructure and Its Management" 2nd Reprint, 2010, Tata McGraw Hill, ISBN: 978-0070699793
2. SjaakLaan , "IT Infrastructure Architecture : Infrastructure Building Blocks and Concepts",2011 , Lulu Press Inc, ISBN 978-1-4478-8128-5.
3. Leonard Jessup, Joseph Valacich,"Information System Today: Managing Digital World", 3rd Edition, 2007, Prentice Hall, ISBN: 0-13-233506-9.
4. Hausman, Cook, "IT Architecture for Dummies", 2011, Wiley Publishing, Hoboken, NJ www.wiley.com ISBN: 978-0-470-55423-4
5. Richard J. Reese, "IT Architecture in Action",2008,Xlibris Publishing ,ISBN:978- 1-4363-0505-1

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GRAPH THEORY
(PROFESSIONAL ELECTIVE – I)

Course Code: GR20A3049 **L/T/P/C: 3/0/0/3**
III Year I Semester

Prerequisites:
Students are expected to have knowledge in Discrete Mathematics, Design and Analysis of Algorithms

Course Objectives:

1. Fundamentals of graph theory and Trees.
2. Knowledge on different types of graphs.
3. The concepts of cut-sets, cut-vertices, coloring, covering and partitioning
4. Different ways of representing a graph.
5. Algorithms for graph related problems in different domains of engineering and science.

Course Outcomes:
1. Learn the fundamentals of graph theory
2. Determine cut-sets and cut-vertices
3. Represent a graph in matrix form
4. Understand planar graphs, dual graphs, coloring, covering and partitioning of graphs.
5. Solve graph related problems and write algorithms

UNIT I
Introduction: Graph, Applications, Finite and Infinite graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex, Null Graph.

Paths And Circuits: Isomorphism, Sub-graphs, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs, Components, Euler Graphs, Hamiltonian Paths and Circuits, Travelling Salesman Problem.
Directed Graphs: Directed Graph, Types of Digraphs, Digraphs and Binary Relations, Directed Paths and Connectedness, Euler Digraphs, Trees with Directed Edges, Fundamental Circuits in Digraphs, Matrices Digraphs, Adjacency Matrix of a Digraph.

UNIT II
Trees: Properties, Pendant Vertex, Distance and Centers, Rooted and Binary Tree, Counting Trees, Spanning Trees, Finding all Spanning Tress of a Graph, Spanning Trees in a Weighted Graph.

Cut-Sets and Cut-Vertices: Properties, All Cut-sets in a Graph, Fundamental Circuits and Cut- Sets, Connectivity and Separability, Network Flows, 1-Isomorphisn,2-Isomorphism.

UNIT III

Planar and Dual Graphs: Planar graphs, Different representations of planar graphs, Detection of Planarity, Geometric dual, Combinatorial dual.

Matrix Representation of Graphs: Incidence Matrix, Circuit Matrix, Fundamental Circuit Matrix and Rank, Cut-Set Matrix, Path Matrix, Adjacency Matrix

UNIT IV

Coloring, Covering and Partitioning: Chromatic Number, Chromatic Partitioning, Chromatic Polynomial, Matching, Coverings, The Four Color Problem.

UNIT V

Graphs Theoretic Algorithms: Computer Representation of a Graph, Algorithm for- Connectedness and Components, Spanning tree, Cut-Vertices and Separability, Planarity Testing, Isomorphism, Shortest Path.

Text Books:

1. Narasingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI.

References:

1. Douglas B. West, Introduction to Graph Theory, Prentice Hall India Ltd.
2. Robin J. Wilson, Introduction to Graph Theory, Longman Group Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF E-COMMERCE

(OPEN ELECTIVE – I)

Course Code: GR20A3050 **L/T/P/C: 3/0/0/3**

III Year I Semester

Prerequisites: Computer Network course, Web Technology course and Internet terminologies.

Course Objectives:

1. Comprehend the fundamental e-commerce terminologies; recognize the business models and potential of e-Commerce.
2. Recognize the business models and potential of e-Commerce.
3. Choose better software, hardware and e-com tools for developing a fool proof web application.
4. Build and deploy a safe and secure online payment system.
5. Discuss the trends in e-Commerce, online content, media and the use of the internet.

Course Outcomes:

1. Comprehend and identify the nature and types of e-commerce.
2. Distinguish all types of business models.
3. Choose and pick the suitable software, hardware and e-com tools for developing a better web application.
4. Implement a robust, safe and secured online payment system.
5. Interpret about the current e-commerce development and usage of effective internet and rearticulate about the online content and management.

UNIT I

Introduction to E-Commerce: E-commerce, Difference between E-commerce and E-business, Purpose of E-Commerce, Eight Unique Features of E-commerce Technology, Web 2:0, Types of E- commerce, Growth of the Internet and the Web, Origins and Growth of E-commerce, Understanding E-commerce.

UNIT II

E-Commerce Business Models and Concepts: E-commerce Business Models, Business-to- Consumer (B2C) Business Models, Business-to-Business (B2B) Business Models, Business Models in Emerging E-commerce Areas.

UNIT III

Building an E-Com Web Site: Building an E-commerce Web Site, Choosing Software, Choosing the Hardware, E-commerce Site Tools.

UNIT IV

Online Security and Payment Systems: Security Threats in the E-commerce Environment, Technology Solutions, payment systems, E-commerce Payment System, Electronic Billing Presentment and Payment.

UNIT V:

Online Content and Media: Online Content, Online Publishing Industry, Online Entertainment Industry.

Text Books:

1. Kenneth C. Laudon Carol GuercioTraver, “E-commerce: business, technology, society”, Fifth edition, Pearson Prentice Hall, 2009. (Unit-1:Chapter -1, Unit-II: Chapter-2, Unit- III: Chapter-4, Unit-IV: Chapter-5,Unit-V:Chapter-10)

Reference Books:

1. Dave Chaffey, "E-Business and E-Commerce Management: Strategy, Implementation and Practice", Fifth edition, Pearson Education,2013.
2. K.K. Bajaj, Debjani Nag, "E-Commerce: The Cutting Edge of Business", Second edition, McGraw Hill Education (India) Private Limited,2005.
3. David Whiteley ,“E-Commerce: Strategy, Technologies And Applications”, McGraw Hill Education (India) Private Limited,2001.
4. SteffanoKorper, "The E-Commerce Book: Building the E-Empire", Morgan Kaufmann, 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA WAREHOUSING AND DATA MINING LAB

Course Code: GR20A3051 **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Course Objectives:

1. Understand the basic concepts of creating tables in attribute relation file format
2. Identify the use of attribute relation file format table for data analysis.
3. Acquire knowledge on various pre-processing techniques.
4. Obtain the skill in implementing various data mining functionalities.
5. Implement appropriate mining algorithm using Weka tool to solve real time problems.

Course Outcomes:

1. Learn the concept of creating database tables in attribute relation file format(.arff).
2. Design a database tables in .arff format and insert, modify the data.
3. Apply pre-processing statistical methods for any given raw data.
4. Extract knowledge and implementation of various data mining techniques.
5. Implement data mining algorithms in real time problem solving using weka tool.

Implement the following Tasks using Weka Tool:
(Solve the tasks 1 to 6 by taking given German credit data as case study)
The German Credit Data:
Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel Spreadsheet version of the German credit data. (Download from web). In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer).A few notes on the German dataset:

- DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like aquarter).
- Own_telephone: German phone rates are much higher than in Canada, so fewer people own telephones.
- Foreign_worker: There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
- There are 20 attributes in judging a loan applicant. The goal is to classify the applicant into two categories: good orbad.

TASK 1
List all the categorical (or nominal) attributes and the real-valued attributes separately. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.

TASK 2

Suppose you use your above model (task1) trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy? Why or Why not? Check to see if the data shows a bias against "foreign workers" (attribute 20),or "personal-status" (attribute 9). Did removing these attributes have any significant effect? Discuss.

TASK 3

Describe what cross-validation is briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?

TASK 4

Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. Train your Decision Tree again and report the Decision Tree and cross-validation results.

TASK 5

Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross- validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

TASK 6

How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and one R.

TASK 7

(a) Create a data set Student.arff with required data.
(b) Demonstrate preprocessing techniques on dataset Student.arff

TASK 8

(a) Create a data set Employee.arff by adding required data fields.
(b) Apply Association rule mining on dataset Employee.arff (Use Apriori Algorithm)

TASK 9

(a) Create a data set Weather.arff with required fields.

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

TASK 10

(a) Demonstrate classification algorithm on dataset student.arff using j48algorithm

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

TASK 11

(a) Create a data set customer.arff with required fields.

(b) Write a procedure for Clustering Customer data using Simple KMeans Algorithm.

TASK 12

Demonstration of clustering rule process on dataset student.arff using simple k-means

Text Books:

1. Data Mining– Concepts and Techniques - Jiawei Han &Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition,2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

References:

1. Data Mining Techniques – Arun K. Pujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory and Dennis Murray, Pearson Edn Asia.
3. www.data.gov.in repository

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
WEB TECHNOLOGIES LAB

Course Code: GR20A3052 **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Prerequisite:

- Basic Programming knowledge
- Basics of Java Programming and MYSQL,

Course Objectives:

1. Design syntactically correct web pages using HTML and Java Scripting
2. Build XML applications with DTD and schema that span mutiple domains
3. Develop single page applications using AngularJS
4. Differentiate server side programming for sessions and learn the concept to implement using cookies and url rewriting
5. Develop skills in students in developing applications using concepts like JDBC, Servlets, JSP and Java Beans

Course Outcomes:

1. Develop interactive web sites through the DOM API and to change the CSS styles through java script
2. Build single-page web applications using AngularJS
3. Implement core technologies of modern Java web programming like servlets and JSP
4. Create web application using JSP
5. Develop JSP code without scriplets tag and access the database.

TASK 1

A. Create a HTML page of your present class timetable.

B. Write JavaScript code to change the HTML contents and attributes.

Ex: Change the text of html page on a button click and program to switch on and off the light on the button click.

TASK 2

VALIDATION:

Write JavaScript to validate the following fields of the above registration page.

1. Name (Name should contains alphabets and the length should not be less than 6 characters).
2. Password (Password should not be less than 6 characters length).
3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)

TASK 3

Design a web page using CSS (Cascading Style Sheets) which includes the following:

1)Use different font, styles:

In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

2) Set a background image for both the page and single elements on the page.

3) Work with layers in CSS.

TASK 4

Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.

Use XML schemas XSL and CSS for the above purpose.

Note: Give at least for 4 books. It should be valid syntactically

TASK 5

A. Consider an XML for library. Create XSLT for library XML to display the values in tabular format

B. Create a Single page Application (SPA) where navigation between the pages is performed without refreshing the whole page using angular JS

TASK 6

VISUAL BEANS:

Create a simple visual bean with a area filled with a color.

The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false.

The color of the area should be changed dynamically for every mouse click. The color should also be changed if we change the color in the “property window “.

TASK 7

1) Install TOMCAT web server and APACHE.

While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.

2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.
Access the pages by using the urls : http://localhost:4040/rama/books.html (for tomcat)
http://localhost:8080/books.html (for Apache)

TASK 8

Assume four users user1,user2,user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a servelet for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display "You are not an authenticated user".
Use init-parameters to do this. Store the user-names and passwords in the web.xml and access them in the servlet by using the getInitParameters() method.

TASK 9

Create a JSP application for performing basic arithmetic operations using Java Beans.
Ex: Use jsp:useBean action tag

TASK 10

Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Practice 'JDBC' connectivity.
Write a Servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page. (Registration Page)

TASK 11

Write a JSP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (Task 10) by using registration form.
Authenticate the user when he submits the login form using the username and password from the database.
(Login Page)

TASK 12

Write a JSP code to display all registered users (TASK 10) in a table with Name, Email and Phone number using JSTL SQL Tags.(Display Page)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson
2. Core SERVLETS AND JAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
4. Jakarta Struts Cookbook, Bill Siggelkow, SPDO'Reilly for chap8.
5. Murach's Beginning JAVA JDK5, Murach, SPD

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICRO CONTROLLERS AND INTERNET OF THINGS LAB

Course Code: GR20A3053 **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Course Objectives:

1. Describe the principles of sensors.
2. Summarizing the working principles of actuators.
3. Explore communication devices and interfacing.
4. Demonstrate the text, speech translation.
5. Illustrate IoT case studies.

Course Outcomes:

1. Understand the different blocks involved in an IoT eco-system.
2. Understand interface techniques to connect different sensors to a micro controller.
3. Understand different communication protocols used in IoT.
4. Apply cloud environment for IoT.
5. Apply the concepts learnt to implement IoT projects

Task 1
Smart Street Light Management System.

Task 2
Smart Reverse brake Monitoring System

Task 3
Smart Soil state Monitoring System

Task 4
Microcontroller- Actuator interface

a) DC Motor
b) Relay

Task 5
Moving curtail display using LCD

Task 6
Sensor / Actuator interfacing using ESP32.

Task 7
a) Develop a mobile app for simple user interface
b) Design a mobile app to work with data of a data.

Task 8
Internet enabled remote range indicator.

Task 9
Internet enabled smart room lighting system.

Task 10
Internet enabled smart garden maintenance.

Task 11
Internet enabled display of ambient parameter

Task 12
Internet enabled home safety and security system.

Text Books:

1) Embedded Controllers using C and Arduino/2E by James M. Fiore
2) Simon Monk, "Programming the Raspberry Pi™ Getting Started with Python", McGraw-Hill Publications.

Reference Books:

1) Web references: https://www.arduino.cc/en/Tutorial/HomePage,
2) https://www.w3schools.com/python/andhttps://pythonprogramming.net/introduction- raspberry-pi-tutorials/

III YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE LEARNING

Course code: GR20A3123 **L/T/P/C: 2/1/0/3**
III Year II Semester

Prerequisites:
1. Mastery of introduction-level algebra , statistics and probability theory
2. Data Modeling and Evaluation

Course Objectives:
1. Recognize the basic terminology and fundamental concepts of machine learning.
2. Understand the concepts of Supervised Learning models with a focus on recent advancements.
3. Relate the Concepts of Neural Networks Models of supervised Learning
4. Discover Unsupervised learning paradigms of machine learning
5. Understand the concepts of Reinforcement learning and Ensemble methods

Course Outcomes:
1. Explain the concepts and able to prepare the dataset for different Machine learning models..
2. Identify and Apply appropriate Supervised Learning models.
3. Design Neural Network models for the given data.
4. Perform Evaluation of Machine Learning algorithms and Model Selection.
5. Devise un-supervised and Reinforcement learning models.

UNIT-I:
Introduction: Introduction to Machine learning, Supervised learning, Unsupervised learning, Reinforcement learning. Deep learning.
Feature Selection: Filter, Wrapper, Embedded methods.
Feature Normalization:- min-max normalization, z-score normalization, and constant factor normalization
Introduction to Dimensionality Reduction: Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA)

UNIT-II:
Supervised Learning – I (Regression/Classification)
Regression models: Simple Linear Regression, multiple linear Regression. Cost Function, Gradient Descent, Performance Metrics: Mean Absolute Error (MAE), Mean Squared Error (MSE)
R-Squared error, Adjusted R Square.
Classification models: Decision Trees-ID3,CART, Naive Bayes, K-Nearest-Neighbors (KNN), Logistic Regression, Multinomial Logistic Regression
Support Vector Machines (SVM) - Nonlinearity and Kernel Methods

UNIT-III:
Supervised Learning – II (Neural Networks)
Neural Network Representation – Problems – Perceptrons, Activation Functions, Artificial Neural Networks (ANN) , Back Propagation Algorithm.
Convolutional Neural Networks - Convolution and Pooling layers, Recurrent Neural Networks (RNN).
Classification Metrics: Confusion matrix, Precision, Recall, Accuracy, F-Score, ROC curves

UNIT-IV:

Model Validation in Classification: Cross Validation - Holdout Method, K-Fold, Stratified K-Fold, Leave-One-Out Cross Validation.
Bias-Variance tradeoff, Regularization, Overfitting, Underfitting.
Ensemble Methods: Boosting, Bagging, Random Forest.

UNIT-V:
Unsupervised Learning: Clustering-K-means, K-Modes, K-Prototypes, Gaussian Mixture Models, Expectation-Maximization.
Reinforcement Learning: Exploration and exploitation trade-offs, non-associative learning, Markov decision processes, Q-learning.

Text Books:
1. Machine Learning – Tom M. Mitchell, -MGH
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
3. R. S. Sutton and A. G. Barto. Reinforcement Learning - An Introduction. MIT Press.1998.

References:
1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer2009
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.
3. Machine Learning Yearning, Andrew Ng.
4. Data Mining–Concepts and Techniques -Jiawei Han and Micheline Kamber, Morgan Kaufmann

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FORMAL LANGUAGE AND AUTOMATA THEORY

Course Code: GR20A3117 **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
Students are expected to have knowledge in
- Mathematical Foundation and Computer Science
- Data Structures

Course Objectives:
1. Understand mathematical models finite automata.
2. Explain Regular Expressions and Finite Automata Conversions.
3. Understand Grammars for Regular and Context Free Languages.
4. Learn Context Free Grammar Normal Forms and Push Down Automata.
5. Explain Computational theory and models.

Course Outcomes:
1. Design Finite Automata models.
2. Construct Regular Expressions and equivalent automata models.
3. Formulate Grammars for Formal languages.
4. Represent Normal Forms and Push Down Automata.
5. Experiment with Computational models.

UNIT -I:
Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings and languages, deterministic finite automaton and non- deterministic finite automaton, transition diagrams and language recognizers.
Finite Automata: NFA with ϵ transitions - significance, acceptance of languages.
Conversions and Equivalence: Equivalence between NFA with and without ϵ transitions, NFA to DFA conversion, Minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

UNIT -II:
Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite automata for a given regular expressions, Conversion of finite automata to Regular expressions, Pumping lemma of regular sets, closure properties of regular sets.

UNIT -III:
Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms, Right most and leftmost derivation of strings.

UNIT –IV:

Context Free Grammars: Ambiguity in context free grammars, Minimization of context free grammars, Chomsky normal form, Greibach normal form, Pumping Lemma for Context Free Languages, Enumeration of properties of CFL.

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence, equivalence of CFL and PDA, inter conversion, Introduction to DCFL and DPDA.

UNIT-V:

Turing Machine: Turing Machine, definition, model, design of TM, computable functions, recursively enumerable languages, Church's hypothesis, counter machine, types of Turing machines.

Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, Decidability of problems, Universal Turing Machine, un decidability of posts correspondence problem.

Text Books:

1. Introduction to Automata Theory Languages and Computation, Hopcroft H.E. and Ullman J. D, Pearson Education.
2. Introduction to Theory of Computation–Michael Sipser 2nd edition Thomson.

References:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation, John C Martin, TMH.
3. Theory of Computer Science - Automata languages and computation - Mishra and Chandra shekaran, 2nd edition,PHI.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE ENGINEERING

Course Code: GR20A3054 **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
1. Basic knowledge of programming language
2. Idea about Data base systems
3. Design of flow charts

Course Objectives:
1. Identification and analysis of different Life cycle phases
2. Prepare Good SRS for a Software project.
3. Estimation of a Software Project
4. Understand the process of Design engineering.
5. Develop and Apply different testing techniques.

Course Outcomes:
1. Understand business requirements and choose a relevant Process model for a given software proposal
2. Analyze the requirements to prepare SRS
3. Estimate the Cost and Schedules of a Software Project.
4. Model various Functional and Object-Oriented design for a s/w project.
5. Develop various functional and structural test cases for a software module

UNIT-I
The Software Problem and Process
Software development Process Models: Waterfall, Prototype, Iterative Development, Rational Unified Process, Time boxing Model, Extreme Programming and Agile Process, Unified Process Models, Software Management Process.

UNIT-II
Software Requirement Analysis and Specification
Value of good SRS, Requirements Specification, and Functional specification with Use cases, other approaches for analysis, Data flow diagrams, Entity relationship Diagrams, Validation.

UNIT-III
Planning a Software Project
Effort Estimation, Project Scheduling and Staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling.

UNIT-IV

Design

Design Concepts: Cohesion, Coupling, Functional oriented design: Structured chart, Structured design methodologies, Examples, Object Oriented Design: OO concepts, UML, Design Methodology, Examples, Detailed design: Logic/Algorithm Design, State Modeling of Classes, Verification, Metrics: Metrics for Object Oriented Design, Metrics for Functional Oriented Design

UNIT-V

Software testing strategies:

A strategic approach to software testing, strategic issues, test strategies for conventional software, validation testing, system testing.

TEXTBOOKS

1. Software Engineering a precise approach by Pankaj Jalote, Wiley Publications.

REFERENCE BOOKS

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGraw-Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA SCIENCE WITH R PROGRAMMING
(PROFESSIONAL ELECTIVE II)

Course Code: GR20A3061 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives

1. Understand the basics concepts and working environment of R
2. Learn basic and descriptive statistical analysis techniques using R
3. Outline the Data Science terminology and describe the Data Science process
4. Discuss Data analysis techniques and model evaluation using R
5. Know R Advance features to solve complex problems

Course Outcomes:

1. Use R environment, data structures, functions, to solve statistical problems
2. Analyse basic and descriptive statistical analysis methods using R
3. Apply data collection , preparation, visualization and feature engineering with R
4. Summarize data analysis and machine learning techniques with R
5. Implement R advanced features for real time business case studies

UNIT I

Introduction to R - R Windows Environment, R-Data types, R-Data Structures, R Functions and loops, Reading Datasets, Working with different file types, R packages. Introduction to statistical learning and R-Programming, Overview of CRAN.

UNIT II

Descriptive Statistics- Measures of central tendency, Measures of location of dispersions, Practice and analysis with R.

Basic Statistical Analysis - Statistical hypothesis generation and testing, Chi-Square test, t-Test, Analysis of variance, Correlation analysis, Maximum likelihood test, Practice and analysis with R.

UNIT III

Introduction to Data Science: Data Science Terminology, Data Science Process, Data Science Project Roles.

Data Collection and Management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources.

Data Preparation, Feature Engineering, Data Visualization in R.

UNIT IV

Data Analysis techniques - Exploratory data analysis, Association rules analysis, Regression analysis, Classification techniques, Clustering, Practice and analysis with R

Model Evaluation - Machine Learning concepts, types of machine learning, Machine learning with R.

UNIT V

Advanced R Programming – Data Models, PCA, LDA, Exploratory fact Analysis, NN Modeling with R.
Business Case studies and projects -Understanding business scenarios, scalable and parallel computing with Hadoop and Map-Reduce, Sensitivity Analysis.

Text Books:

1. Probability & Statistics for Engineers & Scientists (9th Edn.), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Prentice Hall Inc.
2. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.), Trevor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014
3. An Introduction to Statistical Learning: with Applications in R, G James, D. Witten, T Hastie, and R. Tibshirani, Springer, 2013
4. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer
5. Beginning R: The Statistical Programming Language, Mark Gardener, Wiley, 2013

Reference Books:

1. Advances in Complex Data Modeling and Computational Methods in Statistics, Anna Maria Paganoni and Piercesare Secchi, Springer, 2013
2. Data Mining and Analysis, Mohammed J. Zaki, Wagner Meira, Cambridge, 2012
3. Hadoop: The Definitive Guide (2nd Edn.) by Tom White, O'Reilly, 2014
4. MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems, Donald Miner, Adam Shook, O'Reilly, 2014

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CLOUD COMPUTING
(PROFESSIONAL ELECTIVE II)

Course Code: GR20A3118 **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
Students are expected to have knowledge on Operating systems, Virtualization and Networking

Course Objectives:
1. Understand the current trend and basics of cloud computing.
2. Learn cloud services from different providers.
3. Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
4. Understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization
5. Learn basic concepts of Map Reduce programming models for big data analysis on cloud.

Course Outcomes:
1. Understand the features, advantages and challenges of cloud computing, compare their operation ,implementation and performance
2. Understand, Analyze and compare different types of clouds and cloud services.
3. Understanding and validating the financial and technological implications in selecting cloud computing paradigm for an organization.
4. Understand and Analyze the security challenges and risks involved in the cloud.
5. Create/Deploying of an application in cloud.

UNIT I
Understanding Cloud Computing: Cloud Computing , Introduction to Cloud Computing ,Cloud Architecture and Cloud Services(IaaS, PaaS, SaaS) , Cloud models– Public vs Private, Cloud Technologies for Network-Based System , System Models for Distributed and Cloud Computing , NIST Cloud Computing Reference Architecture

UNIT II
Virtualization: Basics of Virtualization , Types of Virtualization , Implementation Levels of Virtualization , Virtualization Structures , Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices , Virtual Clusters and Resource management , Virtualization for Data-center Automation

UNIT III
Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources

UNIT IV

Programming Model: Parallel and Distributed Programming Paradigms , Map Reduce, Twister and Iterative Map Reduce , Hadoop Library from Apache , Mapping Applications , Programming Support ,Google App Engine, Amazon AWS , Cloud Software Environments, Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim

UNIT V

Security in the Cloud: Security Overview , Cloud Security Challenges and Risks , Software- as-a- Service Security , Security Governance , Risk Management , Security Monitoring , Security Architecture Design , Data Security , Application Security , Virtual Machine Security, Identity Management and Access Control , Autonomic Security

Text Books:

1. George Reese,"Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
2. Kumar Saurabh, " Cloud Computing , insights into New-Era Infrastructure", Wiley India,2011
3. Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, 'Mastering Cloud Computing", TMGH,2013.

References:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security, A comprehensive Guide to Secure Cloud Computing", Wiley, India, 2010.
5. Nick Antonopoulos, Cloud computing, Springer Publications,2010

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NEURAL NETWORKS AND DEEP LEARNING
(PROFESSIONAL ELECTIVE II)

Course Code: GR20A3119 **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
The subject of Neural Networks & Deep Learning requires strong mathematical concepts of probability, statistics, matrices and a course on Artificial Intelligence is expected to be completed by the student.

Course Objectives:

1. Comprehend the math required for building deep learning networks.
2. Understand the basic building blocks of artificial neural networks (ANNs).
3. Acquire knowledge of supervised/unsupervised learning in neural networks.
4. Explore the methods to develop optimized deep learning networks considering hyper parameters of convolution networks, recurrent neural networks.
5. Model solutions for real life problems using optimized deep learning networks.

Course Outcomes:

1. Understand the basic math required for neural network.
2. Explain working of artificial neural networks.
3. Categorize between supervised and unsupervised learning mechanisms.
4. Analyze the real world problem and identify required hyper parameters to be considered for a deep learning network.
5. Design optimized deep learning applications for small problems using algorithms learnt in the course.

UNIT I
Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT II
Unsupervised Learning Network: Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT III
Introduction to Deep Learning: Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second- Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Image classification, Speech Recognition, Natural Language Processing

Text Books:

1. Deep Learning –Ian Good fellow, Yoshua Bengio, Aaron Courville—MIT Press book- ISBN-13: 978-0262035613,
2. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

References:

1. Artificial Neural Networks – B. Vegnanarayana Prentice Hall of India P Ltd2005
2. Neural Networks in Computer Intelligence, Li Mm Fu TMH2003
3. Deep Learning Fundamentals: An Introduction for Beginners by Chao Pan , AI Sciences Publisher.
4. Pattern Recognition and Machine Learning - Christopher M. Bishop -Information Science and Statistics. ISBN-13:978-1493938438.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE ARCHITECTURE
(PROFESSIONAL ELECTIVE II)

Course Code:GR20A3120 **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
Students are expected to have knowledge in Operating Systems, Object Oriented Programming.

Course Objectives:
1. To understand interrelationships, principles and guidelines governing architecture and evolution overtime.
2. To understand architectural styles, design patterns and their underlying object oriented concepts.
3. Software architecture and quality requirements of evaluation processes in software system
4. Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
5. Methods, techniques, and tools for describing software architecture and documenting design rationale.

Course Outcomes:
1. Design and motivate software architecture for large scale software systems
2. Recognize major software architectural styles, design patterns, and frameworks
3. Describe a software architecture using various documentation approaches and architectural description languages
4. Generate architectural alternatives for a problem and select among them
5. Use well-understood paradigms for designing new system

UNIT I
Introduction To Software Architecture: An Engineering Discipline for Software, Status of S/W Architecture, Architecture Business Cycle, Where do Architectures Come from. Software Processes and the Architecture Business Cycle, Features of Good Architecture.

UNIT II
Designing the Architecture with Styles: Architecture in the Life Cycle, Designing the Architecture, Formatting the Team Structure, Creating a Skeletal System.
Architecture Styles: Pipes and Filters, Data Abstraction and Object Oriented Organization, Event- Based, Implicit Invocation, Layered Systems, Repositories, Interpreters.

UNIT III
Creating an Architecture-I: Functionality and Architecture, Architecture and Quality Attributes, System Quality Attributes, Quality Attribute, Scenarios in Practice, Other System Quality Attributes, Business

Qualities, Architecture Qualities.

Achieving Qualities: Introducing Tactics, Availability Tactics, Modifiability Tactics, Performance Tactics, Security Tactics, Testability Tactics and Usability Tactics.

UNIT IV

Creating an Architecture-II: Documenting Software Architectures, Use of Architectural Documentation, Views, Choosing the Relevant Views, Documenting a view, Documentation across Views.

Reconstructing Software Architecture: Introduction, Information Extraction, Database Construction, View Fusion, and Reconstruction.

UNIT V

Analyzing Architectures: The ATAM-Participants in the ATAM, Outputs of The ATAM, Phases Of the ATAM. The CBAM: Decision-Making Context, the Basis for the CBAM, Implementing the CBAM. A Case study in Interoperability- Relationship to the Architecture Business Cycle, Requirements and Qualities, Architecture Solution, Achieving Quality Goals.

Text Books:

1. Software Architectures in Practice, Len Bass, Paul Clements, Rick Kazman, 2ndEdition, Pearson Publication.
2. Software Architecture, Mary Shaw and David Garlan, First Edition, PHI Publication, 1996.

References:

1. Software Design: From Programming to Architecture, Eric Braude, Wiley,2004.
2. N. Domains of Concern in Software Architectures and Architecture Description Languages, Medvidovic and D. S. Rosenblum.USENIX

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BUSINESS ANALYTICS
(OPEN ELECTIVE – II)

Course Code: GR20A3121 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:
1. Understand the fundamentals of data collection and data management
2. Apprise about the importance of big data management and data visualization
3. Learn and adopt about statistical method in data analytics
4. Extend and implement text analytics and forecasting analytics
5. Relate and review the application in business analytics using case studies.

Course Outcomes:
1. Reproduce the fundamentals of data collection and data management.
2. Describe the importance of big data and to apply the data visualization.
3. Apply and interpret the basic inferences in statistical methods.
4. Practice the text analytics and forecasting analytics
5. Summarize and evaluate the purpose of business analytics using scenarios and applications.

UNIT I
Data Collection: Introduction, The Value of Data, Data Collection Preliminaries, Data Collection Methods, Data Types, Problem Formulation Preliminaries, Challenges in Data Collection, Data Collation, Validation, and Presentation, Data Collection in the Retailing Industry
Data Management: Relational Database Systems (RDBMS) Introduction, Database Systems, Structured Query Language (SQL).

UNIT II
Statistical Methods
Basic Inferences: Introduction, Methods of Basic Inference: Sample and Population, Central Limit Theorem, Confidence Interval, Sample Size Determination, Large-Sample Confidence Intervals, Sample Size Determination, Confidence Intervals for the Population Variance, Hypothesis Testing
Regression Analysis: Introduction, Motivating Examples, Methods of Regression: Linear Regression, Basic Descriptive Statistics and Box Plots, Linear Regression Model and Assumptions, Single Regressor Case.

UNIT III
Big Data Management: Introduction, Big Data, Big Data Technologies, Cloud Computing for Big Data.
Data Visualization: Introduction, Methods of Data Visualization, Software and Data Visualization

UNIT IV
Analytics
Text Analytics: Introduction, Motivating Text Analysis, Google Flu Detector, Data Sources for Text Mining, Methods of Text Analysis, Terminology, Co-occurrence Graphs (COG), Elementary Text Analysis Applications. Natural Language Processing (NLP)
Forecasting Analytics: Introduction, Methods and Quantitative Approaches of Forecasting, FORECASTING Applications.

UNIT V

Applications and Case study: Retail Analytics, Social Media and Web Analytics, Healthcare Analytics
Case study: AAA Airline, Infomedia solutions

Text books/References:

1. Bhimasankaram Pochiraju, Sridhar Seshadri, "Essentials of Business Analytics- An Introduction to the Methodology and its Applications", ISBN: 978-3-319-68836-7, Springer, Cham
2. S. Christian Albright, "Business Analytics: Data Analysis & Decision Making", Cengage Learning; 6 edition, ISBN-13: 978-1305947542
3. Stephen G. Powell, "Business Analytics: The Art of Modeling with Spreadsheets, Fifth Edition: The Art of Modeling with Spreadsheets ", Wiley (October 17, 2016)
4. Effrey D. Camm, James J. Cochran , Michael J. Fry , Jeffrey W. Ohlmann , David R. Anderson, "Essentials of Business Analytics"

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE LEARNING LAB

Course code: GR20A3122 **L/T/P/C: 0/0/3/1.5**

III Year II Semester

Prerequisites:

1. Mastery of introduction-level algebra, statistics and probability theory
2. Proficiency in programming basics, and some experience coding in Python or R-Tool

Course Objectives:

1. Learn usage of Libraries for Machine Learning in Python
2. Demonstrate Dimensionality reduction methods
3. Describe appropriate supervised learning algorithms for a given problem.
4. Explore back propagation algorithm and ensemble methods
5. Discuss different unsupervised learning algorithms

Course Outcomes:

1. Illustrate the applications of Python Machine Learning Libraries.
2. Apply Dimensionality reduction methods for Machine Learning Tasks.
3. Design and analyze various supervised learning mechanisms.
4. Develop back propagation algorithm and Random Forest Ensemble method.
5. Design and analyze various unsupervised learning algorithms.

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

Task 1: Write a python program to import and export data using Pandas library functions.

Task 2: Demonstrate various data pre-processing techniques for a given dataset.

Task 3: Implement Dimensionality reduction using Principle Component Analysis (PCA) method.

Task 4: Write a Python program to demonstrate various Data Visualization Techniques.

Task 5: Implement Simple and Multiple Linear Regression Models.

Task 6: Develop Logistic Regression Model for a given dataset.

Task 7: Develop Decision Tree Classification model for a given dataset and use it to classify a new sample.

Task 8: Implement Naïve Bayes Classification in Python

Task 9: Build KNN Classification model for a given dataset.

Task 10: Build Artificial Neural Network model with back propagation on a given dataset.

Task 11:

a) Implement Random Forest ensemble method on a given dataset.

b) Implement Boosting ensemble method on a given dataset.

Task 12: Write a python program to implement K-Means clustering Algorithm.

Reference Books:

1. Python Machine Learning by Sebastian Raschka, Oreilly Publishers
2. Machine Learning – Tom M. Mitchell, - MGH
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

UNIFIED MODELING LANGUAGE LAB

Course code: GR20A4064 **L/T/P/C: 0/0/4/2**
III Year II Semester

Prerequisites:
1. Knowledge in Object Oriented Programming concepts

Course Objectives:
1. Identify and Interpret with object-oriented method in unified modeling language.
2. Relate various UML models including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and categorize diagrams using the appropriate notation.
3. Reframe the behavior of the system as seen by its end users, analysts, and testers
4. Plan system modeling using unified modeling language.
5. Design dynamic design view modeling in UML System.

Course outcomes:
1. An ability to learn analysis and design of a business process and system as a whole by using uml.
2. An ability to apply forward and reverse engineering of system using uml with a team effort.
3. An ability to distinguish the different uml diagrams.
4. An ability to design how to apply the UML to a number of common modeling techniques.
5. Show the role and function of each UML model in developing object oriented software.

I. UML diagrams to be developed are:
- Use Case diagram.
- Class diagram.
- Object Diagram
- Sequence diagram.
- Collaboration diagram.
- State diagram.
- Activity diagram
- Component Diagram
- Deployment Diagram.

II. Case Studies:
- Hospital Management System
- Library Management System
- Railway reservation system.
- Airport check-in and security screening business model.
- Restaurant business model

III. Forward and Reverse Engineering for the Case Studies

Text Books:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY- Dreamtech India Pvt.Ltd

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MINI PROJECT WITH SEMINAR

Course Code: GR20A3141 **L/T/P/C: 0/0/4/2**
III Year II Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statement with systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONSTITUTION OF INDIA

Course Code:GR20A2003 **L/T/P/C: 2/0/0/2**
III Year II Semester

Course objectives:

1. To create an awareness about the Constitution of India, Fundamental Rights and Duties, Directive Principles
2. To Learn the role of Prime Minister, President and the Council of Ministers and the State Legislature
3. To learn the divisions of executive, legislative and judiciary and so on.
4. To know how a municipal office, panchayat office etc. works
5. To understand the importance and role of Election Commission Functions.

Course Outcomes:

1. Students will be able to know the importance of Constitution and Government
2. Students will be able to become Good Citizens and know their fundamental rights, duties and principles.
3. Students will learn about the role of PM, President, Council of Ministers etc and it will help students learn about Local Administration.
4. The Students understand the importance of Election Commission and the Students will become aware of how a Country and State are run in Democracy.
5. They will know about Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States etc.,

UNIT I

Introduction: Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT II

Union Government and its Administration: Structure of the Indian Union: Federalism, Centre - State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

UNIT III

State Government and its Administration: Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT IV

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction,

Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials.

UNIT V

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

Books Recommended:

1. 'Indian Polity' by Laxmikanth 5th Edition, McGraw Hill Edition.
2. Indian Constitution by Subhash C. Kashyap, Vision Books Publisher
3. 'Introduction to Indian Constitution' by D.D. Basu, 21st Edition, LexisNexis Publisher
4. *'Indian Administration by Avasthi and A*vasthi-by Lakshmi Narain Agarwal publication

IV YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: GR20A4047 **L/T/P/C: 2/1/0/3**
IV Year I Semester

Pre-Requisites:
Students should have good knowledge in Computer Networks

Course Objectives:
1. Importance and applications of confidentiality, integrity, authentication, availability.
2. Develop various cryptographic algorithms, related to conventional and asymmetric encryption.
3. Familiarize how to generate and distribute PGP key pair and use the PGP package to send and encrypted E-mail message.
4. Understand the public-key cryptosystem and enhancements made to IPV4 by IPSec.
5. Understand with intrusion and intrusion detection / web security and Firewalls.

Course Outcomes:
1. Work and check the applications defined with confidentiality, integrity, and authentication.
2. Work with various public key and private key cryptographic algorithms.
3. Examine the issues and structure of Authentication Service and Electronic Mail Security.
4. Understand the IP Security Architecture, Web Security and Key Management techniques.
5. Understand intrusion and intrusion detection, Web security and firewalls

UNIT I
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) Security Mechanisms, a model for Internetwork security.
Conventional Encryption Principles, substitution ciphers, transposition ciphers.

UNIT II
Conventional encryption algorithms (DES, Blowfish, Idea), cipher block modes of operation, location of encryption devices, key distribution.
Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), digital signatures, digital certificates, certificate authority and key management.

UNIT III
Approaches of Message Authentication, Secure Hash Functions(MD-5,SHA-1) and HMAC.
Kerberos, X.509 Directory Authentication Service.
Email privacy: Pretty Good Privacy (PGP), MIME,S/MIME.

UNIT IV

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management, Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNITV

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats, firewall Design principles, Trusted System, Intrusion Detection Systems.

Text Books

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and RyanPermeh, wiley Dreamtech

References

1. Fundamentals of Network Security by Eric Maiwald (Dreamtechpress)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner,Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings,PHI/Pearson
4. Principles of Information Security, Whitman,Thomson.
5. Network Security: The complete reference, Robert Bragg, MarkRhodes,TMH
6. Introduction to Cryptography, Buchmann,Springer.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPILER DESIGN

Course Code: GR20A4048 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. Understand the fundamental principles in compiler design and to provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.
2. Explore the algorithms and data structures involved in the design and construction of compilers.
3. Introduce the major concept in the areas of language translation and compiler design.
4. Develop an awareness of the function and complexity of modern compilers.
5. Enrich the knowledge in various phases of compiler ant its use, code optimization techniques, machine code generation, and use of symbol table.

Course Outcomes:

1. Understand the basic concepts of compiler design, and its different phases.
2. Understand the different types of parsing techniques and should be in a position to solve the problem.
3. Analyze the program and minimize the code by using optimizing techniques which helps in reducing the number of instructions in a program and also utilization of registers in an effective way.
4. Learn the process of translating a modern high-level language to executable code.
5. Construct new tools for compilation for small programming languages.

UNIT I

Overview of Compilation: Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and phases of translation, interpretation, bootstrapping, data structures in compilation – LEX/ lexical analyzer generator.

UNIT II

Top down Parsing: Context-free grammars, Top down parsing – Backtracking, LL(1), Recursive Descent Parsing, Predictive parsing, preprocessing steps required for predictive parsing.
Bottom up Parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser/ generator.

UNIT III

Semantic Analysis: Intermediate forms of source programs – abstract syntax tree, polish notation and three address codes. Attributed Grammars, Syntax Directed Translation, Conversion of popular programming languages constructs into Intermediate code forms, Type checker.
Symbol Tables: Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information.

UNIT IV

Block Structure and Non-Block Structure Storage Allocation: Static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

Code Optimization: Consideration for optimization, scope of optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

UNIT V

Data Flow Analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Object Code Generation: Object code forms, machine dependent code optimization, register allocation and assignment, generic code generation algorithms, DAG for register allocation.

Text Books:

1. Principles of Compiler Design -A.V. Aho,J.D.Ullman, Pearson Education.
2. Modern Compiler Implementation in C-Andrew N. Appel, Cambridge University Press.

References:

1. Lex&Yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs,Wileydreamtech.
3. Engineering a Compiler-Cooper & Linda,Elsevier.
4. Compiler Construction- Louden,Thomson.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NETWORK ROUTING ALGORITHMS
(Professional Elective –III)

Course Code: GR20A4049 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:
1. Gain knowledge on the need for intra and internetwork devices and its functionality
2. Apply the knowledge of IP addressing in various routing environments.
3. Describe various routing algorithms in intra and inter networking.
4. Explain overlay and other data delivery networks
5. Distinguish various types of routing protocols used in wireless networks

Course Outcomes:
1. Acquire knowledge on network devices where and when they are used.
2. Comprehend various types of subnets and address formats.
3. Examine different dimensions of routing in different types of networks
4. Analyse different types of data delivery methods.
5. Apply various routing protocols in wireless network scenario

UNIT I
NETWORK ROUTING BASICS: Reference model OSI, TCP/IP, ATM. Network devices: Hubs, repeaters, switches, bridges, routers and gateways. Types of switches, bridges and routers. Router: Input processing, switching, output processing. Control plane versus data plane. Frame formats: IEEE 802.3, 802.11 and 802.15. Software defined network (SDN): SDN architecture, SDN advantages.

UNIT II
IP ADDRESSING: The Internet Protocol (IP): Classful and classless addressing, Subnets and super netting, VLSM and FLSM. IPv4 and IPv6 address formats. Transitions from IPV4 to IPV6. Forwarding and Addressing in the Internet, Datagram Format, Internet Control Message Protocols: ICMP, IGMP. ARP and DHCP.

UNIT III
ROUTING ALGORITHMS: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing. Routing in the Internet: Intra-AS Routing in the Internet: RIP,Intra-AS Routing in the Internet: OSPF. Inter-AS Routing: BGP, Broadcast and Multicast Routing Broadcast Routing Algorithms. Intra-domain Multicast Protocols, Inter-domain Multicast Protocols.

UNIT IV
ROUTING PROTOCOLS: VPNs, Tunnelling and Overlay Networks: Virtual Private Networks(VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks –VoIP and Multimedia Networking: Overview of

IP Telephony, VoIP Signalling Protocols, Real-Time Media Transport Protocols, Stream Control Transmission Protocol. Internet Protocol-Connectionless Datagram Delivery- Forwarding IP Datagrams-Congestion control in data networks and internets

UNIT V

ROUTING IN AD-HOC NETWORKS: Mobile Ad-Hoc Networks (MANETS): Classification of routing protocols, The table-driven or proactive protocols are: i). The Destination-Sequenced Distance Vector (DSDV) protocol, ii). The Cluster-Head Gateway Switch Routing (CGSR) protocol, iii).The Wireless Routing Protocol (WRP). The source-initiated protocols are: i). The Dynamic Source Routing (DSR) protocol, ii). The Associative-Based Routing (ABR) protocol, iii). The Temporally Ordered Routing Algorithm (TORA), iv). Ad-Hoc On-Demand Distance Vector (AODV) protocol.

Text Books:

1. Computer networking A Top Down Approach sixth edition, James F kurose& Keith W Ross
2. Computer and Communication networks, Nader F. Mir, Pearson Education, 2007

Reference Books:

1. Data communications and Networking, Behrouz Z. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomsho, Ed Title, David Johnson, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, S. Keshav, Pearson Education.
4. Campus Network design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
IMAGE AND VIDEO PROCESSING
(Professional Elective –III)

Course Code: GR20A4050 **L/T/P/C:3/0/0/3**
IV Year I Semester

Pre requisites:
Students are expected to have knowledge in

1. Analysis of algorithms and linear algebra.
2. Programming experience.

Course Objectives:

1. Describe and explain basic principles of digital image processing.
2. Cover the basic analytical methods such as image enhancement ,restoration, segmentation
3. Learn image compression techniques
4. Learn and explain basic principles of digital image and video processing.
5. Cover the basic motion estimations used in video processing.

Course Outcomes:

1. Describe the basic principles of Imaging.
2. Learn the knowledge of the images in transform domains and segmentation.
3. Apply image compression on images.
4. Understand and develop algorithms video processing.
5. Implement various video motion techniques.

UNIT I
Fundamentals of Image Processing and Image Transforms: Basic steps of Image Processing System Sampling and Quantization of an image, Basic relationship between pixels.

UNIT II
Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, Image smoothing, Image sharpening, Selective filtering.
Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Thresholding, Region based segmentation.

UNIT III
Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy& Lossless, Huffman coding, Bit plane coding, Transform coding, Predictive coding, Wavelet coding, Lossy Predictive coding, JPEG Standards.

UNIT IV

Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, filtering operations.

UNIT V

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block-Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Application of motion estimation in Video coding.

Text Books:

1. Digital Image Processing – Gonzalez and Woods, 3rd Ed., Pearson.
2. Video Processing and Communication – Yao Wang, Joem Oysterman and Ya–quin Zhang. 1st Ed., PHInt.

References:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – Scotte Umbaugh, 2nd Ed, CRCPress,2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International
3. Digital Image Processing with MATLAB and Lab view – VipulaSingh,Elsevier
4. Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5th Ed.,Elsevier

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NATURAL LANGUAGE PROCESSING
(Professional Elective –III)

Course Code: GR20A4051 **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
Students are expected to have knowledge in Formal Languages and Automata Theory, Compiler Design.

Course Objectives:

1. Role of natural language processing and language modelling.
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:
1. Summarize the role of natural language processing in various applications and explain language modelling.
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
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

UNIT III
Word Level Analysis: Introduction, Regular Expressions, Finite State Automata, Morphological Parsing, Spelling Error Detection and correction, Words and Word classes, Part of Speech Tagging, TF, IDF
Syntactic Analysis: Introduction, Context-free Grammar, Constituency, Parsing, Probabilistic Parsing.

UNIT IV

Semantic Analysis: Introduction, Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation.

Discourse Processing: Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure

UNIT V

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

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.

References:

1. 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.
2. James Allen, Bejamin/cummings, “Natural Language Understanding”, 2ndedition,1995.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AGILE METHODOLOGIES
(Professional Elective –III)

Course Code: GR20A3128 **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
Students are expected to have knowledge in principles of software engineering

Course Objectives:

1. To understand the benefits and pitfalls of agile model.
2. To understanding of agile software development practices and how small teams can apply them to create high- quality software.
3. To provide a good understanding of software design and a set of software technologies.
4. To do a detailed examination and demonstration of Agile development and testing techniques.
5. To understand Agile development and testing.

Course Outcomes:

1. Realize the importance of interacting with business stakeholders in determining the requirements for a software system.
2. Perform iterative software development processes: how to plan them, how to execute them.
3. Develop techniques and tools for improving team collaboration and software quality.
4. Perform Software process improvement as an ongoing task for development teams.
5. Show how agile approaches can be scaled up to the enterprise level.

UNIT-I
Introduction: Agile Definition, How to be Agile, Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

UNIT-II
Practicing XP: Thinking, Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

UNIT-III
Releasing: Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

UNIT-IV

Planning: Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.

UNIT -V

Developing: Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

TEXT BOOKS:

1. James Shore and Shane Warden, "The Art of Agile Development", O'REILLY,2007.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns, and Practices" , PHI,2002

REFERENCE BOOKS

1. Craig Larman, ―Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.
2. Kevin C. Desouza, ―Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION STORAGE AND MANAGEMENT
(Professional Elective –IV)

Course Code: GR20A4052 **L/T/P/C:3/0/0/3**
IV Year I Semester

Course Objectives:

1. To understand the components of storage infrastructure.
2. To gain knowledge to evaluate storage architectures including storage subsystems
3. To understand the business continuity, backup and recovery methods.
4. To acquire knowledge on information security framework
5. To introduce the working principle of storage infrastructure with monitoring principles and to Understand the structure of cloud computing and its techniques

Course Outcomes:

1. Acquire the knowledge on the components of storage infrastructure
2. Attain the ability to evaluate storage architectures including storage subsystems
3. Realise the business continuity, backup and recovery methods.
4. Appreciate the concepts of storage security and information security applied to virtual machine.
5. Apply the knowledge for storage infrastructure and acquire the knowledge on structure of cloud computing and its techniques

UNIT I
INTRODUCTION TO INFORMATION STORAGE MANAGEMENT

Virtualization and Cloud Computing: Fiber Channel: Overview, Business Continuity, Back Up Recovery: Business Continuity: Information Availability, Storage Security and Management: Cloud Computing: Cloud Enabling Technologies

Evolution of Storage Architecture: SAN and its Evolution BC Terminology, BC Planning life cycle, Information Security Framework, Characteristics of Cloud Computing

UNIT II
DATA CENTRE INFRASTRUCTURE

Components of FC SAN, FC Connectivity, FC Architecture, Failure Analysis, Business Impact Analysis, Risk Triad, Benefits of Cloud Computing.

Virtualization and Cloud Computing: IPSAN-iSCSI components, BC Technology Solutions, Storage Security Domains, Cloud Service Models, Key challenges in managing information: iSCSI Protocol Stack iSCSI Names, Backup and Archive: Backup Purpose, Security Implementations in Storage Networking, Cloud Deployment models

UNIT III

DATA CENTER ENVIRONMENT AND DBMS

Data Center Environment: Application, NAS: General Purpose Servers versus NAS Devices, Backup Considerations, Securing Storage Infrastructure in Virtualized and Cloud Environments, Cloud Infrastructure Mechanism: Logical Network Perimeter

Database Management System (DBMS): Benefits of NAS- File Systems and Network File Sharing Backup Granularity, Recovery considerations, RSA and VMware Security Products, Virtual Server, Cloud Storage Device

UNIT IV

HOST AND INTELLIGENT STORAGE SYSTEM

Host: Connectivity, Storage Components of NAS Backup Methods, Backup Architecture, Monitoring the Storage Infrastructure, Cloud Usage Monitor, Disk Drive Components, Disk Drive Performance, NAS I/O Operation, Backup and Restore Operations, Monitoring Parameters, Resource Replication

Intelligent Storage System: NAS Implementations, Backup Topologies, Components Monitored, Monitoring examples, Ready Made environment, Components of an Intelligent Storage System, NAS File Sharing Protocols Backup in NAS Environments Storage Infrastructure Management Activities Container

UNIT V

STORAGE PROVISIONING AND VIRTUAL STORAGE MACHINE

Storage Provisioning: Object Based Storage Devices, Backup Targets, Data Deduplication for Backup Storage Infrastructure Management Challenges, Storage Management Examples Cloud Challenges, Types of Intelligent Storage Systems, Content Addressed Storage, Backup in Virtualized Environments, Storage Allocation to a New Server/Host, Cloud Adoption Considerations

Virtual storage machine: Creation of Virtual storage machine, Configuration and Tracing of FC scan, Sharing Files between host and Virtual, Creation of a Linux Instance in Public, Usage of Cloud services with open source, Navigation of storage system, iSCSI scan Machines, Usage of Backup techniques, Cloud, Generate a private key, Access using SSH client, cloud tools (like Eucalyptus, Open stack, Open Nebula and others)

Text Books

1. EMC Education Services, “Information Storage and Management”, 2nd edition Wiley India, ISBN-13:978-1118094839
2. Thomas Erl, “Cloud Computing: Concepts, Technology & Architecture”, Prentice Hall, 2013,ISBN:9780133387568

References

1. Ulf Troppens, Rainer, Wolfgang, Muller,”Storage Networks Explained”, India, Wiley, 2010, ISBN-13: 978-0470741436
2. Matthew Portnoy, “Virtualization Essentials”, ISBN-13: 978-1119267720, Sybex; 2 edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MULTIMEDIA APPLICATIONS
(Professional Elective –IV)

Course Code: GR20A4053 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. To Understand about Multimedia and Hyper media and video, audio and text applications.
2. To Learn Multimedia Action Scripts
3. To Understand Multimedia application Development and Multimedia Data Compression techniques.
4. To learn various Video Compression Techniques.
5. To understand various network aspects used for multimedia applications.

Course Outcomes:

1. Identify and categorize various file formats like text, audio and video and image models.
2. Implement Action Script features in Multimedia applications.
3. Implement multimedia animation movies using action scripts.
4. Implement multimedia audio, video and data compression Techniques.
5. Apply various networking protocols for multimedia applications.

UNIT I

Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools, Graphics and image data representation, graphics/image data types, file formats, **Color in image and video:** color science, color models in images, color models in video.
Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT II

Action Script I: Action Script Features, Object-Oriented Action Script, Data types and Type Checking, Classes, Authoring an Action Script Class.
Action Script II: Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions.

UNIT III

Application Development: An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.
Multimedia Data Compression: Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet- Based Coding, Embedded Zero tree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

UNITIV

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT V

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand -(MOD).

Text Books:

1. Fundamentals of Multimedia By ZeNian Li and mark S Drew PHI/Pearson Education
2. Essentials Action Script 2.0,Colin Moock,SPDO,REILLY

References:

1. Digital Multimedia, Nigel Chapman and Jenny Chapman,WileyDreantech
2. Macromedia Flash MX Professional 2004Unleashed,Pearson.
3. Multimedia and Communications Technology, SteveHeath, Elevier (FocalPress)
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BIG DATA ANALYTICS
(Professional Elective –IV)

Course Code: GR20A3131 **L/T/P/C:3/0/0/3**
IV Year I Semester

Pre- Requisites:
Students should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

Course Objectives:
1. Describe Big Data and its use cases from selected business domains.
2. Provide an overview of HDFS Architecture and its daemon services.
3. Perform Map Reduce analytics with YARN using Hadoop.
4. Understand the working of data ingestion tools and PIG Latin.
5. Use Hadoop related tools such as Hive and HBase for big data analytics.

Course Outcomes:
1. Understand the concepts of Big Data and navigation of the Hadoop Ecosystem.
2. Illustrate the HDFS Architecture and the coordination service of Hadoop.
3. Implement distributed processing Map Reduce Paradigm with YARN.
4. Analyze importing and exporting data from Hadoop using Sqoop, Flume and working with PIG.
5. Examine the data stores - Hive and HBase on Hadoop.

UNIT I
Introduction to Big Data and Hadoop:
Challenges of Traditional Decision Making, Solution with Big Data Analytics, Classification of Digital Data, Definition of Big Data, Characteristics of Big Data, Definition of Big Data Analytics, Features of Hadoop, History of Hadoop, RDBMS Vs. Hadoop, Hadoop Distributors, Ecosystems of Hadoop.

UNIT II
HDFS and Zoo Keeper:
HDFS: Concepts – Blocks, HDFS Components, Block Caching, Characteristics of HDFS, HDFS High Availability Architecture and its types, HDFS Command Line, Data Flow – Anatomy of File read and File write operations.
Zoo Keeper: Characteristics of Zoo Keeper, Zoo keeper Services, Zoo keeper Data Model.

UNIT III
Map Reduce and YARN
YARN: Elements of YARN Architecture, Map Reduce: Characteristics of Map Reduce, Phases of Map Reduce with an Example, Anatomy of MR Job Run with YARN, Handling Failures, Task Execution, Map Reduce Input and Output Formats, Shuffle and Sort, Built - in Counters of MR, Joins in MR

UNIT IV
Data Ingestion Tools and PIG Data Ingestion Tools: Data Ingestion, Big Data Ingestion Tools, SQOOP - Benefits of SQOOP, SQOOP Connectors, Importing and Exporting to and from Hadoop using SQOOP,

Limitations of SQOOP, FLUME – Apache Flume, Data Sources for FLUME, Components of FLUME Architecture. **PIG:** Introduction to PIG, Components of PIG, Data Types in PIG – Simple and Complex, PIG Execution Modes, PIG Interactive Modes, Comparison of PIG with databases, Data Processing Operators.

UNIT V
HIVE and HBASE
HIVE: Features of HIVE, HIVE Architecture, HIVE Meta store, Data types in HIVE, HIVEQL, Tables, File Format Types – Text, Sequence, AVRO, Parquet, Querying Data.
HBASE: NOSQL Database, Types of NOSQL Database, Characteristics of HBASE, Architecture, HBaseVs. RDBMS, HBASE Shell Commands.

Text Books:

1. Tom White “Hadoop: The Definitive Guide” 4thedition, O’reily Media,2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley2015.

References:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer,2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press(2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jefrey David Ulman, “Mining of Massive Datasets”,Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons,2012.
6. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons,2007
7. Pete Warden, “Big Data Glossary”, O’Reily,2011.
8. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics:Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”,MC Press,2012
10.Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles, David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications,2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE TESTING METHODOLOGIES
(Professional Elective –IV)

Course Code: GR20A4058 **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:

1. Students should have finished a course on Software Engineering.
2. Basic Knowledge about Object oriented design

Course Objectives:

1. Identify types of bugs and adopt a model for testing various bugs.
2. Apply path testing strategies various application software's
3. Techniques to test a given application using various dataflow and transaction flow testing techniques.
4. Design of decision tables for the given logic of a program subsystem.
5. Realization of graph matrices for given state diagrams.

Course Outcomes:

1. Create a model for testing and criticize various consequences of bugs.
2. Apply Path testing Strategies to conduct as part of White Box Testing.
3. Apply various Data flow testing techniques for exploring Data Bugs and Domain Bugs.
4. Design test cases based on decision tables for a given logical construct.
5. Attribute graph matrices techniques for the simplification of graphs and simplify testing process.

UNIT I

Introduction: Purpose of testing, Dichotomies, Model for testing, Consequences of bugs, Taxonomy of Bugs.

UNIT II

Flow Graphs and Path Testing: Basics concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.
Transaction Flow Testing: Transaction flows, transaction flow testing techniques.

UNIT III

Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.
Domain Testing: Domains and paths, Nice & ugly domains, Domain Testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT IV

Paths, Path products and Regular expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications.

UNIT V

State, State Graphs and Transition testing: State graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, Node Reduction algorithm.

TEXT BOOKS:

1. Software Testing techniques – Boris Beizer, Dreamtech, 2nd Edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, PearsonEducation.
2. Software Testing Techniques –SPD(Oreille)
3. Software Testing in the Real World – Edward Kit,Pearson.
4. Effective methods of Software Testing, Perry, JohnWiley.
5. Art of Software Testing – Meyers, JohnWiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AUGMENTED REALITY AND VIRTUAL REALITY
(Open Elective –III)

Course Code: GR20A3067 **L/T/P/C:3/0/0/3**
IV Year I Semester

Course Objectives:

1. To acquire the knowledge on augmented reality
2. To demonstrate the augmented reality devices.
3. To acquire the knowledge on virtual reality.
4. To illustrate the VR devices.
5. To explain how to apply VR/AR for various applications.

Course outcomes

1. To summarize about augmented reality.
2. To choose AR devices for various applications.
3. To summarize about augmented reality.
4. To experiment with VR devices.
5. To apply AR & VR technology in various domains.

UNIT I

What Is Augmented Reality?, Where Did Augmented Reality Come From?, Augmented Reality, The Relationship Between Augmented Reality and Other Technologies, Augmented Reality Concepts, How Does Augmented Reality Work?, Ingredients of an Augmented Reality Experience.

UNIT II

Augmented Reality Hardware, Major Hardware Components for Augmented Reality Systems, Augmented Reality Software, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application.

UNIT III

Virtual Reality: The Three I's of Virtual Reality, A Short History of Early Virtual Reality, Early Commercial VR Technology , VR Becomes an Industry, The Five Classic Components of a VR System.
Input Devices: Trackers, Navigation, and Gesture Interfaces: Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces

Unit IV

Output Devices: Graphics, Three-Dimensional Sound, and Haptic Displays :Graphics Displays, Sound Displays, Haptic Feedback.
Human Factors in VR: Methodology and Terminology, User Performance Studies, VR Health and Safety Issues, VR and Society

Unit V:

Augmented Reality Applications, What Makes a Good Augmented Reality Application?, Application Areas, Magic Books, Magic Windows and Doors, Applying Augmented Reality to a Problem, Evaluating Augmented Reality Applications, VR Applications in Manufacturing, Applications of VR in Robotics.

Text Books:

1. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.
2. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.

Reference Books:

1. LaValle, “Virtual Reality”, Cambridge University Press, 2016.
2. Alan 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 House, Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CRYPTOGRAPHY AND NETWORK SECURITY LAB

Course Code: GR20A4054 **L/T/P/C: 0/0/4/2**
IV Year I Semester

Course Objectives:

1. Explain different types of ciphers used for encryption and decryption.
2. Demonstrate on symmetric encryption algorithms.
3. Demonstrate on asymmetric encryption algorithms.
4. Experiment on Hash algorithms.
5. Illustrate programs related to digital certificates and digital signatures.

Course Outcomes:

1. Use the concepts of different ciphers for encryption and decryption.
2. Implement symmetric encryption algorithms.
3. Examine asymmetric encryption algorithms.
4. Interpret hash algorithms and their functionalities.
5. Solve the problems on digital signatures and digital certificates.

TASK 1:
Write a Java program to perform encryption and decryption using the following algorithms.
a. Ceaser cipher b. Substitution cipher c. Hill Cipher

TASK 2:
Write a C/ JAVA program to implement the DES algorithm.

TASK 3:
Write a C/JAVA program to implement the Blowfish algorithm.

TASK 4:
Write a C/JAVA program to implement the AES algorithm.

TASK 5:
Write the RC4 logic in Java.

TASK 6:
Implement DES-2 and DES-3 using Java cryptography package.

TASK 7:
Write a Java program to implement RSA algorithm.

TASK 8:
Implement the Diffie-Hellman Key Exchange mechanism

TASK 9:
Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

TASK 10:
Calculate the message digest of a text using the MD5 algorithm in JAVA.

TASK 11:
Explore the Java classes related to digital certificates.

TASK 12:
Write a program in java, which performs a digital signature on a given text.

Text Books:

1. Network Security Essentials (Applications and Standards) William Stallings Pearson Education.
2. Fundamentals of Network security by Eric Maiwald (Dreamtech press)

References:

1. Introduction to Cryptography, Buchmann, Springer.
2. Cryptography and network security, Third Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPILER DESIGN LAB

Course Code: GR20A4055 **L/T/P/C: 0/0/4/2**
IV Year I Semester

Course Objectives:

1. Introduce the major concept areas of language translation and compiler design.
2. Understand practical programming skills necessary for constructing a compiler.
3. Learn parsing techniques and to parse given string.
4. Learn LEX and YACC tool to develop a scanner &parser.
5. Provide deeper insights into the concept of code generation.

Course Outcomes:

1. Demonstrate different phases of compiler through programming language.
2. Define the role of lexical analyser and use of regular expressions.
3. Develop program for implementing parsing techniques.
4. Understand the working of LEX and YACC compiler and develop simple applications.
5. Design programs that execute faster by using code optimization techniques

TASK 1
Design a lexical analyser for given language (ignore redundant spaces, tabs, comments new lines etc.)

TASK 2
Write a program to recognize strings under 'a', 'a*b+', 'abb'.

TASK 3
Implement symbol table formation.

TASK 4
Write a program to implement predictive parser table.

TASK 5
Write a program to compute First () and Follow () for the given grammar.

TASK 6
Construct operator precedence parser.

TASK 7
Write a program to parse a string using Shift Reduce Parser.

TASK 8

Solve the given string using LALR parser.

TASK 9

Write a program to implement lexical analyzer functionalities using LEX tool.

TASK 10

Design a simple arithmetic calculator using LEX.

TASK 11

Write a Lex program to count no of characters, words, lines and special characters in a file.

TASK 12

Implement code optimization technique.

Text Books:

1. Principles of compiler design -A.V. Aho,J.D.Ullman, Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

References:

1. Lex&Yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly
2. Compiler Construction- Louden, Thomson.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROJECT WORK - PHASE I

Course Code: GR20A4129 **L/T/P/C: 0/0/12/6**
IV Year I Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statement with systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

IV YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FUNDAMENTALS OF MANAGEMENT AND ENTREPRENEURSHIP

Course Code: GR20A3140 **L/T/P/C:3/0/0/3**
IV Year II Semester

Course Objectives:

1. To provide engineering and science students with an accelerated introduction to the basics of management.
2. The course provides a framework that will enhance a person's effectiveness in the business world and make familiarize management language.
3. To understand the management concepts and applications of concepts in practical aspects of business and development of managerial skills.
4. To provide the student with a clear understanding of Entrepreneurship.
5. To give hands on experience on how to generate ideas, evaluate business model.

Course Outcome:

1. The students understand the significance of Management in their Profession.
2. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course.
3. The students can explore the Management Practices in their domain area and understand, adopt motivational theories and leadership styles and apply controlling techniques at right time for better decision making.
4. The student will be exposed to the basic concepts of entrepreneurship and its development process.
5. The student will be able to evaluate business ideas and attain hands on experience in designing value proposition and he will acquire the ability of developing a business plan / model.

UNIT I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills; **Evolution of Management Thought**- Classical Approach- Scientific and Administrative Management; The Behavioural approach; The Systems Approach; Contingency Approach.

UNIT II

Planning and Organizing: Planning – Planning Process, Types of Plans, Decision making and Steps in Decision Making; Principles of Organization: Span of control, organizational Design & Organizational Structures; Departmentalization, Delegation; Centralization, Decentralization.

UNIT III

Leading, Motivation and Controlling: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills. Motivation – Types; Motivational Theories – Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y. - **controlling** – basic control process – control techniques.

UNIT IV

Nature of Entrepreneurship: Characteristics and skills of an entrepreneur, Entrepreneur scenario in India and abroad. Types of entrepreneur, types of ownership, Small business in Indian economy. Risk Reduction strategies. Strategies for growth. Financial aspects: sources of rising capital, schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, IFCI and IDBI.

UNIT V

Creating and Starting the venture: Creativity and the business idea (Self-discovery, Opportunity discovery); Developing the business plan (Business model – Lean canvas by Alexander Osterwalder); Marketing plan (Customer & Solution- Value proposition, Marketing & Sales); Financial plan (Validation, money), Human Resource Plan (Team).

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
3. Principles and Practice of Management, L. M. Prasad, Sultan Chand & Sons, 2012
4. Entrepreneurship- Robert D Hisrich, Michael P Peters, Dean A Shepherd, TMH.2009

REFERENCES:

1. Essentials of Management, Koontz Kleihrich, Tata Mc – Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Entrepreneurship- Rajeev Roy, Oxford, 2011
4. Intellectual Property- Deborah E.Bouchoux, Cengage, 2012

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
REAL TIME OPERATING SYSTEMS
(Professional Elective –V)

Course Code: GR20A4114 L/T/P/C:**3/0/0/3**
IV Year II Semester

Course Objectives:

1. Know the overview of the operating systems.
2. Know the distributed operating system.
3. Know the real time models and languages
4. Know the RTOS Kernel principles and standards
5. Know the RTOS domain applications

Course Outcomes:

1. Understand the concepts of Operating system Principles, System Calls and Files.
2. Understand the concepts of Operating system Process, Communication and structures.
3. Understand the Network topologies and Distributed Operating system.
4. Understand the Real-time Languages, Models and Kernel Principles.
5. Understand the RTOS Domain Applications.

UNIT I

Review of Operating Systems: Basic Principles, system calls, Files-Processes, design and implementation of processes, Communication between processes, operating system structures.

UNIT II

Distributed Operating Systems: Topology, Network Types, Communication, RPC, Client server model, Distributed file systems and design strategies.

UNIT III

Real Time Models and Languages: Event based, Process based, Graph models, Petrinet models
Real-time Languages, RTOS tasks, RTscheduling, Interrupt processing, Synchronization, Control blocks, Memory requirements.

UNIT IV

Real Time Kernel: Principles, Polled loop systems, RTOS porting to a target, Comparison and Study of RTOS, VxWorks and mCoS, case studies.
Implementation of RTOS in ESP32,Inter-Task Communication in the Spark Fun ESP32 thing with Free RTOS.

UNIT V

RTOS And Application Domains: RTOS for image processing, Embedded RTOS for voice over IP, RTOS for fault tolerant applications, RTOS for control systems.

Text Books:

1. Charles Crowley “operating systems , A design oriented approach” McGraw Hill
2. Tenenbum, “Distributed Operating Systems”PHI,1999
3. CM Krishna,Kang G. Shin, “Real time Systems”, McGrawHill,1997
4. Raymond J.A., Donald L Baily, “An introduction to real time operating systems” PHI, 1999.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CYBER SECURITY
(Professional Elective –V)

Course Code: GR20A4115 **L/T/P/C:3/0/0/3**
IV Year II Semester

Pre-requisites:
Students are expected to have knowledge in

1. Basic communication methods.
2. Knowledge about cyber crimes.
3. Security primitives.

Course Objectives:

1. Learn about cybercrimes and classifications
2. Identify cyber offences and legal perspectives.
3. Understand the cybercrimes related to mobile and wireless devices.
4. Study the tools and methods used in cybercrimes
5. Know the Security Risks and threats for Organizations.

Course Outcomes:

1. Obtain firm understanding on basic terminology and concepts of cybercrimes.
2. Analyze different types of attacks.
3. Deal with the security challenges posed by mobile devices for develop encryption algorithm.
4. Implement the tools to handle security challenges.
5. Evaluate the associated challenges and the cost of cybercrimes in Organizations.

UNIT I
Introduction to Cybercrime: Introduction, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes and Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II
Cyber Offenses: Introduction, How Criminals plan the Attacks, Types of attackers, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on

Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and Types of DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, WileyINDIA.

References:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu,J.David Irwin.CRC Press T&F Group.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREEN COMPUTING
(Professional Elective –V)

Course Code: GR20A4116 **L/T/P/C:3/0/0/3**
IV Year II Semester

Course Objectives:

1. To acquire knowledge to adopt green computing practices.
2. To minimize negative impacts on the environment.
3. To develop skill in energy saving practices in their use of hardware.
4. To examine technology tools that can reduce paper waste and carbon footprint by user.
5. To understand how to maximize and implement green computing by case studies.

Course Outcomes:

1. Recite the fundamentals of green computing practices.
2. Apply the modelling to reduce negative impact on the environment.
3. Utilize the energy saving practices for use in hardware.
4. Adopt the tools for reducing paper waste and carbon foot print.
5. Acquire knowledge for adopting green computing in different scenarios.

UNIT I

Fundamentals: Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon footprint, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II

Green Assets and Modeling: Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture –Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III

Grid Framework: Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV

Green Compliance: Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V

Case Studies: The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TEXT BOOKS/ REFERENCES:

1. Bhuvan Unhelkar**, "**Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2011
2. Woody Leonhard, Katherrine Murray, "Green Home computing for dummies", August 2009.
3. Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey", Shoff/IBM rebook, 2011.
4. John Lamb, "The Greening of IT", Pearson Education, 2009.
5. Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry",Lulu.com, 2008.
6. Carl speshocky, "Empowering Green Initiatives with IT", John Wiley & Sons, 2010.
7. Wu Chun Feng (editor), "Green computing: Large Scale energy efficiency", CRC Press, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN PATTERNS
(Professional Elective –V)

Course Code: GR20A4124 **L/T/P/C:3/0/0/3**
IV Year II Semester

Prerequisites:
Knowledge in OOPS and UML concepts

Course Objectives:

1. Ability to learn different design patterns available, and to apply them to solve Design Problems
2. The capability to analyze how Design patterns solve many of the day-to-day problems object-oriented designers face, and in many different ways.
3. Ability to learn creative, structural and behavioral design properties to help them understand existing object oriented systems.
4. The ability to learn different structural design patterns like Adapter, Bridge, Composite, Decorator, Façade. Flyweight, and Proxy.
5. The ability to use design patterns to make the system seen less complex by talking about it at a higher level of abstraction than that of a design notation.

Course Outcomes:

1. The ability to learn different design patterns available, and to organize them and solving of Design Problems using Design Patterns, to understand and analyze how to select a Design Pattern, use them in real life examples.
2. To capability to analyze how Design patterns solve many of the day-to-day problems object-oriented designers face, and in many different ways. To understand the applications of design patterns by using a case study of designing a Document Editor.
3. The skill to learn different creational design patterns like Abstract Factory, Builder, Factory Method, Prototype, Singleton. To Learn these design patterns to help them understand existing object-oriented systems.
4. The ability to learn different structural design patterns like Adapter, Bridge, Composite, Decorator, Façade. Flyweight, and Proxy. To recognize how the Design patterns help one identify less-obvious abstractions and the objects that can capture them. For example, objects that represent a process or algorithm dont occur in nature, yet they are a crucial part of flexible designs.
5. The ability to learn different behavioral design patterns like Chain of Responsibility Command, Interpreter, Iterator, Mediator, Observer, State, Strategy, Template Method, Visitor and To understand the impact the design patterns will have, how they are related to other work in design, and how you can get involved in finding and cataloging patterns.

UNIT I

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT II

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

UNIT III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

Structural Pattern Part-I: Adapter, Bridge, and Composite.

UNIT IV

Structural Pattern Part-II: Decorator, Façade, Flyweight, Proxy.

Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, and Iterator.

UNIT V

Behavioral Patterns Part-II: Mediator, Memento, Observer, State, Strategy, Template Method Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

TEXT BOOKS

1. Design Patterns by Erich Gamma, Pearson Education

REFERENCES

1. Pattern's in JAVA Vol-I by Mark Grand, Wiley Dream Tech.
2. Pattern's in JAVA Vol-II by Mark Grand, Wiley Dream Tech.
3. JAVA Enterprise Design Patterns Vol-III by Mark Grand, Wiley Dream Tech

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HUMAN COMPUTER INTERACTION
(Professional Elective –VI)

Course Code: GR20A4067 **L/T/P/C:3/0/0/3**
IV Year II Semester

Course Objectives:

1. The basic understanding of guidelines, principles, and theories influencing human computer interaction.
2. The knowledge of how a computer system may be modified to include human diversity.
3. The appropriate evaluation of human computer interaction system.
4. Select an effective style for a specific application.
5. The basic concepts of User Experience Design and the factors that influence the user experience.

Course Outcomes:

1. Learn the concepts of interaction design and how it relates to human computer interaction and other fields.
2. Design how technologies can be to change people's attitudes and behavior.
3. Apply the difference between qualitative and quantitative data and analysis.
4. Extract the social Mechanisms that are used by people to communicate and collaborate.
5. Explore the user Experience design and analyze the factors involved in design.

UNIT I

Introduction: Importance of user Interface, definition, importance of good design. Benefits of good design, a brief history of Screen design.

The graphical user interface: popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user, Interface popularity, characteristics, Principles of user interface.

UNIT II

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III

Screen Designing : Design goals, Screen planning and purpose, organizing screen elements, ordering of screen emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT IV

Develop System Menus and Navigation Schemes: Select the Proper Kinds of Windows, Select the Proper Device, Based Controls , Choose the Proper Screen Based Controls

Interaction Devices: Keyboard and function keys, speech recognition digitization and generation, Image and video displays, drivers

UNIT V

A Brief Introduction to User Experience (UX) Design: Complexity and perception, What is User Experience (UX), What is a UX Designer

What is Design Thinking and Why is it so Popular: What is Design Thinking, Design Thinking's Phases

The 7 factors that influence user experience: Useful, Usable, An introduction to usability, Why does usability matter, The 5 Characteristics of usable products How to conduct user interviews, What is User Interview, Preparing for user interview, How to conduct a user interview, Reporting on user interview What is interaction design?-Understanding of Interaction design, The 5 Dimensions of interaction design

Text Books:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
3. The basics of User Experience design, Interaction design foundation 2002.

References:

1. Human Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson.
2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dream Tech,
3. User Interface Design, Soren Lauesen, Pearson Education.
4. User Experience for Beginners, Joel Marsh.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER GRAPHICS
(Professional Elective –VI)

Course Code: GR20A3057 **L/T/P/C:3/0/0/3**
IV Year II Semester

Prerequisites:

Student should have knowledge of the following mathematical topics

1. Matrices
2. Basic linear algebra such as solving a system of linear equations
3. Polynomials
4. Elementary signal processing (Fourier transform and filtering)

Course Objectives:

1. Outlining the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. Learn the basic principles of 3- dimensional computer graphics.
3. Determine to scan and convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. Change from a world coordinates to device coordinates, clipping and projections.
5. Articulate the application of computer graphics concepts in the development of computer games, information visualization and business applications.

Course Outcomes:

1. Describe the basic concepts used in computer graphics.
2. Implement various algorithms to draw line, circle, scan and convert the basic geometrical primitives.
3. Understand the basics of different algorithms for drawing 2D primitives such as transformations, area filling and clipping.
4. Describe the importance of viewing and projections.
5. Define the fundamentals of animation, virtual reality and its related technologies.

UNIT I

Introduction to computer graphics- Introduction, Non interactive/interactive Graphics, Uses of computer graphics, classification of Applications, Programming Language, Graphics system configuration

Graphic Systems- Introduction, Cathode Ray Tube(CRT)basics, Refresh Display, Raster Display, Computer Graphic Software, Integration of Graphics Standard

UNIT II

Output Primitives- Introduction, Representing Image, Straight Line, Line drawing algorithms, Differential Digital Analyser (DDA) algorithm, Bresenham's Line Algorithm, Circle generating Algorithm, Bresenham's circle Algorithm, Midpoint circle Algorithm, Polygon filling Algorithms, Character or Text Generation, Aliasing and Antialiasing

UNIT III

Two Dimensional Transformations-Introduction, Representation of points, Matrix Algebra and Transformation, Transformation of points, Transformation of straight line, Midpoint Transformation, Transformation of Parallel Lines, Transformation of Intersecting Lines, Rotation

Window Clipping- Introduction, Viewing Transformation, Clipping, Point Clipping, Line Clipping, Cohen-Sutherland Line clipping, Polygon Clipping, Sutherland-Hodgman Algorithm, Curve Clipping

UNIT IV

3D Concepts and Techniques- Introduction, 3D Transformations, Rotation about an axis Parallel to a Coordinate Axis, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, 3D Modeling Schemes, Projection, Orthographic Projection, Isometric Projection, Oblique Projection, perspective projection

UNIT V

Introduction to Multimedia- Pc specification, visual elements, wav and mp3 format, sound elements, multimedia storage, flash animation.

Textbooks:

- Computer Graphics, Amarendra N Sinha, ArunDUdai, Tata McGraw Hill
- Fundamentals of Multimedia, Ze-Nian Li, Mark S. Drew,Pearson Prentice Hall

Reference Books:

1. Multimedia and communications technology, Steve Heath, Elsevier
2. Mathematical Elements for Computer Graphics, 2nd Edition, David F. Rogers, J.Alan Adams

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA ANALYTICS USING OPEN SOURCE TOOLS
(Professional Elective –VI)

Course Code: GR20A4117 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To acquire and relate knowledge about graphics techniques in data analysis.
2. To Model data using various data modeling techniques
3. To mine data using clusters and simulations
4. To report data using business intelligence and predictive analytics
5. To setup and evaluate the Programming Environments with Data analytics

Course Outcomes:

1. Describe and recall about graphics techniques in data analysis.
2. Experiment data using various data modeling techniques
3. Mine data using clusters and simulations
4. Summarize data using business intelligence and predictive analytics
5. Implement the Programming Environments with Data analytics

UNIT I

Graphics: Looking at Data, Introduction, A Single Variable, Two Variables, Time As A Variable, More Than Two Variables

UNIT II

Modeling Data: Guesstimation and the back of the envelope, Models from scaling arguments, Arguments from probability models, classical statistics

UNIT III

Mining Data: Simulations, Finding Clusters, Seeing the Forest for the trees

UNIT IV

Data utilization: Reporting, Business intelligence and Dashboards, Financial calculations and modeling predictive analytics

UNIT V

Programming Environments and Data analytics

Programming Environments: Software Tools, A Catalog of Scientific Software, Writing Your Own Software

Results from Calculus: Common Functions, Calculus, Useful Tricks, Notation and Basic Math

Working with data: Sources for Data, Cleaning and Conditioning, Sampling, Data File Formats, The Care and Feeding of Your Data Zoo

TEXT BOOK:

1. Philipp K. Janert, Data Analysis with Open Source Tools, O'Reilly Media, Inc, November 2010: First Edition.

REFERENCES:

1. G James, D. Witten, T Hastie, and R. Tibshirani, An Introduction to Statistical Learning: with Applications in R, Springer, 2013
2. Chambers, John, Software for Data Analysis Programming with R, Springer, 2008
3. Trevor Hastie Robert Tibshirani Jerome Friedman, The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.), Springer, 2014
4. Mark Gardener, Beginning R: The Statistical Programming Language, Wiley, 2013
5. Upadhyaya and A. Upadhyaya, Material Science and Engineering, Anshan Publications, 2007

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE PRODUCT DEVELOPMENT AND MANAGEMENT
(Professional Elective –VI)

Course Code: GR20A4118 **L/T/P/C:3/0/0/3**
IV Year II Semester

Course Objectives

1. To learn the foundation and product planning in software development.
2. To understand the product development architecture, design and testing.
3. To make release the software with testing and training.
4. To meet the market and to sales of software with legal and management compliance.
5. To provide service and support with monitoring and controlling.

Course Outcomes:

1. Recite the foundation of Software Product Development Methodology and planning.
2. Apply the product development architecture, design and testing.
3. Release the software with prior testing and training.
4. Marketing and selling the software with legal and management compliance.
5. Software product service is provided with monitoring and controlling.

UNIT I

FOUNDATION AND PLANNING: INTRODUCTION AND FOUNDATION: Introduction to Software Product Development Methodology -Phases -Roles - Responsibilities.
PRODUCT PLANNING: Product Envisioning - Conceptualize Product -Product Roadmap -High-Level Planning.

UNIT II

PRODUCT DEVELOPMENT: Initiation -Architecture and Design -Testing Approach -Release Planning -Iterative Development -Design by Feature -Build by Feature -Certify by Feature -Continuous Build and Integration.

UNIT III

PRODUCT RELEASE: Alpha Release/Product Qualification -Beta Release -Product Training Planning.

UNIT IV

PRODUCT SALES AND MARKETING: Product Sales and Marketing Approach -Product Legal and Compliance Management -Product Market Rollout.

UNIT V

SERVICES AND SUPPORT: Product Support -Product Governance -Monitoring and Control Through-Out Entire Product Lifecycle, Case study.

TEXT BOOKS:

1. Dan Conde, Software Product Management: Managing Software Development from Idea to Product to Marketing to Sales, Aspatore Books; 1st edition
2. Alyssa Dver , Software Product Management Essentials, Meghan KifferPr

REFERENCES:

1. GerardusBlokdyk, Software Product Development A Complete Guide, 5starcooks
2. Allan M. Anderson, Product Development and Management Body of Knowledge: A Guidebook for Training and Certification, CreateSpace Independent Publishing Platform
3. https://en.wikipedia.org/wiki/Software_development

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROJECT WORK - PHASE II

Course Code: GR20A4130 **L/T/P/C: 0/0/12/6**
IV Year II Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statement with systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT SKILLS AND INTERPERSONAL COMMUNICATION

(OPEN ELECTIVE)

Course Code: GR20A3136 **L/T/P/C: 3/0/0/3**

Course Objectives:

1. To know the importance of soft skills.
2. To identify good leadership skills /qualities.
3. To recognize the importance of interpersonal skills.
4. To demonstrate the significance of confidence building.
5. To define and differentiate between a report and a proposal.

Course Outcomes:

1. Develop soft skills communication skills, leadership skills etc.
2. Implement goal setting techniques to build a promising career.
3. Design formal report and proposals with appropriate formal expressions.
4. Create healthy workplace environment by treating others with respect and dignity.
5. Evaluate the power of confidence building and self-esteem with examples.

UNIT I: Soft Skills

- Introduction to soft skills, Definition of Soft skills, Importance of soft skills
- Communication skills, Usage of English in Business/Corporate scenario
- Nonverbal communication - Proxemics
- Presentation skills

UNIT II: Team Building & Leadership Qualities

- Qualities of a good leader
- Problem solving and Decision Making
- Strategic management
- Crisis management

UNIT III: Personality Development

- Motivation
- Goal setting
- Self-esteem
- Team skills

UNIT IV: Developing Reports and Proposals

- Understanding reports and proposals
- Planning reports and proposals
- Writing beginning, body and ending
- Formats of reports and proposals

UNIT V: Interpersonal Skills

- Understanding professional relationships
- Networking professionally
- Showing basic office courtesies
- Interview skills

Text books:

1. Soft Skills-Key to success in workplace and life Meenakshi Raman, Raman Upadhyay, CENAGE

Reference books:

1. Soft skills for Everyone - Jeff Butterfield, CENAGE Learning
2. Soft skills for Interpersonal Communication - S.Balasubramaniam (ORIENT BLACKSWAN)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOUR
(OPEN ELECTIVE)

Course Code: GR20A3137 **L/T/P/C: 3/0/0/3**

Course Objectives:

1. OB provides perspectives and skills that enhance understanding of our own behaviour and our ability to influence the behaviour of others in organizational settings
2. OB and HRM together can instill sustainability deep within an organizations' culture.
3. To equip them with behavioural skills in managing people at work.
4. To make student aware of the concepts, techniques and practices of human resource development.
5. This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.

Course Outcomes

1. To acquaint the student with the determinants of intra -individual, inter-personnel and inter-group behaviour in organisational setting.
2. To Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories and apply in the organizational context.
3. To assess the group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations in the framework of organization and to familiarize the concepts, techniques and practices of human resource development in the current organizational view.
4. To impart and apprise the capable of applying the principles and techniques as professionals for developing human resources in an organization.
5. To report the current trends and applications in HRD and Balanced Scorecard to measures the performance and to develop, implement, and evaluate organizational human resource development strategies aimed at promoting organizational effectiveness in different organizational environments.

UNIT I

Introduction to OB : Organisational Behaviour- Concept and Emergence of OB Concept; Nature and Theoretical frameworks; Models of Organisational Behaviour, Challenges and Opportunities for Organisational Behavior;

UNIT II

Individual Behaviour: Individual Behaviour: Personality, Learning, Values and Attitudes, Perception, Stress at work. Management's assumptions about people- McGregor's Theory X and Theory Y. Motivation - Maslow's Need Hierarchy, Herzberg's Two Factors Theory, Vroom's Expectancy Theory.

UNIT III

Inter-personal and Group Behaviour: Interpersonal communication and Feedback; Transactional

Analysis (TA); Johari Window. Group Behaviour: Group Dynamics, Cohesiveness and Productivity; Management of Dysfunctional groups; Group Decision Making. Leadership- Concept and Styles.

UNIT IV

Introduction to Human Resource Development: Concept; Relationship between human resource management and human resource development; HRD mechanisms, processes and outcomes; HRD matrix; Roles and competencies of HRD professionals; Challenges in HRD, steps in HRD Process.

UNIT V

HRD Applications and Trends: Coaching and mentoring; Career management and development; Competency mapping; Balanced Score Card. HRD in Organisations: Selected cases covering HRD practices in government organisations, manufacturing and service industries and MNCs.

Text Books:

1. Robbins, Stephen P. and Timothy A. Judge, Organisational Behaviour, Prentice -Hall, New Delhi.
2. Werner J. M., DeSimone, R.L., Human resource development, South Western.

Reference Books:

1. Luthans, Fred, Organizational Behaviour, McGraw-Hill, New York.
2. Gregory, Moorhead and Ricky W. Griffin, Managing Organizational Behaviour, Thomson South Western Publication.
3. Pareek, Udai and V. Sisodia, “HRD in the New Millennium, Tata McGraw - Hill Publishing Co. Ltd., New Delhi, 1999.
4. Haldar, U. K., Human resource development, Oxford University Press India.
5. Rao, T.V., Future of HRD, Macmillan Publishers India.
6. Rao, T.V., HRD Score Card 2500: Based on HRD audit, Response Books, SAGE Publications.
7. Mankin, D., Human resource development, Oxford University Press India.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CYBER LAW AND ETHICS
(OPEN ELECTIVE)

Course Code: GR20A3138 **L/T/P/C: 3/0/0/3**

Course Objectives

1. The course objective is to provide the fundamental skill to understand cyber laws.
2. It enable to understand the legal frameworks
3. It helps the student understand different cyber crimes
4. It provides overview on Intellectual Property, copy rights, patents rights etc.
5. Given rapid changes in technology and the corresponding changes in crime and the law

Course outcomes.

1. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
2. Students locate and apply case law and common law to current legal dilemmas in the technology field.
3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
4. Students will be able understand cybercrime and ethical practices and the student will be able to know and learn web technologies and related issues.
5. The student will be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc. and provide an overview of cybercrime and framework.

UNIT I

The Legal System: Sources of Law and The Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court), Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

UNIT II

Introduction cyber law: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level.

UNIT III

Constitutional & Human Rights Issues in Cyber space : Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace, Access to Internet, Right to Privacy, Right to Data Protection.

UNIT IV

Cyber Crimes & Legal Framework: Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act

UNIT V

Intellectual Property Issues in Cyber Space: Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues.

Text books:

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012)
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. JonthanRosenoer, Cyber Law, Springer, New York, (1997).
5. SudhirNaib, The Information Technology Act, 2005: A Handbook.
6. S. R. Bhansali, Information Technology Act, 2000
7. University Book House Pvt. Ltd. Jaipur (2003).
8. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ECONOMIC POLICIES IN INDIA

(OPEN ELECTIVE)

Course Code: GR20A3139 **L/T/P/C:3/0/0/3**

Course Objectives:

1. To analyse the overall business environment and evaluate its various components in business decision making.
2. To Provide an analysis and examination of significant contemporary ethical issues and challenges.
3. To Emphases the manager's social and environmental responsibilities to a wide variety of Stakeholders.
4. To know the various Government policies governing industry.
5. To know economic terms and its scope.

Course Outcomes:

1. Familiarize with the nature of business environment and its components.
2. The students will be able to demonstrate and develop conceptual framework of business environment.
3. Understand the definition of ethics and the importance and role of ethical behaviour in the business world today.
4. Explain the effects of government policy on the economic environment.
5. Outline how an entity operates in a business environment.

UNIT I

Business environment-factors effecting Business Environment-need for industrial policies, Overview of Indian Economy, Trends towards market economy, problems of underdevelopment –meaning, Main problems, reasons, of underdevelopment.

UNIT II

Factors and measure, Meaning of Economic development, National income, Per capital income, Quality of life, Capital Formation – Savings, Investment.

UNIT III

NITI Aayog and Planning in India, NitiAayog and its function, how is Niti Aayog different from planning commission, Meaning, Importance, Main reasons of adopting, planning in India,Objectives of planning, Economic development, moderation, stability, self-sufficiency, employment Etc, foreign aid, Employment. Allocation of Resources

UNIT IV

Private and Public Sector, Public Sector – role and growth, Achievements of the public sector,Private Sector – Importance Problems, New foreign Trade Policy.

UNIT V

Present Economic Policy, Main feature, Globalization, Expansion of Private sector, moremarket orient approach. Public distribution system, Industrial policies before and after 1991, Industrial Licensing, Monetary and Fiscal Policy, elements of Indian current GDP and review of current budget.

Text books

1. Francis Cherunilam: Business Environment: Text and Cases. 18/e. Himalaya. 2009.
2. Misra and Puri: Indian Economy, Himalaya, 2009.

References:

1. Indian Economy- A. N. Agarwal
2. Indian Economy – Mishra &Puri
3. Indian Development and planning – M. L. Jhingan
4. Indian Economy – R. S. RastogiYozna and Kurukshetra Magazines