Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2020)

Information Technology

Department of Information Technology
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING & TECHNOLOGY
Bachupally, Kukatpally, Hyderabad, Telangana, India
500 090

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD
DEPARTMENT OF INFORMATION TECHNOLOGY
PROGRAMME BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY
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 Information Technology 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 Information Technology, 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 Information Technology 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.

d) 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 be condoned.

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. Plagiarism 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).

f) **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.

g) **EngineeringGraphics:**
  - Two internal examinations, each is of 10 marks. The average of the two internal tests shall be considered for the award ofmarks.
  - 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 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 totalof 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 second semester. (ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student 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 second semester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student 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 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.
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 kth 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 ith course and G_i is the grade point scored by the student in the ith 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 $\geq$ 6.50 and CGPA < 8.00
14.4	Second Class	CGPA $\geq$ 5.50 and CGPA < 6.50
14.5	Pass Class	CGPA $\geq$ 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 (forthat

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 orfrom other Colleges/ Universities shall be considered only on case-to-case basis by the AcademicCouncil 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.

5	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.
(040)65864440

INFORMATION TECHNOLOGY
B.Tech (IT) – GR20 Course Structure

I B. Tech (IT) - 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	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	GR20A1007	Programming for Problem Solving	2	1	0	3	2	1	0		30	70	100
5	EEE	ES	GR20A1017	Basic Electrical Engineering Lab	0	0	1	1	0	0	2	2	30	70	100
6	Chemistry	BS	GR20A1014	Engineering Chemistry 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	ME	ES	GR20A1019	Engineering Workshop	1	0	1.5	2.5	1	0	3	4	30	70	100
		TOTAL			11	4	5.5	20.5	11	4	11	26	240	560	800
9	Mgmt	MC	GR20A1021	Life skills and Personality Development	1	0	0	1	2	0	0	2	30	70	100

I B. Tech (IT) - 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	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	GR20A1011	Data Structures	2	1	0	3	2	1	0	3	30	70	100
5	Physics	BS	GR20A1012	Applied Physics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
6	ME	ES	GR20A1010	Engineering Graphics	1	0	2	3	1	0	4	5	30	70	100
7	CSE	ES	GR20A1018	Data Structures Lab	0	0	1	1	0	0	2	2	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**	**5.5**	**19.5**	**11**	**3**	**11**	**25**	**240**	**560**	**800**
9	Mgmt	MC	GR20A1020	Design Thinking	1	0	0	1	2	0	0	2	30	70	100

II B.Tech(IT) - 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	PC	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	IT	PC	GR20A2070	Database Management Systems	3	0	0	3	3	0	0	3	30	70	100
5	CSE	BS	GR20A2069	Discrete Mathematics	2	1	0	3	2	1	0	3	30	70	100
6	IT	PC	GR20A2057	Digital Electronics Lab	0	0	1.5	1.5	0	0	3	3	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**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2002	Value Ethics & Gender Culture	2	0	0	2	2	0	0	2	30	70	100

II B. Tech (IT) - 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	GR20A2077	Design and Analysis of Algorithms	3	0	0	3	3	0	0	3	30	70	100
2	IT	PC	GR20A2074	Computer Organization	3	0	0	3	3	0	0	3	30	70	100
3	Mgmt	HS	GR20A2004	Economics & Accounting for Engineers	3	0	0	3	3	0	0	3	30	70	100
4	IT	PC	GR20A2081	Data Communicationand Computer Networks	3	0	0	3	3	0	0	3	30	70	100
5	CSE	PC	GR20A2075	Operating Systems	2	1	0	3	2	1	0	3	30	70	100
6	IT	PC	GR20A2082	Design and Analysis of Algorithms using Java Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	IT	PC	GR20A2083	Operating Systems and Sci Lab	0	0	2	2	0	0	4	4	30	70	100
8	IT	PC	GR20A2084	Data Communication and Computer Networks Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
				TOTAL	**14**	**1**	**5**	**20**	**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 (IT) - 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	PC	GR20A3054	Software Engineering	3	0	0	3	3	0	0	3	30	70	100
2	IT	PC	GR20A3055	Internet of Things and Applications	2	1	0	3	2	1	0	3	30	70	100
3	IT	PC	GR20A3056	Web Programming	3	0	0	3	3	0	0	3	30	70	100
4	IT	PE		Professional Elective-I	3	0	0	3	3	0	0	3	30	70	100
5	IT	OE		Open Elective-I	3	0	0	3	3	0	0	3	30	70	100
6	IT	PC	GR20A3058	Internet of Things and Applications Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	IT	PC	GR20A3059	Web Programming Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	IT	PC	GR20A3060	Python and R Programming Lab	0	0	2	2	0	0	4	4	30	70	100
				TOTAL	**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2003	Constitution of India	2	0	0	2	2	0	0	2	30	100	100

Professional Elective – I				
S. No.	BOS	Group	Course Code	COURSE
1	CSE	PE	GR20A3044	Data Warehousing and Data Mining
2	CSE	PE	GR20A3047	Principles of Programming Languages
3	CSE	PE	GR20A4115	Cyber Security
4	IT	PE	GR20A3057	Computer Graphics

Open Elective – I				
S. No.	BOS	Group	Course Code	COURSE
1	CSE	OE	GR20A3046	Artificial Intelligence

III B. Tech (IT) - 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	Mgmt	HS	GR20A3140	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	0	0	3	30	70	100
2	IT	PC	GR20A3123	Machine Learning	2	1	0	3	2	1	0	3	30	70	100
3	IT	PC	GR20A3124	Full Stack Development	3	0	0	3	3	0	0	3	30	70	100
4	IT	PE		Professional Elective-II	3	0	0	3	3	0	0	3	30	70	100
5	IT	OE		Open Elective-II	3	0	0	3	3	0	0	3	30	70	100
6	IT	PC	GR20A3122	Machine Learning Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	IT	PC	GR20A3130	Full Stack Development Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	IT	PW	GR20A3141	Mini Project with Seminar	0	0	2	2	0	0	4	4	30	70	100
				TOTAL	**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**

Professional Elective – II				
S. No.	BOS	Group	Course Code	COURSE
1	IT	PE	GR20A3125	Unix Programming
2	IT	PE	GR20A3126	Automata and Compiler Design
3	IT	PE	GR20A3127	Distributed Database and Systems
4	IT	PE	GR20A3128	Agile Methodologies

Open Elective – II				
S. No.	BOS	Group	Course Code	COURSE
1	IT	OE	GR20A3129	Introduction to Data Science

IV B. Tech (IT) - 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	PC	GR20A4056	Unified Modelling Language	2	1	0	3	2	1	0	3	30	70	100
2	IT	PC	GR20A4057	Middleware Technologies	3	0	0	3	3	0	0	3	30	70	100
3	IT	PE		Professional Elective-III	3	0	0	3	3	0	0	3	30	70	100
4	IT	PE		Professional Elective-IV	3	0	0	3	3	0	0	3	30	70	100
5	IT	OE		Open Elective-III	3	0	0	3	3	0	0	3	30	70	100
6	IT	PC	GR20A4064	Unified Modelling Language Lab	0	0	2	2	0	0	4	4	30	70	100
7	IT	PC	GR20A4065	Middleware Technologies Lab	0	0	2	2	0	0	4	4	30	70	100
8	IT	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	IT	PE	GR20A4058	Software Testing Methodologies
2	IT	PE	GR20A4059	Network Programming
3	IT	PE	GR20A4060	Information Retrieval Systems
4	CSE	PE	GR20A4116	Green Computing

Professional Elective – IV				
S. No.	BOS	Group	Course Code	COURSE
1	IT	PE	GR20A4061	Deep Learning
2	IT	PE	GR20A4062	Soft Computing
3	IT	PE	GR20A4063	Advanced Computer Networks
4	CSE	PE	GR20A3118	Cloud Computing

Open Elective – III				
S. No.	BOS	Group	Course Code	COURSE
1	CSE	OE	GR20A4067	Human Computer Interaction

IV B. Tech (IT) - 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	GR20A4119	Software Project Management	2	1	0	3	2	1	0	3	30	70	100
2	IT	PE		Professional Elective-V	3	0	0	3	3	0	0	3	30	70	100
3	IT	PE		Professional Elective-VI	3	0	0	3	3	0	0	3	30	70	100
4	IT	PW	GR20A4130	Project Work-Phase II	0	0	6	6	0	0	12	12	30	70	100
				TOTAL	**8**	**1**	**6**	**15**	**8**	**1**	**12**	**21**	**120**	**280**	**400**

Professional Elective – V				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	CSE	PE	GR20A4050	Image and Video Processing
2	EEE	PE	GR20A4099	Embedded Systems
3	CSE	PE	GR20A4125	Cyber Forensics
4	IT	PE	GR20A4120	E-Commerce

Professional Elective – VI				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	IT	PE	GR20A4121	Essentials of Big Data Programming
2	IT	PE	GR20A4122	Speech and Natural Language Processing
3	IT	PE	GR20A4123	Storage Area Networks
4	IT	PE	GR20A4124	Design Patterns

Professional Elective Threads

Elective/Thread	Systems and Software Architecture	Programming	Data Science and Machine Learning	Applications and Networking
Professional Elective I (III-I)	Computer Graphics	Principles of Programming Languages	Data Warehousing andData Mining	Cyber Security
Professional Elective II (III-II)	Automata and Compiler Design	Unix Programming	Distributed Databaseand Systems	Agile Methodologies
Professional Elective III (IV-I)	Green Computing	Network Programming	Information RetrievalSystems	Software Testing Methodologies
Professional Elective IV (IV-I)	Soft Computing	Cloud Computing	Deep Learning	Advanced Computer Networks
Professional Elective V (IV-II)	Embedded Systems	Image and Video Processing	Cyber forensics	E-Commerce
Professional Elective VI (IV-II)	Storage Area Networks	Speech and Natural Language Processing	Essentials of Big DataProgramming	Design Patterns

Open Electives for GR20 Regulations:

THREAD 1	THREAD 2	OFFERED BY
1. Soft Skills and Interpersonal Communication 2. Human Resource Development and Organizational Behavior 3. Cyber Law and Ethics 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. Human Computer Interaction	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 Cycle Analyses	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, 9th edition, 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
ENGINEERING CHEMISTRY

Course Code: GR20A1005   **L/T/P/C: 3/1/0/4**
I Year I 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. Know the origin of different types of engineering materials used in modern 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 ofnickel.

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; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
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. A Textbook of Engineering Chemistry by Shashi Chawla, 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 I 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
DC 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 batterybackup.

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

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

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, Parametersand 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
BASIC ELECTRICAL ENGINEERING LAB
Course Code: GR20A1017   **L/T/P/C: 0/0/2/1**
I Year I 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
ENGINEERING CHEMISTRY LAB

Course Code :GR20A1014   **L/T/P/C: 0/0/3/1.5**
I Year I 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 $KMnO_4$
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)

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
a. Write a C program to implement operators in c?
b. Write a C program to find greatest and smallest among three numbers using conditional operator.
c. 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   ii.   1
    2 3   2   3
    4 5 6   4   5   6
     7 8 9 10   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
1) Write a C program to find sum, average and minimum and maximum in a list of numbers.
2) Write a C program to implement linear search.
3) 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
ENGINEERING WORKSHOP

Course Code: GR20A1019   **L/T/P/C: 1/0/3/2.5**
I Year I 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 I 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 year time they spend in the college.
2. Apart from understanding the importance of English language skills in a globalized world, they will learnt 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 behavior Vs 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; Dangers of 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

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 $V(x)$ Ξ $cosax$ 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
APPLIED PHYSICS

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

Course Objectives:
The course will help to
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
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
APPLIED PHYSICS LAB

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING GRAPHICS

Course Code: GR20A1010   **L/T/P/C: 1/0/4/3**
I Year II 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, Pyramidand 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
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
ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

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

Course Objectives:
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 II 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 G

II YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL LOGIC DESIGN

Course Code: GR20A2067   **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:
1. Comprehend different number systems including the binary system and Boolean algebraic principles.
2. Create minimal realizations of single and multiple output Boolean functions;
3. Design and analyze combinational circuits using medium scale integrated (MSI) components, including arithmetic logic units;
4. Apply strategies for state minimization, state assignment, for the implementation of synchronous Finite State Machines
5. Design of Combinational Programmable Logic Devices (CPLDs) like PROM, PAL, and PLA and develop HDL Models for Logic Circuits.

Course Outcomes:
1. Apply knowledge of fundamental Boolean principles and manipulation to design Logic Circuits.
2. Apply various techniques of Boolean function simplification to create minimal expressions.
3. Create combinational circuits for a specified behavior with minimal specification.
4. Synthesize Sequential circuits with minimal states.
5. Realize combinational circuitry using Combinational PLDs and develop & test HDL models of Logic Circuits.

UNIT I
Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.
Boolean Algebra And Logic Gates: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

UNIT II
Gate-Level Minimization: The Map method, Four-variable map, Five-variable map, Product of Sum's simplifications, Don't care conditions, NAND and NOR implementation, other two level implementations, Exclusive-OR Function.

UNIT III
Combinational Logic: Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT IV
Synchronous Sequential Logic: Sequential Circuits, Latches, Flip-Flops, Analysis of clocked sequential circuits, State Reduction and Assignment, Design Procedure.
Registers and Counters: Registers, Shift registers, Ripple Counters, Synchronous Counters, other counters.

UNIT V

Memory and Programmable Logic: Introduction, Random Access Memory, Memory decoding, Error detection and correction, Read only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

Hardware Description Language: Hardware Description Language, Definition, Structural Definitionof HDL, HDL models for Combinational circuits, HDL for models for Sequential circuits.

Teaching methodologies:
- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:
1. Digital Design with an Introduction to the Verilog HDL – Fifth Edition, M. Morris Mano, Pearson Education.
2. Fundamentals of Logic Design – Roth, 7th Edition, Thomson.

References:
1. Switching and Finite Automata Theory by ZviKohavi, Tata Mc Graw Hill.
2. switching and Logic Design – CVS Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata Mc Graw Hill.
4. Fundamentals of Digital Logic and Micro Computer Design, 5th Edition, M.Rafiquzzaman (John Willey)

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
JAVA PROGRAMMING

Course Code: GR20A2076   **L/T/P/C : 3/0/0/3**
II Year I Semester

Course Objectives:
1. The Java programming language: its syntax, idioms, patterns, and styles.
2. Object oriented concepts in Java and apply for solving the problems.
3. How exception handling and multithreading makes Java robust
4. Explore java Standard API library such as io, util, applet, awt
5. Building of applications using Applets and Swings

Course Outcomes: Upon the successful completion of the course, the student will be able to:
1. Identify the model of Object-Oriented Programming: Abstract data types, Encapsulation, Inheritance and Polymorphism
2. Summarize the fundamental features like Interfaces, Exceptions and Collections
3. Correlate the advantages of Multi-threading.
4. Design interactive programs using Applets, AWT and Swings
5. Develop real time applications using the features of Java

UNIT I
OBJECT ORIENTED THINKING
Introduction, Need of object-oriented programming, principles of object-oriented languages, Applications of OOP, history of JAVA, Java Virtual Machine, Java features, Program structures, Installation of JDK.
Variables, Primitive data types, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and Ternary, Expressions, Primitive Type conversion and casting,flow of control- branching, conditional, loops.

UNIT II
CLASSES, INHERITANCE, POLYMORPHISM
Classes and Objects- Classes, Objects, creating objects, methods, constructors- constructor overloading, cleaning up unused objects- Garbage collector, class variable and methods- static keyword, this keyword, arrays, Command linearguments, NestedClasses
Strings: String, StringBuffer, StringTokenizer
Inheritance and Polymorphism- Types of Inheritance, deriving classes using extends keyword, super keyword, Polymorphism – Method Overloading, Method Overriding, final keyword, abstract classes.

UNIT III
INTERFACES, PACKAGES, EXCEPTIONS
Interfaces: Interface, Extending interface, interface Vs Abstract classes.
Packages- Creating Packages, using Packages, Access protection, java I/O package. **Exceptions -** Introduction, Exception handling techniques-try…catch, throw, throws, finally block, user defined Exception.

UNIT IV
MULTITHREADING, COLLECTIONS
java.lang.Thread, the main Thread, creation of new Threads, Thread priority, multithreading-using isalive() and join(), Synchronization, suspending and resuming Threads, Communication between Threads. Exploring java.io, Exploring java.util

Collections: Overview of Collection Framework : ArrayList, LinkedList, Vector, HastSet, TreeSet, HashMap, HastTable, TreeMap, Iterator, Comparator

UNIT V
APPLETS, AWT AND SWINGS
Applet class, Applet structure, an example Applet program, Applet life cycle.
Event Handling- Introduction, Event Delegation Model, Java.awt.event Description, Adapter classes, Innerclasses.
Abstract Window Toolkit: Why AWT?,java.awt package, components and containers, Button, Label, Checkbox, Radio buttons, List boxes, choice boxes, Text field and Text area, container classes, Layout Managers.
Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, JList and JScroll Pane, Split Pane, JTabbed Pane, Dialog Box, Pluggable Look andfeel.

Text/Reference Books:
1. Java: The Complete Reference, 10thedition, Herbert Schildt, McgrawHill.
2. Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
3. Java for Programming, P.J.Dietel PearsonEducation
4. Object Oriented Programming through Java, P.Radha Krishna, UniversitiesPress.
5. Thinking in Java, Bruce Eckel, PearsonEducation
6. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROBABILITY AND STATISTICS

Course Code: GR20A2005   **L/T/P/C : 3/0/0/3**
II Year I Semester

Course Objectives:
- Interpret the measures of central tendency and dispersion.
- Distinguish between explanatory and response variables and analyze data using correlation and regression.
- Apply various probability distributions.
- Apply tests of hypothesis.
- Employ basic analysis of time series data.

Course Outcomes
The expected outcomes of the Course are:
- Compute and interpret descriptive statistics.
- Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson, Normal and Exponential distributions.
- Fit the models using Regression Analysis.
- Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.
- Interpret Time series data.

UNIT I : Random Variables, Basic Statistics, Correlation and Regression
Notion of Randomness, Random Experiment, Random variables – Discrete and Continuous, Probability mass function and density function, constants of r.v.s (Mean, Variance, Monents about mean), Concept of Bivariate distributions and Covariance.
Measures of central tendency and moments.
Correlation : Karl-Pearson's correlation coefficient and Spearman's Rank correlation, Statements of their properties and problems, Simple and Multiple Linear Regression (three variables case only), Statements of properties of Regression coefficients and problems.

UNIT II : Probability Distributions
Discrete Distributions: Binomial and Poisson distributions - definition, real life examples, Statements of their Mean and Variance, related problems, evaluation of statistical parameters.
Continuous Distributions: Normal, Exponential and Gamma distributions - definition, real life examples, Statements of their Mean and Variance and related problems, evaluation of statistical parameters for Normal distribution.

UNIT III : Testing of Hypothesis-1 (Large sample)
Concept of Sampling distribution and Standard error, tests for single proportion, difference of proportions, single mean, difference of means and Chi-square test for independence of attributes. Estimation of confidence interval for population mean and population proportions.

UNIT IV : Testing of Hypothesis-2 (Small Sample)
Tests for single mean, difference of means, Population variance, ratio of variances, ANOVA 1-way and 2-way. Estimation of confidence interval for Population mean.

UNIT V : Time Series analysis
Components of Time series, Additive and Multiplicative Decomposition of Time series components, Measuring trend by method of Moving averages, Straight line and Second degree parabola, Measuring seasonal variation by Ratio to Trend method and Ratio to Moving averages method.

Text / References:
1. S. C.Gupta&V.K.Kapoor, "Fundamentals of Mathematical Statistics", S.Chand.
2. Richard A.Johnson," Probability and Statistics for Engineers", Pearson Education.
3. Jay Devore, "Probability and Statistics for Engineering and the Sciences",Cengage learning.
4. Murat Kulahci,"Time series analysis and forecasting by example",John Wiley & Sons
5. S. C.Gupta&V.K.Kapoor, "Fundamentals of Applied Statistics", S.Chand.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
DATABASE MANAGEMENT SYSTEMS

Course Code: GR20A2070   **L/T/P/C : 3/0/0/3**
II Year I Semester
Course Objectives:
   1. To understand the different issues involved in the design and implementation of a database system.
   2. To understand Structured Query Language for manipulating the Data.
   3. To study the physical, conceptual and logical database designs
   4. To provide concepts of Transaction, Concurrency and Recovery Management Strategies of a DBMS
   5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Course Outcomes:
   1. Identify the role of Database System Applications and the design issues related.
   2. Design the logical model for the applications and apply indexing techniques.
   3. Construct a Database Schema, manipulate data using a SQL.
   4. Can apply the Schema Refinement techniques for a database design for optimized access.
   5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.

UNIT I
INTRODUCTION TO DATABASE AND SYSTEM ARCHITECTURE
Database Systems and their Applications, Database Vs File System, View of Data, Data Models, Database Languages- DDL and DML, Transaction Management, Database users and Administrators, Database System Structure.
Introduction to Database Design: ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship set, Extended ER Features, Conceptual Design with the ER Model, Logical database Design.

UNIT II
SQL
Queries and Constraints: SQL Data Definition**,** Types of SQL Commands, Form of Basic SQL Query, SQL Operators, Set Operators, Nested Queries, Aggregate Operators, NULL values, Integrity Constraints Over Relations, Joins, Introduction to Views, Destroying / Altering Tables and Views, Cursors, Triggers and Active Databases.

UNIT III
RELATIONAL MODEL
 Introduction to Relational Model, Basic Structure, Database Schema, Keys, Relational Algebra and Relational Calculus.
Storage and Indexing: File Organizations and Indexing-Overview of Indexes, Types of Indexes, Index Data Structures, Tree structured Indexing, Hash based Indexing.

UNIT IV
SCHEMA REFINEMENT AND NORMAL FORMS
Introduction to Schema Refinement, Functional Dependencies, Reasoning about FD, Normal Forms, Properties of Decomposition.

UNIT V
TRANSACTION MANAGEMENTTRANSACTIONS
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability.
Concurrency Control: Lock based Protocols, Timestamp based protocols **Recovery System:** Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery with concurrent Transactions, Buffer Management.

Text/Reference Books
1. "Data base Management Systems", Raghurama Krishnan, Johannes Gehrke,TATA McGraw Hill 3rdEdition
2. "Data base System Concepts", Silberschatz, Korth, McGraw hill, Vedition.
3. "Introduction to Database Systems", C.J.Date PearsonEducation.
4. "Database Systems design, Implementation, and Management", Rob & Coronel5th Edition.
5. "Database Management Systems", P. Radha Krishna HI-TECH Publications 2005.
6. "Database Management System", ElmasriNavate PearsonEducation.
7. "Database Management System", Mathew Leon,Leo

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DISCRETE MATHEMATICS

Course Code: GR20A2069   **L/T/P/C: 2/1/0/3**

II Year I Semester

Course Objectives:
1. Use mathematically correct terminology and notation.
2. Construct correct direct and in direct proofs.
3. Use division into cases in a proof.
4. Use counter examples.
5. Apply logical reasoning to solve a variety of problems.

Course Outcomes: At the end of the course, the student will be able to
1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives.
2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.
3. For a given a mathematical problem, classify its algebraic structure.
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
5. Develop the given problem as graph networks and solve with techniques of graph theory.

UNIT I
MATHEMATICAL LOGIC
Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.
Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction.

UNIT II
SET THEORY
Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hassediagram.
Functions: Inverse Function Composite of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.
Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

UNIT III
ELEMENTARY COMBINATORICS
Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT IV
RECURRENCE RELATION: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, solving recurrence relation by substitution and Generating funds. Characteristics roots solution of Inhomogeneous Recurrence Relation.

UNIT V
GRAPH THEORY
Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs
Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text /Reference Books:
1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition– Ralph.P.Grimaldi.PearsonEducation
2. Discrete Mathematical Structures with applications to computer science Trembly J.P. &Manohar.P,TMH
3. Mathematical Foundations for Computer Science Engineers,JayantGanguly,Pearson Education
4. Discrete Mathematics and its Applications, Kenneth H. Rosen,FifthEdition.TMH.
5. Discrete Mathematics with Applications, ThomasKoshy,Elsevier
6. Discrete Mathematical Structures, BernandKolman, Roberty C. Busby, Sharn Cutter Ross, Pearson

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL ELECTRONICS LAB
Course Code: GR20A2057   **L/T/P/C: 0/0/3/1.5**
II Year I Semester

Course Objectives:
1. Introduction to digital fundamental techniques and process in logic design
2. Visualization of digital combinational circuits using VHDL
3. Skill of seeing the equations and code developments in design of digital logic circuits
4. To understand the concept of VHDL fundamentals
5. To understand the counters and registers design with VHDL programming

Course Outcomes: At the end of the course, students will be able to
1. Comprehend the fundamentals digital theory to enable the process of logical design
2. Analyze the concept of design of digital combinational circuits using VHDL programming
3. Know the origin of sequential circuits design using VHDL
4. Acquaint with binary to grey and parity checker
5. Discriminate in digital counters and registers

1. DESIGN AND SIMULATION OF COMBINATIONAL CIRCUITS USINGVHDL
Experiment 1: Realization of Gates
Experiment 2: Half adder, Full adder
Experiment 3: Magnitude comparator
Experiment 4: Encoder
Experiment 5: Multiplexer
Experiment 6: Demultiplexer
Experiment 7: Excess-3 code Converter
Experiment 8: Parity Generator
Experiment 9: Programmable Logic Array

2. DESIGN AND SIMULATION OF SEQUENTIAL CIRCUITS USING VHDL
Experiment 10: S-R Flip-Flops
Experiment 11: Left Shift Register
Experiment 12: Serial to Parallel Shift Register
Experiment 13: Binary Counter
Experiment 14: Asynchronous BCD Up Counter
Experiment 15: Synchronous Down Counter

Note: A minimum of 12 (Twelve) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

Text Books
   1. Digital Design –Fourth Edition, M. Morris Mano, Pearson Education.
   2. Fundamentals of Logic Design –Roth, 5th Edition, Thomson.

References Books
   1. Switching and Finite Automata Theory by ZviKohavi, Tata McGraw Hill.
   2. Fundamentals of Digital Logic with VHDL Design, Stephen Brown, Zvonko Vranesic, TataMcGraw Hill, Indian edition.
   3. Switching and Logic Design –CVS Rao, Pearson Education

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
JAVA PROGRAMMING LAB
Course Code: GR20A2080   **L/T/P/C : 0/0/4/2**
II Year I Semester

Course Objectives:
1. Understand Object Oriented Programming concepts and apply them in problem solving.
2. Get knowledge on Abstract classes, Interfaces and Multithreading
3. Developing java applications and handle the exceptions.
4. Design applications for solving real world problems using Collection framework
5. Building java GUI based applications using Applets, AWT and Swing.

Course Outcomes: Upon the successful completion of the course, the student will be able to:
1. Analyze a problem, identify and define the computing requirements appropriate to its solution using object-oriented programming concepts.
2. Design the applications using Inheritance, Polymorphism and Synchronization concepts
3. Handle exceptions at Compile time and Run time
4. Solve the real-world problems using Java Collection framework.
5. Develop GUI applications using Applets, AWT and Swings

Task-1: Write java programs that implement the following
   a) Constructor
   b) Parameterized constructor
   c) Method overloading
   d) Constructor overloading.

Task-2:
   a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
   b) Write a Java program for sorting a given list of names in ascending order.
   c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use StringTokenizer class of java.util)

Task-3: Write java programs that uses the following keywords
       a) this   b)super   c)static   d)final

Task-4:
   a) Write a java program to implement method overriding
   b) Write a java program to implement dynamic method dispatch.
   c) Write a Java program to implement multiple inheritance.
   d) Write a java program that uses access specifiers.

Task-5:
   a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file

Task-6:
a) Write a Java program for handling CheckedExceptions.
b) Write a Java program for handling UncheckedExceptions.

Task- 7:
a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

Task-8:
Write a program illustrating following collections framework
a) ArrayList   b) Vector   c) HashTable   d) Stack

Task-9:
a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field and compute its factorial value and return it in another text field, when the button named "Compute" is clicked.
c) Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -,*, % operations. Add a text field to display the result.

Task-10:
a) Write a Java program for handling mouse events.
b) Write a Java program for handling key events.

Task-11:
a) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.
b) The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.

Task -12:
a) Write a java program that simulates 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.
b) Write a Java program that allows the user to draw lines, rectangles and ovals.

Task -13:
Create a table in Table.txt file such that the first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.

Text/Reference Books:

1. Java: The Complete Reference, 10thedition, Herbert Schildt, McgrawHill.
2. Java Fundamentals- A Comprehensive introduction, Herbert schildtand Dale skrien, TMH.
3. Java for programming, P.J.Dietel Pearson education (OR) Java: How to Program P.J.Dietel and H.M.Dietel,PHI
4. Object Oriented Programming through java, P.Radha Krishna, UniversitiesPress.
5. Thinking in Java, Bruce Eckel, PearsonEducation
6. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press.

DATABASE MANAGEMENT SYSTEMS LAB
Course Code: GR20A2073   **L/T/P/C : 0/0/3/1.5**
II Year I Semester

Course Objectives:
1. Develop the logical design of the database using data modeling concepts such as Relational model
2. Infer the data models and use of queries in retrieving the data.
3. Create a relational database using a relational database package.
4. Manipulate a database using SQL.
5. Render the concepts of database system structure.

Course Outcomes: At the end of the course, the student will be able to
1. Construct the schema of the database and modify it.
2. Compile a query to obtain the aggregated result from the database.
3. Speculate the concepts of various database objects.
4. Compare the use of procedure and function in database.
5. Use triggers and packages to create applications in the database.

Task-1:
DDL commands (Create, Alter, Drop, Truncate)
1. Create a table EMP with the following structure.

    Name   Type
    -
    EMPNO   NUMBER(6)
    ENAME   VARCHAR2(20)
    JOB   VARCHAR2(10)
    MGR   NUMBER(4)
    DEPTNO   NUMBER(3)
    SAL   NUMBER(7,2)

2. Add a column commission to the emptable. Commission should be numeric with null values allowed.
3. Modify the column width of the job field of emptable.
4. Create dept table with the following structure.

    Name   Type
    -
    DEPTNO   NUMBER(2)
    DNAME   VARCHAR2(10)
    LOC   VARCHAR2(10)
    DEPTNO as the primary key

5. Add constraints to the emptable that is empno as the primary key and deptno as the foreign key.
6. Add constraints to the emptable to check the empno value while entering(i.e)empno>100. Salary value by default is 5000, otherwise it should accept the values from the user.
7. Add columns DOB to the emp table. Add and drop a column DOJ to the emp table.

Task-2: DML COMMANDS (Insert, Update, Delete)
 1. Insert 5 records into dept Insert few rows and truncate those from the emp1 table and also drop it.
 2. Insert 11 records into emptable.
 3. Update the emptable to set the value of commission of all employees to Rs1000/- who

are working as managers.
4. Delete only those who are working as supervisors.
5. Delete the rows whose empnois7599.

Task-3: TCL COMMANDS (Save Point, Rollback Commit)

Task-4: DQL COMMAND (Select)- SQL Operators and Order by Clause
1. List the records in the emptable order by salary in descending order.
2. Display only those employees whose deptnois30.
3. Display deptno from the table employee avoiding the duplicated values.
4. List all employee names, salary and 15% rise in salary. Label the column as pay hike.
5. Display the rows whose salary ranges from 15000 to30000.
6. Display all the employees in dept 10 and 20 in alphabetical order of names.
7. List the employee names who do not earn commission.
8. Display all the details of the records with 5-character names with 'S' as starting character.
9. Display joining date of all employees in the year of1998.
10. List out the employee names whose salary is greater than 5000 and less than6000

Task-5: SQL Aggregate Functions, Group By clause, Having clause
1. Count the total records in the emptable.
2. Calculate the total and average salary of the employee.
3. Determine the max and min salary and rename the column as max-salary and min_salary.
4. Find number of departments in employee table.
5. Display job wise sum, average, max, min salaries.
6. Display maximum salaries of all the departments having maximum salary >2000
7. Display job wise sum, avg, max, min salaries in department 10 having average salary is greater than 1000 and the result is ordered by sum of salary in descending order.

Task-6: SQL Functions
1. Display the employee name concatenate with employee number.
2. Display half of employee name in upper case and half in lowercase.
3. Display the month name of date "14-jul-09" infull.
4. Display the Date of joining of all employees in the format "dd-mm-yy".
5. Display the date two months after the Date of joining of employees.
6. Display the last date of that month in"05-Oct-09".
7. Display the rounded date in the year format, month format, day format in the employee
8. Display the commissions earned by employees. If they do not earn commission, display it as "No Commission".

Task-7: Nested Queries
1. Find the third highest salary of an employee.
2. Display all employee names and salary whose salary is greater than minimum salary of the company and job title starts with 'M'.
4. Write a query to display information about employees who earn more than any employee in dept30.
5. Display the employees who have the same job as Jones and whose salary is greater than or equal to the salary of Ford.

6. List out the employee names who get the salary greater than the maximum salaries of dept with deptno 20,30.
7. Display the maximum salaries of the departments whose maximum salary is greater than 9000.
8. Create a table employee with the same structure as the table empand insert rows into the table using select clauses.
9. Create a manager table from the emp table which should hold details only about the managers.

Task-8 Joins, Set Operators.
1. Display all the employees and the departments implementing a left outer join.
2. Display the employee name and department name in which they are working implementing a full oute rjoin.
3. Write a query to display their employee names and their managers' name and salary for every employee.
4. Write a query to output the name, job, empno, deptname and location for each dept, even if there are no employees.
5. Display the details of those who draw the same salary.

Task-9: Views
1. Create a view that displays the employee id, name and salary of employees who belong to 10thdepartment.
2. Create a view with read only option that displays the employee name and their department name.
3. Display all the views generated.
4. Execute the DML commands on views created and drop them

Task-10: Practices on DCL commands, Sequence and indexes.

Task-11:
1. Write a PL/SQL code to retrieve the employee name, join date and designation of an employee whose number is given as input by the user.
2. Write a PL/SQL code to calculate tax of employee.
3. Write a PL/SQL program to display top ten employee details based on salary using cursors.
4. Write a PL/SQL program to update the commission values for all the employees' with salary less than 2000, by adding 1000 to the existing values.

Task-12:
1. Write a trigger on employee table that shows the old and new values of employee name after updating on employee name.
2. Write a PL/SQL procedure for inserting, deleting and updating the employee table.
3. Write a PL/SQL function that accepts the department number and returns the total salary of that department.

Task-13:
1. Write PL/SQL program to handle predefined exceptions.
2. Write PL/SQL program to handle user defined exception.
3. Write a PL/SQL code to create
a. Package specification
b. Package body to insert, update, delete and retrieve data on emptable.

Task-14: Table locking (Shared Lock and Exclusive lock)

Text/Reference Books

1. The Complete Reference,3rd edition by James R.Groff, Paul N.Weinberg, AndrewJ. Oppel
2. SQL & PL/SQL for Oracle10g, Black Book,Dr.P.S.Deshpande.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
VALUE ETHICS AND GENDER CULTURE

Course Code: GR20A2002   **L/T/P/C : 2/0/0/2**
II Year I Semester

Course Objectives:
1. To understand about the importance of ethical values
2. To understand the significance of human conduct and self-development
3. To enable students to imbibe and internalize the value and Ethical behaviour in personal and professional lives.
4. To provide a critical perspective on the socialization of men and women.
5. To create an awareness on gender violence and condemn it.

Course Outcomes:
1. To enable the student to understand the core values that shapes the ethical behaviour.
2. Student will be able to realize the significance of ethical human conduct and self-development
3. Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
4. The students will learn the rights and responsibilities as an employee and a team member.
5. Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
6. Students will develop a better understanding on issues related to gender.
7. Empowering students to understand and respond to gender violence.

UNIT I
Values and Self Development –social values and individual attitudes, Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

UNIT II
Personality and Behaviour Development-positive thinking, punctuality,avoiding fault finding, Freefrom anger, Dignity of labour, religious tolerance, Aware of self-destructive habits.

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

UNIT IV
Introduction to Gender - Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of Gender.

UNIT V
Gender-based Violence -The concept of violence, Types of Gender-based violence, the relationship between gender, development and violence, Gender-based violence from a human rights perspective.

Text Books
1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whit beck, 2e, Cambridge University Press 2015.
3. A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas

and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

Reference Books

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008

II YEAR
II SEMESTER

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:
Students who complete the course will have demonstrated the ability to do the following:
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
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, NP, NP-completeness, circuit-satisfiability problem, 3-CNF satisfiability.

Textbooks:

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
COMPUTER ORGANIZATION

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:
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, Arithmetic Micro operations, Logic micro operations, Shift micro operations, Arithmetic logic shift unit.

UNIT II
Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, MemoryReference 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.

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
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-1
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 RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA COMMUNICATION AND COMPUTER NETWORKS
Course Code: GR20A2081   **L/T/P/C : 3/0/0/3**
II Year II Semester

Course Objectives:
1. Acquire the fundamental concepts of data communication, computer networks and understand the various transmission media and network topologies
2. Identify various error detection and correction techniques along with protocols related to data link layer
3. Understand various routing algorithms and problems in data transmission.
4. Recognize various transport protocols and different techniques of quality of service (QoS)
5. Comprehend application layer protocols

Course Outcomes: After completing this course the students will be able to
1. Appraise various network topologies and transmission media.
2. Apply framing methods and design error correction technique for specified problems
3. Compare various routing methods and apply them to solve transmission problems
4. Apply various transmission methods and techniques to improve the quality of service.
5. Design and implement different protocols in network design and implementation.

UNIT I
DATA COMMUNICATIONS: Components – Direction of Data flow, Networks: Types of Connections – Topologies – Categories of Networks – The Internet , Protocols and Standards – OSI model – TCP/IP protocol suite.
 Physical layer: Transmission modes, Multiplexing, Transmission Media: Guided and Unguided,Switching: Circuit Switched Networks - Datagram Networks - Virtual Circuit Networks.

UNIT II
DATA LINK LAYER: Introduction, Framing, Error Detection and Correction: Parity – Hamming codes – CRCs – Checksum, Flow and Error Control: Noiseless Channels – Noisy Channels.
Medium Access sub layer: Random Access – ALOHA – CSMA – CSMA /CD – CSMA /CA, Controlled Access: Reservation – Polling – Token Passing,   Channelization . IEEE Standards, Standard Ethernet 802.3, Wireless LAN 802.11 – Bluetooth 802.15

UNIT III
NETWORK LAYER: Logical Addressing - IPv4 - IPv6, Internetworking, Transition from IPv4 to IPv6 , Address mapping: ARP – RARP–BOOTP–DHCP, ICMP, IGMP, Uni-Cast Routing Protocols, Multicast Routing Protocols.

UNIT IV
TRANSPORT LAYER: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, QoS, Techniques to Improve QoS, Integrated Services, Differentiated Services.

UNIT V
 Application Layer: DNS - Domain name space -DNS in internet, Electronic mail, SMTP, FTP, WWW:Architecture – Web documents, HTTP, SNMP.

Text Books:
1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH, 2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.

Reference Books:

1. Data communications and Computer Networks, P.C .Gupta, PHI.
2. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
3. Data and Computer Communication, William Stallings, Sixth Edition, Pearson Education, 2000

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. To understand main concepts of OS and to analyze the different CPU scheduling policies
2. To understand process synchronization and deadlock management.
3. To understand memory management and virtual memory techniques
4. To appreciate the concepts of storage and file management
5. To study OS protection and security concepts.

Course Outcomes: At the end of the course, the student will be able to
1. Explain functions and structures of operating system and differentiate among different OS types; Implement and analyze various process management concepts and maximization of CPU throughput
2. Analyze synchronization problems and solutions; Design a deadlock management policy.
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 AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia StudentEdition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall ofIndia.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, IrwinPublishing
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.
   Operating Systems in depth, T. W. Doeppner, Wiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN AND ANALYSIS OF ALGORITHMS USING JAVA LAB
Course Code: GR20A2082   **L/T/P/C : 0/0/3/1.5**
II Year II Semester

Course Objectives:
1. Measure and compare the performance of different algorithms.
2. Recall various programming concepts of JAVA.
3. Design and implement various algorithms in JAVA
4. Employ various design strategies for problem solving.
5. Explore the java standard API library to write complex programs.

Course Outcomes:
Students who complete the course will have demonstrated the ability to do the following:
1. Analyze the asymptotic behaviors of functions obtained by elementary composition of polynomials, exponentials and logarithmic functions
2. Apply different sorting algorithms using divide and conquer strategy.
3. Design and implement greedy and dynamic approach.
4. Build various graph algorithms to solve different problems.
5. Develop branch and bound technique algorithms and backtracking algorithms.

Week 1 :
Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.

Week 2:
Demonstrate using Java how the divide -and- conquer method works to sort a given set of n integer elements using Quick Sort method and compute its time complexity. Read the numbers using random number generator.

Week 3:
Write a java program to implement greedy algorithm for job sequencing with deadlines.

Week 4:
Implement in Java, the 0/1 Knapsack problem using greedy approach.

Week 5:
Write a java program to implement Dijkstra's algorithm for the Single source shortest path problem.

Week 6 :
Write a java program that implements Prim's algorithm to generate minimum cost spanning tree.

Week 7:
Write a java program that implements Kruskal's algorithm to generate minimum cost spanning tree

Week 8:
Implement All-Pairs Shortest Paths problem using Floyd's algorithm

Week 9:
Write a java program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.

Week 10:

Implement Travelling Sales Person problem using Dynamic programming.

Week 11:

Write a java program to implement the backtracking algorithm for the sum of subsets problem of a given set S = {Sl, S2,.... ,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2,5,6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

Week 12:

Write a java program to implement the backtracking algorithm for the Hamiltonian Circuits problem.

Textbooks:

T1. 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

T2. Goodrich, Michael T. & Roberto Tamassia, Algorithm Design, Wiley Singapore Edition, 2002.

T3. Java: The Complete Reference, 10th edition, Herbert Schildt, McgrawHill.

T4. Java Fundamentals- A Comprehensive introduction, Herbert schildtand Dale skrien, TMH.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
OPERATING SYSTEMS AND SCI LAB
Course Code: GR20A2083   **L/T/P/C : 0/0/4/2**
II Year II Semester

Course Objectives:
1. Demonstrate the core features of Operating Systems and Scilab.
2. Evaluate various Scheduling algorithms, memory management techniques.
3. Understand the file storage and organization concepts.
4. Explain of the syntax, semantics, data-types and library functions of numerical computing using SCILAB.
5. Implement simple mathematical functions/equations in numerical computing environment such as Scilab.

Course Outcomes:
1. Understand and analyze the various file organization and storage concepts.
2. Implementation of CPU scheduling algorithms, memory management techniques.
3. Understand the need for simulation/ implementation for the verification of mathematical   functions.
4. Implement simple mathematical functions/ equations in numerical computing environment in Scilab.
5. Interpret and visualize simple mathematical functions and operations there on using plots/display.

PART I:
Task-1: Simulate the following CPU scheduling algorithms
            a) FCFS   b) SJF   c) Priority   d) Round Robin
Task-2: Simulate MFT and MVT
Task-3: Simulate Paging Technique of memory management.
Task-4: Simulate all page replacement algorithms
            a) FIFO   b) Optimal   c) LRU
Task-5: Simulate all File Organization Techniques
             a) Single level directory   b) Two level directory
Task-6: Simulate all file allocation strategies
            a) Sequential   b) Indexed   c) Linked

PART II
To understand Scilab environment and programming
Exercise 1: Scilab environment
Exercise-2: The Workspace and Working Directory
Exercise-3: Vector Operations
Exercise-4: Creating Matrices
Exercise-5: Sub- Matrices
Exercise-6: Statistics
Exercise-7: Working with Polynomials
Exercise-8: Plotting Graphs
Exercise-9: Scilab Programming Languages
Exercise-10: Functions in Scilab
Exercise-11: File Operations
Exercise-12: Reading Microsoft Excel Files

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA COMMUNICATIONS AND COMPUTER NETWORKS LAB
Course Code: GR20A2084   **L/T/P/C : 0/0/3/1.5**
II Year II Semester

Course Objectives:
1. Introduces the architecture, structure, functions, components, and models of the data communication, devices and configurations
2. Develop network using different topologies and protocols
3. Understanding the working of wired and wireless networks
4. Illustrate various framing techniques, error correction and detection methods
5. Simulate the routing algorithms

Course Outcomes: After completing this course the student must demonstrate the knowledge and ability to:
1. Independently understand basic computer network technology, Data Communications System and its components.
2. Identify the different types of network topologies and protocols.
3. Understanding the working of wired and wireless networks
4. Understand the implementation of different framing techniques, Error detecting and correcting techniques
5. Implementation of various routing algorithms.

PART I
Task-1: Introduction to Cisco Packet tracer Simulator
Task-2: Initial Configuration of switch and router
Task-3: Working with static and dynamic IP addressing
Task-4: Design star,bus,ring topology using packet tracer
Task-5: Design a network using Static NAT and Dynamic NAT
Task-6: Design a wireless LAN

PART II
Task-7: Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
Task-8: Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 andCRC CCIP.
Task-9: Implement Hamming code
Task-10: Implement Dijkstra's algorithm to compute the Shortest path through a graph.
Task-11: Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.
Task-12: Take an example subnet of hosts. Obtain broadcast tree for it.

Text/reference Books:
1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH,2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education,PHI.
3. Data communications and Computer Networks, P.C .Gupta, PHI.
4. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.

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 regulationswhich 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 UniversityGrants 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 LearningPrivate Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHILearning 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
SOFTWARE ENGINEERING

Course code: GR20A3054   **L/T/P/C:3/0/0/3**
III Year I 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.

TEXT BOOKS

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.
   McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INTERNET OF THINGS AND APPLICATIONS

Course Code: GR20A3055   **L/T/P/C:2/1/0/3**
III Year I Semester

Prerequisites:
Digital Logic Design, Computer Organization.

Course Objectives:
1. Describe the Microcontroller architecture.
2. Learn sensors and their controlling operations.
3. Understand the concepts of IoT.
4. Learn IoT architecture and network communication interfaces in IoT.
5. Learn IoT protocols & cloud services for IoT.

Course Outcomes:

1. Analyze the functionality of microcontroller.
2. Demonstrate sensors, actuators and communication devices for IoT.
3. Understand the basic concepts of IoT.
4. Understand IoT architecture and network communication interfaces in IoT.
5. Apply the IoT protocols & cloud services for IoT.

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 Architecture Reference Model- Introduction, Reference Model and Architecture.
ESP32 & Network Communication: Introduction to ESP32 functional diagram and programming, Wi-Fi communication using ESP32 in station & Access Point Mode, Introduction to network communication interfaces like I2C, SPI and UART.

UNIT-V

IoT Protocols: IoT Access Technologies- Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: 6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT.

Cloud Services for IoT: Introduction to Cloud Storage models and communication APIs, Google Firebase cloud operations, Integration of firebase with ESP32.

Textbooks:

1. Embedded Controllers using C and Arduino/2E by JmesM. Fiore.
2. Internet of Things: A Hands-On Approach. By Arshdeep Bahga, Vijay Madisetti 1st Edition, 2014.
3. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things David Hanes, CCIE No. 3491 Gonzalo Salgueiro, CCIE No. 4541 Patrick Grossetete Robert Barton, CCIE No. 6660, CCDE No. 2013:6 Jerome Henry, CCIE No. 24750.
4. ESP32 Development using the Arduino IDE Kindle Edition by iain Hendry.
5. The Internet of things- Enabling Technologies,Platforms and Use Cases by Pethuru Raj and Anupama C.Raman.
6. The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World 2015 by Michael Miller.

Reference Books:

1. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) [Kindle Edition] by CunoPfister,2011
2. Francis daCosta: "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications,2013.
3. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle: "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , The Internet of Things Key applications and Protocols, Wiley, 2012
5. Designing the Internet of Things (Nov 2013) by Adrian McEwen & Hakim Cassimally.

E-Resources:

1. Website: https://medium.com/firebase-developers/getting-started-with-esp32-and-firebase-1e7f19f63401.
2. https://dronebotworkshop.com/esp32-intro/
3. https://www.emqx.com/en/cloud?gclid=Cj0KCQjw-4SLBhCVARIsACrhWLUGaKMGxP1jGbcqiUR7faVOP9wPx11Qu5Gn7jjPC6De5UnuoZsvfYMaAs2BEALw_wcB

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
WEB PROGRAMMING

Course code: GR20A3056   **L/T/P/C:3/0/0/3**
III Year I Semester

Prerequisites
1. Knowledge in core Programming

Course Objectives
1. Learn to write syntactically correct web pages and describe the various tags related to HTML.
2. Learn to build XML and Java Bean applications that span multiple domains.
3. Describe server side programming for sessions conceptually and learn the concept to implement using cookies.
4. Develop a reasonably sophisticated web application using JSP that appropriately employs the MVC architecture
5. Develop skills in developing applications using concepts like JDBC, Servlets, JSP.

Course Outcomes
1. Develop web page using JavaScript for event handling which uses HTML tags and intrinsic event attributes.
2. Understand the concept and learn to use the building blocks of XML and Java Bean Components.
3. Build server side applications using servlets for web applications.
4. Design dynamic and interactive websites using JSP.
5. Design databases and Develop the supporting code for Client and Server-Side applications using JSP and Servlets

UNIT - I:
HTML: Common tags- List, Tables, images, forms, Frames, Cascading Style sheets.
Java Script: Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT - II:
XML: Introduction to XML, Building Blocks in XML, Document type definition, XML Schemas, Presenting XML.
Java Beans: Introduction to Java Beans, Advantages of Java Beans, Java Beans API and Features of Java Beans: Introspection, Bound properties, Constrained properties, Persistence, Customization.

UNIT - III:
Servlets: Introduction, Lifecycle, Generic Servlet Package, reading parameters, Reading Initialization parameters, HTTP Servlet Package, Handling Http Request & Responses, Cookies, Session Tracking.

UNIT - IV:
JSP Application Development: The Problem with Servlet, The Anatomy of a JSP Page, JSP Processing, JSP Components: Directives, Action Elements, Scripting Elements, Tag Libraries, Expression Language, Java Bean Components, Deploying JAVA Beans in a JSP Page, Model View Controller, JSP Application Design with MVC Setting Up, Error Handling, Scope of Implicit Objects.

UNIT -V:

Database Access: Database Programming using JDBC, Studying javax.sql.* package, Steps to access database, Working with Prepared Statements, Accessing a Database from a Java/Servlet/JSP, Application – Specific Database Actions, Introduction to struts framework.

TEXTBOOKS:
1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY, Dreamtech
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages –Hans Bergsten, SPD O'Reilly

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson
2. Core SERVLETS ANDJAVASERVER 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, S P D O'Reilly for chap 8.
5. Murach's beginning JAVA JDK 5, Murach, SPD
6. An Introduction to web Design and Programming –Wang-Thomson
7. Web Applications Technologies Concepts-Knuckles,John Wiley
8. Programming world wide web-Sebesta, Pearson
9. Web Warrior Guide to Web Programming-Bai/ Ekedaw-Thomas
10. Beginning Web Programming-Jon Duckett WROX.
11. Java Server Pages, Pekowsky, Pearson

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA WAREHOUSING AND DATA MINING
(Professional Elective-I)

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.
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 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, 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, 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.

Textbooks:
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
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.

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 languages features, parse trees, ambiguous grammars, attribute grammars, denotational 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, applications 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.

Textbooks:
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
CYBER SECURITY
(Professional Elective –I)

Course Code: GR20A4115 L/T/P/C: 3/0/0/3
III Year I Semester

Pre-requisites:
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 and security.
2. Analyze the plans of attacks.
3. Deal with the security challenges posed by mobile devices.
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.

Textbooks:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and LegalPerspectives, Nina Godbole and Sunil Belapure, WileyINDIA.

References:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security ,Chwan-Hwa(john) Wu,J.DavidIrwin.CRC Pr

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER GRAPHICS
(Professional Elective -I)

Course code: GR20A3057   **L/T/P/C:3/0/0/3**
III Year I Semester

Prerequisites:
Student should have knowledge of the following mathematical concepts:
  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 coordinate 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:

1 Computer Graphics, Amarendra N Sinha, Arun DUdai, TataMcGrawHill
2 Fundamentals of Multimedia,Ze-Nian Li, Mark S. Drew,PearsonPrenticeHall

Reference Books:

1 Multimedia and communications technology, Steve Heath,Elsevier
2 Mathematical Elements for Computer Graphics,2nd Edition, David F. Rogers, J.AlanAdams

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ARTIFICIAL INTELLIGENCE
(Open 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 of AI.
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: Image formation, 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.

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

References:
1. Artificial Intelligence **–** Riche &K.Night , 2nd edition TMH.
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
INTERNET OF THINGS AND APPLICATIONS LAB

Course Code: GR20A3058   **L/T/P/C:0/0/3/1.5**
III Year I Semester

Course Objectives:
1. Analyze the code and build simple real time applications using 8-bit and 32-bit microcontroller.
2. Develop the skills to write and to upload the programs.
3. Extract the features of WiFi based Generic sensor Board and interfacing with different peripherals.
4. Develop mobile applications to work with data through cloud.
5. Analyze communication protocols.

Course Outcomes:
1. Apply the skills to code and build simple real time applications using 8-bit and 32-bit microcontroller.
2. Develop the skills to write and to upload the programs.
3. Understand interfacing techniques to connect different sensors to a microcontroller.
4. Design mobile applications to work with data through cloud.
5. Apply communication protocols.

TASK 1
Write an ARDUINO Program for
   a) Blinking LEDs
   b) Serial Lights
   c) LED Interface through Switch

TASK 2
Write an ARDUINO Program for
   a) Display string1 on first line and string2 on second line on LCD
   b) Scrolling content on LCD
   c) Implement different LCD commands

TASK 3
Write an ARDUINO Program for
   a) Take command from PC and glow corresponding LED
   b) Echo Program- read a string from serial monitor and display it back on PC
   c) Press Switch and display switch number on PC

TASK 4
Write an ARDUINO Program
   a) Read LM35 sensor data, and display the temperature value on the serial monitor
   b) Read LDR sensor data, and display it on the PC
   c) Read LDR sensor data and make the LED ON or OFF

TASK 5
Write an ARDUINO Program
   a) Rotate Motor Clock wise, Anti Clock wise and Stop

b) Rotate Motor Clock wise, Anti Clock wise and stop using commands received from Hyper Terminal (C: Clockwise, A: Anti-Clockwise, S: Stop)

TASK 6

Write an ARDUINO Program
a) Transfer/ Receive data to/ from PC using Bluelink and display data on PC
b) Read data from mobile phone and make the LED ON or OFF using Bluelink

TASK 7

Interfacing different Sensors/Actuator to ESP32
a) Programming a Generic Sensor Board to interface the Temperature & Humidity sensor
b) Write a program for interfacing the Ultrasonic Sensor with Generic Sensor Board
c) Using Generic Sensor Board write a program to interface the Soil Moisture Sensor
d) Programming a Generic Sensor Board to interface the Real Time Clock module

TASK 8

a) Design and interface the Magnetic Sensor with Generic Sensor Board
b) With the help of Generic Sensor Board, build an interface for switching applications using relay

TASK 9

a) Develop a Mobile app for simple User Interface
b) Design a Mobile app to work with data of a cloud

TASK 10

Design an application to create a Remote Motor Control System

TASK 11

Develop a Smart Garden using Generic Sensor Board

TASK 12

Design an application using RFID communication technologies along with latest communication protocols like MQTT and CoAP

Textbooks:
1. Embedded Controllers using C and Arduino/2E by JmesM.Fiore

References:
1. **Web references:** https://www.arduino.cc/en/Tutorial/HomePage, https://www.espressif.com/en/products/socs/esp32

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
WEB PROGRAMMING LAB

Course code: GR20A3059   **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Prerequisites
Knowledge in core Java programming and the following Software's
1. A database either Mysql or Oracle
2. JVM(Java virtual machine) must be installed on your system
3. BDK(Bean development kit) must be also be installed
4. Apache Tomcat Sever

Course Objectives
1. Choose best technologies for solving web client/server problems.
2. Model JavaScript applications to validate web page form input entry
3. Create adaptive web pages for applications.
4. Demonstrate installing web server and database server applications.
5. Build applications using Java Bean and Servlets

Course Outcomes
1. Create web pages using HTML, DHTML and Cascading Styles sheets.
2. Design dynamic web pages using JavaScript (client side programming).
3. Apply the concepts of XML, Servlets, JSP and protocol usage in the workings of the web applications
4. Analyze a web page and identify its elements and attributes.
5. Create interactive web applications using JSP.

Task -1

Design the following static web pages required for an online book store web site.

Home Page: The static home page must contain three frames.

> **Top frame :** Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

> **Left frame:** At least four links for navigation, which will display the catalogue of respective links.
> For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.
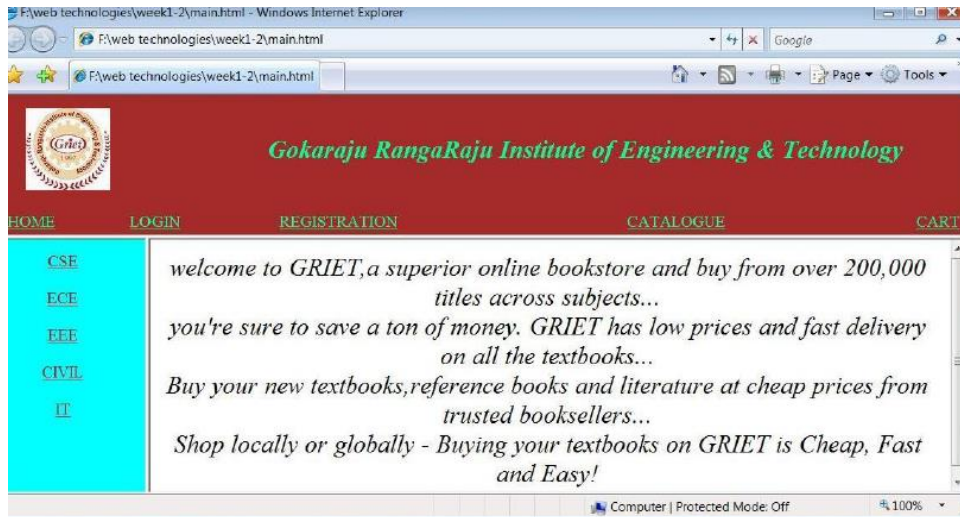
Login Page

CATOLOGUE PAGE

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button
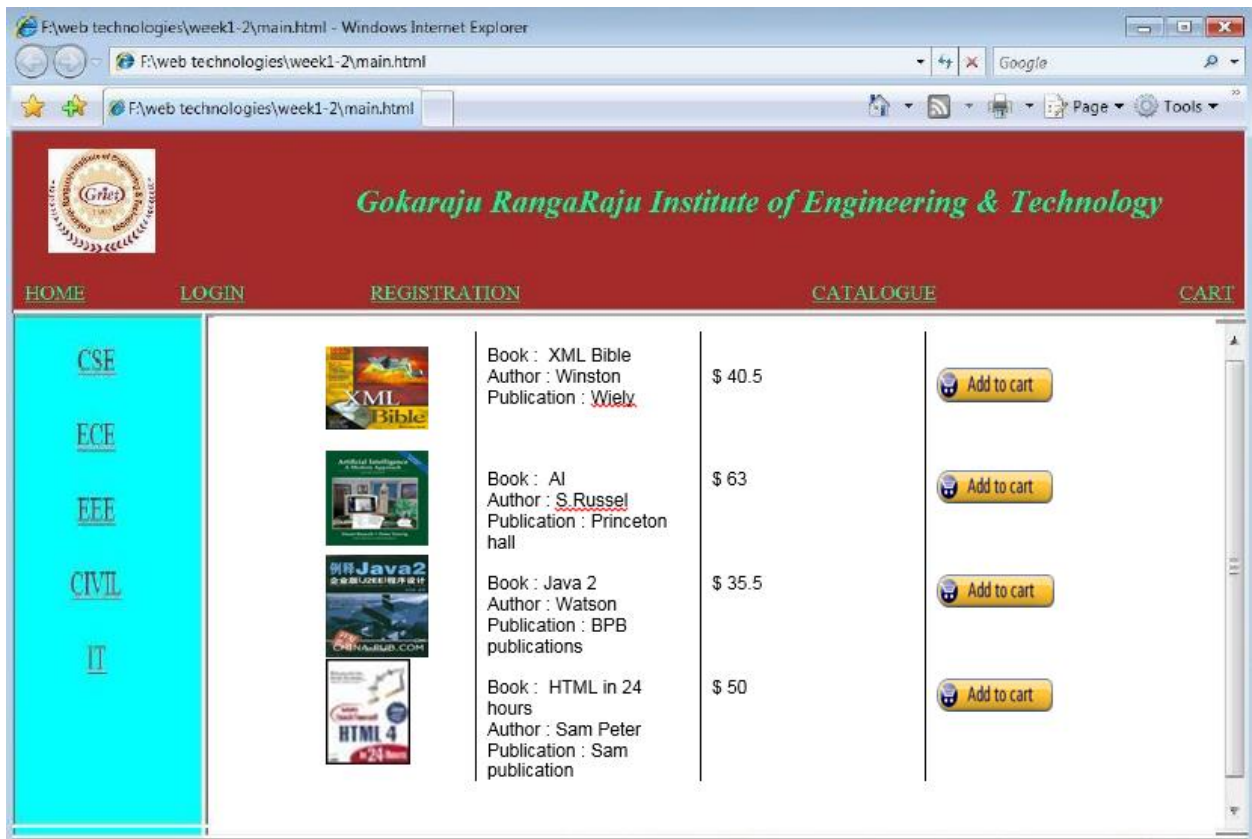
Note: Task 2 contains the remaining pages and their description.
Task -2

Cart Page

The cart page contains the details about the books which are added to the cart. The cart page should look like this:
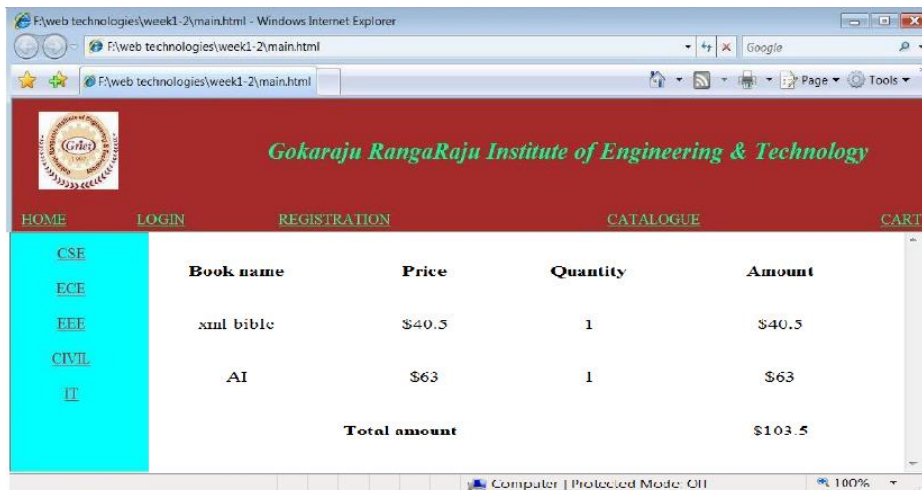
Registration Page

Create a "registration form "with the following fields
1. Name (Text field)
2. Password (password field)
3. E-mail id (text field)
4. Phone number (text field)
5. Gender (radio button)
6. Date of birth (3 select boxes)
7. Languages known (check boxes English, Telugu, Hindi, Tamil)
8. Address (text area)

Task-3
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)
4. Phone number (Phone number should contain 10 digits only).

Note : You can also validate the login page with these parameters.

Task-4

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. Control the repetition of the image with the background-repeat property. As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4. Design a web page which must include hyperlinks by using A:link, A:visited, A:active, A:hover

5. Work with layers
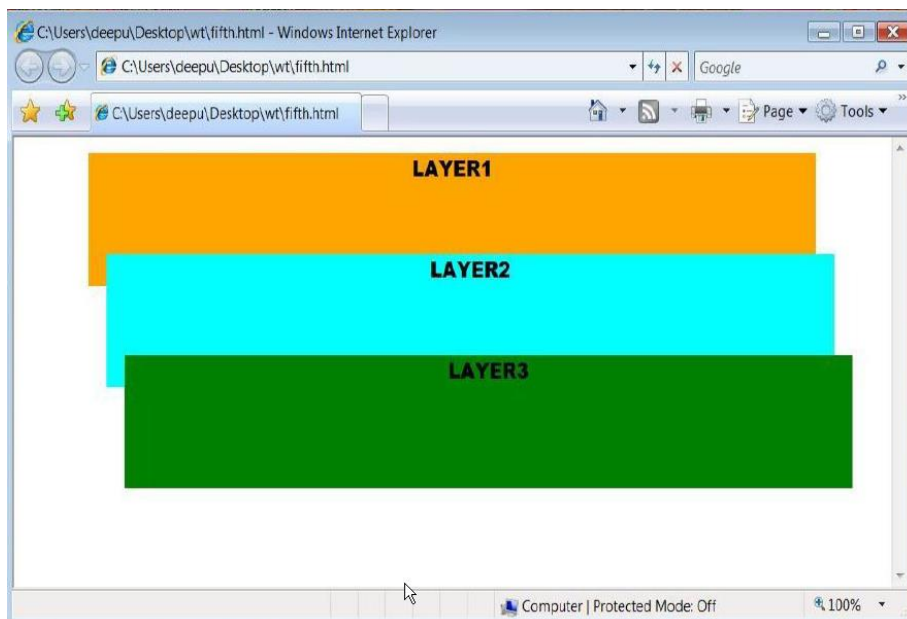
6. Add a customized cursor like crosshair, help, wait, move, e-resize

Task-5

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.

Task- 6
Visual Beans
Create a simple visual bean with an 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
User Authentication :

1. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following.
• Create a Cookie and add these four user id's and passwords to this Cookie.
• 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/she 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 ".
2. Repeat the same using by storing the 4 user ids and passwords in web.xml file using init-parameters.

Task-9

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 java program/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 (week2).

Task-10

Write a JSP which does the following job:
Insert the details of the 3 or 4 users who registered with the web site using week9 by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Task-11

Create tables in the database which contain the details of books having Book name, Price, Quantity, Amount of each category. Modify the catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Task-12

HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time. This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()). Modify the catalogue and cart JSP pages to achieve the above mentioned functionality using sessions.

TEXTBOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY,

   Dreamtech

2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages –Hans Bergsten, SPD O'Reilly

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PYTHON AND R PROGRAMMING LAB

Course code: GR20A3060   **L/T/P/C: 0/0/4/2**
III Year I Semester

Prerequisites
> Little bit mathematical background is preferable

Course Objectives:
1. To know the basics of Python variables, expressions, statements, develop programs with conditionals and loops.
1. To define Python functions and call them, and usage of Strings
2. To use Python data structures –-lists, tuples, dictionaries.
3. To do input/output with files and Regular expressions in Python
4. To know the basics of R variables, expressions, statements, develop programs with conditionals and loops.

Course Outcomes:
1. Structure simple Python programs for solving problems, and to decompose a Python program into functions.
2. Represent compound data using Python lists, tuples, and dictionaries.
3. Read and write data from/to files in Python Programs.
4. Structure simple R programs for solving problems, and to decompose a Python program in to functions
5. Represent compound data using R Vectors, Lists, Matrices, Data frames

Task 1: Write a program using conditions and loops of Python/R.

    a. Biggest of three numbers
    b. Check the given number is even or odd
    c. Ways of implement Swapping of two numbers
    d. Check given number is prime or not
    e. Factorial of a given number
    f. Power of a given number
    g. Compute the GCD of two numbers.

Task 2: Write a program to implement various concepts of functions using Python.

    a. Creating a user defined function and to call the function
    b. Ways of argument passing as function/ positional/ default / keyword arguments.
    c. Program to implement call by value and reference

Task 3: Write a program to implement various ways of slicing operations on String/List/Tuple/Dictionary data structures?

Task 4: Write a program to implement ways various builtin functions of String/List/Tuple/Dictionary data structures?
Task 5: Write a python function to add 'ing' at the end of a given string and return the new string.

If the given string already ends with 'ing' then add 'ly'.
If the length of the given string is less than 3, leave it unchanged.

Task 6: Write a python function to create and return a new dictionary from the given dictionary(item:price).

>Given the following input, create a new dictionary with elements having price more than 200.
>
>prices = {'ACME': 45.23,'AAPL': 612.78, 'IBM': 205.55,'HPQ': 37.20,'FB': 10.75}

Task 7:

>Write a python function which accepts a list of strings containing details of deposits and withdrawals made in a bank account and returns the net amount in the account. Suppose the following input is supplied to the function
>["D:300","D:300","W:200","D:100"] where D means deposit and W means withdrawal, then the net amount in the account is 500.

Sample Input	Expected Output
["D:300","D:200","W:200","D:100"]	400
["D:350","W:100","W:500","D:1000"]	750

Task 8:

>Given a list of numbers, write a python function which returns true if one of the first 4 elements in the list is Otherwise, it should return false. The length of the list can be less than 4 also.

Sample Input	Expected Output
[1, 2, 9, 3, 4]	True
[1, 2,3,4]	False

Task 9: Write a program to implement various concepts of functions using R.

   a. Creating a user defined function and to call the function
   b. Ways of argument passing as Argument Values (by position and by name)/Default Argument

Task 10: Write a program to manipulate strings using R.

Task 11: Write a program to demonstrate ways of creation of Vectors and manipulation of Vectors using R.

Task 12: Write a program to demonstrate ways of List creation and List manipulating List elements using R.

Task 13: Write a program to demonstrate ways of Accessing Elements of a Matrix, Matrix Computations using R.

Task 14: Write a program to demonstrate creation of DataFrame and extract data from Dataframe using R

TEXTBOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2ndedition, Updated for Python 3, Shroff/O'ReillyPublishers,
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python –Revised and updated for Python3.x
3. The Art of R Programming, Norman Matloff, CengageLearning
4. R for Everyone, Lander,Pearson

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONSTITUTION OF INDIA

Course code: GR20A2003   **L/T/P/C:2/0/0/2**
III Year I 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.
4. It will help students learn about Local Administration.
5. The Students understand the importance of Election Commission.
6. The Students will become aware of how a Country and State are run in Democracy.
7. 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 andits 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
Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC.

Textbooks:

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 Avasthi-by lakshminarainagarwal publication

III 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**
III Year II Semester

Course Objective:
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 andSteps 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 skillsof 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).

TEXTBOOKS:
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
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-Neighbours (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, AndrewNg.
4. Data Mining–Concepts and Techniques -Jiawei Han and Micheline Kamber,Morgan Kaufmann

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FULL STACK DEVELOPMENT

Course Code: GR20A3124   **L/T/P/C: 2/1/0/3**
III Year II Semester

Course Objectives:
1. The core concepts of both the frontend and backend programming course
2. Get familiar with the latest web development technologies
3. Build strong foundations (ex: OOPS) in entry level engineers thereby making them job ready as per industry requirements. Enable them to learn new technologies by applying foundation paradigms
4. About Sql and NoSql databases
5. Complete web development process

Course Outcomes: Upon the successful completion of the course, the student will be able to:
1. Enable participants to develop a complete web application from the scratch that includes Front-end, Back-end and Data-exchange technologies
2. Attain the knowledge of web development basics, HTML, CSS and building interactive web pages using JavaScript & jQuery.
3. Design the applications using node.js and Angular
4. Construct the real-world applications using PHP and MySQL
5. Become an industry-ready engineer who can be readily deployed in a project

UNIT I
HTML 5: New Elements, Video & Audio, Canvas, Vector Graphics, Web Storage, Drag & Drop, Geolocation.
CSS3: Basic Styling, Positioning & Background Images, Pseudo Classes, Colors, Backgrounds & Gradients, Text & Box Shadows, Transitions & Animation, Columns & Flexbox

UNIT II
Bootstrap Programming: Setup, Templates & Navbar, Typography, Forms & Tables, CSS Components, Grid System, Modal, Dropdown, Tabs & Tooltip, Collapse, Accordion and Carousel
Java Script: Variables, Arrays & Objects, Loops, Conditionals & Switches, Functions & Events, JavaScript Form Validation, Learning Ajax

UNIT III
jQuery Programming: Selectors & Mouse Events, Form Events, DOM Manipulation, Effects & Animation, Traversing & Filtering.
Backend Programming with Node.js: Installation and Simple Server, Express Setup and Routing, Template Engines, Node MongoDB Driver, Setup, Middleware & Routes, Creating the UI, Form Validation and User Register, Password Encryption, Login Functionality, Access Control & Logout.

UNIT IV
App Development with Angular: Angular 2 App from Scratch, Components & Properties, Events & Binding With ngModel, Fetch Data from A Service, Submit Data to Service, Http Module & Observables, Routing.

Database Design using MySQL: An Overview of SQL, XAMPP and MySQL Setup, Create Tables, Columns and Insert Data, Selecting Data, Distinct, Aliases & Concat, Update, Delete & Alter, Foreign Keys, Table Joins.

UNIT V

Backend Programming with PHP: Linux Installation, XAMMP Environment Setup, PHP Programming Fundamentals, PHP Data Types & Dates, Cookies, Sessions, Objects and Classes, Intro to PHP & MySQL, creating a MySQL Database, Connect & Fetch data from MySQL, Insert and Delete MySQL data from PHP.

Textbooks:
1. 1 Modern Full-Stack Development: Using TypeScript, React, Node.js, Webpack, and Docker 1st ed. Edition by Frank Zammetti
2. Web Design with HTML, CSS, JavaScript and jQuery Set 1st Edition by Jon Duckett
3. The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer 1st ed. Edition, Kindle Edition by Chris Northwood

References:
1. Quick Start Full Stack Web Development: Build Secure Asynchronous Single-Page Apps with Flask, React, and PostgreSQL by Erik M. Ferragut (Author)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIX PROGRAMMING
(Professional Elective-II)

Course code GR20A3125   **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
1   Knowledge in C Programming
2   Knowledge in Operating System

Course Objectives
1. Comprehend various procedures for shell programming and explore system calls of kernel in file and directory management
2. Explore the process and signal handling concepts of UNIX operating system
3. Learn to create IPC using pipes, FIFOs and concurrency management
4. Demonstrate the ability to work with SYSTEM V IPC
5. Demonstrate the ability to work with sockets

Course Outcomes
1. Experiment and work with various shell scripts. Demonstrate the usage of various system calls for file and directory management
2. Develop the ability to implement various process and signal handling mechanisms of UNIX
3. Select the appropriate mechanism for working with IPC using pipes, named pipes along with concurrency management
4. Interpret the usage of system calls for SYSTEM-V IPC using programs
5. Develop the ability to implement various client server applications using sockets

UNIT I
Working with the Bourne shell: shell responsibilities, shell meta characters, shell variables, shell commands, control structures, shell script examples.
Unix Files: Unix file structure, low level file access system calls, usage of open, creat, read, write, close, lseek, stat, fstat, umask, dup, dup2. Formatted I/O, streams and file descriptors, file and directory maintenance system calls chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd, Directory handling system calls opendir, readdir, closedir, rewinddir, seekdir, telldir.

UNIT II
Unix Process and Signals: process structure, starting new process, waiting for a process, zombie process, process control, system call interface for process management-fork, vfork, exit, wait, waitpid, exec, system, **Signals**- Signal functions, unreliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT III
Interprocess Communication Overview: Introduction to IPC, IPC between processes on a single   computer system, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces.

UNIT IV

Message Queues-Unix system-V messages, unix kernel support for messages, unix APIs for messages, client/server example. Semaphores-Unix system-V semaphores, unix kernel support for semaphores, unix APIs for semaphores, file locking with semaphores. Shared Memory-Unix system-V shared memory, unix kernel support for shared memory, unix APIs for shared memory, semaphore and shared memory example.

UNIT V

Sockets: Introduction to Sockets, Socket system calls for connection-oriented protocol and connectionless protocol, example-client/server programs.

Text Books:
1. Unix the ultimate guide, Sumitabha Das, TMH
2. Unix Network Programming, W.R.Stevens, Pearson/PHI
3. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AUTOMATA AND COMPILER DESIGN
(Professional Elective-II)

Course code: GR20A3126   **L/T/P/C:3/0/0/3**
III Year II Semester

Prerequisites:
Students should have Knowledge in Data Structures, Simple graph algorithms,
Programming language.

Course Objectives:
1. Use the knowledge of Finite Automata and able to represent the language in form of Regular Expressions, Grammar and convert NFA to DFA and vice versa.
2. Understand different phases of the compiler, Lexical analyzer and Top down parsing.
3. Demonstrate Bottom up parsing technique.
4. Illustrate memory management techniques during different phases.
5. Identify the effectiveness of optimization and differences between machine dependent and independent translation

Course Outcomes:
1. Express the statements in form of Regular Expression and Grammar using the knowledge of Finite Automata.
2. Identify the objectives of the phases of the compiler and explain lexical analysis phaseandtheirconnectiontolanguagedefinitionthroughregularexpressionsand grammars.
3. Explain the syntax analysis phase and differentiate among various parsing techniques and grammar transformation techniques.
4. Analyze different memory management techniques during different phases of the compiler.
5. Differentiate machine dependent and independent translation of intermediate code.

UNIT I
Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic Finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic Finite Automata (NFA), introduction to CFG, Ambiguous grammar, Regular Expressions, Arden's theorem.

UNIT II
Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler. **Lexical Analysis**: The role of Lexical Analyzer, The Lexical-Analyzer Generator Lex , **Syntax Analysis** : CFG, Lexical Versus Syntactic Analysis , Eliminating Ambiguity , Elimination of Left Recursion , Left Factoring , **Top-Down parsers**: Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) Grammars, Non recursive Predictive Parsing, Error Recovery in Predictive Parsing.

UNIT III
Bottom–up Parsers: Reductions, Handle Pruning ,Shift-Reduce Parsing, Conflicts During Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers : SLR, Canonical LR, LALR, Using Ambiguous Grammars: Precedence and Associativity to Resolve Conflicts, The "Dangling-Else" Ambiguity , Parser Generators : YACC. Syntax Directed translation mechanism and attributed definition.

Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Quadruples & Triples, Types and Declarations, Translation of Expressions, Type Checking, Control Flow, Switch- Statements, Intermediate Code for Procedures.

UNIT IV
Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management, Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

UNIT V
Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

TEXT BOOKS
1. Introduction to Theory of Computation. Sipser, 2ndEdition,Thomson.
2. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
3. Compilers Principles, Techniques and Tools Aho, Ullman, Sethi,Pearson Education

REFERENCES
1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction ,LOUDEN, Thomson.
3. Elements of Compiler Design, A. Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V.Raghavan, TMH.
5. Engineering a Compiler, K. D. Cooper, L.Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation - Kamala Krithivasan and RamaR, Pearson.
7. Modern Compiler Design, D. Grune and others,Wiley-India.
8. A Text book on Automata Theory, S. F. B. Nasir, P. K. Srimani, Cambridge Univ. Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DISTRIBUTED DATABASE AND SYSTEMS
(Professional Elective -II)

Course code: GR20A3127   **L/T/P/C:3/0/0/3**
III Year II Semester

Prerequisites:
1   Knowledge in Data Base Management Systems
2   Knowledge in Computer Networks

Course Objectives
1   To understand the architecture of Distributed databases.
2   To apply the concepts and techniques of distributed systems including principles, architectures, design, implementation and major domain of application.
3   To learn query processing techniques in DDBMS.
4   To understand transactional aspect and concurrency control of distributed systems
5   To learn the parallel database systems and architecture

Course Outcomes
1.   Demonstrate system architecture based on distributed databases.
2.   Illustrate the introductory distributed system concepts and its structures.
3.   Develop the query processing techniques in DDBMS.
4.   Understand transaction management and concurrency control of distributed systems
5.   Discover the parallel database systems and its architecture.

UNIT I
Introduction: Distributed data processing, what is a Distributed Database System, Advantages and Disadvantages of DDBS, Design Issues, Overview of Database and Computer Network Concepts
Distributed DBMS Architecture: Transparencies in a distributed DBMS, Distributed DBMS architecture**.**

UNIT II
Distributed Database Design: Alternative design strategies, Distributed design issues, Fragmentation, Allocation
Semantic Data Control: View management, Data security, Semantic Integrity Control.

UNIT III
Overview of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing, Query decomposition, Localization of distributed data
Optimization of Distributed Queries: Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms.

UNIT IV
Introduction to Transaction Management: Definition of Transaction, Properties of transaction, Types of transaction
Distributed Concurrency Control: Serializability theory, Taxonomy of concurrency control mechanisms, locking-based concurrency control algorithms, Timestamp-based concurrency control algorithms, Optimistic Concurrency Control Algorithms, Deadlock Management

UNIT V

Reliability: Reliability concepts and measures, Failures in Distributed DBMS, Local Reliability protocols, Distributed Reliability protocols, dealing with site failures, Network Partitioning, Parallel Database Systems, Database Servers, Parallel Architectures.

Textbooks
1. Principles of Distributed Database Systems, Second Edition, M. Tamer Ozsu Patrick Valduriez.
2. Distributed Databases principles and systems, Stefano Ceri, Giuseppe Pelagatti, TataMcGrawHill.

References
1. Fundamental of Database Systems, Elmasri&Navathe, Pearson Education,Asia.
2. Database System Concepts, Korth&Sudarshan, TMH

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AGILE METHODOLOGIES
(Professional Elective-II)

Course code: GR20A3128   **L/T/P/C:3/0/0/3**
III Year II 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.

TEXTBOOKS:

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

REFERENCES :

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
INTRODUCTION TO DATA SCIENCE
(Open Elective-II)

Course Code: GR20A3129   **L/T/P/C: 3/0/0/3**
III Year II Semester

Prerequisites:
   Knowledge of Python programming, Linear algebra, Statistics, Probability and Calculus
Course Objectives
   1. Understand Numpy, Pandas for mathematical computation and Data Analysis
   2. Understand the importance of pre-process techniques for Data Science
   3. Understand the importance of prediction and classification of various datasets
   4. Understand how to group objects based on their similarity measures
   5. Understand how to process text data using NLP techniques
Course Outcomes
   1. Learn Numpy, Pandas for mathematical computation and Data Analysis
   2. Analyze the importance of pre-processing techniques for Data Science
   3. Learn and Analyze various prediction and classification techniques on various datasets
   4. Learn and Analyze the applications of clustering techniques
   5. Analyze Text data and Web scrapping data at morphological and syntactic and semantic levels using NLP techniques

UNIT I
Introduction to Data Science, Components of Data Science, Application of Data Science
NumPy: Array,Matrix and associated operations, Linear algebra and related operations
Pandas: Series, Data Frames, Panels, Reading files, Exploratory data analysis, Data preparation, Indexing, Slicig, Merging and Joining data. Working with MySQL databases
Data Pre-processing Techniques: Data Imputation, Data Encoding, Standardization and Normalization, Dimensionality reduction, Feature Selection methods

UNIT II
Regression Analysis: Introduction to Regression, Simple linear regression, Multi-linear regression, Evaluation metrics for regression
Classification Methods: Introduction to Classification, Naïve Bayes classifier, Decision Tree classifier, Support Vector Machines, Logistic Regression, Ensemble methods, Random Forest, Bagging, Boosting Evaluation metrics for classification

UNIT III
Clustering Methods: Introduction to Clustering, Similarity distance measures, K-means algorithm, Hierarchical clustering algorithm, DBScan algorithm, Evaluation metrics for clustering.

UNIT IV
NLP Overview, Tokenization, Stemming, stop words removal, POS tagging, Lemmatization, Feature extraction using SKlearn, Text Classification, Text Clustering.

UNIT V
Learning Best Practices for Model Evaluation:
Pipelining, Hyperparameter Tuning, Debugging algorithms with learning and validation curves

TEXTBOOKS
   1. Python Machine Learning, Second Edition by Sebastian Raschka Vahid Mirjalili
Statistics and Machine Learning in Python Edouard Duchesnay,

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 preprocessing 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.

Textbooks:
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
FULL STACK DEVELOPMMENT LAB

Course code: GR20A3130   **L/T/P/C:0/0/4/2**
III Year II Semester

Prerequisites:
   1   Knowledge of Web Programming concepts
Course Objectives:
1. To understand Designing of Front-End Applications.
2. To design client-side applications using HTML, JavaScript.
3. To build Robust and Scalable Websites, Backend APIs.
4. To understand end-to-end application with exciting features and test it
5. To understand database connectivity with web applications.
Course Outcomes:
1. To Design a website
2. To implement client-side validation.
3. To Develop the Robust and Scalable Websites, Backend APIs
4. To implement end-to-end applications.
5. To design the web applications and make use of database.

  Week 1: Write a Program on HTML5 Video and Audio
  Week 2: Write a Program on CSS3 Colors, Fonts, Text Align, Cursors
  Week 3: Write a Program on Text and Box Shadows
  Week 4: Write a Program on Transitions and Animations in CSS
  Week 5: Write a Program on Bootstrap templates and NavBar
  Week 6: Write a Program on Tabs and Tooltip
  Week 7: Write a Program on Java Script Functions and Events
  Week 8: Write a Program on Java Script Form Validation
  Week 9: Write a Program on Ajax using HTTP Request
  Week 10: Write a Program on jQuery form events
  Week 11: Write a Program on jQuery traversing and filtering
  Week 12: Write a Program on adding MySQL to Node.js
  Week 13: Write a Program on NgModel in Angular
  Week 14: Write a Program on performing basic operations in MySQL
  Week 15: Write a Program on Looping constructs in PHP
  Week 16: Write a Program on connecting, fetching data from MySQL using PHP

Textbooks:

1. 1 Modern Full-Stack Development: Using TypeScript, React, Node.js, Webpack, and Docker 1st ed. Edition by Frank Zammetti
2. Web Design with HTML, CSS, JavaScript and jQuery Set 1st Edition by Jon Duckett
3. The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer 1st ed. Edition, Kindle Edition by Chris Northwood

References:

1. Quick Start Full Stack Web Development: Build Secure Asynchronous Single-Page Apps with Flask, React, and PostgreSQL by Erik M. Ferragut (Author)
2. Full Stack Web Development For Beginners: Learn Ecommerce Web Development Using HTML5, CSS3, Bootstrap, JavaScript, MySQL, and PHP by Riaz Ahmed

IV Year
I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIFIED MODELING LANGUAGE

Course code: GR20A4056   **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
1. Knowledge in Software Engineering concepts.
2. Knowledge in Object Oriented Programming concepts

Course Objectives:
1. Explain static design view modeling in UML System
2. Interpret dynamic design view modeling in UML System
3. Use and Connect the importance of the Software Design Process in Real time Systems
4. Plan building blocks of the Software Intensive system
5. Write the differences between object oriented modeling and structural modeling in real time systems. Demonstrate the Structural and Behavioral Modeling in UML System

Course Outcomes:
1. Identify the interface between classes and objects
2. Create class diagrams that model both the domain model and design model of a software system
3. Create interaction diagrams that model the dynamic aspects of a software system. Create use case documents that capture requirements for a software system.
4. Identify business classes, attributes and relationships and construct the domain model as a class diagram using Rational Rose Model. Construct Component and Deployment diagrams for Real time Systems
5. Model Forward and reverse engineering design for all UML Diagrams

UNIT I
Introduction to UML: Importance of modeling, Principles of modeling, Object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle. Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

UNIT II
 Advanced Structural Modeling: Advanced classes, advanced relationships.
 Class & Object Diagrams: Terms, concepts, Modeling Techniques for Class & Object Diagrams

UNIT III
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT IV
Advanced Behavioral Modeling: Events and signals, State machines, processes and Threads, time and space, State chart diagrams.

UNIT V
Architectural Modeling: Component, Deployment, Component diagrams and Deployment

diagrams.

Case Study: Design and Implement Forward Engineering of Unified Library application

TEXTBOOKS:

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- Dream tech India Pvt. Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOG
MIDDLEWARE TECHNOLOGIES

Course Code: GR20A4057   **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
1. Knowledge of Scripting Languages, Web Technologies

Course Objectives:
1. To make student understand the client server computing model and distributed model
2. To describe the remote applications with RMI and RPC
3. To lustrate the java bean component model with EJBS
4. To make student understand, design and implement real time projects by combining CORBA and database interfacing
5. To Implement distributed applications using .Net

Course Outcomes:
1. Choose appropriate client server computing model for given problem.
2. Develop java bean component model with EJB'S.
3. Design distributed applications using Enterprise Java Beans.
4. Develop real time projects by Using CORBA.
5. Implement distributed applications using .Net

UNIT I
CLIENT/SERVER CONCEPTS: Client – Server – File Server, Database server, Group server, Object server, Web server. Middleware – General middleware – Service specific middleware. Client/Server Building blocks-RPC – Messaging – Peer – to – Peer.

UNIT II
EJB ARCHITECTURE: EJB –EJB Architecture – Overview of EJB software architecture – View of EJB – Conversation – Building and Deploying EJBs – Roles in EJB.

UNIT III
EJB APPLICATIONS: EJB Session Beans – EJB entity beans – EJB clients – EJB Deployment – Building an application with EJB.

UNIT IV
CORBA: CORBA – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB – Building an application with CORBA.

UNIT V
COM: COM – Data types – Interfaces – Proxy and stub – Marshalling – Implementing server/Client – Interface pointers – Object Creation, Invocation, Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture–Marshalling – Remoting.

TEXT BOOKS

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client/server Survival Guide", Galgotia publications Pvt. Ltd., 2002.(UNIT 1)
2. Tom Valesky, "Enterprise Java Beans", Pearson Education, 2002.(UNIT 2 & 3)
3. Jason Pritchard. "COM and CORBA side by side", Addison Wesley,2000 (UNIT 4 & 5)

REFERENCES

1. Mowbray, " Inside CORBA", Pearson Education, 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE TESTING METHODOLOGIES
(Professional Elective-III)

Course code: GR20A4058   **L/T/P/C: 3/0/0/3**
IV Year I Semester

Prerequisites:
1. Students should have finish 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
NETWORK PROGRAMMING
(Professional Elective-III)

Course code: GR20A4059   **L/T/P/C:3/0/03**
IV Year I Semester

Course Objectives:
1. Identify different transmission media used for wired networks and wireless networks.
2. Analyze the functionalities TCP/UDP
3. Design different Routing technologies involved to route packets with respect to Unicasting, Broadcasting and Multicasting.
4. Compare Internet protocol (IP), Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).
5. Learn technologies and protocols used in network communications

Course Outcomes:
1. Understand detailed knowledge of the TCP/UDP Sockets
2. Understand the key protocols which support the Internet
3. Learn advanced programming techniques such as IPv6 Socket Programming, Broadcasting, Multicasting
4. Compare the functionalities of Internet protocol (IP), Transport Control Protocol (TCP) and User Datagram Protocol (UDP).
5. Describe major technologies and protocols used in network communications

UNIT-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II

Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT-III

TCP Client Server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-IV

I/O Multiplexing and Socket Options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options**.**

Elementary UDP Sockets: Introduction UDP Echo server function, lost datagram, summary

of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

UNIT-V

Elementary Name and Address Conversions: DNS, gethost by Name function, Resolver Option, Function and IPV6 support, uname function, other networking information.

Textbook:

1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. W.Richard Stevens, Pearson Edn.Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens.PHI.

REFERNCES:

1. UNIX SYSTEMS PROGRAMMING USING C++ T CHAN,PHI.
2. UNIX for programmers and Users, 3RD Edition, GRAHAM GLASS, KING ABLES, Pearson Education.
3. Advanced UNIX programming, 2nd edition, M J Rochkind pearsoneducation.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-III)

Course code: GR20A4060   **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
1   Core programming & algorithm skills, Data structures and DBMS concepts
2   Basic Probability and Statistics concepts

Course Objectives
1. To learn the different models for information storage and retrieval
2. To learn about the various retrieval utilities
3. To understand indexing and querying in information retrieval systems
4. To expose the students to the text search algorithms
5. To learn about web search

Course Outcomes
1. To understand the different models of information storage and retrieval
2. Possess the ability to use the various retrieval utilities for improving search
3. Possess an understanding of indexing and compressing documents to improve space and time efficiency
4. Possess the skill to formulate parallel and distributed text search algorithms
5. Understand issues in webs search.

UNIT I
Introduction, Retrieval Strategies: Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language Models.

UNIT II
Retrieval Utilities: Relevance feedback, Clustering, N-grams, PAT data structure, Regression analysis, Thesauri.

UNIT III
Retrieval Utilities: Semantic networks, Parsing Cross-Language Information Retrieval: Introduction, Crossing the language barrier.

UNIT IV
Efficiency: Inverted index, Query processing, Signature files, Duplicate document detection.

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

TEXTBOOK

1. David A. Grossman, Ophir Frieder, information Retrieval —Algorithms and Heuristics, Springer, 2 Edition (Distributed by Universities Press),2004.
2. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press,1997.

REFERENCE BOOKS

1. Gerald J Kowaiski, Mark T Maybury. Information Storage and Retrieval Systems, Springer,2000
2. Soumen Chakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan-Kaufrnann Publishers, 2002
3. Christopher D. Manning, Prabhakar Raghavan, HinñchSchütze, An Introduction to Information Retrieval, Cambridge University Press, Cambridge, England,2009

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREEN COMPUTING
(Professional Elective – III)

Course Code: GR20A4116   **L/T/P/C:3/0/0/3**
IV Year I 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 foot print, 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.

TEXTBOOKS:

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
DEEP LEARNING
(Professional Elective -IV)

Course code: GR20A4061   **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
   Knowledge of Data science with Python and R, Linear algebra, Statistics, Probability and
   Calculus .

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
Applied Math and Deep Learning basics: Historical trends in deep learning, Scalars, Vectors,
Matrices and Tensors. Multiplying matrices and vectors, identity and inverse matrices, Linear
dependence and span, Norms, Eigen Decomposition, Singular Value Decomposition, The moore-
penrosepsuedoinverse, The trace operator. **Probability and Information Theory**: Why probability,
Random variables, Probability distributions, marginal probability, conditional probability, The chain
rule of conditional probability, Independence and conditional independence, expectation, variance,
Covariance Baye's Rule.

UNIT II
Basics of Deep Learning: learning algorithms, Capacity, over fitting and under fitting, Hyper
parameters and validation sets, Estimators, Bias and Variance, Maximum likelihood Estimation,
Bayesian statistics, Supervised learning algorithms, unsupervised learning algorithms, Stochastic
Gradient Descent, Building a machine learning algorithm, Challenges motivating deep learning.
Deep Feed forward networks: Example: XOR, Gradient-based learning, Hidden units, architecture
design, Back –propagation algorithm.

UNIT III
Regularization for deep learning: Parameter norm penalties, norm penalties as constrained
optimization, Data set augmentation, Noise robustness, semi-supervised learning, Multi-task learning,
early stopping, parameter tying and sharing, sparse representation, Dropout**.**

Optimization for training deep models: How learning differs from pure optimization. Challenges in Neural Network Optimization. Basic algorithms, parameter initialization strategies, algorithms with adaptive learning rates. Approximate second order methods, optimization strategies and meta-algorithms.

UNIT IV
Convolutional Networks: The convolution operation, motivation, pooling, convolution and pooling as an infinitely strong prior, variants of basic convolution function, structured outputs, data types, Efficient convolution algorithms, random or unsupervised features, the neuro scientific basis for convolution networks.

UNIT V
Recurrent and recursive nets: Unfolding computational graphs, recurrent neural networks, bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, deep recurrent networks. Applications: Large-scale deep learning, computer vision, Natural Language Processing,

TEXTBOOK
1. Deep Learning –IanGoodfellow, YoshuaBengio, AaronCourville—MIT Press book - ISBN-13:978-0262035613,

REFERENCE BOOKS
1. Artificial Neural Networks – B. Venkataraman Prentice Hall of India P Ltd2005
2. Neural Networks in Computer Inteligance, 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
SOFT COMPUTING
(Professional Elective-IV)

Course Code: GR20A4062   **L/T/P/C: 3/0/0/3**
IV Year I Semester

Prerequisites:
  Knowledge of Cloud computing and software engineering methodologies and fuzzy
  logics and neural networks

Course Objectives:
  1. Understand soft computing techniques and apply these techniques to solve real-world
     problems.
  2. To know the fundamental things about fuzzy systems, fuzzy logic and its applications.
  3. To analyze the Fuzzy Inference technique with different variables.
  4. Understand the complete structure of Neurons and its applicability in different domains.
  5. Differentiate between the Neural Networks and Genetic Algorithms.

Course Outcomes:
  1. Apply all the Soft Computing Techniques to solve real world problems.
  2. Differentiate between Fuzzy Model with respect to Probabilistic Model.
  3. Apply Fuzzy Inference Techniques to solve problems in different domain.
  4. Identify the problems, where Supervised and (Neural Networks) Unsupervised Learning
     Techniques can be applied.
  5. To know how to evaluate the Fitness function in Genetic Algorithm.

UNIT-1
Introduction to Soft Computing: Computing System, "Soft" Computing Versus "Hard" Computing,
Soft Computing Methods, Recent trends in Soft Computing, Characteristics of Soft Computing,
Applications of Soft Computing Techniques.

UNIT-II
Fuzzy Logic: I(Introduction): Fuzzy Logic Basic Concepts, Fuzzy Sets and Crisp Sets, Fuzzy Set
Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp
Conversation.

UNIT-III
Fuzzy Logic: II(Fuzzy Membership, Rules): Membership Functions, Interference in Fuzzy Logic,
Fuzzy if then else Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzifications and
Defuzzifications, Fuzzy Controller, Industrial Applications.

UNIT IV
Neural Network: Structure and Function of a single neuron: Biological Neuron, Artificial Neuron,
Definition of ANN, Taxonomy of Neural Network, Difference between ANN and human brain,
Characteristics and Applications of ANN, Single Layer Network.

UNIT-V
Genetic Algorithms: Basic Operators and Terminology, Traditional Algorithms Versus Genetic

Algorithm, Simple Genetic Algorithm, General Genetic Algorithm, Classification of genetic Algorithm, Genetic Programming, Applications of Genetic Algorithm.

Applications of Soft Computing: Internet Search Techniques, Hybrid Fuzzy Controllers.

Text Books:

1. B.K. Tripathy, J. Anuradha," Soft Computing Advances and Applications", Cengage Learning.
2. S.Rajsekaran and G.A. VijaylakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.
3. Introduction to Artificial Neural Systems- Jacek M. Zuarda, Jaico Publishing House, 1997.
4. N. P. Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.

   Reference Books:

1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India
4. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED COMPUTER NETWORKS
(Professional Elective-IV)

Course code: GR20A4063   **L/T/P/C:3/0/0/3**
IV Year I Semester

Prerequisites:
Students are expected to have knowledge about DCCN and Operating system concepts

Course Objectives:
1. Identify different transmission media used for wired networks and wireless networks.
2. Analyze the functionalities of various kinds of networking devices used for Communication.
3. Design different Routing technologies involved to route packets with respect to Unicasting, Broadcasting and Multicasting.
4. Compare Internet protocol (IP), Transmission Control Protocol (TCP) and User Datagram Protocol(UDP).
5. Describe routing procedure in Cellular Networks, Wireless Mesh Networks and Optical Systems

Course Outcomes:
1. Compare different kinds of transmission media for wired networks and wireless networks.
2. Recognize various networking devices used for different networks.
3. Implement routing methods and protocols for unicasting, broadcasting and multicasting communication.
4. Compare the functionalities of Internet protocol (IP), Transport Control Protocol (TCP) and User Datagram Protocol(UDP).
5. Apprise various routing procedures used in Cellular Networks, Wireless Mesh Networks and Optical Networks.

UNIT I
Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks. Foundation of Networking Protocols: OSI Model, TCP/IP Model.
Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

UNIT II
The Link Layer and Local Area Networks: Introduction and Services, Error- Detection and Error-Correction techniques, Multiple Access protocols, Link Layer Addressing, Point to Point Protocol (PPP)
Routing and Internetworking: Network-Layer Routing, Least–cost-path algorithms, non-least-cost-path algorithms, Intra-domain Routing Protocols, Inter- domain Routing Protocols, Congestion control at Network Layer

UNIT III
Logical Addressing: IPv4 Addresses, IPv6 Addresses, Internet Protocol: Internetworking, IPV4,IPV6, Transitions from IPV4 to IPV6, Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra-domain Multicast Protocols, Inter-domain Multicast Protocols. Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocols (TCP),User Datagram Protocol (UDP) Applications Layer: The Web and HTTP, FTP, Electronic Mail in the Internet, Domain Name System (DNS).

UNIT IV
Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocations in Networks,

UNIT V
VPNs, Tunneling and Overlay Networks: Virtual Private Networks(VPNs) , Multiprotocol Label Switching(MPLS), Overlay Networks –VoIP and Multimedia Networking : Overview of IP Telephony , VoIP Signaling Protocols, Real-Time Transport Protocols, Stream Control Transmission Protocol, Mobile A-Hoc Networks : Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks.

TEXTBOOKS
1. 1.Computer Networking: A Top Down Approach Featuring the Internet, James F. Kurose,Keith W. Ross, Third edition, PearsonEducation,2007.
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, EdTitle, David Johnson, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, S. Keshav, PearsonEducation.
4. Campus Network design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CLOUD COMPUTING
(Professional Elective-IV)

Course Code: GR20A3118   **L/T/P/C: 3/0/0/3**
IV Year I 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 thecloud.
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. RajkumarBuyya, Christian Vecchiola, S.TamaraiSelvi, '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
HUMAN COMPUTER INTERACTION
(Open Elective –III)

Course Code: GR20A4067   **L/T/P/C:3/0/0/3**
IV Year I 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 peoples 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 Dreama 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
UNIFIED MODELING LANGUAGE LAB

Course code: GR20A4064   **L/T/P/C: 0/0/4/2**
IV Year I 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.

UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt.Ltd

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MIDDLEWARE TECHNOLOGIES LAB

Course code: GR20A4065   **L/T/P/C:0/0/4/2**
IV Year I Semester

Prerequisites:
1   Knowledge in Java Programming, C Programming

Course Objectives:
1. To understand the role of middleware in the distributed Environment.
2. To design reusable component using Java Beans.
3. To design and demonstrate the EJB Architectures.
4. To demonstrate middleware basics through the CORBA objects.
5. To understand creation of applications using .Net Technology.

Course Outcomes:
1. To demonstrate middleware basics through the RMI.
2. To learn the object-oriented middleware basics through the example of the following CORBA objects.
3. An Ability to understand the EJB Architectures and Applications
4. To learn the object-oriented middleware basics through the example of the following CORBA objects.
5. To Implement applications using .Net Technology.

Tasks
1. Create a distributed application to download various files from various servers using RMI.

2. Create a Java Bean to draw various graphical shapes and display it using or without using BDK.
3. Develop an Enterprise Java Bean for student Information System.
4. Develop an Enterprise Java Bean for Library operations.
5. Create an Active-X control for Timetable.
6. Develop a component for converting the currency values using COM/.NET.
7. Develop a component for encryption and decryption using COM/. NET.
8. Develop a component for retrieving information from message box using DCOM/ .NET
9. Develop a middleware component for retrieving Stock Market Exchange information Using CORBA.
10. Develop a middleware component for retrieving Bank Balance using CORBA.
11. Develop a middleware component for retrieving Weather Forecast information using CORBA.

IV Year
II Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE PROJECT MANAGEMENT

Course code: GR20A4119   **L/T/P/C: 2/1/0/3**
IV Year II Semester

Pre-requisites
1. Students should also have knowledge of the aspects of software development Process.

Course Objectives:
1. Understand the fundamental principles of Software Project management.
2. To provide the students on conventional management, economics software.
3. Acquire Plan and manage projects at each stage of the software development life cycle (SDLC)
4. To prepare organizational needs to the most effective software development model.
5. To Apply project management concepts and techniques to Software projects.
Course Outcomes:
1. To take responsibility of project team and project organization
2. Apply problem solving skills, core IT concepts, best practices and standards to information technologies.
3. Work with high level and low-level Displays of mobile and storing data by using record management system
4. Acquire the knowledge of managing, economics for conventional, modern and future software projects.
5. Identify the different project contexts and suggest an appropriate management strategy.

UNIT-I
Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation. Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT-II
Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based Software Architectures: A Management perspective and technical perspective. Work Flows of the Process: Software process work flows, Iteration workflows.

UNIT-III
Checkpoints of the Process: Major milestones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work break down structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT-IV
Project Organizations and Responsibilities:
Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment.

UNIT-V
Project Control and Process instrumentation: The seven project management core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Textbooks
1. Software Project Management, Walker Royce: Pearson Education, 2005.
References
1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education

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

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

Prerequisites:
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, JoemOysterman and Ya–quin Zhang. 1st Ed., PHInt.

References:
1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – ScotteUmbaugh, 2nd Ed, CRCPress,2011.
2. Digital Video Processing – M. Tekalp, Prentice HallInternational
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
EMBEDDED SYSTEMS
(Professional Elective -V)

Course code: GR20A4099   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
Knowledge on Operating systems, Devices and Buses for Devices Network

Course Objectives:
1. Comprehend the different issues related to embedded systems and their design.
2. Acquire the fundamental concepts of embedded processors architecture.
3. Identify various I/O devices used for embedded systems.
4. Recognize various concepts related to real time operating systems.
5. Understand different system design techniques.

Course Outcomes:
1. Identify various I/O devices and their communication.
2. Define the unique design problems and challenges of real-time systems Program an embedded system
3. Recognize unique characteristics of real-time operating systems and evaluate the need for real-time operating system
4. Relate structure of real-time systems to build an embedded real-time systems.
5. Develop embedded systems based on different applications and real-time operating systems.

UNIT I
Introduction to Embedded Systems: Embedded Systems, Processor Embedded to a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of Embedded systems, Soc(System on chip) and use of VLSI circuit design technology, complex system design and processors, Design process in Embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for embed system design.

UNIT II
Devices and Buses for Devices Network: I/O Devices:- Types and Examples of I/O devices, Synchronous, Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices:- SPI, UART, Parallel Port Devices - Timer and Counting Devices – Serial Communication using: 'I2C', 'USB', 'CAN'- Advanced I/O Serial high speed buses: ISA, PCI, PCI- X, cPCI and advanced buses

UNIT III
Real Time Operating Systems: Definitions of process, tasks and threads–Inter Process Communication, Shared data problem, Use of Semaphore(s), Priority Inversion Problem and Deadlock Situations, Message Queues, Mail boxes, Pipes, Virtual (Logical) Sockets, Remote Procedure Calls (RPCs).

UNIT IV
Operating System Services: Goals, Structures, Kernel, Process Management, Memory Management, Device Management- Real Time Operating System-RTOS Task scheduling models-Co-operative Round Robin Scheduling, Cyclic Scheduling with Time Slicing.

UNIT V
System Design Techniques: Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design. Design Examples: Telephone PBX-System Architecture, Inkjet printer-Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes

TEXT BOOKS:
1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct.2003

REFERENCE :

1. Steve Heath, Embedded Systems Design, Second Edition-2003,Newnes
2. David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Frank Vahidand Tony Givargis, Embedded Systems Design–A unified Hardware/Software Introduction, JohnWiley,2002.
4. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint2001.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CYBER FORENSICS
(Professional Elective -V)

Course code: GR20A4125   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
1. Student should be aware of Information Security concepts
2. Student required Computer programming and Information science

Course Objectives::
1. Learn the security issues network layer and transport layer.
2. Be exposed to security issues of the application layer.
3. Learn computer forensics.
4. Be familiar with forensics tools.
5. Learn to analyze and validate forensics data.

Course Outcomes:
1. Discuss the security issues network layer and transport layer.
2. Apply security principles in the application layer.
3. Explain computer forensics.
4. Use forensics tools.
5. Analyze and validate forensics data.

UNIT I
Network Layer Security & Transport Layer Security IPSec Protocol - IP Authentication Header - IP ESP - Key Management Protocol for IPSec. Transport layer Security: SSL protocol, Cryptographic Computations – TLS Protocol.

UNIT II
E-Mail Security & Firewalls PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce   Transactions.

UNIT III
Introduction to Computer Forensics Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT IV
Evidence Collection and Forensics Tools Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/Hardware Tools.

UNIT V

Analysis and Validation Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

TEXT BOOKS:
1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
2. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.

REFERENCE BOOKS:
1. John R.Vacca, "Computer Forensics", Cengage Learning, 2005.
2. Richard E.Smith, "Internet Cryptography", 3rd Edition Pearson Education, 2008.
3. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3rd Edition, Prentice Hall, 2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
E-COMMERCE
(Professional Elective - V)

Course code: GR20A4120   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
1. Fundamental knowledge of online transaction
2. Knowledge of business process is preferable

Course Objectives:
1. Identify the major categories and trends of e-commerce applications.
2. Identify the essential processes of an e-commerce system.
3. Define various electronic payment types and associated security risks and the ways to protect against them.
4. Understand the main technologies behind e-commerce systems and how these technologies interact.
5. Discuss the various marketing strategies for an online business.

Course Outcomes:
1. Summarize nature and types of e-commerce.
2. Differentiate all types of business models.
3. Plan suitable software, hardware and e-com tools for developing a better web application.
4. Implement a robust, safe and secured online payment system.
5. Recognize online content and management.

UNIT I
E-Commerce: Electronic Commerce-Framework, anatomy of E-Commerce applications, E-commerce Consumer applications, E-Commerce organization applications.
Consumer Oriented Electronic commerce: Consumer-Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumer's Perspective, and Mercantile Models from the Merchant's Perspective.

UNIT II
Business Models for E-commerce: Business-to-Consumer (B2C), Business-to-Business(B2B), Consumer-to-Consumer (C2C), Consumer-to-Business(C2B).
Electronic Payment Systems: Types of Electronic Payment System, Smart Cards, Credit Cards, Risks and Electronic Payment System.
Inter Organizational Commerce and EDI: Electronic Data Interchange, Standardization and EDI, EDI Software Implementation, Value-Added Networks (VANs).

UNIT III
Intra Organizational Commerce- work Flow Automation and Coordination, Customization and internal Commerce, Supply chain Management.
Corporate Digital Library-Document Library, digital Document types, corporate Data Warehouses.

UNIT IV
Electronic Commerce and World Wide Web: Architectural Framework for Electronic Commerce, World Wide Web(WWW) as the Architecture, Web Background: Hypertext Publishing, Technology behind the Web.

Advertising and Marketing-Information based marketing, advertising on Internet, on-line marketing process, market research.
Consumer Search and Resource Discovery-Information search and Retrieval, Commerce Catalogues, Information Filtering

UNIT V
Multimedia-key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing. Case study for point of sales.

Text Books:
1. Frontiers of electronic commerce– Kalakata, Whinston, Pearson.
2. E-COMMERCE: An Indian Perspective,3rd editionP.T.Joseph,S.J.

Reference Books:

1. Hochreiter, Sepp, and JargenSchmidhuber. "Long short-term memory." Neural computation 9.8(1997).
2. E-CommercefundamentalsandapplicationsHendryChan,RaymondLee, TharamDillon,EllizabethChang,JohnWiley.
3. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1(2009).
4. E-Commerce, EfrainTurbon,Jae Lee, David King,H.MichaelChang.
5. ElectronicCommerce–GaryP.Schneider–CeyngageLearning..
6. E-Commerce–Business,Technology,Society,KennethC.Taudon, Carol GuyericoTraver.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ESSENTIALS OF BIG DATA PROGRAMMING
(Professional Elective – VI)

Course code: GR20A4121   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
    Knowledge of Data bases, Machine Learning, types of data in real world are preferable

Course Objectives:
1   Understand the Big Data Platform and its Usecases.
2. Provide HDFS Concepts and Interfacing with HDFS
3. Understand Map Reduce Jobs.
4. Provide an deep insight on Hodoop Eco System
5. Understand Machine Learning with Big Data

Course Outcomes:
1. Distinguishes applications and Analytic Challenges with Traditional Data and Big Data.
2. Manage Large Data Storage requirement on Hadoop Distributed File System.
3. Develop Map Reduce Jobs for Large data Processing in Hadoop Environment
4. Analyze Big Data Solutions using Hadoop EcoSystem
5. Apply Different types of Analytics on Big Data.

UNIT I
INTRODUCTION TO BIG DATA AND BIG DATAANALYTICS
Types of Digital Data : Structured, Semi-Structured and Unstructured data. Characteristics of Data, Evolution of Big Data, Why Big Data, What is Big Data Analytics, Big Data Challenges, Features of Hadoop, Evolution of Hadoop, Introduction to Hadoop EcoSystem.

UNIT II
HDFS(Hadoop Distributed File System)
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Sqoop, Concepts of Hadoop I/O : Data Integration, Compression, Serialization and File-Based Data structures.

UNIT III
Map Reduce
Analyzing Data with Unix tools, Analyzing Data with Hadoop.
Hadoop Map Reduce Programming Model : Map, Reduce, Combine, Sort and Shuffle. Anatomy of Map Reduce Job Run, Failures handling in Map Reduce, Input/output File Formats in MR, Hadoop Streaming : A Framework for Map Reduce with Python.

UNIT IV
Hadoop Eco System
Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Pig Latin, Data Processing operators and , User Defined Functions in Pig

Structured Data Queries with Hive : The Hive Command Line Interface(CLI), Hive Query Language(HQL), Data Analysis with Hive.
NoSQL Database HBase : CAP theorem, NoSQL Databases, Column-Oriented Databases, Real Time analytics with HBase.

UNIT V
In-Memory Computing with Spark : Spark Basics, Interactive Spark Using PySpark, Writing Spark Applications with PySpark.
Scalable Machine Learning with Spark : Collaborative Filtering, Classification, Clustering.

Text Books
1. Tom White " Hadoop: The Definitive Guide" Third Editon, O'reilly Media,2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley2015.
3. Benjamin Bengfort& Jenny Kim, "Data Analytics with Hadoop" First Editon, O'reilly Media,2016.

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, Ambiga Dhiraj, "Big Data, Big Analytics : Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. Arvind Sathi, "Big Data Analytics: 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
SPEECH AND NATURAL LANGUAGE PROCESSING
(Professional Elective -VI)

Course code: GR20A4122   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives
1. To know the basics of regular expressions, text normalization, n gram representation and vector representation of text
2. To know word classes, Maximum Entropy Markov Models and Context-Free Grammars
3. To know about CKY parsing, PCFG parsing and CCG parsing techniques
4. To know the basics of dependency relations and formalisms, first order logic and description of logics.
5. To know about relation extraction using events and template filling, frame net and semantic role labeling.

Course Outcomes
1. To understand regular expressions, text normalization, n gram and vector representation of text
2. To understand word classes, Maximum Entropy Markov Models and Context-Free Grammars
3. To understand CKY parsing, PCFG parsing and CCG parsing, and dependency relations
4. To understand relation extraction using events and template filling, frame net and semantic role labeling
5. To understand discourse analysis and machine translation for question answering and speech recognition methods.

UNIT I
Introduction, Regular Expressions, Text Normalization, Edit Distance, N-gram Language Models Naïve Bayes and Sentiment Classification, Vector Semantics

UNIT II
Part-of-Speech Tagging, Formal Grammars of English Syntactic Parsing, Statistical Parsing, Hidden Markov Models (Forward and Viterbi algorithms and EM training).

UNIT III
Dependency Parsing, Neural shift-reduce dependency parsing, Efficientparsing for context-free grammars (CFGs). Statistical parsing, probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT IV
Discourse Analysis.Information Extraction: Relation extraction, Event extraction Semantic Role Labeling,IE using sequence labeling, Lexicons for Sentiment analysis

UNIT V
Machine Translation (MT): Basic issues in MT. Statistical translation, word alignment, phrase-based translation, and synchronous grammars.

TEXTBOOKS:

1. Daniel Jurafsky and James H. Martin. 2018. Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, andComputational Linguistics. 3^{rd}edition.Prentice-Hall.
2. Christopher D. Manning and HinrichSchütze. 1999. Foundations of Statistical Natural Language Processing. MITPress

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
STORAGE AREA NETWORKS
(Professional Elective VI)

Course Code: GR20A4123   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
Knowledge on Information retrieval system, Computer Networks, Cloud computing

Course Objectives:
1. Evaluate storage architectures, and Data Protection Methods.
2. Examine emerging technologies including IP-SAN.
3. Define backup, recovery, disaster recovery, business continuity, and replication.
4. Define cloud computing and storage virtualization technologies.
5. Identify components of Securing, managing and monitoring the data infrastructure.

Course Outcomes:
1. Understand the storage architectures and data protection Methods.
2. Explain components and the implementation of NAS
3. Identify the different types of backup, recovery and replication techniques.
4. Identify key challenges in managing information and analyze different storage networking technologies and virtualization
5. Illustrate the secure and storage infrastructure and management activities

UNIT I
Storage System Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing. Data Center Environment: Application, Host (Compute), Connectivity, Storage. **Data Protection-RAID:** RAID Implementation Methods, RAID Techniques, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, RAID Impact on Disk Performance. Intelligent Storage Systems: Components of Intelligent Storage System, Storage Provisioning.,

UNIT II
Storage Networking Technologies Fiber Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fiber Channel Architecture, Zoning, FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP, FCoE. **Network Attached Storage:** Components of NAS, NAS I/O Operation, NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage, Unified Storage.

UNIT III
Backup, Archive and Replication Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, BC Technology Solutions. Backup and Archive: Architecture of backup/recovery and the different backup/recovery topologies, Backup Methods, Backup Targets, Data De duplication for Backup, Backup in Virtualized Environments, Data Archive. Local Replication: Replication Terminology, Uses of Local Replicas, Local Replication Technologies, Local Replication in a Virtualized Environment. Remote Replication:

Remote Replication Technologies, Three-Site Replication, Remote Replication and 8 Hours Migration in a Virtualized Environment.

UNIT IV
Cloud Computing and Virtualization Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service Models, Cloud Deployment Models, Cloud Computing Infrastructure, Cloud Challenges and Cloud Adoption Considerations, Block level virtualization.

Virtualization Appliances: Black Box Virtualization, In-Band Virtualization Appliances, Out of-Band Virtualization Appliances, High Availability for Virtualization Appliances, Appliances for Mass Consumption. Storage Automation and Virtualization: Policy-Based Storage Management, Application-Aware Storage Virtualization, Virtualization-Aware Applications.

UNIT V
Securing and Storage Infrastructure Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments.

Managing the Storage Infrastructure Monitoring the Storage Infrastructure, Storage Infrastructure Management activities, Storage Infrastructure Management Challenges, Information Lifecycle management, Storage Tiering.

TEXT BOOKS:

1. Information Storage and Management, Author :EMC Education Services, Publisher: WileyISBN: 9781118094839
2. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN :9780321262516

REFERENCE :

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGrawHill, Osborne,2003.
2. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne,2001.
3. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited,2002.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN PATTERNS
(Professional Elective –VI)

Course Code: GR20A4124   **L/T/P/C: 3/0/0/3**
IV Year II Semester

Prerequisites:
Knowledge on 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 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 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, Composite.

UNIT IV
Structural Pattern Part-II: Decorator, Façade, Flyweight, Proxy.
Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, 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.

TEXTBOOKS:
1. Design Patterns by Erich Gamma, Pearson Education

REFERENCES:
1. Pattern's in JAVA Vol-I by Mark Grand,Wiley DreamTech.
2. Pattern's in JAVA Vol-II by Mark Grand,Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III by Mark Grand,Wiley DreamTech

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFT SKILLS AND INTERPERSONAL SKILLS
(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

REFERENCES:
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 BEHAVIOR
(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.

Textbooks:

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. Sudhir Naib, 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 Objective:
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, Percapital income,Quality of life, Capital Formation – Savings, Investment.

Unit III: NITI Aayog and Planning in India, Niti Aayog 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, more market 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.

Textbooks:

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. Rastogi Yozna and Kurukshetra Magazines