ACADEMIC REGULATIONS PROGRAMME STRUCTURE AND DETAILED SYLLABUS

Bachelor of Technology

Electronics and Communication Engineering

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

GOKARAJU RANGARAJU

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ACADEMIC REGULATIONS
PROGRAMME STRUCTURE
&
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Bachelor of Technology
Electronics and Communication Engineering

(Four Year Regular Programme)
(Applicable for Batches Admitted from 2020-21)

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

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAMME BACHELOR OF TECHONOGY IN ELECTRONICS AND COMMUNICATION ENGINEERING

GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2020 Regulations (GR20 Regulations) are given here under. These regulations govern the programmes offered by the Department of Electronics and Communication Engineering with effect from the students admitted to the programmes in 2020- 21 academic year.

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

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

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

4. Programme Pattern:

a) Each Academic year of study is divided in to two semesters.

b) Minimum number of instruction days in each semester is 90.

c) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).

d) The total credits for the Programme is160.

e) Student is introduced to "Choice Based Credit System (CBCS)".

f) A student has a choice to register for all courses in a semester / one less or one additional course from other semesters provided the student satisfies prerequisites.

g) All the registered credits will be considered for the calculation of final CGPA.

h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.

i) **Subject / Course Classification:** All subjects/ courses offered for the under graduate programme in E & T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	CourseDescription
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 ifhe/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 becondoned.

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

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

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

b. Distribution and Weightage of marks

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

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

Assessment Procedure:

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

d) Mini Project with Seminar: The Mini Project is to be taken up with relevance to Industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation. The supervisor continuously assesses the students for 20 marks (Continuous Assessment – 15 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committee for 10 marks. The mini project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 70 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor. Plagarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

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

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 theroad 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 PhaseII.Plagarism 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 beconsidered 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 ofhis/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 ofhis/her answer book on payment of a prescribed fee.

10.Supplementary Examinations: A student who has failed to secure the required creditscan appear for asupplementary examination, as per the schedule announced by the College.

11.Malpractices in Examinations: Disciplinary action shall be taken in case ofmalpractices during Mid / End-examinations as per the rules framed by the Academic Council.

12.Academic Requirements and PromotionRules:

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

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

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

13. Grade Points: A 10 - point grading system with corresponding letter gradesand percentage ofmarks, 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' inany 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) Sk the SGPA of k^{th} semester(1 to 8) is the ratio of sum of the product of the number of credits and grade points to the total credits of all courses registered by a student, i.e.,

$$SGPA\ (Sk) = \sum^{n}i{=}1\ (Ci * Gi) / \sum^{n}i{=}1\ Ci$$

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

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

$$CGPA = \sum_{i=1}^{m}(Ci * Gi) / \sum_{i=1}^{m} Ci$$

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

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

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

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

16. Transfer of students from the Constituent Colleges of JNTUH or from other Colleges / Universities: Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.

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

18. General Rules

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

b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.

d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

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

(Applicable for Batches Admitted from 2021-2022)

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

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

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

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

2. Academic Requirements and Promotion Rules:

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

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

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester.	Regular course of study of second year first semester.
2	Second year second semester to third year first semester.	(i) Regular course of study of second year second semester. (ii) Must have secured at least 50% credits up to second year second semesterfrom all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
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 theProgramme**
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**

Academic Regulations for B.Tech. with Minors Programme under GR20
(Applicable for Batches Admitted from 2020-21)

1. Objectives

The key objectives of offering B. Tech. with Minor program are:

- To expand the domain knowledge of the students in one of the other programmes of engineering.
- To increase the employability of undergraduate students keeping in view of better opportunity in interdisciplinary areas of engineering & technology.
- To provide an opportunity to students to pursue their higher studies in the inter-disciplinary areas in addition to their own programme of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrust areas of Engineering.

2. Academic Regulations for B.Tech. Degree with Minor programmes

a) The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4 -Years B.Tech. programme.

b) For B.Tech. with Minor, a student needs to earn additional 18 credits (over and above the required 160 credits for B.Tech. degree). All these 18 credits need to be completed in III year and IV year only.

c) After registering for the Minor programme, if a student is unable to earn all the required 18 credits in a specified duration (twice the duration of the course), he/she shall not be awarded Minor degree. However, if the student earns all the required 160 credits of B.Tech., he/she will be awarded only B.Tech. degree in the concerned programme.

d) There is no transfer of credits from Minor programme courses to regular B.Tech. degree course and vice versa.

e) These 18 credits are to be earned from the additional Courses offered by the host department in the college as well as from the MOOCS platform.

f) For the course selected under MOOCS platform following guidelines may be followed:

- **i)** Prior to registration of MOOCS courses, formal approval of the courses, by the University is essential. University before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.
- **ii)** Minimum credits for MOOCS course must be equal to or more than the credits specified in the Minor course structure provided by the University.
- **iii)** Only Pass-grade/marks or above shall be considered for inclusion of grades in minor grade memo.
- **iv)** Any expenses incurred for the MOOCS courses are to be met by the students only.

g) The option to take a Minor programme is purely the choice of the student.

h) The student shall be given a choice of withdrawing all the courses registered and/or the credits earned for Minor programme at any time; and in that case the student will be awarded only B.Tech. degree in the concerned programme on earning the required credits of 160.

i) The student can choose only one Minor programme along with his/her basic engineering degree. A student who chooses an Honors programme is not eligible to choose a Minor programme and vice-versa.

j) A student can graduate with a Minor if he/she fulfils the requirements for his/her regular B.Tech. programme as well as fulfils the requirements for Minor programme.

k) The institute shall maintain a record of students registered and pursuing their Minor programmes, minor programme-wise and parent programme -wise. The same report needs to be sent to the University once the enrolment process is complete.

l) The institute / department shall prepare the time-tables for each Minor course offered at their respective institutes without any overlap/clash with other courses of study in the respective semesters.

3. Eligibility conditions for the student to register for Minor programme

a) A student can opt for B.Tech. programme with Minor programme if she/he has no active backlogs till II Year I Semester (III semester) at the time of entering into III year I semester.

b) Prior approval of mentor and Head of the Department for the enrolment into Minor programme, before commencement of III year I Semester (V Semester), is mandatory

c) If more than 50% of the students in a programme fulfil the eligibility criteria (as stated above), the number of students given eligibility should be limited to 50%.

4. Registration for the courses in Minor Programme

a) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

b) The students should choose a course from the list against each semester (from Minors course structure) other than the courses they have studied/registered for regular B.Tech. programme. No course should be identical to that of the regular B.Tech. course. The students should take the advice of faculty mentors while registering for a course at the beginning of semester.

c) The maximum No. of courses for the Minor is limited to two (three in case of inclusion of lab) in a semester along with regular semester courses.

d) The registration fee to be collected from the students by the College is **Rs. 1000/-** per one credit.

e) A fee for late registration may be imposed as per the norms.

5. Minor courses and the offering departments

S. No.	Minor Programme	Eligible programme of students	@Offering Department	Award of Degree
1.	Artificial Intelligence & Machine Learning	All programmes, except B.Tech. in CSE (AI&ML) /B.Tech. (AI&ML)/ B.Tech. (AI)/ B.Tech. CSE(AI)	CSE	"B.Tech. in programme name with Minor in Artificial Intelligence & Machine Learning"

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Electronics and Communication Engineering)

B.Tech – ECE - GR20 Course Structure

I B. Tech (ECE) - 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	3	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**	**12**	**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 (ECE) - 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 (ECE) - 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	ECE	PC	GR20A2052	Electronic Devices and Circuits	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PC	GR20A2053	Digital Electronics	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PC	GR20A2054	Signals and Systems	3	0	0	3	3	0	0	3	30	70	100
4	ECE	BS	GR20A2055	Probability Theory and Stochastic Processes	2	1	0	3	2	1	0	3	30	70	100
5	Mgmt	HS	GR20A2004	Economics and Accounting for Engineers	3	0	0	3	3	0	0	3	30	70	100
6	ECE	PC	GR20A2056	Electronic Devices and Circuits Lab	0	0	2	2	0	0	3	3	30	70	100
7	ECE	PC	GR20A2057	Digital Electronics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	ECE	PC	GR20A2058	Signals and Systems Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
TOTAL					**15**	**0**	**5.5**	**20**	**18**	**0**	**6**	**27**	**270**	**630**	**900**
9	Chemistry	MC	GR20A2001	Environmental Science	2	0	0	2	2	0	0	2	30	70	100
10	CSE	MC	GR20A2006	Data Base for Engineers	2	0	0	2	2	0	0	2	30	70	100

II B. Tech (ECE) - 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	ECE	PC	GR20A2059	Network Analysis	2	1	0	3	2	1	0	3	30	70	100
2	ECE	PC	GR20A2060	Electromagnetic Fields and Transmission Lines	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PC	GR20A2061	Analog and Pulse Circuits	3	0	0	3	3	0	0	3	30	70	100
4	ECE	PC	GR20A2062	Analog and Digital Communications	3	0	0	3	3	0	0	3	30	70	100
5	Maths	BS	GR20A2008	Computational Mathematics for Engineers	3	0	0	3	3	0	0	3	30	70	100
6	CSE	ES	GR20A2064	OOPS through Java Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	ECE	PC	GR20A2065	Analog and Pulse circuits Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	ECE	PC	GR20A2066	Analog and Digital Communications Lab	0	0	2	2	0	0	3	3	30	70	100
TOTAL					**14**	**1**	**4.5**	**20**	**14**	**1**	**9**	**24**	**240**	**560**	**800**

III B. Tech (ECE) - 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	ECE	PC	GR20A3033	Microcontrollers and Interfacing	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PC	GR20A3034	Integrated Circuits and Applications	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PC	GR20A3035	Linear Control Systems	2	1	0	3	2	1	0	3	30	70	100
4	ECE	PE 1		Professional Elective-I	3	0	0	3	3	0	0	3	30	70	100
5	ECE	OE 1		Open Elective -I	3	0	0	3	3	0	0	3	30	70	100
6	ECE	PC	GR20A3040	Internet of Things Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	ECE	PC	GR20A3041	Microcontrollers and Interfacing Lab	0	0	2	2	0	0	4	4	30	70	100
8	ECE	PC	GR20A3042	Integrated Circuits and Applications Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
TOTAL					**14**	**1**	**5**	**20**	**14**	**1**	**9**	**24**	**240**	**560**	**800**
9	Mgmt	HS	GR20A2003	Constitution ofIndia	2	0	0	2	2	0	0	2	30	70	100

PROFESSIONAL ELECTIVE – I				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	PE	GR20A3036	Electronic Measurements and Instrumentation
2	ECE	PE	GR20A3037	Coding Theory
3	CSE	PE	GR20A3043	Computer Networks
4	ECE	PE	GR20A3038	Artificial Neural Networks

OPEN ELECTIVE – I				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	OE	GR20A3039	Principles of Communication

III B. Tech (ECE) - 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	ECE	PC	GR20A3107	Digital SignalProcessing	2	1	0	3	2	1	0	3	30	70	100
2	ECE	PC	GR20A3108	VLSI Design	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PC	GR20A3109	Antennas and Wave Propagation	3	0	0	3	3	0	0	3	30	70	100
4	ECE	PE 2		Professional Elective-II	3	0	0	3	3	0	0	3	30	70	100
5	ECE	OE 2		Open Elective-II	3	0	0	3	3	0	0	3	30	70	100
6	ECE	PC	GR20A3115	Digital Signal Processing Labthrough Python	0	0	1.5	1.5	0	0	3	3	30	70	100
7	ECE	PC	GR20A3116	VLSI DesignLab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	ECE	PW	GR20A3141	Mini Project with Seminar	0	0	2	2	0	0	4	4	30	70	100
TOTAL					**14**	**1**	**5**	**20**	**14**	**1**	**9**	**24**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2002	Value Ethics and Gender Culture	0	0	0	2	2	0	0	2	30	70	100

PROFESSIONAL ELECTIVE – II				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	PE	GR20A3110	Embedded System Design
2	ECE	PE	GR20A3111	Signal Processing for Speech and Biomedical Applications
3	ECE	PE	GR20A3112	Communication Technologies
4	ECE	PE	GR20A3113	Introduction to Machine Learning

OPEN ELECTIVE – II				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	OE	GR20A3114	Sensor Technology

IV B. Tech (ECE) - 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	Mgmt	HS	GR20A3140	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PE 3		ProfessionalElective-III	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PE 4		Professional Elective-IV	3	0	0	3	3	0	0	3	30	70	100
4	ECE	OE 3		Open Elective-III	3	0	0	3	3	0	0	3	30	70	100
5	ECE	PC	GR20A4036	Microwave and Optical Communications	3	0	0	3	3	0	0	3	30	70	100
6	ECE	PC	GR20A4045	Advanced Communications Lab	0	0	2	2	0	0	4	4	30	70	100
7	ECE	PC	GR20A4046	Microwave Engineering Lab	0	0	2	2	0	0	4	4	30	70	100
8	ECE	PW	GR20A4129	Project Work Phase I	0	0	6	6	0	0	12	12	30	70	100
TOTAL					**15**	**0**	**10**	**25**	**15**	**0**	**18**	**33**	**240**	**560**	**800**

PROFESSIONAL ELECTIVE – III				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	PE	GR20A4037	Digital System Design
2	ECE	PE	GR20A4038	Digital Image Processing
3	ECE	PE	GR20A4039	RADAR Systems
4	ECE	PE	GR20A4040	Internet of Nano Things

PROFESSIONAL ELECTIVE – IV				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	PE	GR20A4041	Hardware Accelerators and Architectures
2	ECE	PE	GR20A4042	Deep Learning for Signal ProcessingApplications
3	ECE	PE	GR20A4043	Software Defined Radio and Cognitive Radio
4	CSE	PE	GR20A4115	Cyber Security
OPEN ELECTIVE – III				
S. No.	**BOS**	**Group**	**Course Code**	**COURSE**
1	ECE	OE	GR20A4044	Cellular and Mobile Communications

IV B.Tech (ECE) - 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	ECE	PC	GR20A4107	Satellite Communication	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PE 5		Professional Elective-V	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PE 6		Professional Elective-VI	3	0	0	3	3	0	0	3	30	70	100
4	ECE	PW	GR20A4130	Project Work -PhaseII	0	0	6	6	0	0	12	12	30	70	100
TOTAL					**9**	**0**	**6**	**15**	**9**	**0**	**12**	**21**	**120**	**280**	**400**

PROFESSIONAL ELECTIVE – V				
S. No.	**BOS**	**Group**	**Course Code**	**Course**
1	ECE	PE	GR20A4108	Nano Electronics
2	CSE	PE	GR20A4051	Natural Language Processing
3	ECE	PE	GR20A4109	5G Technology
4	CSE	PE	GR20A3118	Cloud Computing

PROFESSIONAL ELECTIVE - VI				
S. No.	**BOS**	**Group**	**Course Code**	**Course**
1	ECE	PE	GR20A4110	Actuators and Robotics
2	ECE	PE	GR20A4111	Global Navigation Satellite System
3	ECE	PE	GR20A4112	Fundamentals of MIMO Wireless Communications
4	ECE	PE	GR20A4113	Software Defined Networking and Network Function Virtualization

PROFESSIONAL ELECTIVES - 4 THREADS

S. No.	Thread I	Thread II	Thread III	Thread IV
1	Electronic Measurementsand Instrumentation	Coding Theory	Computer Networks	Artificial NeuralNetworks
2	Embedded System Design	Signal Processing for Speech and Biomedical Applications	CommunicationTechnologies	Introduction to MachineLearning
3	Digital System Design	Digital Image Processing	RADAR Systems	Internet of Nano Things
4	Hardware Accelerators and Architectures	Deep Learning for Signal Processing Applications	Software Defined Radio and Cognitive Radio	Cyber Security
5	Nano Electronics	Natural Language Processing	5G Technology	Cloud Computing
6	Actuators and Robotics	Global Navigation SatelliteSystem	Fundamentals of MIMO Wireless Communications	Software Defined Networking and Network Function Virtualization

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. Distributed Database and Systems	**CSE (AIML)**
	1. Augmented Reality and Virtual Reality 2. Internet of Things 3. Human Computer Interaction	**CSE (DS)**
	1. Services Science and Service Operational Management 2. IT Project Management 3. Marketing Research and Marketing Management	**CSBS**
	1. Artificial Intelligence 2. Introduction to Data Science 3. Human Computer Interaction	**IT**
	1. Non-Conventional Energy Sources 2. Machine Learning 3. Artificial Intelligence Techniques	**EEE**
	1. Principles of Communication 2. Sensor Technology 3. Cellular and Mobile Communications	**ECE**
	1. Robotics 2. Composite Materials 3. Operations Research	**ME**
	1. Engineering Materials for Sustainability 2. Geographic Information Systems and Science 3. Environmental Impact Assessment and Life 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

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 methods.
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 ortho normalization of vectors, Q-R factorization, Singular value decomposition

Moore-Penrose pseudo inverse of a matrix, least squares solution of an over determined system of equations using pseudo inverse

UNIT IV

MULTIVARIABLE DIFFERENTIAL CALCULUS AND FUNCTION OPTIMIZATION

Partial Differentiation: Total derivative. Jacobian; Functional dependence

Unconstrained optimization of functions using the Hessian matrix, constrained optimization using Lagrange multiplier method

UNIT V

SINGLE VARIABLE CALCULUS

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem and Taylor's theorem (without proof), their geometrical interpretation, approximation of a function by Taylor's series

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (for Cartesian coordinates)

TEXT BOOKS

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
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 otherfields.
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:

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:

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:

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

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

UNIT IV

Engineering Materials and Water Technology:

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

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

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

Text Books:

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

References:

1. Organic Chemistry by Morrison, Boyd &Bhattacharjee (Pearson Pubs)
2. Solomons' Organic Chemistry, Wiley pubs
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell. McGraw HillPublication
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:

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 andworking of synchronous generators.

UNIT V

ELECTRICAL INSTALLATIONS

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

Text Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata 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, Parameters and return type of a function(categories of functions), call by value,call by reference,passing arrays to functions, recursion, merits and demerits of recursive functions, Storage classes.

UNIT IV

Pointers and Structures: Pointers: Idea of pointers, Defining pointers, Pointer to pointer, void pointer, Null pointer, Pointers to Arrays and Structures, Function pointer.
Structures and unions: Defining structures, Initializing Structures, Array of structures, Arrays

within structures, Nested structures, Passing structures to functions, Unions, typedef.

UNIT V

File handling and Preprocessor in C:

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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 KMnO4
4. Estimation of HCl by Conduct ometrictitrations
5. Estimation of Acetic acid by Conduct ometrictitrations
6. Estimation of Ferrous iron by Potentiometry using dichromate
7. Determination of rate constant of acid catalyzed reaction of methylacetate
8. Determination of acid value of coconutoil.
9. Adsorption of acetic acid by charcoal
10. Determination of surface tension of liquid by using stalagmometer
11. Determination of viscosity of liquid by using Ostwald'sviscometer.
12. Determinationofpartitioncoefficientofaceticacidbetweenn-butanolandwater.
13. Synthesis of Aspirin
14. Synthesis of Paracetamol.

Reference Books:

1. Vogel's text book of Practical organic chemistry, 5thEdition.
2. Senior Practical Physical Chemistry, B.D. Khosala, A. Gulati and V. Garg (R. ChCo.,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
2 3
4 5 6
7 8 9 10

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

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

c. Write a C program to calculate the following Sum:
   a. Sum=1+x/1!-x2/2!+x3/3!-x4/4!+…..xn/n!

TASK 6

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

TASK 7

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

TASK 8

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

TASK 9

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

TASK 10

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

TASK 11

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

TASK 12

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

TASK 13

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

TASK 14

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

TASK 15

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
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:

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:

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:

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

UNIT I

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

Time management: What is meant by time management; Impulsive behaviorVs goal directive behavior; The concept of time log; What are the usual time wasters for students; How to minimize time wasters.

Information overload and how to cope with it: ICT revolution; proliferation of electronic media; Exponential growth in online content; Impact of information overload on human brain; How information overload interferes with student learning.

UNIT II

How to master English Language Skills: Importance of English in a globalized world; For any engineer, the whole world is his job market; Companies conduct exams, interviews & group discussions in English; Interdependence of communication skills & language skills; Entrance exams to foreign universities test English language skills; What are the various language skills; Practical strategies to improve one's English language skills.

Communication Skills: What is communication; Various types of communication's; Why communication skills are important in the modern world; Importance given to communication by companies during recruitment; Barriers to effective communication; Practical strategies to improve one's communication skills.

Body language, Etiquette and Non-Verbal communication: What is etiquette, grooming, attire & body language? Why these are important in the modern world; What kind of etiquette is expected by companies; How success in career & life is interlinked to etiquette, grooming, attire & body language; practical steps to improve one's etiquette, grooming, attire & body language.

UNIT III

Science behind personal health management: Widespread ignorance in society on health issues; WHO definition of Health; Human evolution; Hunting & Gathering lifestyle; Importance of physical work for human body & mind; Dangers of sedentary lifestyle; Germ diseases Vs Lifestyle diseases; How to integrate physical exercise into daily life.

Science behind Addictions: What is an addiction? Neurology and hormonal basics of addictive behavior; How addictions are formed; Harmful effects of addictions on physical health & mental health; How to recognize the addictions in oneself; How to come out of addictions.

Stress management: What is stress; Various stressors faced by a student; Fight & Flight response of humans; Harmful effects of chronic stress; Symptoms of poor coping skills of stress; Stress & Psychiatric problems; Easy coping strategies for stress.

UNIT IV

Need for cultivating good hobbies: Why hobbies are important for maintaining work-life balance; how hobbies help in maintaining good physical and mental health, what are various hobbies.

What is habit? Why it is so important. How to cultivate good habits & discard bad habits: Why habits are critical for successful life; How habits forms; How to analyze one's own habits; How to recognize useless & harmful habits; How to cultivate & Sustain useful habits; Difference between hobby & habit.

Peer pressure and how to cope with it: Human being is a social animal; Physical pain & social pain; How to be aware of harmful social pressure; Role of prefrontal cortex in judgment and decision making; why teenagers are vulnerable to peer pressure; strategies to overcome harmful peer pressure.

UNIT V

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

Cross culture sensitization: What is culture; why there are different cultures; How to understand culture; Today all workplaces are multi-cultural; How stereotypes develop in the mind about other cultures; 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:

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

UNIT I
ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER

LDE of the first order: Solution of Exact, Linear and Bernoulli equations, modeling Newton's law of cooling, growth and decay models, modeling of R-L circuit

UNIT II
ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

LDE with constant coefficients: Complementary function, over damping, under damping and critical damping of a system, Particular integrals for *f(x)* of the form $e^{ax}, x^n, cosax, sinax, e^{ax}V(x)$ *and* $x\,V(x)$where $V(x) \equiv cosax$ *and* $sinax$, the method of variation of parameters

LDE with variable coefficients: Cauchy's homogeneous equation, Legendre's homogeneous equations

UNIT III
MULTIPLE INTEGRALS

Double integrals: Evaluation of Double Integrals, change of order of integration (only Cartesian form), change of variables (Cartesian and polar coordinates)

Triple Integrals: Evaluation of triple integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates)

Applications: Area using the double integral –Volume of a solid using the double and triple integral-Mass, Center of mass and Center of gravity using double and triple integrals

UNIT IV

VECTOR DIFFERENTIATION AND LINE INTEGRATION

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

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

UNIT V

SURFACE INTEGRATION AND VECTOR INTEGRAL THEOREMS

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

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

TEXT BOOKS

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
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:

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:

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:

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:

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:

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, Pyramid and Prism).

UNIT V

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

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

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

Text /Reference Books:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
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:

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**
1. **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 – Idris Mootee.

REFERENCE BOOKS:

1. Zero to One: Note on Start-Ups, or How to Build the Future
2. The Lean Startup: How Constant Innovation Creates Radically Successful Businesses
3. Start With Why: How Great Leaders Inspire Everyone To Take Action

II YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTRONIC DEVICES AND CIRCUITS

Course Code: GR20A2052 **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:
1. To understand the components and its functionality such as Diodes, BJTs and FETs.
2. To know the switching characteristics of components
3. To classify and compare the functionalities of diodes, BJTs and FETs
4. To know the applications of components.
5. To understand the various types of circuits used in Engineering Field.

Course Outcomes:
1. Describe about different types of diodes, transistors and applying them for understanding various circuits.
2. Know the characteristics of various components.
3. Analyze the working principles of various components.
4. Ability to express functioning of diodes, BJT's, UJT's, FET's and SCR's.
5. Analyze and design various circuits for different applications in Engineering Field.

UNIT I
Semiconductors and PN junction Diode: Semi-conductor physics: n and p type semiconductors mass action law, Fermi level in intrinsic and extrinsic semiconductors, Open circuited p-n junction, Energy band diagram of p-n junction diode Forward and reverse bias, Current components in p-n diode , Law of junction, Diode equation Volt-ampere characteristics of p-n diode, Temperature dependence of V-I Characteristics ,Transition and Diffusion capacitances , Breakdown, Mechanisms in semiconductor Diodes(Avalanche and Zener break down), Zener diode Characteristics**.**

UNIT II
Power Amplifiers: Half wave rectifier, Full wave rectifier and Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L-section filter, Π section filter and comparison of various filter circuits in terms of ripple factors, Simple circuit of a Zener diode as a voltage regulator.
Special Diodes: Characteristics of Tunnel Diode, Varactor diode, LED.

UNIT III
Bipolar Junction Transistor: Junction Transistor, Transistor Current Components, Transistor Construction, Detailed Study of currents in a transistor, Input and output characteristics of transistor in common Base , Input and output characteristics of transistor in common Emitter and common collector configurations, Relation between Alpha and Beta and Gamma ,Typical transistor junction voltage values.
Junction Field Effect Transistors (JFET): JFET Characteristics (n and p channels), MOSFET characteristics (Enhancement and depletion mode), Introduction to SCR and UJT.

UNIT IV

Biasing and Stabilization: BJT biasing, DC Equivalent Model, Criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for Stabilization , Stabilization factors, Compensation techniques, Compensation against variation in V_{BE} and $I_{CO,}$ Thermal run away, Thermal Stability

UNIT V

Amplifiers: Small Signal low frequency amplifier circuits, h-parameter representation of a transistor, Analysis of Single Stage transistor amplifier using h-parameters: voltage gain, current gain Input and Output impedance, Comparison of transistor configurations in terms of Ai, Ri, Av, Ro

Text/Reference Books:

1. Integrated Electronics - Jacob Millman and Christos C Halkias, 1991 ed., 2008, TMH.
2. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 ed., 2008PE.
3. Electronic Devices and Circuits, S Salivahanan and N Suresh kumar, McGraw Hill Education.
4. Introductory Electronic Devices and Circuits– Robert T. Paynter, 7 ed., 2009, PEI.
5. Electronic Circuit Analysis – K. Lal Kishore, 2004, BSP.
6. Electronic Devices and Circuits, David A. Bell – 5 ed., Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL ELECTRONICS

Course Code: GR20A2053 **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:

1. To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
2. To study the combinational logic design of various logic and switching devices and their realization, verilog programming concepts.
3. To study the sequential logic circuit design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations using verilog.
4. To study the sequential elements like registers, counters and their usage in the real world.
5. To understand characteristics of memory and their classification, concept of Programmable Devices, PLA, PAL and CPLD and implement digital system using verilog.

Course Outcomes:

1. Aware of theory of Boolean algebra, Logic gates & the underlying features of various number systems.
2. Use the concepts of Boolean algebra for the analysis & design of various combinational logic circuits, can able to write verilog program.
3. Use the concepts of Boolean algebra for the analysis & design of various sequential logic circuits, can able to write verilog program.
4. Apply the fundamental knowledge of analog and digital electronics to design different circuit elements like registers and counters which are very useful for real world with different changing circumstances.
5. Classify different semiconductor memories, Design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays and and implement digital system using verilog.

UNIT I

Boolean algebra & Logic Gates: Number systems, Number- Base Conversions, Signed Binary Numbers, Binary Codes, Axiomatic Definition of Boolean Algebra, Basic Theorems, Boolean Functions, Canonical and standard Forms. Logic Gates: Digital Logic Gates, NAND and NOR Implementation, Exclusive-OR Function, Integrated Circuits, Gate-level Minimization, The K-Map Method, Four- Variable Map, Five-Variable Map, Don't-care Conditions.

UNIT II

Combinational logic circuits: Introduction to Combinational circuits, Analysis Procedure, Design Procedure, Codeconversion, Binary Adder-Subtractor, Carry Propagation, Half Subtractor, Full Subtractor, Binary Subtractor, Decimal Adder, BCD adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers with design examples. Introduction to verilog to implement combinational circuits.

UNIT III

Sequential Logic circuits: Difference between combinational and sequential logic circuits, Flip-Flops, Triggering of Flip Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Fundamentals of Asynchronous Sequential Logic: Introduction, Analysis procedure, Circuits with Latches, Design Procedure. verilog code to implement sequential circuits.

UNIT IV

Registers and Counters: Registers with parallel load, Shift registers, Serial Transfer, Serial Addition, Universal Shift Register, Ripple Counters, Binary Ripple Counter, BCD Ripple Counter, Synchronous Counters, Binary Counter, Up-Down Counter, BCD Counter, Binary Counter with Parallel Load, Counter with Unused States, Ring Counter, Johnson Counter, verilog to design Registers and Counters.

UNIT V

Memory and Programmable Logic: Types of Memories, Random-Access Memory, Read-Only Memory, Memory Operations, Timing waveform, Memory Decoding, Internal Construction, Address Multiplexing, Combinational Circuit Implementation, PROM, Combinational PLDs, Programmable Logic Array, Programmable Array Logic.

Text/Reference Books:

1. M Morris Mano and Michael D.Ciletti, Digital Design, Pearson 6th ed2018.
2. Charles H.Roth Jr.,Larry L. Kinney, Fundamentals of Logic Design, Cengaue learning 6th edition, 2013
3. J. Bhaskar, “A Verilog HDL Primer Hardcover”
4. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rdEdition, Cambridge, 2010.
5. Modern Digital Electronics – R. P. Jain, 3rd edition, 2007- Tata McGraw-Hill.
6. Introduction to Switching Theory and Logic Design – Fredric J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
7. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS

Course Code: GR20A2054 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

1. To understand the basic concepts of Continuous Time Signals (CTS) and Discrete Time Signals (DTS) and their properties
2. To interpret the CTS as a sum of infinite orthogonal functions and analyse their working in time and frequency domains.
3. To employ the transformation techniques like Fourier, Laplace and Z-transforms
4. To represent the CT System in mathematical form and acquire knowledge of the properties and vital concepts of systems to work in application areas like filtering, communication and signal processing.
5. To apply the concepts of sampling process of analog signals and A/D and D/A conversions.

Course Outcomes:

1. Explain the fundamentals and detailed mathematical analysis of deterministic CTS and DTS and their spectra
2. Represent a deterministic CTS in terms of Fourier series and analyze its frequency spectra
3. Discriminate the application of Fourier, Laplace and Z-transforms appropriately on CTS and DTS
4. Analyze the effect of convolution on LTI systems and their working in time and frequency domains
5. Design basic filtersfor signal processingby applying the band-limited sampling theorem concepts.

UNIT I

Introduction to Continuous-time Signals and Fourier series

Part-A: Representation of Continuous-time Signals: Introduction to typical signals; Time-domain operations; Continuous-time signal characteristics (periodicity, frequency, deterministic and random, symmetry, energy and power); Analogy between vectors and signals; Orthogonal signal space; Signal approximation using orthogonal functions; Mean squared error; Orthogonality in complex functions.

Part-B: Fourier Series: Representation of continuous-time periodic signals by Trigonometric and Exponential Fourier series; Dirichlet's conditions; Properties of Fourier series, Parseval's theorem; Complex Fourier spectrum, Power Spectrum.

UNIT II

Fourier Transform, and Laplace Transform: Fourier transform via Fourier series; Convergence of Fourier transform; Fourier transforms of basic signals like impulse function, UNIT step, signum function and for various periodic and aperiodic signals; Properties of Fourier transforms, Parseval's theorem; Definition of two-& one-sided Laplace Transform (LT), Relation between LT and FT, Region of convergence (ROC) and Properties of LT.

UNIT III

Signal Transmission through Linear Systems Continuous-time Linear Time-Invariant systems Representation by differential equations, Properties of continuous-time systems (linearity, time invariance, causality and stability); Impulse response, Convolution; Transfer function, frequency response; Ideal vs. realizable LPF, HPF and BPF characteristics; Signal bandwidth, system bandwidth, rise-time, gain-bandwidth; Distortion; Causality and Paley-Wiener criterion for physical realization.

UNIT IV

Discrete Time signal characteristics (periodicity, frequency, deterministic, random, symmetry, energy and power), Discrete Time (DT) signal representation using complex exponential and sinusoidal components; z-Transform of a discrete sequence; Relationship between z-Transform and Discrete Time Fourier Transform; Transfer function of a LTI system (No difference equations); Region of convergence of z-Transform, Constraints on ROC for various classes of signals; Properties of z-Transform, Inverse z-Transform by Partial Fractions (simple poles only).

UNIT V

Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals; Impulse-train sampling; Reconstruction of signal from its samples; Undersampling and Aliasing; Natural and Flat-top sampling, Band pass sampling.

Text/Reference Books

1. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, “Signals and Systems”, Second Edition, PHI Learning, New Delhi, 2007.
2. B. P. Lathi, Signals, Systems and Communications-B.S. Publications, 2003.
3. Simon Haykin and Barry Van Veen, “Signals and Systems”, Edition, John Wiley and Sons, 2002.
4. Principles of Communication Systems by GoutamSaha,Herbert Taub& Donald Schilling, III Edition, Tata Mc graw Hill Education Private Limited
5. M J Roberts, “Signals and Systems”,2e, TMH, 2012.
6. Hwei P. Hsu, “Signals and Systems”, 3e, McGraw Hill Education,2014.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: GR20A2055 **L/T/P/C: 2/1/0/3**
II Year I Semester

Course Objectives:

1. To manage situations involving more than one random variable and functions of random variables in engineering applications.
2. To analyze the various concepts like autocorrelation and cross correlation, power spectral density.
3. To understand the properties of random signals through time and frequency domain representation.
4. To compare the various noises involved in communication and their effects.

Course Outcomes:

1. Define probability and interpret probability by modeling sample spaces.
2. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.
3. Apply the concepts of random process in communication and signal processing.
4. Evaluate response of a linear system to Random Process
5. Analyze the importance of various probability distributions in signal analysis

UNIT I
INTRODUCTION TO PROBABILITY

Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Baye's Theorem, Independent Events, Random Variable, Functions of random variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Binomial, Poisson, Uniform, Gaussian Distribution. Simulation of Baye's Theorem in MATLAB.

UNIT II
OPERATIONS ON SINGLE VARIABLE – EXPECTATIONS

Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables. Simulation of Moments in MATLAB

UNIT III
OPERATIONS ON & MULTIPLE RANDOM– EXPECTATIONS

Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions. Simulation of Central Limit Theorem in MATLAB.

UNIT IV

RANDOM PROCESSES -TEMPORAL and SPECTRAL CHARACTERISTICS

The Random process, classification, deterministic and non-deterministic processes, distribution and density Functions, stationarity and statistical independence, first-order stationary processes, second-order and wide-sense stationarity, auto correlation function and its properties, cross-correlation function and its properties, covariance functions, Gaussian random processes, random signal response of linear systems, autocorrelation and cross-correlation functions of input and output.

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output. Simulation of Gaussian random process in MATLAB.

UNIT V

MODELLING OF NOISE: Classification of Noise, types and sources of noises, Thermal Noise Source, Effective Noise Temperature, Average Noise Figures. Simulation and analysis of White Noise in MATLAB.

Text/Reference Books:

1. Probability, Random Variables and Stochastic Processes - Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.
2. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001
3. Random Processes for Engineers-Bruce Hajck, Cambridge unipress,2015
4. Probability, Statistics & Random Processes-K .Murugesan, P. Guruswamy, Anuradha Agencies, 3rd Edition, 2003.
5. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.
6. Digital Modulations using Matlab: Build Simulation Models from Scratch- Mathuranathan Viswanathan-ebook, 2017.

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 I 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:

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTRONIC DEVICES AND CIRCUITS LAB

Course Code: GR20A2056 **L/T/P/C: 0/0/3/2**
II Year I Semester

Course Objectives:

1. To Know the characteristics of various semiconductor devices.
2. To Know the applications of Components.
3. To Compare the functionalities of Diodes, BJTs and FETs.
4. To apply concepts for the design of voltage regulator.
5. To verify the theoretical concepts through laboratory and simulation Experiments.

Course Outcomes:

1. Analyze the characteristics of various semiconductor devices
2. Apply the knowledge of semiconductors
3. Design various circuits based on the characteristics of the components.
4. Apply concepts for the design of voltage regulator.
5. Verify the theoretical concepts through laboratory and simulation.

LIST OF EXPERIMENTS

Hardware of any 10 Experiments and Simulation of any 5 Experiments using Multisim Software.

1. Forward and Reverse Bias V-I Characteristics of PN junction Diode.
2. V-I Characteristics of Zener diode.
3. Zener diode as Voltage Regulator.
4. Half wave Rectifier without and with filter
5. Full wave Rectifier without and with filter.
6. Bridge rectifier without and with filter.
7. Characteristics of a BJT under CB configuration.
8. Characteristics of a BJT under CE configuration.
9. Measurement of h-parameters of transistor in CE configuration.
10. Characteristics of a JFET under CS configuration.
11. V-I Characteristics of MOSFET.
12. V-I Characteristics of UJT

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL ELECTRONICS LAB

Course Code: GR20A2057 **L/T/P/T: 0/0/3/1.5**
II Year I Semester

Course Objectives:

1. To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
2. To study the various coding schemes are the part of the digital circuit design.
3. To study the combinational logic design of various logic and switching devices and their realization.
4. To study the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations.
5. To Explain and analyze the VERILOG programming concepts for the design of digital circuits.

Course Outcomes:

1. Explain theory of Boolean Algebra & the underlying features of various number systems.
2. Analyze the various coding schemes are the part of the digital circuit design.
3. Construct basic combinational circuits and verify their functionalities.
4. Apply the design procedures to design various sequential logic circuits.
5. Design of various circuits with the help of VERILOG Coding techniques.

LIST OF EXPERIMENTS

TASK-1: XILINX ISE QUICK Start Tutorial
TASK-2: Introduction to VERILOG Programming
TASK-3: Design and Simulation of Combinational Logic Circuits Using VERILOG

i. Realization of Logic GATEs
ii. Half adder and Full adder circuits
iii. Magnitude comparator
iv. Binary to Gray and Gray to Binary converter
v. Encoder & Decoder
vi. Parity Checker

TASK-4: Design and Simulation of sequential logic circuits using VERILOG

i. D and T Flip-Flops
ii. SR and JK flipflops
iii. Frequency Divider
iv. Left and Right Shift Register
v. Serial to Parallel and Parallel to Serial converter
vi. Binary Counter
vii. Asynchronous BCD Up counter
viii. Synchronous down counter
ix. MOD 5 and MOD 10 counters

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS LAB

Course Code: GR20A2058 **L/T/P/C: 0/0/3/1.5**

II Year I Semester

Course Objectives

1. To provide a thorough understanding and analysis of signals and systems using MATLAB platform
2. To generate and process various deterministic continuous and discrete-time signals.
3. To be aware of the underlying phenomenon of Fourier analysis thereby analyzing the signals and sequences transforming them into frequency domain
4. To demonstrate the system representation and characterize the properties of Linear Time-Invariant (LTI) systems
5. To process continuous-time signals by first sampling and then processing the sampled signal in discrete-time.

Course Outcomes:

1. Understand basics of MATLAB syntax, functions and programming.
2. Generate and characterize various continuous and discrete time signals.
3. Design and analyze linear time-invariant (LTI) systems and compute its response.
4. Analyze the spectral characteristics of signals using Fourier analysis, Laplace transform and Z-transform.
5. Process continuous-time signals by first sampling and then processing the sampled signal in discrete-time and employ for signal processing applications.

List of Experiments

1. Perform Basic Matrix Operations with the help of Matlab program.
2. Illustrate the basic periodic and aperiodic signals/sequences with the help of Matlab Program.
3. Write a Matlab Program to perform the basic operations like Addition, Multiplication, Folding, Shifting, and Flipping, evaluating Energy and Power for various periodic and aperiodic signals.
4. Segregate with the help of Matlab program Even, Odd, Real and Imaginary parts of given signal/sequence.
5. Verify Gibb's phenomenon for the various periodic waveforms by Fourier series representation.
6. Find the Fourier Transform of (not limited to)

a. A **b**. u(t) **c**. $A.e^{-t}u(t)$ **d**. $Ate^{-t}u(t)$ **e**. ACosωt

7. (i) Find the Laplace transform of(not limited to)

a. Sin(ωt) **b**. Sin(ω(t-1))

(ii) Find Inverse Laplace Transform of Y(s)= 24/s(s+8)

8. a. Prove that the given system y(t)=t*x(t) is linear in nature.

b. Prove that the given system $y(n)=n*x(n)+n^2*x^2(n)$ is Time Variant.

9. For any given LTI system, compute the Impulse Response.
10. Demonstrate Convolution of two continuous time signals and discrete time sequences with the help of Matlab program.
11. Evaluate the Z-Transform of

a. n **b**. a^n **c**. $n.a^n$ **d**. $e^{(-a*n*t)}$

12. Locate the Poles and Zeros of a given Transfer function in S-Plane and Z-Plane respectively

a. $H(s)=\frac{s^2-2s+1}{s^3+6s^2+11s+6}$ **b**. $H(Z)=\frac{-1+Z^{-1}}{1+Z^{-1}+0.16Z^{-2}}$

13. Verify the Sampling Theorem for various conditions prevailing between Sampling Frequency (fs) and Message Frequency (fm)

a. fs<2 fm **b**. fs=2 fm **c.**fs>2fm

14. Perform Auto Correlation and Cross Correlation on various sequences with the help of Matlab program.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENVIRONMENTAL SCIENCE

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

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

UNIT I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem 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 management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Resource exploitation, Crazy Consumerism, Environmental Education, Environmental Ethics, Concept of Green Building.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA BASE FOR ENGINEERS

Course Code: GR20A2006 **L/T/P/C: 2/0/0/2**
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 DBMS, Data Base System Applications, Data Base System VS File System, Instances And Schemas, Data Models – The ER Model, ER Diagrams –Attributes And Entity Sets – Relationships And Relationship Sets – Concept Design With The ER Model .
To Practice:
1)Practicing DDL commands: Creating tables for various relations (in SQL).
2) Practicing Hostel Management System ER Diagram, Airlines Reservation System ER Diagram.

UNIT II

Relational Model: Introduction To The Relational Model – Basic Structure, Database Schema, Keys, Form Of Basic SQL Query – Database Langugages , DDL , DML , Examples Of Basic SQL Queries
To Practice:
Practicing SQL Queries of above mentioned topics

UNIT III

SQLoperators,SQL functions, JOINS, -Types of Joins,Introduction To Nested Queries, Set Operators,Integrity Constraints over relations,Introduction to Views , Destroying / altering tables and views.Practice on DCL and TCL commands.
To Practice:
Practicing SQL Queries of above mentioned topics

UNIT IV

Pitfalls in relational databases,Functional Dependencies ,Importance of Normalization– 1NF,2NF,3NF,BCNF,4NF

To Practice:

Concepts of Normalizations and its types, Writing Assertions.

UNIT V

Transaction Concept- Transaction state,ACID properties, Concurrent executions,Serializability, Lock based protocols,Log based recovery.

To Practice:

Practicing, DCL and TCL commands,(Commit, rollback, Save points, Grant, Revoke and Roles commands on tables)

TEXT BOOK:

1. "Data base Management Systems", Raghurama Krishnan, Johannes Gehrke, TATAMcGraw Hill 3rd Edition

REFERENCE BOOKS:

1."Data base System Concepts", Silberschatz, Korth, McGraw hill, V edition.
2. "Introduction to Database Systems", C.J.Date Pearson Education.
3. "Database Systems design, Implementation, and Management", Rob & Coronel 5th Edition.
4. "Database Management Systems", P. Radha Krishna HI-TECH Publications 2005.
5. "Database Management System", ElmasriNavate Pearson Education.
6. "Database Management System", Mathew Leon, Leo.

II YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NETWORK ANALYSIS

Course Code: GR20A2059 **L/T/P/C: 2/1/0/3**
II Year II Semester

Course Objectives:

1. To distinguish basic concepts, techniques and applications of Electrical circuits
2. To describe various fundamental techniques for analysis of electrical circuits.
3. To apply the working principles of linear constant coefficient differential equations with the help of Laplace Transforms in electric circuits
4. To solve and compile the techniques like cut-set, tie-set, pole zero parameters and its stability
5. To compare the transient analysis with different network models

Course Outcomes:

1. Comprehend the mathematical expression for voltages and currents in RL, RC and RLC circuits to find the transient response of inductor and capacitor in dc circuits.
2. Analyze the concept with working principles of linear constant coefficient differential equations with the help of Laplace transforms.
3. Know the basic skills of an ac circuits with independent/dependent voltage current sources by drawing impedance/admittance diagrams or using various laws/ techniques like source conversion.
4. Discriminate the concepts like cut-set, tie-set, pole zero parameters and stability analysis
5. Interpolate the two-port network parameters, conversion between parameters, interconnection of two port networks.

UNIT I

Review of Network Elements: Network Elements - Self and Mutual inductance – Dot rule - Coefficient of coupling - Analysis of multi-winding coupled (series and parallel) circuits; Natural response and forced response - DC Transients: Inductor - Capacitor - Concepts of Natural, Forced and Complete response of RL, RC and RLC Circuits

UNIT II

S-Domain Analysis of Circuits: Review of Laplace Transform - Transformation of a circuit into S-domain - Transformed equivalent of inductance, capacitance and mutual inductance - Impedance and admittance in transform domain - Node analysis and Mesh analysis of the transformed circuit.

UNIT III

Sinusoidal steady state analysis: Characteristics of sinusoids - Forced Response to Sinusoidal Functions - The Complex Forcing Functions, The Phasor, Phasor Relationship for R,L and C - Impedance and Admittance - Phasor Diagram.

UNIT IV

Network Topology: Network terminology - Graph of a network - Incidence and reduced incidence matrices – Cutsets - Fundamental cutsets - Cutset matrix – Tiesets. Network Functions: Poles and zeros of network functions, Network functions for the one- and two- ports, Restrictions **on pole and zero locations for driving point functions and transfer functions.**

UNIT V

Two Port Network Parameters: Open circuit impedance (Z) parameters - short circuit admittance(Y) parameters - transmission (ABCD) parameters and inverse transmission parameters - Hybrid (h) parameters and inverse hybrid parameters - Conversion between parameters - interconnection of two-port networks. Lattice networks, Image parameters.

Text Books

1. William H. Hayt Jr. and Jack E. Kemmerly, ‘ Engineering Circuit Analysis‘, 6th Edition, McGraw Hill 2008.
2. Vanvalkenburg M.E, ‘Network Analysis‘, PHI, 3rd Edition, 2007.
3. Kuo F. F., ―Network Analysis and Synthesis‖, 2nd Ed., Wiley India.,2008.

Reference Books

1. Edminister J. Circuit Theory‘, Schaum‘s outline Series, TMH 1998
2. Valkenberg V., Network Synthesis. 2008

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

Course Code: GR20A2060 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. Carryout a study on various analytical methods of calculating electric field intensities and electric potentials
2. Carryout a study on various analytical methods of calculating magnetic field intensities and magnetic potentials
3. Carryout a study on time varying electrical and magnetic field intensities and consolidating important laws as Maxwell's Equations,
4. Carryout fundamentals of uniform plane waves in various media; calculation of power density and reflection
5. Carryout a study on transmission lines and usage of Smith Chart

Course Outcomes:

1. Apply Coulomb's law, Gauss's law equations for calculating electric field intensities and electric potentials in vacuum and materials due to various charge distributions
2. Apply Biot-Savart's law, Ampere's circuital law for calculating magnetic field intensities and potentials (scalar & vector) in vacuum and materials due to steady electric currents
3. Apply Faraday's law in generation of Electro Motive Force and modified Ampere's law to get finalized forms of Maxwell's equations
4. Apply fundamentals of uniform plane waves in various electromagnetic wave propagation problems
5. Apply filed theory, circuit theory and Smith chart knowledge to transmission lines

UNIT I

Electrostatics: Coulomb's Law, Force on a discrete charge due to single charge and charge distributions, Electric Field Intensity – Fields due to Different Charge configurations, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V(Potential gradient), Maxwell's Equations for Electrostatic Fields(Divergence and curl of Electric field). Convection and Conduction Currents, Point form of Ohm's Law, Continuity Equation, Boundary conditions (only statements no derivation). Simulation of electrostatic fields using Matlab or CST Studio Suite.

UNIT II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Equations for Magnetostatic Fields(Divergence and curl of Magnetic field), Magnetic Scalar Potentials, Force between current-carrying conductors, .Boundary conditions (only statements). Inductance fundamental. Simulation of magnetostatic fields using Matlab or CST Studio Suite.

UNIT III

Time Varying Fields, Maxwell's Equations and Wave Equations: Faraday's Law -Transformer EMF and motional EMF, Concept of Displacement Current. Maxwell's Equations in final forms, Vector wave equation (Helmholtz Equation), Solution of one-dimensional wave equation. Uniform Plane

wave characteristics. Simulation of Uniform plane waves using Matlab or CST Studio Suite.

UNIT IV

EM Wave Propagation in Different Media: – Loss tangent, Classification of materials into good conductors, good dielectrics and quasi conductors. Wave propagation in good conductors, good dielectrics and quasi conductors, Instantaneous and average Poynting vectors, Reflection, and Transmission coefficients of Normal incidence. Qualitative understanding of Oblique incidence with final expressions (no derivations).Simulation of wave movement in different media using Matlab or CST Studio Suite.

UNIT V

Transmission Lines: Transmission Line Parameters, Transmission Line Equations, Characteristic Impedance, Propagation characteristics, Lossless/ Low Loss Line Analysis, Conditions for Distortion less Transmission and Minimum Attenuation. Finite Transmission Line, Input Impedance, Short Circuit and Open Circuit Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements - $\lambda/2$, $\lambda/4$, $\lambda/8$ Lines. Impedance Transformations and Matching.

Smith Chart– Theory and Applications, Single Stub Matching. Propagation between Parallel Plates, Modes, Cut-off Frequencies, Phase and Group Velocities, Wavelengths, Wave Impedances.

Text/Reference Books:

1. Principles of Electromagnetics – Matthew N.O. Sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015.
2. EM waves and radiating systems by E C Jordan and Balmain.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 8th Ed., McGrawHill,2014

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ANALOG AND PULSE CIRCUITS

Course Code: GR20A2061 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. Learn the concepts of high frequency analysis of transistors.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback
4. To construct various multivibrators using transistors and sweep circuits.
5. To apply and analyze various amplifiers and multivibrator circuits for various applications.

Course Outcomes:

1. Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
2. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
3. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
4. Design multivibrators and sweep circuits for various applications.
5. Apply and analyze various amplifiers and multivibrator circuits for various applications.

UNIT I

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid -πmodel of Common Emitter transistor model, fα, fβ and UNITy gain bandwidth, Gain-bandwidth product.

UNIT II

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

UNIT III

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

UNIT IV

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.

Tuned Amplifiers: Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

UNIT-V

Multi-vibrators: Types of Triggering, Analysis and Design of Bistable, Monostable, AstableMulti-vibrators and Schmitt trigger using Transistors.

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

Text/Reference Books:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition 2010
2. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
3. Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford, 1986.
4. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson
5. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. PrakashRao, 2 Ed., 2008, TMH.
6. Pulse, Switching and Digital Circuits – 5thEdition, David A. Bell, Oxford, 2015
7. Linear Integrated Circuits, D. Roy and Choudhury, Shail B. Jain, 4th Edition, New Age International (P) Limited, 2010.
8. Operational Amplifiers and Linear Integrated Circuit Theory and Applications, Denton J Dailey, McGraw-Hill, 1989. 8. Applications and Design with Analog Integrated Circuits, J. Michael Jacob, 2nd Edition, PHI, 2003.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ANALOG AND DIGITAL COMMUNICATIONS

Course Code: GR20A2062 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.
5. To analyze the various modulation techniques in different environments.

Course Outcomes:

1. Analyze various continuous wave and angle modulation and demodulation techniques.
2. Understand the effect of noise present in continuous wave and angle modulation techniques.
3. Attain the knowledge about AM, FM Transmitters and Receivers.
4. Analyze and design the various Pulse, Digital Modulation Techniques and Baseband transmission.
5. Apply and analyze the various Modulation techniques in different environments.

UNIT I

Amplitude Modulation: Introduction to Communication Systems: Modulation – Types – Need for Modulation. Theory of Amplitude Modulation – Evolution and Description of AM, DSBSC and SSB Techniques. Generation and Detection of AM, DSBSC and SSB waves. Vestigial side band modulation: Time and Frequency description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier. SNR concepts, AM Receiver, Noise in AM, DSBSC and SSB, Threshold effect in AM systems.

UNIT II

Angle Modulation: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band and Wide band FM, Generation of FM Waves: Direct and Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM, PM and FM. FM receiver, Noise in angle modulation: FM, PM. Threshold effect in FM, Pre-emphasis and De-emphasis.

UNIT III

Pulse Modulation

Types of Pulse modulation: PAM, PWM and PPM, Comparison of FDM and TDM.

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, DM, Noise in DM and Adaptive DM.

UNIT IV

Digital Modulation Techniques

BASK Modulator and Demodulator, BFSK Modulator and Demodulator, BPSK Modulator and Demodulator, QPSK Modulator and Demodulator, Differential PSK.

Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver

and its probability of error, Optimum Receiver, Matched Filter, Probability of error for ASK, PSK, FSK, Inter Symbol Interference (ISI).

UNIT V

Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN-Sequences: Generation and Characteristics, Synchronization in Spread Spectrum Systems, Gold Sequences.

Text books:

1. An introduction to analog and digital communications, Haykin, Simon S. Vol. 1. New York: Wiley, 1989.
2. Analog and digital communications, Sanjay Sharma
3. Communication Systems - Simon Haykin, John Wiley, 5th Ed. 2009
4. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, Mcgraw-Hill, 2008.

Reference Books:

1. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, 2009, PHI.
2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
3. Electronics & Communication System – George Kennedy and Bernard Davis , TMH 2004
4. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTATIONAL MATHEMATICS FOR ENGINEERS

Course code: GR20A2008 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

1. Distinguish between analytical and numerical solutions arising in mathematics.
2. Take part in providing solutions to problems hitherto unsolvable due to their complexnature.
3. Construct a hidden function from given data
4. Interpret concepts like interpolation, numerical differentiation and integration.
5. Utilize the concept of finite differences and its applications in numerical techniques.

Course Outcomes:

1. Apply well known techniques to find real roots of an equation and linear algebraic systems byiterative methods.
2. Utilize interpolation techniques for univariate and bivariate data using Gaussian and cubicspline methods.
3. Apply numerical techniques to find eigenvalues and corresponding eigenvectors of a matrix.
4. Make use of numerical techniques in differentiation and integration.
5. Model finite differences method to solve IVP in ODE and PDE.

UNIT I

Root finding and Numerical solution of linear algebraic systems

Finding the real root of an equation by regula-falsi and Newton Raphson method-Gauss Jacobi and Gauss Seidel iterative methods to solve a linear algebraic system

UNIT II

Interpolation and Cubic spline

Interpolation with non-uniform data: Newton divided differences formula, Hermite interpolation, Interpolation with uniform data- Newton and Gauss formulas-Newton's bivariate interpolation for uniform data, Fitting natural cubic spline to data

UNIT III

Eigenvalues and Eigenvectors

Jacobi iteration method for finding all eigenvalues and eigenvectors of a symmetric matrix- Power method and inverse power method for finding the largest and smallest eigenvalues and eigenvectors of a matrix.

UNIT IV

Numerical differentiation and Numerical integration

Numerical differentiation using the Newton's forward, backward and central difference formulas. Numerical integration by Trapezoidal rule, Simpson's 1/3rd and $3/8^{th}$ rules, Gauss-Legendre one point, two-point and three-point rules.

UNIT V

Numerical solution of initial and boundary value problems in ODE and PDE

Euler and R-K fourth order methods to solve initial value problems in ODE- Finite differences method to solve boundary value problems in ODE- Solution of Laplace's equation by Jacobi and Successive over relaxation (SOR) methods.

TEXT BOOKS

1. M.K.Jain, S.R.K. Iyengar, R.K.Jain-.Numerical methods for scientific and engineeringcomputation-New Age International publishers-Fourth edition-2—3
2. Robert J.Schilling and Sandra L.Harries- Applied numerical methods for engineers usingMATLAB and C-Thomson Brooks/Cole-2002

REFERENCE BOOKS

1. GRIET reference manual
2. S.S.Sastry- Introductory methods of numerical analysis- Prentice Hall (India)- Fourth edition-2010

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
OOPS THROUGH JAVA LAB

Course Code: GR20A2064 **L/T/P/C: 0/0/3/1.5**
II Year II Semester

Course Objectives

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the principles of inheritance, packages and interfaces Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
3. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
4. Be aware of the important topics and principles of software development and ability to write a computer program to solve specified problems.
5. Create database connectivity in java and implement GUI applications.

Course Outcomes

1. Write basic Java programs, Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles and proper program structuring.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write JAVA programs to demonstrate method overloading, overriding.
5. Explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language.

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.
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, and 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 Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions.

TASK-7

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.

TASK-8

a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.

TASK-9

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

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. 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 l Light is on when the program starts.
b) Write a Java program that allows the user to draw lines, rectangles and ovals.

Text books:

1. Java; the complete reference,7th editon, Herbert Schildt, TMH.
2. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
3. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education.
4. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ANALOG AND PULSE CIRCUITS LAB

Course Code: GR20A2065 **L/T/P/C: 0/0/3/1.5**
II Year II Semester

Course Objectives:

1. Learn the concepts of high frequency analysis of transistors.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback
4. To construct various multivibrators using transistors and sweep circuits.
5. To apply and analyze various amplifiers and multivibrator circuits for various applications.

Course Outcomes:

1. Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
2. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
3. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
4. Design multivibrators and sweep circuits for various applications.
5. Apply and analyze various amplifiers and multivibrator circuits for various applications

List of Experiments

TASK-1: Two Stage RC Coupled Amplifier
TASK-2: Darlington Pair
TASK-3: Voltage Series Feedback amplifier
TASK-4: RC Phase shift Oscillator
TASK-5: Colpitt's Oscillators
TASK-6: Wien Bridge Oscillator using Transistors
TASK-7: Class A power amplifier
TASK-8: Class B Complementary symmetry amplifier
TASK-9: Design an AstableMultivibrator and draw its waveforms
TASK-10: Design a MonostableMultivibrator and draw its waveforms
TASK-11: Response of Schmitt Trigger circuit for loop gain less than and greater than one
TASK-12: The output- voltage waveform of Boot strap sweep circuit.

Lab Methodology: -
Lab experiments with Hardware and Software:
Hardware: - Analog Discovery; Software: - Multisim 14.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ANALOG AND DIGITAL COMMUNICATIONS LAB

Course Code:GR20A2066 **L/T/P/C: 0/0/3/2**
II Year II Semester

Course Objectives:

1. To develop an ability to design basic model of analog and digital communication systems.
2. To understand practically the generation, detection of various analog and digital modulation techniques using MATLAB.
3. To acquire practical knowledge of each block in AM, FM transmitters and receivers.
4. To discuss various security based transmission techniques.
5. To analyze the various modulation techniques in different environments and to verify its performance using MATLAB.

Course Outcomes:

1. Analyze the spectrum of various analog and digital modulation techniques.
2. Understand the effect of noise present in continuous wave and angle modulation techniques.
3. Attain the knowledge of design about analog and digital Transmitters and Receivers using components.
4. Apply and analyze the various Modulation techniques in different environments using MATALB.
5. Explains spread spectrum systems to provide security to data using MATALB.

List of the Experiments/TASKs

(All the experiments can be done either using hardware or using MATLAB)

TASK-1: (i) Amplitude Modulation and Demodulation (ii) Spectrum analysis of AM

TASK-2: (i) DSB-SC Modulator & Demodulator (ii) Spectrum Analysis of DSBSC

TASK-3: (i) SSB-SC Modulator & Demodulator (ii) Spectrum Analysis of SSBSC

TASK-4: (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM (iii) Pre emphasis and De emphasis

TASK-5: Frequency Division Multiplexing & De multiplexing

TASK-6: Pulse Amplitude Modulation & Demodulation

TASK-7: Pulse Width Modulation & Demodulation

TASK-8: Pulse Position Modulation & Demodulation

TASK-9: PCM Generation and Detection

TASK-10: Delta Modulation

TASK-11: Non Uniform Quantization-(i) μ-Law (ii) A-law

TASK-12: Amplitude Shift Keying: Generation and Detection

TASK-13: Frequency Shift Keying: Generation and Detection

TASK-14: Binary Phase Shift Keying: Generation and Detection

TASK-15: Generation and Detection (i) DPSK (ii) QPSK

TASK-16: Time Division Multiplexing

TASK-17: PN sequence Generation

III YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICRCONTROLLERS AND INTERFACING

Course Code: GR20A3033 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:
1. To describe the basic concepts and structure of computers.
2. To compare features and internal components of microprocessors and microcontrollers
3. To describe the 8086 microprocessor architecture and 8051 microcontroller architecture
4. To analyse assembly language programming concepts
5. To create various programs to run several applications by interfacing

Course Outcomes:
1. Describe the internal structure of basics of computer organization and Microprocessors
2. Compare the architectures of microprocessors and microcontrollers
3. Analyze the functionality of 8051 microcontroller and 8086 microprocessor architectures
4. Write assembly language programs by using the instruction set
5. Design various programs to run several applications

UNIT I

Basics of Computer organization and Microprocessors : Introduction to computing, Inside the computer, Internal organization of computers, data bus, address bus, CPU and its relation to RAM and ROM, Inside CPU :Internal block diagram of CPU, Internal working of computers, von neumann Architecture, Harvard Architecture, CISC characteristics, RISC characteristics

8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

UNIT II

Introduction to Microcontrollers: Differences between microprocessors and microcontrollers, Overview of 8051 Microcontroller, Pin diagram of 8051,Architecture, Programming model, I/O Ports, Memory Organization of 8051,Special function Registers**,** PSW, SCON, TCON, TMOD, PCON etc.

UNIT III

Arithmetic and logical operations of 8051: Addressing Modes of 8051:Immediate and register addressing modes, Accessing memory using various addressing modes, bit addresses for I/O and RAM Assembly language programming. Arithmetic, logical instructions and programs: Arithmetic instructions and operations, Logic and compare instructions, Rotate instructions and data serialization, BCD ASCII and other application programs

UNIT IV

Jump, loop and call Operations of 8051: Loop and jump instructions, call instructions, I/O port programming: 8051 I/O Programming, I/O bit manipulation Programming,

Microcontroller design: Timer Programming: Programming 8051 timers ,Counter programming, Serial Port Programming: Basics of serial communication,8051 serial port programming in Assembly, Interrupts Programming:8051 Interrupts, Programming timer interrupts, Programming external

hardware interrupts, Programming the serial interrupt, Interrupt priority in the 8051.

UNIT V

Applications and Interfacing of 8051: LCD and keyboard interfacing, ADC interfacing, DAC interfacing: Generation of sine wave, square wave, triangular wave etc., Interfacing to External Memory: 8031/51 interfacing with external ROM, 8051 data memory space.

Text Books:

1. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed,2004.

Reference Books:

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
3. The 8051 Microcontroller and Embedded Systems –Muhammad Ali Mazidi,Janice Gillispie Mazidi, Rolin D.McKinlay

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INTEGRATED CIRCUITS AND APPLICATIONS

Course Code: GR20A3034 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

1. To introduce the basic building blocks of linear integrated circuits and be able to understand the linear and non – linear applications of operational amplifiers.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To teach the theory of ADC and DAC.
4. To introduce the concepts of waveform generation and introduce some special function ICs.
5. To understand and implement the working of basic digital circuits

Course Outcomes:

1. Understand the operational amplifiers with linear integrated circuits.
2. Understanding of the different families of digital integrated circuits and their characteristics.
3. Design circuits using operational amplifiers for various applications.
4. Differentiate and apply the ADC and DAC concepts
5. Apply Integrated circuits for applications related to signal processing, communication etc

UNIT I

Block diagram of Operational Amplifier (Op-Amp), Op-Amp DC and AC Characteristics, Op-Amp open loop and closed configurations, Modes of Operation – Inverting, Non-Inverting, and Differential. Classification of Integrated Circuits, Features of IC 741 and LM 324.

UNIT II

Op-Amp Applications- Waveform Generators, Instrumentation Amplifier, Sample and hold circuit, Differentiator, Integrator, Schmitt Trigger, Comparators, Active Filters and Oscillators.

UNIT III

IC555 Timer – Functional Diagram, Monostable, and Astable Operations, Applications, Voltage Regulators, IC723 Regulator, Three Terminal Voltage Regulators IC 7805,7809 and 7912.

UNIT IV

Basic DAC techniques, types of DACs-Weighted Resistor, R-2R ladder and Inverted R-2R DAC, ADCs – Flash type, ADC, Counter type ADC, Successive Approximation ADC and Dual Slope ADC.

UNIT V

Digital ICs- IC74138 3-8 Decoder, IC74151 Multiplexer, IC74155 Demultiplexer, 4-bit Parallel Binary Adder/Subtractor, IC7485 Comparator. IC7474 Flip-flops, IC7490&IC74193 Counters, IC74194&195 Shift Registers.

TEXT BOOKS

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCE BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd., 2003.
2. Operational Amplifiers with Linear Integrated Circuits by K.Lal Kishore – Pearson, 2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
LINEAR CONTROL SYSTEMS

Course Code: GR20A3035 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

1. To provide the student basic understanding of open and closed loop systems and deduce signal flow graphs.
2. To familiarize the student with fundamentals in control systems for solving engineering problems.
3. To enable student to design and analyze LTI systems and their stability factors in frequency and time domains.
4. To model the systems in state space analysis.
5. To be able to apply control systems to Multi-disciplinary domains.

Course Outcomes:

1. Determine the Transfer function using block diagram reduction technique and signal flow graphs.
2. Evaluate steady state errors from Transfer function.
3. Apply Routh criterion/Root locus to determine the stability of LTI systems.
4. Evaluate Bode, Polar, inverse and Nyquist plots.
5. Apply state space analysis to control systems

UNIT I

Introduction to control systems, Classification, open-loop and closed-loop systems. Transfer function of SISO and MIMO, Block Diagram of a closed-loop system, procedure for drawing a block diagram, transfer function of block diagrams, construction of Signal Flow Graphs (SFG), Signal Flow Graph analysis.

UNIT II

Time response of control system, Standard test signals, Time response of first-order and second-order systems, steady state errors and error constrains, Bounded Input and Bounded Output (BIBO), Necessary conditions for stability, Routh stability criterion, applications of the Routh stability criterion, relative stability analysis.

UNIT III

Root locus concepts, construction of root loci, rules for the construction of the root locus, Correlation between time and frequency response, Polar plots and inverse polar plots.

UNIT IV

Bode plots, Basic factors of *G(jw)H(jw),* general procedure for constructing Bode plots, computation of Gain Margin and Phase margin, Nyquist plots, principle of argument, Nyquist stability criterion.

UNIT V

State Space Analysis: Concepts of state, state variables and state models, state-space representation, state transition matrix and state transition equation.

TEXT BOOKS

1. A.Anand Kumar, “Control Systems”, Seventh printing, PHI Learning New Delhi, 2012
2. J. Nagrath, M. Gopal,“Control Systems Engineering”,Fifth Edition, NewAge International, New Delhi, 2007.

REFERENCES

1. Katsuhiko Ogata, “Discrete Time Control Systems”, Second Edition, PHI Learning New Delhi, 2006.
2. R. Ananda natarajan, P. Ramesh Babu, “Control Systems Engineering”, Second edition, Sci Tech Publications Pvt. (India) Ltd, 2008.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Professional Elective -I)

Course Code: GR20A3036 **L/T/P/C: 3/0/0/3**

III Year I Semester

Course Objectives

1. To introduce students to monitor, analyze and control any physical system.
2. To understand how different types of meters work and their construction
3. To provide knowledge to design and create novel products and solutions for real life problems.
4. To familiarize students regarding usage of modern tools for electrical projects.
5. To illustrate the basic bridge circuits and meters.

Course Outcomes

1. Design a system, component or process to meet desired needs in electrical engineering.
2. Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
3. Ability to measure frequency, phase with Oscilloscope
4. Ability to know the applications of various transducers
5. Ability to measure strain, displacement, Velocity, Angular Velocity, Pressure, Vacuum, and Flow

UNIT I

Block Schematics of Measuring Systems: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters.

UNIT II

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers. Signal Generators: AF, RF Signal Generators, Pulse and Square wave Generators, Function Generators.

UNIT III

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes.

UNIT IV

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, LVDT, Thermocouples, Piezoelectric Transducers, Variable Capacitance Transducers.

UNIT V

Bridges: Wheat Stone Bridge, Kelvin Bridges, and Maxwell Bridge**.**

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure , Vacuum level - Measurements**.**

TEXT BOOKS

1. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition2004.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D.Helbincs,
3. W.D. Cooper: PHI, 5th Edition, 2003.

REFERENCE BOOKS

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
3. Measurement Systems - Emest O. Doebelin and Dhanesh N Manik, 6th Ed.,TMH.
4. Electronic Measurements and Instrumentations by K. Lal Kishore, PearsonEducation- 2010.
5. Industrial Instrumentation: T. R. Padmanabham Springer2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CODING THEORY
(Professional Elective-I)

Course Code: GR20A3037 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:
1. To measure information in terms of entropy and probability and understand their basic properties
2. To guide the student through the implications of understanding the channel and its capacity
3. To understand the fundamentals of coding schemes and error correcting codes
4. To measure the probability of error for applying various codes for error control in data storage systems
5. To understand the set-backs and consequences in laws of information and coding theory with reference to the application in modern communication systems

Course Outcomes:
1. Relate the conditional and joint entropies of variables in terms of their coupled probabilities.
2. Apply Shannon's Theorem to analyze channel capacity and properties
3. Construct efficient codes for data on imperfect communication channels.
4. Evaluate and minimize probability of error for various coding techniques for efficient working of estimation and detection techniques
5. Employ various encoding and decoding techniques with error correction mechanisms for efficient bandwidth in modern communication systems

UNIT I
Information Theory: Definition of Information, Entropy, Mutual Information, Properties of Mutual Information, Fundamental Inequality, I.T. Inequality, Divergence, Properties of Divergence, Divergence Inequality, Relationship between entropy and mutual information, relative entropy and mutual information.

UNIT II
Channel Capacity Uniform Dispersive Channel, Uniform Focusing Channel, Strongly Symmetric Channel, Binary Symmetric Channel, Binary Erasure Channel. Channel Capacity of all these channels, Channel Coding Theorem, Shannon-Hartley Theorem Data Compression: Kraft inequality, Huffman codes, Shannon-Fano coding, Arithmetic Coding.

UNIT III
Linear Block Codes Types of Errors, Error Control Strategies, Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes, and Applications of Block codes for Error control in data storage system

UNIT IV
Cyclic Codes Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT V

Convolutional Codes Encoding of Convolutional Codes, Graphical representation of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes, Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

TEXT BOOKS

1. Shu Lin, Daniel J.Costello,Jr, "Error Control Coding- Fundamentals and Applications", Prentice Hall, Inc.
2. Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill
3. F.J. MacWilliams and N.J.A. Slone, The theory of error correcting codes, North Holland, 1977.
4. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.
5. Thomas M. Cover, Joy A. Thomas, "Elements of Information Theory", Wiley Publishers.
6. Ranjan Bose," Information Theory Coding, Cryptography", TMH Publication.

REFERENCE BOOKS

1. Bernard Sklar, "Digital Communications-Fundamental and Application", PE.
2. John G. Proakis, "Digital Communications", 5 th Edition, 2008, TMH.
3. Salvatore Gravano, "Introduction to Error Control Codes", Oxford
4. Todd K.Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India.
5. Ranjan Bose, "Information Theory, Coding and Cryptography", 2nd Edition, 2009, TMH.

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

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

Course Objectives:

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

Course Outcomes:

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

UNIT I

Computer Networks: Uses of Computer Networks, Network Hardware, Network Software, Types of networks, Network topologies, Layered architecture. Reference Models: OSI, TCP/IP, ARPANET, Internet, and ATM header, Reference model, QoS.
Physical Layer: Guided Transmission Media, Wireless Transmission Media, Communication Satellites. Switching and Multiplexing, Mobile Telephone Network, GSM.

UNIT II

Data link layer: Design Issues, Framing, Error Detection, Elementary Data Link Protocol, and Sliding Window Protocols.
Medium Access sub layer: Static vs. Dynamic, Multiple Access Protocols: ALOHA, CSMA and Collision Free Protocols. Ethernet (IEEE 802.3), wireless LANS (IEEE 802.11), Bluetooth (IEEE 802.15), The Network and internetwork devices.

UNIT III

Network Layer: Routing Algorithms, Flooding, Broadcasting and Multicasting. Congestion Control Algorithms: General Principles of Congestion Control, Prevention Policies, Congestion Control in Virtual and Datagram Subnets, QoS in the Internet.
The Network Layer in the Internet: IPv4 Addressing Scheme, Subnetting and Masking, CIDR, NAT, Intra and Inter domain routing protocols, Mobile IP, IPv6 Header Format and Transmission Methods.

UNIT IV

Transport Layer: Transport Services, Elements of Transport Protocols.

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

UNIT V

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

Multi Media: Audio and video compression techniques, streaming audio and video, VOIP.

Text Books:

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

References:

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

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICIAL NEURAL NETWORKS
(Professional Elective-I)

Course Code: GR20A3038 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives

1. To understand the fundamental theory and concepts of neural networks, neuromodeling, several neural network paradigms and its applications.
2. To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
4. To demonstrate neural network applications on real-world TASKs.
5. To provide knowledge for network tuning and over fitting avoidance.

Course Outcomes

1. Comprehend the concepts of feed forward neural networks
2. Analyze the various feedback networks.
3. Understand the concept of fuzziness involved in various systems and fuzzy set theory.
4. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5. Analyze the application of fuzzy logic control to real time systems.

UNIT I

Neural Networks-I (Introduction & Architecture) Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetero-associative memory.

UNIT II

Neural Networks-II (Back propagation networks) Architecture: perception model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting back propagation training, applications.

UNIT III

Fuzzy Logic-I (Introduction) Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT IV

Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzylogic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

UNIT V

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators,Generational Cycle, applications.

TEXT BOOKS

1. S. Rajsekaran& G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic
2. 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. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India
2. P. Vas: Artificial-Intelligence-Based Electrical Machines and Drives: Application of Fuzzy, Neural, Fuzzy- Neural, and Genetic-Algorithm-Based Techniques, OxfordUniversity Press, 1999.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF COMMUNICATION
(Open Elective-I)

Course Code: GR20A3039 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

1. To understand various analog and digital modulation schemes.
2. Learn about various Digital modulation and modulation transmission techniques
3. To understand the fundamentals of telecommunication and networking
4. Able to learn the basics of satellite and optical communications
5. To understand the various wireless cellular technologies

Course Outcomes:

1. Able to understood need for modulation and its types
2. Gain Knowledge about the various modulation and modulation transmission techniques in digital communication
3. To understood the concepts about telecommunication systems and networking
4. How the communication is established with satellite and optical devices
5. To understood how the communication is happens in various wireless technologies and cellular networks

UNIT I

Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT II

Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT III

Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT IV

Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT V

Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, and WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, Zig Bee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

TEXT BOOKS

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Electronic Communications systems, Kennedy, Davis 4e, MC GRAW HILL EDUCATION, 1999

REFERENCE BOOKS

1. Theodore Rapp port, Wireless Communications - Principles and practice, Prentice Hall, 2002.
2. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
3. Introduction to data communications and networking, Wayne Tomasi, Pearson Education, 2005.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INTERNET OF THINGS LAB

Course Code: GR20A3040 **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Course Objectives:

1. To gain knowledge of various sensors and actuators used in implementation of IoT modules
2. To understand various techniques and algorithms used for interfacing the sensors with the microcontrollers
3. To access the Cloud via gateway and enable information transition to and from the Cloud
4. To design a complete IoT ecosystem incorporating different communication protocols.
5. To build Mobile applications for implementing various dataflow scenarios.

Course Outcomes:

1. Understand the different blocks involved in an IOT eco-system and
2. Understand interfacing techniques to connect different sensors to a microcontroller.
3. Understand how a gateway module works as a bridge between two networks
4. Understand different communication protocols used in IOT such as HTTP and web sockets
5. Understand the programming of mobile applications to push and pull data from the cloud. and apply the concepts to implement a complete IOT eco-system with different dataflow scenarios

TASK 1
Microcontroller – sensor/ actuator Interfacing
Programming a Generic Sensor Board to interface the following sensors/actuators

- Temperature & Humidity sensor module
- Ultrasonic sensor module
- Real Time Clock module
- Soil Moisture Sensor Module
- LPG gas leak detector module
- Magnetic sensor for door/window open detection
- Relay for switching applications
- Solenoid switch
- OLED Display interface

TASK 2
Mobile App development
Mobile app development using MIT's App Inventor and Kodular platforms to

1. Develop apps with simple UI
2. Mobile apps to push pull data from the cloud database
3. Mobile apps to push actuator commands to the cloud database

TASK-3

IOT projects

Integrating different blocks to do the following IOT projects

1. Remote Ambient Parameter Monitor
2. Remote Motor Control
3. Smart Garden
4. Remote Range Meter
5. Real Time based Appliance Control
6. Home Safety & Security System
7. Biometric based Access Control

Text/ Reference Books:

1. Building Arduino Projects for the Internet of Things by Adeel Javed, Apress, 2016

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICRCONTROLLERS AND INTERFACING LAB

Course Code: GR20A3041 **L/T/P/C: 0/0/4/2**
III Year I Semester

Course Objectives
1. To impart the knowledge of 8051 and AVR Microcontrollers architecture & its programming
2. To extract the features of microcontroller and interfacing with different peripherals.
3. To know the working Environment on Arduino IDE and Keil IDE.
4. To understand the concept of Assembly, Embedded C and AVR programming.
5. To develop an application Using AVR/8051 microcontroller in Embedded C.

Course Outcomes:
1. Acquire the knowledge of 8051and AVR microcontroller architecture & its programming.
2. Work on Arduino Uno and 8051 microcontroller based boards.
3. Interface different peripherals with Microcontroller.
4. Implement a wireless based Monitoring and appliance control System.
5. Define and Design a project on the exposure with AVR/8051.

TASK-1: 8051 Microcontroller Programming Using Keil IDE.
1.8051 Assembly Language Programs for Arithmetic and Logical Operations.
2.8051 Serial Communication.
3. Time delay Generation Using Timers of 8051.

TASK-2:Embedded C/Arduino Programming Using Arduino Uno Boards and Arduino IDE
1. LEDs and Switches
2. 2*16 LCD
3. Serial Communication
4. Reading sensors using Internal ADC
5. Device control
6. DC Motor control
7. Real Time Clock
8. Wireless Communication(Bluetooth/ Zigbee)
9. Interrupts

TASK-3: AVR Programming Using Arduino Uno Boards and Arduino IDE.
1. AVR Program to interface a switch and a buzzer to two different pins of a Port such that the buzzer should sound as long as the switch is pressed.
2. AVR Program for Echo.
3. AVR Program to read the LDR sensor and control the appliances based on light intensity.

Note:
* TASK1Programs have to be tested Using Keil IDE or Equivalent.
* TASK 2 Programs have to be tested on Arduino Uno Boards (AVR Microcontroller Boards)or Equivalent Using Embedded C/Arduino Programming and Arduino IDE.
* TASK 3 Programs have to be tested on Arduino Uno Boards (AVR Microcontroller Boards) or Equivalent Using AVR Programming and Arduino IDE.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
INTEGRATED CIRCUITS AND APPLICATIONS LAB

Course Code: GR20A3042 **L/T/P/C: 0/0/3/1.5**
III Year I Semester

Course Objectives

1. Comprehend basic integrated circuits.
2. Fundamentals of analog integrated circuits.
3. Fundamentals of digital integrated circuits.
4. Design methodologies using practical integrated circuits.
5. The application areas of integrated circuits.

Course Outcomes

1. Design and analyze the various linear application of op-amp.
2. Design and analyze the various non-linear application of op-amp.
3. Design and analyze filter circuits using op-amp
4. Design and analyze the various application of 555 timer like oscillators and multivibrator circuits
5. Design and analyze various combinational & sequential logic circuits using Digital Integrated IC's.

PART – I: Linear IC Experiments

1. Op-Amp Inverting and Non-Inverting Amplifiers.
2. Adder, Subtractor.
3. Function Generator.
4. Active Filter LPF&HPF (first order)
5. Oscillators-RC& Wein Bridge
6. IC 555 Timer – Monostable and Astable Multivibrator
7. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.
8. DAC-Weighted and R-2R

PART – II: Digital IC Applications

1. 3-8 decoder using IC74138
2. 4-bit comparator IC7485.
3. 8*1 Multiplexer IC74151 and 2*4 Demultiplexer IC74155.
4. D Flip Flop IC7474.
5. Decade counter IC 7490.
6. UP/DOWN counter IC 74193
7. Shift registers using IC74194/195.

Equipment required:

1. IC LM324
2. IC74138 IC74151, IC74155, IC7485, IC7474, IC7490&IC74193, IC74194&195
3. Analog Discovery
4. CRO
5. Digital trainer kits
6. Multimeter

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. The Students understand the importance of Election Commission.
5. They will know about Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States etc.,

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

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 and Woman.

TEXT BOOKS

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
DIGITAL SIGNAL PROCESSING

Course Code: GR20A3107 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

1. To introduce the concepts of various types of discrete signals and systems, frequency response.
2. To use the transformation techniques for analysis of discrete time signals and systems.
3. To know how to find the discrete time systems stability and to know the realization of the digital filters.
4. To understand and design analog filters and analog filters design from digital filters.
5. To introduce various concepts of digital filter design techniques and applications

Course Outcomes:

1. Use discrete time signals and systems, frequency response for real time applications
2. Use different transforms and analyze the discrete time signals and systems.
3. Realization of digital filters using various structures.
4. Design analog and digital filters for various applications.
5. Design digital filters using various techniques and implement multi sampling rate conversion.

UNIT I
Introduction
Introduction to Digital Signal Processing: Discrete Time Signals &Sequences, Linear Shift Invariant Systems, Stability, and Causality, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.

UNIT II
Discrete Fourier series: DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT, Relation between DTFT, DFS, DFT and Z-Transform.
Fast Fourier Transforms: Fast Fourier Transforms (FFT)-Radix-2, Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix N.

UNIT III
Realization of Digital Filters: Applications of Z-Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters - Direct, Canonical, Cascade and Parallel Forms.

UNIT IV
IIR Digital Filters:
Analog filter approximations-Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Impulse Invariant Techniques, Bilinear Transformation Method

UNIT V

FIR Digital Filters:

Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, and Comparison of IIR &FIR filters. Multi rate signal processing

TEXT BOOKS

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI,2007.
2. Discrete Time Signal Processing-AV. Oppen heimand R.W.Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing-Loney Ludeman, John Wiley, 2009

REFERENCES BOOKS

1. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
2. Andreas Antoniou, Digital Signal Processing, TMH, 2006.
3. John G.Proakis, Dimitris GManolakis, digital Signal Processing: Principles, AlgorithmsandApplications,PearsonEducation,PHI,2003

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VLSI DESIGN

Course Code: GR20A3108 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives:

1. To learn the fundamentals of MOS transistors and IC fabrication technologies
2. To analyze and design CMOS subsystems
3. To understand the flow of VLSI design and to draw stick diagrams and layouts for CMOS circuits
4. To implement the VLSI designs using programmable logic devices
5. To understand the need of testing and the methods of testing ICs

Course Outcomes:

1. The student able to visualize the fabrication process of IC technology.
2. The student able to analyze and design CMOS subsystems
3. The student able to draw stick diagrams and layouts for CMOS circuits using design rules
4. The student able to implement the VLSI design using programmable logic devices
5. The student able to understand various testing schemes

UNIT I

Introduction: Introduction to IC Technology–MOS transistors, NMOS, CMOS & BiCMOS fabrication processes, Integrated Resistors and Capacitors

UNIT II

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage Vt, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter-analysis and design, BiCMOS Inverters, Power Dissipation

UNIT III

VLSI Circuit Design Processes, Gate Level Design: VLSI Design Flow, Stick Diagrams, Layout, Lambda based Design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Design using Pass transistors and transmission gates, Dynamic CMOS Logic and Domino CMOS Logic

UNIT IV

Data path Subsystems, Array Subsystems: Subsystem Design, Shifters, Adders- Ripple Carry, CLA CSA, ALUs, Multipliers –Array Type, Booth,Wallace tree, Parity generators, Comparators, Zero/One Detectors, SRAM, DRAM, ROM

UNIT V

Semicustom Integrated Circuit Design, IC Testing: PLAs, Programmable Array Logic, FPGAs, CPLDs, Standard cells design approach, Need for Testing, Test Principles, Design Strategies for Test, Chip Level Test Techniques, System-Level Test Techniques.

TEXTBOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas A.Pucknell, Sholeh Eshraghian, PHI,2011.
2. CMOS VLSI Design–A circuits and systems perspective, Neil H.E Weste, David Harris, Fourth Edition, Addison Wesley, 2011.
3. VLSI Design, K. Lal Kishore and V. S. V. Prabhakar, 1st Edition, I.K. International, 2009.

REFERENCES BOOKS

1. CMOS logic circuit Design- John. P. Uyemura, Springer, 2013.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rdEdition, 1997.
3. VLSI Design–A. Albert Raj, Latha, PHI, 2008
4. Introduction to VLSI–Mead & Convey, BS Publications, 2010

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ANTENNAS AND WAVE PROPAGATION

Course Code: GR20A3109 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

1. To study and understand radiation mechanism and parameters of an antenna
2. To study and understand basic antennas mathematical realization and concept of arrays
3. To study and understand miniaturization of antennas by microstrip parch design
4. To study and understand basics of various antennas for different applications
5. To study and understand measuring parameters of an antenna practically and wave propagation in atmosphere

Course Outcomes:

1. Apply basic characteristics in analysing and designing antenna.
2. Apply mathematical realization to design an array.
3. Design micro strip antenna, slot antenna for various applications
4. Design and analyze some common antennas for various application.
5. Carry out measurement of radiation pattern for a given antenna and select a type of propagation for a given application.

UNIT I
Antenna Basics
Introduction: Radiation Mechanism, Current Distribution on a Thin Wire Antenna, Fundamental Parameters of Antennas: Radiation Pattern, Radiation Power Density, Radiation Intensity, Beam width, Directivity, Antenna Efficiency, Gain, Beam Efficiency, Bandwidth, Polarization, Input Impedance, Antenna Radiation Efficiency, Antenna Vector Effective Length and Equivalent Areas, Maximum Directivity and Maximum Effective Area, Antenna Temperature

UNIT II
Hertzian dipole, Linear antennas and Basics of Arrays
Fields, Power and Impedance -Infinitesimal Dipole (Hertzian Dipole), Half-Wavelength Dipole, Monopole, Folded dipole. Arrays: Concept of point source, two sources of any phase and any amplitude, uniform linear array, binomial array and Dolph-Chebyshev arrays.

UNIT III
Special Antennas
Aperture Antennas: Horn Antenna & Slot Antenna, Log Periodic Dipole Antenna (LPDA), Yagi-Uda antenna, Helical Antenna, Wearable Antenna.

UNIT IV
Reflectors and Patch Antennas
Flat-Sheet/corner reflectors, Parabolic Reflectors, Microstrip Patch Antenna, parametric analysis of rectangular Patch Antenna design using CST/HFSS(Case Study),Introduction to MIMO Antennas.
Antenna Measurements: Friis Transmission Equation, Pattern Measurement, Outdoor/ Indoor.

UNIT V – Wave Propagation

Ground Wave Propagation-Plane earth reflection, Space and Surface Waves, elevated dipole antenna above plane earth, Wave tilt of surface wave, Spherical earth propagation. Tropospheric waves: Normal refraction, abnormal refraction and reflection, modified index curves and duct propagation, troposphere scatter. Sky Wave Propagation: Structure and Layers of Ionosphere, Electrical Properties of Ionosphere, Refraction and Reflection by Ionosphere, Critical Frequency, MUF. LUF, Skip Distance, Maximum Single-hop Distance, Virtual Height.

TEXTBOOKS

1. Antenna Theory- Analysis and Design- C.A. Balanis, John Wiley & Sons, 3rd ed. 2005.
2. Antennas and Wave Propagation - J.D. Kraus, RJ. Marhefka and Ahmad S. Khan. TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
3. Electromagnetic Waves and Radiating Systems - E.C. Jordan and K.G. Balmain. PHI, 2nd ed., 2000.
4. Modern Small Antennas Kyohei Fujimoto Hisashi Morishita, Cambridge university press, 2013.

REFERENCES BOOKS

1. Antenna and Wave Propagation – Harish AR and Sachidananda M, Oxford University Press, 2007
2. Antenna Theory and Design - Warren L. Stutzman, Gary A. Thiele, John Wiley & Sons, 3rd edition. 2013

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
EMBEDDED SYSTEMS DESIGN
(Professional Elective-II)

Course Code: GR20A3110 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:
1. Students have knowledge about the basic functions, structure, concepts and applications of embedded systems.
2. Develop familiarity with 8051 Microcontrollers and their applications in an embedded environment.
3. To learn the method of designing and program an Embedded Systems for real time applications.
4. Students have knowledge about the development of embedded software using RTOS and implement small programs to solve well-defined problems on an embedded platform.
5. To understand operating system concepts, types and choosing RTOS. And Develop familiarity with tools used to develop in an embedded environment.

Course Outcomes:
1. Understand basic concept of embedded systems.
2. Apply and analyze the applications in various processors and domains of embedded system.
3. Analyze and develop embedded hardware and software development cycles and tools.
4. Analyze to understand what a microcomputer, core of the embedded system.
5. Remember the definitions of ASICs, PLDs, memory, memory interface.Analyze to understand different concepts of a RTOS, sensors, memory interface, communication interface.

UNIT I
Introduction to Embedded Systems
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT II
Typical Embedded System
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT III
Embedded Firmware
Reset Circuit, Brown-out Protection Circuit, Oscillator UNIT-, Real Time Clock, Watchdog Timer, Embedded Firmware Desgn Approaches and Development Languages.

UNIT IV

RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, TASKs, Process and Threads, Multiprocessing and MultiTASKing, TASK Scheduling.

UNIT V

TASK Communication

Shared Memory, Message Passing, Remote Procedure Call and Sockets, TASK Synchronization: TASK Communication/Synchronization Issues, TASK Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. Embedded Systems - Raj Kamal, TMH.

REFERENCE BOOKS

1. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer - David E. Simon, Pearson Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SIGNAL PROCESSING FOR SPEECH AND BIOMEDICAL APPLICATIONS
(Professional Elective-II)

Course Code: GR20A3111 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

1. To understand sampling methods and its concept, Architecture
2. To understand data conversion techniques and filter design
3. To understand concepts of ECG signals and its Noise Cancellation using signal processing for real time applications
4. To understand various data compression techniques and analysis of ECG signal to identify abnormalities
5. To understand neurological signals and its analysis

Course Outcomes:

1. To study uniform sampling and AGC in modern digital signal processing perspective.
2. To study modern modulators and multirate signal processing
3. The student will be able to understand various sources of bio signal distortions and its remedial techniques.
4. The students will be able to analyze ECG and EEG signal with characteristic feature points.
5. The student will have a basic understanding of diagnosing bio-signals and classifying them.

UNIT I
Wavelet and Speech Processing
Introduction to wavelets – CWT and DWT with Haar wavelet, Time frequency representation, pyramid algorithm, Speech analysis, Cepstrum, Homomorphic filtering of speech signals. Introduction to bio signals: Computers in medicine. EEG signal and its characteristic- ECG signal origin and characteristics.

UNIT II
Analysis Of Bio signals Automatic analysis and classification of ECG, P-wave detection, QRS complex detection, Correlation analysis of ECG signals, Signal averaged ECG, Analysis of Heart Rate variability, Synchronized averaging of PCG envelopes, Analysis of PCG signal, Analysis of EMG signal.

UNIT III
Cardiological Signal Processing: Basic electrocardiography; ECG data acquisition; ECG lead system; ECG parameters and their estimation; Use of multi-scale analysis for parameters estimation of ECG waveforms. Adaptive noise canceller; Cancellation of 60 Hz interference in electrocardiography.

UNIT IV
Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DCT and the K L transform. Cardiological Signal Processing: Pre-processing. QRS Detection Methods. Rhythm analysis. Arrhythmia detection Algorithms. Automated ECG Analysis.

UNIT-V: Neurological Signal Processing: The Brain and its potentials; The Electrophysiology origin of brain waves; the EEG Signal and its characteristics; EEG analysis. Simulate on ECG and EEG signals application to noise removal, classification, signal recognition

TEXT BOOKS:

1. Tony J. Rouphael, RF and Digital Signal Processing for Software-Defined Radio, 2009, Elsevier Inc.
2. Reddy D C. "Modern Biomedical Signal Processing – Principles and Techniques", TMH, NewDelhi,2005
3. Akay M. "Biomedical Signal Processing", Academic press, California,1994.
4. Tompkins W J "Biomedical Signal Processing", Prentice hall of India, New Delhi, 1999.
5. Rangaraj M. Rangayyan – Biomedical Signal Analysis. IEEE Press, 2001.
6. John G, Proakis and Dimitris Manolakis G. "Digital Signal Processing,Algorithms and Applications", PHI of India Ltd., New Delhi, fourth Edition, 2007.

REFERENCE BOOKS:

1. Weitkunat R, Digital Bio signal Processing, Elsevier, 1991.
2. Bronzino J D "The Biomedical Engineering handbook", CRC and Free press, Florida, 1995.
3. Arnon Cohen "Biomedical Signal Processing" CRC Pr I Llc; 2nd edition, May, 2002.
4. Raghuvir Rao and Ajit S. Bopardikar, Wavelet Transforms: Introduction, Theory and Applications, Pearson Education , 2000.
5. J.C. Goswami and A.K. Chan, Fundamentals of Wavelets: Theory, Algorithms and Applications, 2ndEd, WILEY, 2011.
6. Sanjit. K, Mitra "Digital Signal Processing", A Computer Based Approach",Tata McGraw-Hill, New Delhi, fourth edition 2011.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMMUNICATION TECHNOLOGIES
(Professional Elective - II)

Course Code: GR20A3112 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives

1. Analyze the properties of basic Modulation techniques and apply them to Digital Communication.
2. Apply different types of coding techniques to design the optimum receiver for channels with ISI and AWGN.
3. Design and develop the different types of modulation techniques, equalizer to improve the performance under fading channels for various applications.
4. Understand and appreciate the need of various modulations and spread spectrum techniques.
5. Analyze the performance of spread spectrum systems in the presence of interference.

Course Outcomes

1. Explain merits and demerits of different modulation techniques & coding techniques, spread spectrum signals and Channel behavior.
2. Analyze various modulation, equalization, diversity and coding techniques for communication systems.
3. Compare performance of different types of modulation on different wireless application fading channels.
4. Design and demonstrate various modulation/coding equalization techniques and measure their performance.
5. Apply spread spectrum techniques to the baseband signal in the presence of interference to reduce the occurrence of error.

UNIT I

Review of fundamental concepts and parameters in Digital Communication. Digital modulation schemes, Power spectra of digital modulation signals.

UNIT II

Performance of carrier modulation schemes : Performance of BPSK and QPSK in AWGN Channel, Performance of Binary FSIC in M-ary PSK in AWGN Channel, Minimum Shift keying (MSK) Modulation, GMSK continuous phase modulation(CPM) schemes.

UNIT III

Channel characterization and modeling: Optimum receivers for AWGN Channels, Equalization techniques, Orthogonal Frequency Division Multiplexing (OFDM). Carrier Synchronization, Timing synchronization.

UNIT IV

Introduction to spread spectrum modulation, Direct Sequence modulation, spreading codes, Advantage of CDMA for wireless, Code Synchronization, Code Acquisition and tracking. Channel estimation, Power control, the near-far problem, FEC coding and CDMA, Frequency Hopping spread spectrum, Complex baseband representation of FHSS, slow and fast frequency hopping, Processing

gain.

UNIT V

Spread spectrum as a Multiple access technique: Multi channel and Multi carrier systems; Digital Communication through fading multipath channels; Multi user communications. 'Space diversity on Receiver' technique, MIMO antenna systems, Space time codes for MIMO wireless Communication, Differential space time block codes, SDMA, Smart antennas.

Text books

1. John G. Proakis and Masoud Salehi, "Digital Communications," McGraw Hill, 5/e, 2008.
2. Simon Haykin and Michael Moher, "Modern Wireless Communications," Pearson Education, 2005. 4. Marvin K. Simon, Sami M. Hinedi and W. C. Lindsay, "Digital Communication Techniques," Eastern Economy Edition, 2010.

References books

1. Stephen G. Wilson, "Digital Modulation and coding," Pearson Education, 2010.
2. Andrew J Viterbi, "CDMA principles spread spectrum communications," Adison Wesley, 1995.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INTRODUCTION TO MACHINE LEARNING
(Professional Elective-II)

Course Code: GR20A3113 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

1. To understand how linear regression can be extended to accommodate multiple input features.
2. To introduce the notion of classification and the cost function for logistic regression,
3. To acquire fundamental knowledge of Neural networks.
4. To share best practices for applying machine learning in practice and evaluate performance of the learned models.
5. To introduce the idea and intuitions behind SVMs.

Course Outcomes:

1. To learn cost function and gradient descent method for linear regression.
2. To apply logistic regression to multi-class classification.
3. To implement our own neural network by learning parameters.
4. To learn how to optimize a machine learning algorithm.
5. To build models that help us understand our data better.

UNIT I

Linear Regression with One Variable

Model Representation, **Cost** Function, Gradient Descent Intuition, Gradient Descent For Linear Regression

Linear Regression with Multiple Variables

Cost Function, Multiple Features, Gradient Descent for Multiple Variables, Feature scaling and Learning rate, Features and Polynomial Regression

UNIT II

Logistic Regression

Classification, Hypothesis Representation, Decision Boundary, Simplified Cost Function and Gradient Descent, Multiclass Classification: One-vs-all, The Problem of Over fitting, Regularized Linear Regression, Regularized Logistic Regression

Programming: Logistic Regression

UNIT III

Neural Networks Representation: Non-linear Hypotheses, Model Representation, Multi class Classification: Examples and Intuitions.

Neural Networks: Learning Cost Function, Back propagation Algorithm, Gradient Checking, Random Initialization, Autonomous Driving Example

Programming: Multi-class Classification and Neural Networks

UNIT IV

Machine Learning System Design

Evaluating a Hypothesis, Model Selection and Train/Validation/Test Sets, Diagnosing Bias vs. Variance, Regularization and Bias/Variance, Learning Curves, Error Analysis, Error Metrics for Skewed Classes.

Programming: Regularized Linear Regression and Bias/Variance

UNIT V

Support Vector Machines: Large Margin Intuition, Mathematics Behind Large Margin Classification

Unsupervised Learning: Introduction, K-Means Algorithm, Dimensionality Reduction, Data Compression, Principal Component Analysis- Problem Formulation, Algorithm, Reconstruction from Compressed Representation

Programming: K-Means Clustering and PCA

TEXT BOOKS

1. The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009. [TH-2009]
2. Foundations of Data Science. Avrim Blum, John Hopcroft and Ravindran Kannan. January 2017. [AB-2017]

REFERENCE BOOKS

1. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 2017. [SS-2017]
2. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006. [CB-2006]

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSOR TECHNOLOGY

(Open Elective-II)

Course Code: GR20A3114 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives:

1. To provide the basic understanding of measurement and instrumentation systems and the insight of the resistive sensors and its applications in real life.
2. To introduce the concept of the reactive sensors and self-generating sensors and its applications in real life.
3. To familiarize the characteristics, working principle and application of special purpose transducers.
4. To acquaint various intertial sensors like accelerometer sensors and gyroscopes for MEMS applications.
5. To impart the importance of smart sensors, sensor interface standards and its impact on social life.

Course Outcomes:

1. Demonstrate the concept of resistive sensors which can be employed for real life applications
2. Realize the concept of reactive sensors employed for real life applications
3. Understand the working principle of special purpose sensors and the need for developing smart sensors.
4. Comprehend the design and development of various wearable sensors for use in healthcare applications.
5. Able to design and perform experiments on the sensors and develop the projects based on the customer needs.

UNIT I

General concepts and terminology of Sensor systems, Transducers classification-sensors and actuators, General input-output configurations, Static and dynamic characteristics of measurement system.

UNIT II

Resistive sensors- Potentiometers, strain gages (piezo-resistive effect), resistive temperature detectors (RTD), thermistors, light dependent resistor (LDR), resistive hygrometers, resistive gas sensors.

UNIT III

Inductive sensors - variable reluctance sensors, Hall effect, Eddy current sensors, Linear variable differential transformers (LVDT), variable transformers, magneto-elastic, magneto-resistive, and magnetostrictive sensors. Capacitive sensors- variable capacitor, differential capacitor.

UNIT IV

Accelerometers: Characteristics and working principle, Types- Capacitive, Piezoresistive, piezoelectric; Gyroscopes: Characteristics and working principle, Rotor Gyroscope; Diaphragm Pressure Sensor –resistive & capacitive type (micro press sensor).

UNIT V

Overview of various smart sensors: Digital temperature sensor (DS1621, TMP36GZ), Humidity sensor (DHT11, DHT22), Gas sensor (MQ2,MQ8), Pressure sensors (BMP180), Accelerometers (ADXL335); Structural health monitoring sensors, Introduction to MEMS and Flexible sensors.

TEXTBOOKS

1. B. C. Nakra, K.K. Choudhury, “Instrumentation, Measurement and Analysis” -3rd Edition, Tata McGraw, 2009
2. Jacob Fraden, “Hand Book of Modern Sensors: physics, Designs and Applications”, 3rd ed.,
3. Springer, 2010.

REFERENCES

1. A.K. Sawhney, “Electrical and Electronic Measurements and Instrumentation”, DhanpatRai.
2. Er. R.K. Rajput, “Electronic Measurements and Instrumentation”, S. Chand & Company Ltd. 3rd Edition.
3. Bentley, John P., “Principles of Measurement Systems”, 4thedition, Pearson/Prentice Hall, 2005
4. Jon. S. Wilson, “Sensor Technology Hand Book”, Elsevier Inc., 2005.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL SIGNAL PROCESSING LAB THROUGH PYTHON

Course Code: GR20A3115 **L/T/P/C: 0/0/3/1.5**
III Year II Semester

NOTE: The Programs shall be implemented in Software (Using PYTHON/ MATLAB/ LabView / C Programming/ Equivalent) and Hardware (Using TI/Analog Devices/ Motorola/ Equivalent DSP processors.

Course Objectives

1. To familiarize with Linear and Circular Convolution
2. To acquaint with Fourier Transform Concepts
3. To implement FIR and IIR filters
4. To study the architecture of DSP processor.
5. Work with PYTHON libraries/ MATLAB functions.

Course Outcomes

1. The student is able to experiment with concepts of DSP and its applications using PYTHON/ MATLAB Software.
2. The student is able to acquaint with Analyze various signals in transform domain
3. Analyze and design different signals using PYTHON/ MATLAB
4. Apply knowledge of digital filter design for various applications.
5. Demonstrate their abilities towards DSP Processor based implementation on DSP kits.

Experiments Based on PYTHON/ MATLAB/Lab View/C Programming Equivalent

1 Generation of Sinusoidal waveform/signal based on recursive difference equations
2 Linear and circular convolutions and DFT
3 To find frequency response of a given system given in (Transfer Function/ Differential equation form) (Frequency response of analog Butterworth filter)
4 Implementation of DFT, inverse DFT and FFT of given sequence
5 Determination of Power Spectrum of a given signal (s).
6 Implementation of LP FIR filter for a given sequence (Frequency response and time domain simulation of FIR filter (1))
7 Implementation of HP FIR filter for a given sequence
8 Implementation of LP IIR filter for a given sequence (First order IIR filter (LP): Frequency-response and time-domain simulation)
9 Implementation of HP IIR filter for a given sequence First order IIR filter (HP): Frequency response and time-domain simulation
10 Generation (Recovery) of Sinusoidal signal through filtering
11 Generation of DTMF signals
12 Implementation of Decimation Process
13 Implementation of Interpolation Process
14 Implementation of *VD* sampling rate converters
15 Impulse response of first order and second order systems.

Experiments Based On DSP Processor

1 Generation of Sine wave with Buffer
2 Generation of Sum of sinusoidal signals
3 Linear Convolution of Two Signal sequences
4 Circular Convolution of Two signal sequences
5 Dot Product of Two Sequences
6 Square and Saw tooth wave generation
7 DFT of a sequence
8 IDFT of a sequence
9 Low pass and High Pass IIR filter design
10 Low pass and High Pass FIR filter design

NOTE: A minimum of 12 experiments, choosing 04 (Six) from experiments based on DSP Processor to be performed and recorded by the candidate to attain eligibility for Practical Examination.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
VLSI DESIGN LAB

Course Code: GR20A3116 **L/T/P/C: 0/0/3/1.5**
III Year II Semester

Course Objectives

1. Apply the concepts of basic combinational logic circuits, sequential circuit elements, and programmable logic in the laboratory setting.
2. To develop familiarity and confidence with designing, building and testing digital circuits, including the use of CAD tools.
3. To describe the design in Behavioral, register- transfer, logic, and physical-level structured VLSI design using CAD tools and hardware description language (verilog).
4. To analyze the results of logic and timing simulations and to use these simulation results to debug digital systems.
5. To draw the layout of ICs.

Course Outcomes

1. Design and analyze various combinational and sequential logic circuits.
2. Simulate and verify the design
3. To draw the layout of ICs.
4. To check Design rules and compare layout with schematic
5. To check the parasitic components

VLSI Programs:

TASK1: Introduction to Layout Design Rules
TASK2: Layout of CMOS Inverter
TASK3: Layout of CMOS NAND/NOR Gates
TASK4: CMOS AND/OR Gates
TASK5: CMOS XOR/XNOR Gates
TASK6: CMOS 1-bit Full Adder T
TASK7: Static RAM
TASK8: Latch
TASK9: Gray to Binary code converter
TASK10: Simulation of Differential amplifier
TASK11: Simulation of Common Source amplifier
TASK12: Simulation of Common Drain amplifier
TASK13: System Level Design using PLL
TASK14: Transmission Gate
TASK15: Multiplexer

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MINI PROJECT WITH SEMINAR

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

Course Objectives:

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

Course Outcomes:

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

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

Course Code: GR20A2002 **L/T/P/C: 2/0/0/2**
III Year II 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. And Student will be able to realize the significance of ethical human conduct and self-development
2. Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
3. The students will learn the rights and responsibilities as an employee and a team member.
4. Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
5. Students will develop a better understanding on issues related to gender and 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.

❖ A Case study on values and self-development

UNIT II

Personality and Behavior Development-positive thinking, punctuality, avoiding fault finding, Free from anger, Dignity of labour, religious tolerance, Aware of self-destructive habits.

❖ A Case study on Personality

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.

❖ A Case study on professional ethics

UNIT IV

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

❖ A Case study/ video discussion on attitudes towards 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.

❖ A Case study/ video discussion on gender-based violence in view of human rights

Textbooks

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, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, 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

IV YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FUNDAMENTALS OF MANAGEMENT AND ENTREPRENEURSHIP

Course Code: GR20A3140 **L/T/P/C: 3/0/0/3**
IV Year I 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 and Steps in Decision Making; Principles of Organization: Span of control, organizational Design & Organizational Structures; Departmentalization, Delegation; Centralization, Decentralization.

UNIT III

Leading, Motivation and Controlling: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills. Motivation – Types; Motivational Theories – Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.
Controlling – basic control process – control techniques.

UNIT IV

Nature of Entrepreneurship: Characteristics and skills of an entrepreneur, Entrepreneur scenario in India and abroad. Types of entrepreneur, types of ownership, Small business in Indian economy. Risk

Reduction strategies. Strategies for growth. Financial aspects: sources of rising capital, schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, IFCI and IDBI.

UNIT V

Creating and Starting the venture: Creativity and the business idea (Self-discovery, OpportUNITy discovery); Developing the business plan (Business model – Lean canvas by Alexander Osterwalder); Marketing plan (Customer & Solution- Value proposition, Marketing & Sales); Financial plan (Validation, money), Human Resource Plan (Team).

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
3. Principles and Practice of Management, L. M. Prasad, Sultan Chand & Sons, 2012
4. Entrepreneurship- Robert D Hisrich, Michael P Peters, Dean A Shepherd, TMH.2009

REFERENCE BOOKS

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
DIGITAL SYSTEM DESIGN
(Professional Elective -III)

Course Code: GR20A4037 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
4. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. To implement combinational and sequential circuits using VHDL.

Course Outcomes:

1. Develop a digital logic and apply it to solve real life problems.
2. Analyze, design and implement combinational logic circuits.
3. Analyze, design and implement sequential logic circuits.
4. Analyze digital system design using PLD.
5. Simulate and implement combinational and sequential circuits using VHDL systems

UNIT I
Minimization and Transformation of Sequential Machines:
The Finite State Model – Capabilities and limitations of FSM – State equivalence and machine minimization – Simplification of incompletely specified machines. Fundamental mode model – Flow table – State reduction – Minimal closed covers – Races, Cycles and Hazards.

UNIT II
Digital Design:
Digital Design Using ROMs, PALs and PLAs , BCD Adder, 32 – bit adder, State graphs for control circuits, Scoreboard and Controller, A shift and add multiplier, Array multiplier, Keypad Scanner, Binary divider.

UNIT III
SM Charts:
State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, dice game controller.

UNIT IV
Fault Modelling & Test Pattern Generation:
Logic Fault model – Fault detection & Redundancy- Fault equivalence and fault location – Fault dominance – Single stuck at fault model – Multiple stuck at fault models –Bridging fault model. Fault diagnosis of combinational circuits by conventional methods – Path sensitization techniques, Boolean Difference method – Kohavi algorithm – Test algorithms – D algorithm, PODEM, Random testing,

Transition count testing, Signature analysis and test bridging faults.

UNIT V

Fault Diagnosis in Sequential Circuits:

Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification, Design of fault detection experiment, BIST.

TEXT BOOKS

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.
3. Logic Design Theory – N. N. Biswas, PHI

REFERENCE BOOKS

1. Switching and Finite Automata Theory – Z. Kohavi , 2nd Ed., 2001, TMH
2. Digital Design – Morris Mano, M.D.Ciletti, 4th Edition, PHI.
3. Digital Circuits and Logic Design – Samuel C. Lee , PHI

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DIGITAL IMAGE PROCESSING
(Professional Elective -III)

Course Code: GR20A4038 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. Comprehend and illustrate the concepts of gray levels, imaging geometry, sampling and quantization, etc.
2. Analyze computational complexity of different image transform operations, mostly by making use of separable and symmetry properties.
3. Contrast and identify the difference between various enhancement and restoration techniques.
4. Apply different Segmentation methods according to the specific application. Design lossy and lossless image compression models to meet the current technology.
5. Discriminate and develop different image filtering, segmentation, compression and restoration techniques according to the requirements of multimedia applications.

Course Outcomes:

1. Interpret the effect of sampling and quantizing the 2-D continuous-Image signals and analyze, implement fundamental algorithms and different types of image transforms.
2. Analyze and apply enhancement and restoration techniques suitable for specific application.
3. Design simple systems for realizing some multimedia applications with image segmentation techniques.
4. Use color image processing techniques to classify objects.
5. Apply the acquired knowledge to solve practical multimedia related problems and projects on work.

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UNIT I

Digital image fundamentals and Image Transforms:- Digital Image through scanner, Concept of gray levels, Gray level to binary image conversion. Sampling and quantization. Relationship between pixels. 2D FFT and its Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, SVD and Hoteling transform.

UNIT II

Image enhancement in spatial domain and Frequency domain: Point processing, Histogram processing, Spatial filtering, Enhancement in frequency domain, Image smoothing, Image sharpening, Image enhancement using Fuzzy logic.

UNIT III

Color image processing and Restoration: Pseudo color image processing, full color image processing. Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV

Segmentation and Thresholding: Image segmentation, Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation, edge detection using Fuzzy

logic.

UNIT V

Image Compression Techniques: Image compression Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression, Case study in Image watermarking.

TEXT BOOKS

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Education, 2002
2. Fundamentals of Digital Image processing – A.K.Jain , PHI.

REFERENCE BOOKS

1 Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
2. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004. 3. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.

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

Course Code: GR20A4039 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives

1. To understand the basic RADAR system with respect to their functions.
2. To study CW radar system and FMCW radar system
3. To study Doppler Effect and its applications with respect to pulsed Doppler radar and MTI Radar.
4. To understand Pulse Compression Radar and Synthetic Aperture
5. To study and understand the effect of tracking Radars and its types.

Course Outcomes

1. Demonstrate the factors that effect the radar performance using Radar Range Equation.
2. Analyze the principle of FM-CW radar and its applications
3. Familiarize with the different types delay-line cancelers in real time scenario
4. Demonstrate an understanding of the importance of Synthetic aperture radars.
5. Design radar systems and verify the performance of radar systems.

UNIT I
Radar Fundamentals
Fundamental radar principles, types of radar systems, basic radar block diagram and description, detection, range, velocity and target location measurements and signature reflectivity and imaging.

UNIT II
Radar Equations and CW radars
Radar equations: The radar equations: an introduction, the pulse radar equation., the search radar equation the bistatic radar equation, the radar equation with pulse compression, the beacon radar equation.
CW radars: Unmodulated continuous wave (CW) radar, frequency modulated CW radars.

UNIT III
MTI and Pulse Doppler Radars
Introduction, single delay-line canceler, double delay-line canceler, MTI recursive filter, MTI non-recursive filter, pulse Doppler radar, range and Doppler ambiguities.

UNIT IV
Pulse Compression Radar and Synthetic Aperture Radars
The matched filter, the radar ambiguity function, pulse compression in radars, Synthetic aperture radars: SAR general description, SAR signal processing, radar equation of the SAR system.

Radar Receivers: Block diagram of super heterodyne receiver- Detection of Radar signals in noise – Matched filter criterion- detection criterion – Extraction of information and waveform design.
Special purpose radars: Synthetic Aperture Radar- Height finder- 3D radars –Radar Beacons- Radar Jamming.

UNIT V
Tracking Radars
Range tracking, angle tracking: sequential lobing, conical-scan tracking, monopulse tracking radar.

TEXT BOOKS

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981.

REFERENCE BOOKS

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INTERNET OF NANO THINGS
(Professional Elective -III)

Course Code: GR20A4040 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives

1. To understand the fundamental theory and concepts of Internet of Things , network paradigms and various tools and techniques utilized for communication between things over the internet.
2. To understand the various stages of IoT architecture and analyze the elements like sensors, actuators, protocols and cloud services utilized for IoT.
3. To interpret the data within which an action is executed.and demonstrate applications like oil, retailing and home management using IoT.
4. To understand the reference and layered protocol architecture of IoNT with emphasis on constraints for developing the architecture.
5. To be able to build various nano-sensing platforms with the help of nanosensors in Wireless Body Area Networks.

Course Outcomes

1. Understand the innovative directions and strategic research aspects of IoT and Web technology
2. Analyzing the architecture of IoT and subsequently the functional and operational view for deployment purposes
3. Interpret the data in action between the communication devices and managing applications deployed using IoT principles
4. Understanding the functional architecture and communication protocols of IoNT with levied constraints
5. Comprehend the WBAN technology and build a complete IoNT ecosystem using various nanosensors

UNIT I

IoT & Web Technology: The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision,IoTStrategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT II

IoT Architecture-State of the Art: Introduction, State of the art,Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT III

IoT Applications for Value Creations: Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoTfor Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

UNIT IV

Internet Nano of Things: Introduction, IoNT architecture in 5G, IoNT design factors and assessment,IoNT physical layer and 5G,IoNT communication protocols and 5G, Constraints of the IoNT.

UNIT V

Nanosensors for the IoNT: Introduction, Nanosensors and WBAN technology.

TEXT BOOKS

1. Vijay Madisetti and Arshdeep Bahga,"Internet of Things (A Hands-on-Approach)",1stEdition, VPT, 2014
2. Fadi Al-Turjman, "Internet of Nano-Things and Wireless Body Area Networks (WBAN)" Auerbach Publications; 1st edition, 2019.

REFERENCE BOOKS

1. Francis daCosta,"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",1stEdition, Apress Publications, 2013

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HARDWARE ACCELERATORS AND ARCHITECTURES
(Professional Elective -IV)

Course Code: GR20A4041 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives

1. To give an exposure to the various fixed point & a floating point DSP architectures.
2. To give an exposure to the various fixed point & a floating point GPU architectures.
3. To develop applications using these processors.
4. To learn parallel programming with Digital Signal Processors (DSPs).
5. To learn parallel programming with Graphics processing UNITs (GPUs).

Course Outcomes:

1. Recognize the fundamentals of fixed and floating point architectures of DSPs and GPUs.
2. Learn the architecture details and instruction sets of fixed and floating point DSPs and GPUs
3. Learn concepts in parallel programming
4. Implementation of programs on DSPs, GPUs
5. Debugging and profiling parallel programs.

UNIT I

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT II

Multicore processors: Key applications of high-performance multicore devices, FPGAs, Multicore DSPs, GPUs and Multicore CPUs, Challenges faced for programming a multicore processor.

UNIT III

An understanding of the TMS320C66xx SoC

Development tools and programming models, OpenCL and OpenMP, debugging tools. Multicore audio and image applications.

UNIT IV

Review of Traditional Computer Architecture – Basic five stage RISC Pipeline, Cache Memory, Register File, SIMD instructions

UNIT V

GPU architectures - Streaming Multi Processors, Cache Hierarchy, The Graphics Pipeline
Introduction to CUDA programming

TEXT BOOKS

1. Multicore DSP: From Algorithms to Real-time Implementation on the TMS320C66x SoC Naim Dahnoun
2. Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-mei Hwu; Morgan Kaufman; 2010 (ISBN: 978-0123814722)
3. Multicore DSP: Naim Dahnoun Publisher(s): Wiley ISBN: 9781119003823, February 2018

REFERENCE BOOKS

1. Sen M. Kuo & Woon-Seng S. Gan, Digital Signal Processors: Architectures, Implementations, and Applications, Prentice Hall, 2004
2. C. Marven & G. Ewers: A Simple approach to digital signal processing, Wiley Inter science, 1996.
3. R.A. Haddad & T.W. Parson: Digital Signal Processing: Theory, Applications and Hardware, Computer Science Press NY, 1991.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DEEP LEARNING FOR SIGNAL PROCESSING APPLICATIONS
(Professional Elective - IV)

Course Code: GR20A4042 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. To be able to formulate machine learning problems corresponding to different applications.
2. To understand a range of machine learning algorithms along with their strengths and weaknesses.
3. To understand the basic theory underlying deep learning.
4. To understand basic concepts such as recognition, segmentation and classification.
5. To understand deep learning techniques to various problems.

Course Outcomes:

1. Understand various machine learning techniques.
2. Study and analysis of advanced machine learning techniques for computer vision.
3. Implement and evaluate the performance of various deep learning algorithms and classifiers.
4. Student should be able to understand the basic concepts such as recognition, segmentation and classification.
5. Ability to formulate deep learning techniques to various real world problems.

UNIT I
Introduction to Machine Learning
Introduction to learning: Supervised and Unsupervised, Generative and Discriminative models, Classification and Regression problems; linear regression, feature selection, dimensionality reduction using PCA; Bayesian classification, Discriminative classifiers: Perceptron's, Multi-layer perceptron, RBF Networks, Decision Trees, Support Vector Machines; Unsupervised learning: EM Algorithm; K-Means clustering, DBSCAN, Hierarchical Agglomerative Clustering, Density estimation in learning, Mean-shift clustering; Classification performance analysis; Ensemble methods: Ensemble strategies, boosting and bagging; Sequence Models: Hidden Markov Models.

UNIT II
Advanced Topics in Machine Learning
Kernel Methods: Review of SVM, Classification and Regression using SVM, Properties of Kernels, Kernel Selection, Multiple Kernel Learning, Kernel PCA; Probabilistic Graphical Models: Bayesian networks, Undirected models, Bayesian learning, structure learning, Inference on graphical models, multi-class classification and multi-label classification, evaluation metrics.

UNIT III
Deep Learning overview
Deep Learning: Review of Multi-layer Perceptron's, Backpropagation Algorithms, Stochastic Gradient Descent, Loss and Activation functions, Regularization strategies, Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Long Short-Term Memory UNITs (LSTM), Auto encoders; Introduction to Reinforcement Learning, Multi-armed Bandit Problem, Finite Markov Decision Processes, Dynamic Programming, Deep-Q Learning; Applications and Case Studies. Introduction to CNNs; Evolution of CNN Architectures: LeNet, AlexNet, VGG, InceptionNets,

ResNets, DenseNets, Visualization and Understanding CNNs.

UNIT IV

CNNs for Recognition, Segmentation, Detection

CNNs for Recognition and Verification (Siamese Networks, Triplet Loss, Contrastive Loss, Ranking Loss); CNNs for detection: Background of Object Detection, R-CNN, Fast R-CNN, Faster R-CNN, YOLO, RetinaNet, CNNs for Segmentation: FCN, SegNet, U-Net, Mask-RCNN, Review of RNNs; CNN and RNN Models for Video Understanding: Spatio-temporal Models, Action/Activity Recognition.

UNIT V

Applications of Deep Learning

Deep learning for computer vision, face recognition, speech recognition, natural language processing, text mining, image captioning, sentiment analysis, Deep learning for wireless applications, Bio medical applications.

TEXT BOOKS

1. E. Alpaydin, Introduction to Machine Learning, 3rd Edition, Prentice Hall (India) 2015.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, 2016.
3. Michael Nielsen, Neural Networks and Deep Learning, 2016.
4. Yoshua Bengio, Learning Deep Architectures for AI, 2009.

REFERENCE BOOKS

1. Richard Szeliski, Computer Vision: Algorithms and Applications, 2010.
2. Simon Prince, Computer Vision: Models, Learning, and Inference, 2012.
3. David Forsyth, Jean Ponce, Computer Vision: A Modern Approach, 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY SOFTWARE DEFINED RADIO AND COGNITIVE RADIO
(Professional Elective - IV)

Course Code: GR20A4043 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives

1. To analyze and design software defined radio systems.
2. To understand radio frequency translation for software defined radio.
3. To understand the spectrum scarcity problem and how cognitive radio deals with this problem.
4. Technologies to allow an efficient use of TVWS for radio communications.
5. Understanding the various research challenges for deployment of cognitive radio.

Course Outcomes

1. Demonstrate an understanding on software defined radio architecture and design principles.
2. Design, develop and evaluate a software defined radio system.
3. Demonstrate an understanding on cognitive radio components, functions and capabilities.
4. Analyze the spectrum management functions using cognitive radio systems and cognitive radio networks.
5. Demonstrate an understanding on cooperative communications.

UNIT I

Introduction to Software-Defined Radio: Brief History, What is a Software-Defined Radio?, Networking and SDR, RF architectures for SDR, Processing architectures for SDR, Software Environments for SDR.

UNIT II

Radio frequency implementation issues: The purpose of the RF Front-End, Dynamic range: The principal challenge of receiver design. RF receiver front-end topologies, Enhanced flexibility of the RF Chain with Software Radios, Importance of the components to overall performance, Transmitter architectures and their Issues, noise and distortion in the RF Chain, ADC and DAC distortion.

UNIT III

Analog to digital and digital to analog conversion: Parameters of ideal data converters, Parameters of practical data converters, Techniques to improve data converter performance, Sigma-Delta Structures: ADC and DAC.

Applications for Software-Defined Radio: Cognitive Radio, Bumblebee Behavioral Model, Reinforcement Learning, Vehicular Networking.

UNIT IV

Cognitive Radio: Techniques and signal processing: History and background, Communication policy and Spectrum Management, Cognitive radio cycle, Cognitive radio architecture, SDR architecture for cognitive radio, Spectrum sensing Single node sensing: energy detection, cyclostationary and wavelet based sensing- problem formulation and performance analysis based on probability of detection versus SNR. Cooperative sensing: different fusion rules, wideband spectrum sensing- problem formulation and performance analysis based on probability of detection vs SNR.

UNIT V

Cognitive Radio: Hardware and Applications: Hardware platforms for Cognitive radio (USRP and WARP), Details of USRP board, Cognitive wireless communication applications.

Text books

1. Software-Defined Radio for Engineers - Travis F. Collins, Robin Getz, Di Pu, Alexander M. Wyglinski , Artech House, 2018.
2. Software-Defined Radio - A Modern Approach to Radio Engineering, J.H. Reed, , Prentice-Hall, 2002
3. Hüseyin Arslan"Cognitive Radio, Software Defined Radio and Adaptive Wireless Systems", Springer, ISBN 978-1-4020-5541-6 (HB), 2007.

Reference Books

1. RF and Baseband Techniques for Software Defined Radio, Peter B. Kenington, Artech House, 2005.
2. Implementing Software Defined Radio- Eugene Grayver Springer, 2013.
3. Cognitive Radio Technology - Bruce A. Fette,, Elsevier, 2006.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CYBER SECURITY
(Professional Elective –V)

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

Course Objectives:

1. Learn about cybercrimes and classifications
2. Identify cyber offences and legal perspectives.
3. Understand the cybercrimes related to mobile and wireless devices.
4. Study the tools and methods used in cybercrimes
5. Know the Security Risks and threats for Organizations.

Course Outcomes:

1. Obtain firm understanding on basic terminology and concepts of cybercrimes.
2. Analyze different types of attacks.
3. Deal with the security challenges posed by mobile devices for develop encryption algorithm.
4. Implement the tools to handle security challenges.
5. Evaluate the associated challenges and the cost of cybercrimes in Organizations.

UNIT I

Introduction to Cybercrime: Introduction, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes and Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II

Cyber Offenses: Introduction, How Criminals plan the Attacks, Types of attackers, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and Types of DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks

and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and 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 Press T&FGroup.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CELLULAR AND MOBILE COMMUNICATIONS
(Open Elective III)

Course Code: GR20A4044 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. To provide the student with understanding of limitations of conventional mobile telephone systems and describe how to increase number of users/subscribers by using frequency reuse concept.
2. To identify the co-channel interference occurring in the cellular systems and to evaluate the co-channel reduction factor and the carrier to interference ratio (C/I) for improving coverage and capacity in cellular system.
3. To provide the student with an understanding of effects on coverage and interference for signal and traffic.
4. To give the student a better understanding of frequency management and channel assignment.
5. To evaluate dropped call rates, forced handoff, mobile assisted handoff, soft handoff and intersystem handoff.

Course Outcomes:

1. By the end of the course student will be able to understand the limitations of conventional Mobile Telephone System and operation of cellular system.
2. Understands the concept of frequency Reuse channels, Deduce the Co-channel interference reduction factor. The student will be able to design an antenna system to reduce co-channel interference. Understand frequency management and channel assignment strategies.
3. The student will be able to understand the how to overcome the different fading techniques, merit of Lee Model.
4. The student will have a detailed idea on frequency management and channel assignment.
5. The student will have idea of Handoff and evaluation of dropped call rate and to pursue research in the area of wireless communications.

UNIT I

Introduction to Cellular Mobile Radio Systems:

Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Cellular geometry, concept of Frequency reuse, Improving coverage and capacity in cellular systems, Cell splitting, Sectoring, Microcell zone concept, Picocell zone concept

UNIT II

Elements of Cellular Radio System Design:

Concept of frequency channels, Co-channel interference, Co- channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cellular system design in worst-case scenario with an omnidirectional antenna, Non-co-channel interference.

Cell Coverage for Signal and Traffic:

Introduction, Point-to-point model, Propagation over water or flat open area, Foliage loss, Near and long-distance propagation

UNIT III

MOBILE RADIO PROPAGATION

Large Scale Fading : Free space propagation model, Three basic propagation mechanisms, Reflection, Ground Reflection(Two-Ray)Model, Diffraction, Scattering, Practical link budget using path loss models.

Small Scale Fading: Multipath Propagation, Types of small scale fading, Parameters of Mobile Multipath channels, Fading effects due to multipath time delay Spread and Doppler spread

UNIT IV

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile UNITs, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

UNIT V

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

Digital Cellular Networks: GSM architecture, GSM Standards, Multiple access schemes, TDMA, CDMA, WCDMA, 3G, Introduction to 4G and 5G.

Text books

1. Mobile Cellular Telecommunications–**W.C.Y. Lee**, Tata McGraw Hill, 2ndEdition, 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

Reference books:

1. Wireless Communications - **Theodore. S. Rapport**, Pearson education, 2nd Edition, 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI,2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICROWAVE AND OPTICAL COMMUNICATIONS

Course Code: GR20A4036 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

1. To learn how to analyze and design microwave devices and circuits using circuit theory.
2. To learn how to carry out impedance matching in microwave frequencies, filter design and to learn microwave filter implementations.
3. To carry out analyses on various three-port and four-port devices.
4. To study principles of microwave diodes, transistors and tubes.
5. Understand the utility of Optical Fibers in Communications.

Course Outcomes:

1. The learner will be able to apply circuit theory to analyze and design microwave circuits.
2. The learner will be able to apply impedance matching techniques in design of microwave circuits and implement some microwave filters.
3. The learner will be able to design various three-port and four-port networks
4. The learner will be in possession of operating principles and application knowledge of microwave sources, design microwave amplifiers, oscillators, mixers and frequency multipliers.
5. Understand the mechanism of light propagation through Optical Fibers..

UNIT I
Microwave Network Analysis
Equivalent voltages and currents, even and odd properties of driving point impedance and input reflection coefficient. Impedance and Admittance matrices for an N-Port network. Derivation of conditions for reciprocal and lossless networks in terms of impedance and admittance parameters and matrices. Scattering Parameters and Scattering matrix: Scattering matrix in terms of impedance matrix and vice-versa. Conditions for reciprocity and loss less ness in terms of S-Parameters and S-matrix. Shift in reference plane. ABCD parameters of some useful two-port circuits.

UNIT II
Impedance Matching and Filter Implementation
L Networks-analytic solutions and smith chart solutions, Lumped elements for microwave integrated circuits. Tapered lines-exponential tapes, triangular tapes and K loop function tapes.
Filters: Design of Insertion loss based Chebyshev and Butterworth low-pass, high-pass, band pass and band-stop filters in terms of normalization filter component values. Filter design using Richards design and implementation, transformation, stepped impedance low-pass filters.

UNIT III
Three-Port and Four-Port networks:
S matrices of general three-port networks and four-port networks. Analysis of lossless power dividers and resistive dividers. Analysis of Wilkinson power dividers, Single-hole and double-hole directional couplers, analysis of quadrature hybrid.

UNIT IV

Microwave diodes, Transistors and Tubes (No derivations)

Diodes: Operating principle and applications of PIN diodes, Gunn diode, (No derivations) **Transistors**: Operating principle and applications of bipolar junction transistors **Tubes**: Operating principle and applications of Klystrons, reflex klystrons and TWTs.

Microwave amplifiers, Oscillators, Mixers and Frequency Multipliers

Amplifiers: Single -stage transistor amplifier design for maximum power. Oscillators: Negative resistance based oscillators, Transistor oscillators, Frequency multipliers Reactive diode multipliers (include Manley-Rowe relations), Mixers: Single ended diode mixers.

UNIT V

Optical Fiber Transmission Media

Optical Fiber types, Light Propagation, Optical fiber Configurations, Optical fiber classifications, Losses in Optical Fiber cables, Light Sources, Optical Sources, Light Detectors, LASERS, WDM Concepts, Optical Fiber System link budget.

Text Books

1. Microwave Engineering by Pozar
2. Electronic Communications by Kennady
3. Electronic Communications Systems- Wayne Tomasi, Pearson, 5th Edition

Reference Books

1. Microwave devices and circuits by Samuel Lio
2. RF circuit design by Bowick Christopher.
3. Optical Fiber Communication – Gerd Keiser, TMH, 4th Ed., 2008

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED COMMUNICATIONS LAB

Course Code: GR20A4045 **L/T/P/C: 0/0/4/2**
IV Year I Semester

Course Objectives

1. Understand the working principle of bit error rate,convolution encoder and decoder.
2. Understand the efficiency calculations of DSSST,FHSS through simulations.
3. Understand and capture an experimental approach to implement AWGN ,Measurement of ISI and Design of FSK.
4. Understand the simulation and verification of modulation and demodulation of BPSK,DQPSK & 8-QAM Techniques.
5. Understand and performance evaluations of OFDM, CDMA, and Raleigh Fading and AWGN Channel.

Course Outcomes

1. Measurement of Bit Error Rate, Output of Convolution Encoder and Decoder
2. Obtain the efficiency of DSSST, FHSS through simulations
3. Implement AWGN, Measurement of ISI and Design of FSK Signals
4. Simulation and Verification of Modulation and Demodulations of BPSK, DQPSK, 8-QAM Techniques
5. Design and Performance evaluations of OFDM, CDMA,, Rayleigh Fading and AWGN channel

List of Experiments:

(Minimum of 12 Experiments have to be conducted / All Experiments may be Simulated using MATLAB and to be verified using related training kits.)

1. Measurement of Bit Error Rate using Binary Data
2. Determination of output of convolution Encoder for a given sequence
3. Determination of output of convolution Decoder for a given sequence
4. Efficiency of Direct Sequence Spread Spectrum Technique
5. Simulation of Frequency Hopping (FH) Spread- Spectrum
6. Implementation of an optimum receiver for the AWGN channel.
7. Measurement of the effect of Inter-Symbol Interference.
8. Design of FSK system
9. BPSK Modulation and Demodulation Techniques
10. DQPSK Modulation and Demodulation Techniques
11. 8-QAM Modulation and Demodulation Techniques
12. OFDM Transceiver design
13. Performance evaluation of CDMA system
14. Implementation of QPSK Modulation with Rayleigh Fading and AWGN channel

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICROWAVE ENGINEERING LAB

Course Code: GR20A4046 **L/T/P/C: 0/0/4/2**
IV Year I Semester

Course Objectives

1. Know about the behavior of microwave components.
2. To become familiar working with rectangular waveguides and doing microwave bench set up.
3. To determine the characteristics of various microwave components.
4. To be able to measure wave parameters like impedance, frequency, wavelength using microwave bench and VSWR/power meter.
5. Understand the radiation pattern of horn antenna.

Course Outcomes

1. Design test bench for measurement of various microwave parameters.
2. Analyze various characteristics of microwave junctions and design of microwave communication links.
3. Integrating a wide range of Microwave components into one design oriented frame work
4. Use a microwave test bench in analyzing various types of microwave measurements.
5. Design & analyze the micro wave integrated circuits.

List of Experiments:

TASK 1: Reflex Klystron Characteristics.

TASK 2: Gunn Diode Characteristics.

TASK 3: Attenuation Measurement.

TASK 4: Parameters of Directional Coupler.

TASK 5: VSWR Measurement.

TASK 6: Impedance and Frequency Measurement.

TASK 7: Waveguide parameters measurement.

TASK 8: Scattering parameters of Circulator.

TASK 9: Scattering matrices of Tees: E plane, H plane.

TASK 10: Scattering parameters of Magic Tee.

TASK 11: Radiation patterns for basic microwave antennas.

TASK 12: Study of various microwave antennas

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROJECT WORK - PHASE I

Course Code: GR20A4129 **L/T/P/C: 0/0/12/6**
IV Year I Semester

Course Objectives:

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

Course Outcomes:

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

IV YEAR
II SEMESTER

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
SATELLITE COMMUNICATIONS

Course Code: GR20A4107 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To provide an in-depth understanding of different concepts used in a satellite communication system.
2. Study of earth segment and space segment components
3. To explain the tools necessary for the calculation of basic parameters in a satellite communication system.
4. To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.
5. Study of satellite access by various users.

Course Outcomes:

1. Understand the basics of satellite communication
2. Define orbital mechanics and launch methodologies
3. Analyze the link budget and other parameters of satellite signal for proper communication
4. Understand various communication links and different applications in satellite communication.
5. To motivate students to pursue research in the area of space communication.

UNIT I

Introduction: Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

UNIT II

Orbital Mechanics and Launchers: Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT III

Satellite Subsystems: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

UNIT IV

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, Link budget.

UNIT- V

Earth Station Technology: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

Low Earth Orbit and Geo-stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

Text books

1. Satellite communications-Timothi Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Reference books

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Fundamentals of Satellite communications-K.N.Rajarao, PHI, 2004.
3. Satellite communications-Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
NANO ELECTRONICS
(Professional Elective - V)

Course Code: GR20A4108 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. Know the types of nanotechnology, atomic structure, molecular technology, and preparation of nano materials.
2. Understand the fundamentals of nano electronics and its properties.
3. Know the Silicon MOSFET's, and carbon nano tubes.
4. Know the Quantum Transport Devices (QTD).
5. Understand the fundamentals of molecular electronics.

Course Outcomes:

1. Discuss the types of nanotechnology, molecular technology and the preparation of nano materials.
2. Explains the fundamental of the devices such as logic devices, field effect devices, and spintronics.
3. Describe the concepts of silicon MOSFET and Quantum Transport Devices.
4. Summarize the types, synthesis, interconnects, and applications of carbon nano tubes.
5. Explain the concepts, functions, fabrications, and applications of molecular electronics.

UNIT I
INTRODUCTION TO NANOTECHNOLOGY
Introduction: Discussion of the International Technology Roadmap characteristics: Need for new concepts in electronics from microelectronics towards biomolecule electronics
Background to nanotechnology: Types of nanotechnology and nanomachines, periodic table, atomic structure, molecules, and phases – energy – molecular and atomic size, surface and dimensional space – top down and bottom up.

UNIT II
FUNDAMENTALS OF NANOELECTRONICS
Fundamentals of logic devices: Requirements, dynamic properties – threshold gates; physical limits to computations.
Concepts of logic devices: - classifications- two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata.

UNIT III
SILICON MOSFETs & QUANTUM TRANSPORT DEVICES
Silicon MOSFETS - Novel materials and alternate concepts, fundamentals of MOSFET Devices-scaling rules, silicon-dioxide based gate dielectrics, metal gates, junctions & contacts, advanced MOSFET concepts.
Quantum transport devices based on resonant tunneling: Electron tunneling, resonant tunneling diodes

UNIT IV
CARBON NANOTUBES
Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications

UNIT V
MOLECULAR ELECTRONICS
Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication.
Future applications: MEMS – robots – random access memory – mass storage devices.

TEXT BOOKS
1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002.
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003.
4. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007.

REFERENCE
1. M.Ziese and M.J Thornton(Eds.)"Spin Electronics ", Springer-verlag 2001.
2. M.Dutta and M.A Stroscio Edited by "Quantum Based Electronic Devices and systems", world Scientific, 2000.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY
NATURAL LANGUAGE PROCESSING
(Professional Elective - V)

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

Course Objectives:

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

Course Outcomes:

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

UNIT I

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

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

UNIT II

Information Retrieval: Introduction, Design features of Information Retrieval Systems, Classical, Non-classical, Alternative Models of Information Retrieval, Evaluation

Lexical Resources: Introduction, WordNet, Frame Net, Stemmers, POS Tagger, Research Corpora.

UNIT III

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

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

UNIT IV

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

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

UNIT V

Natural Language Generation: Introduction, Architecture of NLG Systems, Generation TASKs and Representations, Application of NLG.

Machine Translation: Introduction, Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages

Text Books:

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

References:

1. Daniel Jurafsky and James H Martin, ”Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”,Prentice Hall, 2nd Edition,2008.
2. James Allen, Bejamin/cummings, “Natural Language Understanding”, 2ndedition,1995

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
5G Technology
(Professional Elective - V)

Course Code: GR20A4109 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To understand the basics of wireless networks and its services from 1G to 5G.
2. To acquaint with the operation of LTE network architecture and protocols.
3. To teach the significance of mobility management in next generation networks.
4. To address the 5G spectrum requirements.
5. To know the the various Modulation techniques in 5G environment.

Course Outcomes:

1. Understand the different types of wireless standards and its services.
2. Comprehend the architecture of LTE network, protocol architecture and inter working with other RATs.
3. Attain the knowledge about multi-carrier modulations schemes for next generation networks.
4. Analyze the spatial multiplexing schemes and low-complexity receivers to maximize the spectral efficiency.
5. Understand the usage of small cells as tools for network densification.

UNIT I
Evolution of Wireless Standards :
Evolution of wireless networks and services, Introduction to 1G/2G/3G/4G/5G, Motivation for IP based wireless networks, Long Term Evolution (LTE), Technologies for LTE, Evolutions from LTE to LTE-A - WiMAX Evolution (IEEE 802.16 family), Cognitive radio (IEEE 802.22).

UNIT II
LTE Network Architecture
LTE network architecture, Roaming architecture, Protocol architecture, Bearer establishment procedure, Inter-working with other RATs.

UNIT III
5G Internet
Internet of things and context awareness, Network reconfiguration and virtualisation support, Mobility, Quality of Service

UNIT IV
Modulation and multiple access for 5G networks
High Frequency bands for 5G, Modulation selection for 5G, FBMC and UFMC modulation, Spatial modulation, OFDM with index modulation for 5G.
Orthogonal multiple access (OMA), Non-orthogonal multiple access (NOMA) schemes: spectral efficiency, out-of-band leakage, and bit-error rate.

UNIT V

Small cells for 5G mobile Networks

Small cells, Capacity limits and achievable gains, Mobile data demand, demand verses capacity, small cell challenges.

TEXT BOOKS

1. StefaniaSesia, IssamToufik, Matthew Baker, LTE – The UMTS Long Term Evolution from Theory to Practice, 2011, 2nd Edition, John Wiley & Sons, New Jersey.
2. Jonathan Rodriguez, Fundamentals of 5G Mobile Networks, 2015, 1st Edition, Wiley Publications, UNITed States.

REFERENCE BOOKS

1. LTE for UMTS Evolution to LTE-Advanced Harri Holma and Antti Toskala, Second Edition – 2011, John Wiley & Sons, Ltd. Print ISBN: 9780470660003.
2. Arunabha Ghosh, Jan Zhang, Jefferey Andrews, Riaz Mohammed, Fundamentals of LTE, Prentice Hall, Communications Engg. and Emerging Technologies.
3. Ayman ElNashar, Mohamed El-saidny, Mahmoud Sherif, Design, Deployment and Performance of 4G-LTE Networks: A Practical Approach, 2014, 1st Edition, John Wiley & Sons, New Jersey.
4. http://www.cse.wustl.edu/~jain/cse574-14/index.html

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

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

Course Objectives:

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

Course Outcomes:

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

UNIT I

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

UNIT II

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

UNIT III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV

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

UNIT V

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

Text Books:

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

Reference Books:

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
ACTUATORS AND ROBOTICS
(Professional Elective-VI)

Course Code: GR20A4110 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To get an understanding of the importance and function of sensors and actuators in robotics.
2. To comprehend the mathematical description of robots and to evaluate the robot's forward kinematics
3. To gain an understanding of the inverse kinematics, path planning, and dynamics of robots
4. To familiarise student with the electric motors found in industrial robots
5. To gain familiarity with the mechanical drives and actuation systems used in industrial and heavy equipment applications for heavy power robots.

Course Outcomes:

1. Students will be able to evaluate and identify the sensors and actuators that must be employed in a robot to complete the assigned TASK.
2. Students can able to deduce the mathematical description of the robot.
3. The robot's inverse kinematics would be computed, and the robot's basic path planning procedures would be understood for further actuation and control.
4. Students can able to specify the type of electrical drive/actuator system that is required for a particular application.
5. Students can able to specify the type of mechanical drive/actuator system that is required for a particular application.

UNIT I

Introduction to Robotics, Sensors and Actuators, Applications

Introduction to robotics, Laws of Robotics, Types of Robots, application and overview of Industrial Robotic arm, Mobile Robots, Aerial Robots, Medical robots, space exploratory robots, underwater robots, Humanoid robots, Bio Inspired Robots. Robot components, Sensors and actuators. Types of sensors. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors. Types of actuators. Robot classification.

UNIT II

Mathematical Modelling: Frame Assignments and Forwards Kinematics

Introduction to robot's Kinematics, Dynamics and Control, Rotation Kinematics, Orientation Kinematics – Axis angle Rotation , Euler Parameters, Motion Kinematics – Rigid body Motion, Homogeneous Transformation, Forward Kinematics: Denavit-Hartenberd Notation, Transformation between two adjacent coordinate frames, Forward position kinematics of robots.

UNIT III

Inverse Kinematics, Dynamics and Path Planning

Inverse Kinematics: Decoupling Technique, Inverse Transformation Technique, Iterative Technique, Comparison of the inverse kinematics techniques, velocity Kinematics, Jacobian Matrix, Robot dynamics: Robot lagrange Dynamics, Path Planning.

UNIT IV

Electrical Actuators in Robotics

Control Techniques: Open and Closed-loop control, computed torque control. Various types of electrical drives in robotics. AC motors and its drive systems, DC motor and its drive systems, Servo motors, Stepper Motors.

UNIT V

Mechanical Actuators in Robotics

Pneumatic Motors: continuous and limited rotation - Hydraulic Motors: continuous and limited rotation - Hydraulic Circuits and Pneumatic Circuits.

Text Books:

1. Theory of Applied Robotics Kinematics, Dynamics, and Control (2nd Edition) Authors: Jazar, Reza N. Springer, Boston, MA
2. Robotics - Modelling, Planning and Control by Bruno Siciliano , Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, Springer Publications

Reference Books:

1.W. Bolton, Mechatronics - Electronic Control systems in Mechanical and Electrical Engineering- , 2nd Edition, Addison Wesley Longman Ltd., 1999.
2. Devdas Shetty, Richard A. Kolk, Mechatronics System Design, PWS Publishing company, 1997

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GLOBAL NAVIGATION SATELLITE SYSTEMS
(Professional Elective-VI)

Course Code: GR20A4111 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To understand the fundamentals of navigation and types of navigation based on Earth's geometry.
2. To understand the concepts of inertial navigation systems and error analysis.
3. To become familiar with various reference systems.
4. To get complete knowledge on GPS navigation and applications.
5. To understand the concept of Link budget and data capacity.

Course Outcomes:

1. Demonstrate the fundamental concepts of communications in understanding of GPS architecture, operation and signal structure.
2. Apply the principles of orbital mechanics, time references, coordinate systems and range measurements in estimating user position.
3. Examine the effect of various error sources and satellite geometry on position estimates and analyze the suitability of a given data format.
4. Compare the architecture and working of other GNSS systems and make use of GNSS systems in a variety of civilian and defense applications.
5. Relate the knowledge of DGPS techniques in understanding augmentation systems.

UNIT I
GPS fundamentals
GPS System Segments: space, control and user segments, Principle of operation, Current status of GPS satellite constellation. Orbital Mechanics: GPS ephemeris data, algorithm for computation of satellite's position from ephemeris data. Time References: solar and sidereal days, UTC time, GPS time.

UNIT II
GPS signals
Legacy GPS signals: Signal structure, Operating frequencies, C/A and P-Code, Navigation message, Modernized GPS signals: list of signals and their significance. Range measurements: code and carrier measurements, User position estimation with PRN codes.
Coordinate systems: Earth Centered Earth Fixed (ECEF) coordinate system, Earth Centered Inertial (ECI) coordinate system, Geodetic coordinate system, Ellipsoid and Geoid, Regional and Global Datum, World Geodetic System (WGS-84).

UNIT III
GPS error sources
Satellite clock error, ephemeris error, Receiver clock errors, satellite and receiver instrumental bias, Multipath error, receiver measurement noise, ionospheric error and tropospheric error, Klobuchar model, ionospheric delay estimation using dual frequency measurements and UERE. Dilution of

precision: HDOP, VDOP, TDOP, PDOP & GDOP.

UNIT IV

Data formats: RINEX Observation and Navigation Data formats

GNSS: architecture, operation and signals of other global satellite systems such as Galileo, Beidou, GLONASS and regional systems such as IRNSS, QZSS.

UNIT V

Differential GPS (DGPS): Principle of DGPS, Types of DGPS: Local Area DGPS (LADPS), Wide Area DGPS (WADGPS).

GPS Augmentation systems: Principle of operation of Satellite Based Augmentation system (SBAS) and Ground Based Augmentation System (GBAS):

GNSS Applications Surveying, Mapping, Marine, air and land Navigation, Military and Space Application.

Text Books:

1. Elliot D Kaplan and Christopher J Hegarty, “Understanding GPS principles and applications”, Artech House Publishers, 2/e Boston & London 2005.
2. Pratap Misra and Per Enge, “Global Positioning System Signals, Measurement, and Performance”, Ganga- Jamuna Press, 2/e, Massachusetts, 2010.

Suggested Reading:

1. B.Hofmann-Wellenhof, H.Lichtenegger, and J.Collins, “GPS Theory and Practice,” Springer Verlog, 5/e, 2008.
2. Ahmed El-Rabbany, “Introduction to GPS”, Artech House Publishers, 2/e, Boston 2006.
3. Bradford W.Parkinson and James J. Spilker, “Global Positioning system: Theory and Application”,Vol.II, American Institution of Aeronautics and Astronautics Inc., Washington, 1996.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FUNDAMENTALS OF MIMO WIRELESS COMMUNICATIONS
(Professional Elective-VI)

Course Code: GR20A4112 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To explore communication concepts and techniques for exploiting wireless MIMO channel characteristics
2. To offer students an understanding of the concepts related to wireless channel modelling and characterization
3. To conceive path loss models and compute the Fading effects
4. To exploit the spatial dimension over and above the time and frequency dimensions fetching greater reliability gains to the MIMO systems
5. To familiarize the students the improvement of spectral capacity and efficiency by analyzing of transmitters and receivers and designing advanced wireless MIMO communication systems

Course Outcomes:

1. Application of concepts and techniques from Multiple-Input Multiple-Output (MIMO) theory to communication systems.
2. Designing and testing wireless communication systems using channel modelling and characterization.
3. Develop and compare the strengths and weaknesses of various wireless fading channel models
4. Evaluate error probability and diversity gain for various MIMO systems at transmitter and receiver
5. Apply the methods for performance analysis and design of advanced wireless communication systems

UNIT I

Introduction to MIMO wireless communications: Overview of Digital and Data Communication, Introduction to MIMO systems, Benefits from multiple antenna, Typical MIMO modes in LTE, Single-user MIMO, Multi-user MIMO, Overview of MIMO modes: Diversity, Spatial Multiplexing, Beam forming and coordinated transmission, Generalized System Model, Layered view of the transmitter and receiver: Introduction to the channel.

UNIT II

Wireless Channels-I: Large Scale propagation models Typical channels, Wireless channel, Characterization of a wireless channel, Large scale fading, Small scale fading, Free space propagation model, Path loss, Basic propagation mechanisms, Two-ray reflection model, Log distance path loss, Indoor and Outdoor path loss models, Large scale fading due to shadowing

UNIT III

Wireless Channels-II: Small Scale Fading and Multipath models Small scale multipath propagation, Factors influencing small scale fading, Doppler Shift, Impulse response model of Multipath model, Complex baseband representation of the pass band wireless signal, Small scale propagation frequency flat fading, Small Scale Propagation Envelope Distribution, Small Scale Propagation Received Signal

Correlation, coherence time, Doppler spectrum, Frequency Selective Fading, coherence bandwidth, delay Doppler characteristics, Spatial Channel Characteristics, MIMO Channel Characteristics

UNIT IV

Diversity: Spatial Diversity, Selective Combining, Maximal Ratio Combining, Diversity Gain and Transmit Multifunctional Reconfigurable Antenna (MRA), Transmit and Receive Diversity, Transmit Diversity with Channel knowledge at the Transmitter, Transmit Diversity without Channel knowledge at the Transmitter, MIMO Transmit Diversity

UNIT V

Wireless Channel Capacity: Capacity of the deterministic MIMO channels, Capacity of Channel Unknown at Transmitter, Capacity of Channel known at Transmitter, MIMO channel capacity, Capacity of Random Channel, Spatial multiplexing

Text Books

1. Wireless Communications, Principles, Practice – Theodore S. Rappaport, PHI, 2nd Ed., 2002
2. Principles of Mobile Communications by G.Stuber, Springer, 2nd ed.,2013
3. Introduction to Space Time Wireless Communications, A. Paulraj, Nabar and Gore, Cambridge University Press, January 2003

Reference Books

1. MIMO wireless communications, by Biligeri, et al. January2008
2. Wireless Communications by A. Goldsmith, Cambridge University Press, June 2012
3. Fundamentals of MIMO Wireless Communications, Kshetrimayum R, Cambridge University Press, 2017
4. Virtual laboratory: fcmcvlab.iitkgp.ac.in (IIT Kharagpur)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SOFTWARE DEFINED NETWORKING AND NETWORK FUNCTION VIRTUALIZATION
(Professional Elective-VI)

Course Code: GR20A4113 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

1. To study and understand the requirements of SDN architecture
2. To analyze the core fundamentals of Openflow and the Data and Control plane devices
3. To comprehend various controllers for centralized control of the data plane
4. To study and understand various applications of centralized SDN architecture
5. To relate the Network Functions Virtualization components and its importance is SDN.

Course Outcomes:

1. Understand the key benefits of SDN by the separation of data and control planes
2. Interpret the SDN data plane devices and Openflow Protocols
3. Implement the operation of SDN control plane with different controllers
4. Apply techniques that enable applications to control the underlying network
5. Analyze the Network Functions Virtualization components and their roles in SDN

UNIT I
History and Evolution of Software Defined Networking
Active Networks, Central Control, Control/ Data Separation, Scalability of Control and Data Planes, Network Virtualization, Evolving network requirements-The SDN Approach: Requirements, SDN Architecture, Characteristics of Software-Defined Networking, SDN and NFV-Related Standards: Standards-Developing Organizations, Open Development Initiatives.

UNIT II
SDN Data plane and OpenFlow
Data plane Functions, Data plane protocols, OpenFlow logical network Device: Flow table Structure, Flow Table Pipeline, The Use of Multiple Tables, Group Table- OpenFlow Protocol.

UNIT III
SDN Control Plane
SDN Control Plane Architecture: Control Plane Functions, Southbound Interface, Northbound Interface, Routing, ITU-T Model- OpenDaylight-REST- Cooperation and Coordination among Controllers.

UNIT IV
SDN Application Plane
SDN Application Plane Architecture: Northbound Interface, Network Applications, User Interface-Network Services Abstraction Layer: Abstractions in SDN, Frenetic- Traffic Engineering Measurement and Monitoring Security- Data Center Networking- Mobility and Wireless.

UNIT V

Network Functions Virtualization (NFV)

Background and Motivation for NFV- Virtual Machines- NFV Concepts: Simple Example of the Use of NFV, NFV Principles, High-Level NFV Framework, NFV Benefits and Requirements- NFV Reference Architecture: NFV Management and Orchestration.

Text Books

1. William Stallings, “Foundations of Modern Networking”, Pearson Ltd.,2016.
2. Software Defined Networks: A Comprehensive Approach by Paul Goransson and Chuck
3. Black,Morgan Kaufmann Publications, 2014
4. SDN - Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013

Reference Books

1. Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history
2. of programmable networks." ACM SIGCOMM Computer Communication Review 44.2
3. (2014): 87-98.
4. Kreutz, Diego, et al. "Software-defined networking: A comprehensive survey." Proceedings of the IEEE 103.1 (2015): 14-76.

Online Resources

[1] https://www.coursera.org/learn/sdn

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROJECT WORK - PHASE II

Course Code: GR20A4130 **L/T/P/C: 0/0/12/6**
IV Year II Semester

Course Objectives:

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

Course Outcomes:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT SKILLS AND INTERPERSONAL COMMUNICATION

(OPEN ELECTIVE)

Course Code: GR20A3136 **L/T/P/C: 3/0/0/3**

Course Objectives:

1. To know the importance of soft skills.
2. To identify good leadership skills /qualities.
3. To recognize the importance of interpersonal skills.
4. To demonstrate the significance of confidence building.
5. To define and differentiate between a report and a proposal.

Course Outcomes:

1. Develop soft skills communication skills, leadership skills etc.
2. Implement goal setting techniques to build a promising career.
3. Design formal report and proposals with appropriate formal expressions.
4. Create healthy workplace environment by treating others with respect and dignity.
5. Evaluate the power of confidence building and self-esteem with examples.

UNIT I

Soft Skills

- Introduction to soft skills, Definition of Soft skills, Importance of soft skills
- Communication skills, Usage of English in Business/Corporate scenario
- Nonverbal communication - Proxemics
- Presentation skills

UNIT II

Team Building & Leadership Qualities

- Qualities of a good leader
- Problem solving and Decision Making
- Strategic management
- Crisis management

UNIT III

Personality Development

- Motivation
- Goal setting
- Self-esteem
- Team skills

UNIT IV

Developing Reports and Proposals

- Understanding reports and proposals
- Planning reports and proposals
- Writing beginning, body and ending
- Formats of reports and proposals

UNIT V

Interpersonal Skills

- Understanding professional relationships
- Networking professionally
- Showing basic office courtesies
- Interview skills

Text books:

1. Soft Skills-Key to success in workplace and life Meenakshi Raman, RamanUpadhyay, CENAGE

Reference books:

1. Soft skills for Everyone - Jeff Butterfield, CENAGE Learning
2. Soft skills for Interpersonal Communication - S.Balasubramaniam(ORIENT BLACKSWAN)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOUR

(OPEN ELECTIVE)

Course Code:GR20A3137 **L/T/P/C: 3/0/0/3**

Course Objectives:

1. OB provides perspectives and skills that enhance understanding of our own behaviour and our ability to influence the behaviour of others in organizational settings
2. OB and HRM together can instill sustainability deep within an organizations' culture.
3. To equip them with behavioural skills in managing people at work.
4. To make student aware of the concepts, techniques and practices of human resource development.
5. This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.

Course Outcomes

1. To acquaint the student with the determinants of intra -individual, inter-personnel and inter-group behaviour in organisational setting.
2. To Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories and apply in the organizational context.
3. To assess the group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations in the framework of organization and to familiarize the concepts, techniques and practices of human resource development in the current organizational view.
4. To impart and apprise the capable of applying the principles and techniques as professionals for developing human resources in an organization.
5. To report the current trends and applications in HRD and Balanced Scorecard to measures the performance and to develop, implement, and evaluate organizational human resource development strategies aimed at promoting organizational effectiveness in different organizational environments.

UNIT I

Introduction to OB : Organisational Behaviour- Concept and Emergence of OB Concept; Nature and Theoretical frameworks; Models of Organisational Behaviour, Challenges and OpportUNITies for Organisational Behavior;

UNIT II

Individual Behaviour: Individual Behaviour: Personality, Learning, Values and Attitudes, Perception, Stress at work. Management's assumptions about people- McGregor's Theory X and Theory Y. Motivation - Maslow's Need Hierarchy, Herzberg's Two Factors Theory, Vroom's Expectancy Theory.

UNIT III

Inter-personal and Group Behaviour: Interpersonal communication and Feedback; Transactional Analysis (TA); Johari Window. Group Behaviour: Group Dynamics, Cohesiveness and Productivity; Management of Dysfunctional groups; Group Decision Making. Leadership-Concept and Styles.

UNIT IV

Introduction to Human Resource Development: Concept; Relationship between human resource management and human resource development; HRD mechanisms, processes and outcomes; HRD matrix; Roles and competencies of HRD professionals; Challenges in HRD, steps in HRD Process.

UNIT V

HRD Applications and Trends: Coaching and mentoring; Career management and development; Competency mapping; Balanced Score Card. HRD in Organisations: Selected cases covering HRD practices in government organisations, manufacturing and service industries and MNCs.

Text Books:

1. Robbins, Stephen P. and Timothy A. Judge, Organisational Behaviour, Prentice -Hall, New Delhi.
2. Werner J. M., DeSimone, R.L., Human resource development, South Western.

Reference Books:

1. Luthans, Fred, Organizational Behaviour, McGraw-Hill, New York.
2. Gregory, Moorhead and Ricky W. Griffin, Managing Organizational Behaviour, Thomson South Western Publication.
3. Pareek, Udai and V. Sisodia, “HRD in the New Millennium, Tata McGraw - Hill Publishing Co. Ltd., New Delhi, 1999.
4. Haldar, U. K., Human resource development, Oxford University Press India.
5. Rao, T.V., Future of HRD, Macmillan Publishers India.
6. Rao, T.V., HRD Score Card 2500: Based on HRD audit, Response Books, SAGE Publications.
7. Mankin, D., Human resource development, Oxford University Press India.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CYBER LAW AND ETHICS
(OPEN ELECTIVE)

Course Code: GR20A3138 **L/T/P/C: 3/0/0/3**

Course Objectives

1. The course objective is to provide the fundamental skill to understand cyber laws.
2. It enable to understand the legal frameworks
3. It helps the student understand different cyber crimes
4. It provides overview on Intellectual Property, copy rights, patents rights etc.
5. Given rapid changes in technology and the corresponding changes in crime and the law

Course Outcomes.

1. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
2. Students locate and apply case law and common law to current legal dilemmas in the technology field.
3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
4. Students will be able understand cybercrime and ethical practices and the student will be able to know and learn web technologies and related issues.
5. The student will be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc. and provide an overview of cybercrime and framework.

UNIT I

The Legal System: Sources of Law and The Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court), Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

UNIT II

Introduction cyber law: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level.

UNIT III

Constitutional & Human Rights Issues in Cyber space : Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace, Access to Internet, Right to Privacy, Right to Data Protection.

UNIT IV

Cyber Crimes & Legal Framework: Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act

UNIT V

Intellectual Property Issues in Cyber Space: Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues.

Text books:

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012)
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. JonthanRosenoer, Cyber Law, Springer, New York, (1997).
5. SudhirNaib, The Information Technology Act, 2005: A Handbook.
6. S. R. Bhansali, Information Technology Act, 2000
7. University Book House Pvt. Ltd. Jaipur (2003).
8. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ECONOMIC POLICIES IN INDIA
(OPEN ELECTIVE)

Course Code: GR20A3139 **L/T/P/C:3/0/0/3**

Course 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, Per capital income, Quality of life, Capital Formation – Savings, Investment.

UNIT III

NITI Aayog and Planning in India, NitiAayog and its function, how is Niti Aayog different from planning commission, Meaning, Importance, Main reasons of adopting, planning in India,Objectives of planning, Economic development, moderation, stability, self-sufficiency, employment Etc, foreign aid, Employment. Allocation of Resources.

UNIT IV

Private and Public Sector, Public Sector – role and growth, Achievements of the public sector,Private Sector – Importance Problems, New foreign Trade Policy.

UNIT V

Present Economic Policy, Main feature, Globalization, Expansion of Private sector, moremarket orient approach. Public distribution system, Industrial policies before and after 1991, Industrial Licensing, Monetary and Fiscal Policy, elements of Indian current GDP and review of current budget.

Text books

1.Francis Cherunilam: Business Environment: Text and Cases. 18/e. Himalaya. 2009.
2. Misra and Puri: Indian Economy, Himalaya, 2009.

References:

1. Indian Economy- A. N. Agarwal
2. Indian Economy – Mishra &Puri
3. Indian Development and planning – M. L. Jhingan
4. Indian Economy – R. S. RastogiYozna and Kurukshetra Magazines