Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2018)

Department of Electronics and Communication Engineering

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING & TECHNOLOGY
Bachupally, Kukatpally, Hyderabad, Telangana, India
500 090

Academic Regulations

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
(B. Tech)

GR18 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2018 Regulations (GR18 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Electronics and Communication Engineering with effect from the students admitted to the programmes in 2018-19 academic year.

1. **Programme Offered:** The programme offered by the Department is B. Tech in Electronics and Communication 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 is 160.
   e) **Student is introduced to "Choice Based Credit System (CBCS)".**
   f) **A student has a choice to register for all courses in a semester/ one less or one additional course from other semesters provided the student satisfies prerequisites.**
   g) **All the registered credits will be considered for the calculation of final CGPA.**
   h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
   i) **Subject/Course Classification:** All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	BSC	Basic Science Courses	Basic Science Courses
2	ESC	Engineering Science Courses	Includes Engineering subjects
3	HSMC	Humanities and Social sciences	Includes Management Courses
4	PCC	Professional Core Courses	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	PEC	Professional Elective Courses	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6	OEC	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	PROJ	Project Work	Project work, seminar and internship in industry or elsewhere

5. **Award of B. Tech Degree:** A student will be declared eligible for the award of B. Tech Degree if he/she fulfils 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 fulfil 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 Electronics and Communications Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfil all the requirements for the award of the degree.

6. **Attendance Requirements**
   a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.
   b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.
   c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.
   d) Shortage of Attendance more than 10% (attendance less than 65% in aggregate) shall in no case be condoned.
   e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

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

a) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council 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 examinations shall be conducted for 20 marks each for duration of 2 hours. Average of the two mid exams shall be considered. i) **Subjective - 15 marks** ii) **Objective - 5 marks** **Tutorials - 5 marks** **2)** Continuous Assessment – 5 marks
		70	Semester end examination	The semester-end examination is for a duration of 3 hours

2.	Practical	25	Internal Examination & Continuous Evaluation	**i) Internal Exam-10 marks ii) Record - 5 marks iii) Continuous Assessment - 10 marks**
		50	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.

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

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

g) Engineering Graphics:

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

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for recounting of his/her answer book on payment of a prescribed fee.
9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.
10. **Supplementary Examinations:** A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the College.
11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid / End-examinations as per the rules framed by the Academic Council.
12. **Academic Requirements and Promotion Rules:**
    - **a)** A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum 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	**First year first semester to first year second semester**	**Regular course of study of first year first semester.**
2	**First year second semester to second year first semester**	**(i) Regular course of study of first year second semester.** **(ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.**
3	**Second year first semester to second year second semester**	**Regular course of study of second year first semester.**
4	**Second year second semester to third year first semester**	**a) Regular course of study of second year second semester** **b) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.**
5	**Third year first semester to third year second semester**	**Regular course of study of third year first semester.**
6	**Third year second semester to fourth year first semester**	**(i) Regular course of study of third year second semester.** **(ii) Must have secured at least 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.**
7	**Fourth year first semester to fourth year second semester**	**Regular course of study of fourth year first semester.**

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

Letter Grade	Grade Point	Percentage of marks
O (Outstanding)	10	Marks >= 90
A+ (Excellent)	9	Marks >= 80 and Marks < 90
A (Very Good)	8	Marks >= 70 and Marks < 80
B+ (Good)	7	Marks >= 60 and Marks < 70
B (Average)	6	Marks >= 50 and Marks < 60
C (Pass)	5	Marks >= 40 and Marks < 50
F (Fail)	0	Marks < 40
Ab (Absent)	0	

Earning of Credit:

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

Computation of SGPA and CGPA:

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

i) S_k the SGPA of 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.,

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

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course and n is the number of courses registered in that semester.ii) The CGPA is calculated in the same manner taking into account all the courses m, registered by student over all the semesters of a programme, i.e., upto and inclusive of S_k, where $k \geq 2$.

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

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

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 the 160 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 withheld 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 GR18
(Applicable for Batches Admitted from 2019-2020)

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 123 credits and secure all credits. The marks obtained in all 123 credits shall be considered for the calculation of the final CGPA.

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

2. **Academic Requirements and Promotion Rules:**

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

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

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

3. Award of Class: After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the 123 credits.

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

Gokaraju Rangaraju Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090, India. (040) 6586 4440

ELECTRONICS AND COMMUNICATION ENGINEERING

I YEAR I SEMESTER

S. No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A1001	Linear Algebra and Differential Calculus	3	1	0	4	4	30	70	100
2	GR18A1005	Engineering Chemistry	3	1	0	4	4	30	70	100
3	GR18A1008	Basic Electrical Engineering	3	0	0	3	3	30	70	100
4	GR18A1006	English	2	0	0	2	2	30	70	100
5	GR18A1013	Engineering Chemistry Lab	0	0	3	3	1.5	30	70	100
6	GR18A1016	Basic Electrical Engineering Lab	0	0	2	2	1	30	70	100
7	GR18A1014	English Language and Communication Skills Lab	0	0	2	2	1	30	70	100
8	GR18A1017	Engineering Workshop	1	0	3	4	2.5	30	70	100
		Induction Programme								
Total			**12**	**2**	**10**	**24**	**19**	**240**	**560**	**800**

I YEAR II SEMESTER

S. No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A1002	Differential Equations and Vector Calculus	3	1	0	4	4	30	70	100
2	GR18A1003	Applied Physics	3	1	0	4	4	30	70	100
3	GR18A1007	Programming for Problem Solving	3	1	0	4	4	30	70	100
4	GR18A1010	Engineering Graphics	1	0	4	5	3	30	70	100
5	GR18A1011	Applied Physics Lab	0	0	3	3	1.5	30	70	100
6	GR18A1015	Programming for Problem Solving Lab	0	0	3	3	1.5	30	70	100
Total			**10**	**3**	**10**	**23**	**18**	**180**	**420**	**600**

II YEAR I SEMESTER

S. No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A2051	Electronic Devices and Circuits	3	0	0	3	3	30	70	100
2	GR18A2030	Digital Electronics	3	0	0	3	3	30	70	100
3	GR18A2052	Signals and Systems	3	0	0	3	3	30	70	100
4	GR18A2053	Probability Theory and Stochastic Processes	3	0	0	3	3	30	70	100
5	GR18A2054	Network Analysis and Transmission Lines	3	0	0	3	3	30	70	100
6	GR18A2004	Economics and Accounting for Engineers	3	0	0	3	3	30	70	100
7	GR18A2055	Electronic Devices and Circuits Lab	0	0	2	2	1	30	70	100
8	GR18A2033	Digital Electronics Lab	0	0	2	2	1	30	70	100
9	GR18A2056	Signals and Systems Lab	0	0	2	2	1	30	70	100
Total			**18**	**0**	**6**	**27**	**21**	**270**	**630**	**900**
10	GR18A2001	Environmental Science	2	0	0	2	2	30	70	100
11	GR18A2083	Design Thinking	2	0	0	2	1	30	70	100

II YEAR II SEMESTER

S.No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A2006	Computational Mathematics for Engineers	3	0	0	3	3	30	70	100
2	GR18A2057	Electromagnetic Fields and Waves	3	0	0	3	3	30	70	100
3	GR18A2058	Analog and Digital Communications	3	0	0	3	3	30	70	100
4	GR18A2059	Analog and Pulse Circuits	3	0	0	3	3	30	70	100
5	GR18A2060	Micro Processors and Microcontrollers	3	0	0	3	3	30	70	100
6	GR18A2061	Principles of Operating Systems	3	0	0	3	3	30	70	100
7	GR18A2062	Analog and Digital Communications Lab	0	0	2	2	1	30	70	100
8	GR18A2063	Analog and pulse circuits Lab	0	0	2	2	1	30	70	100
9	GR18A2064	Microprocessors and Microcontrollers Lab	0	0	2	2	1	30	70	100
Total			**18**	**0**	**6**	**24**	**21**	**270**	**630**	**900**
10	GR18A2002	Value Ethics and Gender Culture	2	0	0	4	2	30	70	100

III YEAR I SEMESTER

S.No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A3130	Computer Architecture & Organization	3	0	0	3	3	30	70	100
2	GR18A3026	Linear Control Systems	3	0	0	3	3	30	70	100
3	GR18A3034	VLSI Design	3	0	0	3	3	30	70	100
4	GR18A3035	Antennas and Wave Propagation	3	0	0	3	3	30	70	100
5	GR18A3036	Integrated Circuits and Applications	3	0	0	3	3	30	70	100
6		Elective-I	3	0	0	3	3	30	70	100
7	GR18A3040	Integrated Circuits Lab	0	0	2	2	1	30	70	100
8	GR18A3041	OOPS through Java Lab	0	0	2	2	1	30	70	100
9	GR18A3042	VLSI Design Lab	0	0	2	2	1	30	70	100
		Total	**18**	**0**	**6**	**27**	**21**	**270**	**630**	**900**
10	GR18A2003	Constitution of India	3	0	0	3	2	30	70	100

ELECTIVE - 1		
S. No.	**Course Code**	**COURSE**
1.	GR18A3037	OOPS through Java
2.	GR18A3095	Digital System Design
3.	GR18A3038	Data Analytics
4.	GR18A3039	Fiber Optic Communications

III YEAR II SEMESTER

S.No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A3090	Microwave Engineering	3	0	0	3	3	30	70	100
2	GR18A3091	Digital Signal Processing	3	0	0	3	3	30	70	100
3	GR18A3044	Computer Networks	3	0	0	3	3	30	70	100
4		Elective-2	3	0	0	3	3	30	70	100
5		Open Elective-1	3	0	0	3	3	30	70	100
6	GR18A3096	Microwave Engineering Lab	0	0	2	2	1	30	70	100
7	GR18A3097	Digital Signal Processing Lab	0	0	2	2	1	30	70	100
8	GR18A3098	Computer Networks Lab	0	0	2	2	1	30	70	100
9	GR18A3116	Mini Project with Seminar	0	0	6	6	3	30	70	100
Total			**15**	**0**	**12**	**27**	**21**	**270**	**630**	**900**

ELECTIVE - 2		
S. No.	**Course Code**	**COURSE**
1.	GR18A3092	Satellite Communications
2.	GR18A3093	Communication Technologies
3.	GR18A3094	Information Theory and Coding
4.	GR18A2068	Database Management Systems

IV YEAR I SEMESTER

S.No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A3115	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	30	70	100
2	GR18A4034	Cellular and Mobile Communications	3	0	0	3	3	30	70	100
3		Elective-3	3	0	0	3	3	30	70	100
4		Elective-4	3	0	0	3	3	30	70	100
5		Open Elective-2	3	0	0	3	3	30	70	100
6	GR18A4061	Project Work (Phase I)	0	0	12	12	6	30	70	100
Total			**15**	**0**	**12**	**27**	**21**	**180**	**420**	**600**

ELECTIVE - 3		
S. No.	**Course Code**	**COURSE**
1.	GR18A4035	Radar Systems
2.	GR18A4036	Bio-Medical Electronics
3.	GR18A4104	Python Programming
4.	GR18A2066	Data Structures

ELECTIVE - 4		
S. No.	**Course Code**	**COURSE**
1.	GR18A4039	Digital Signal Processors and Architectures
2.	GR18A4040	Network Security and Cryptography
3.	GR18A4041	Internet of Things
4.	GR18A4042	Electronic Measurements and Instrumentation

IV YEAR II SEMESTER

S.No.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A4087	Digital Image Processing	3	0	0	3	3	30	70	100
2		Elective-5	3	0	0	3	3	30	70	100
3		Elective-6	3	0	0	3	3	30	70	100
4		Open Elective-3	3	0	0	3	3	30	70	100
5	GR18A4108	Project Work (Phase II)	0	0	12	12	6	30	70	100
Total			**12**	**0**	**12**	**24**	**18**	**150**	**350**	**500**

ELECTIVE - 5		
S. No.	**Course Code**	**COURSE**
1.	GR18A4088	Navigational Aids
2.	GR18A4089	Wireless Communications and Networks
3.	GR18A4090	Introduction to Machine Learning
4.	GR18A4091	Principles of Optimization Techniques

ELECTIVE – 6		
S. No.	**Course Code**	**COURSE**
1.	GR18A4092	Embedded System Design
2.	GR18A4093	Nano Materials and Technology
3.	GR18A4094	Wireless Sensor Networks
4.	GR18A4095	Television Engineering

PROFESSIONAL ELECTIVES – 4 THREADS

Elective	Thread I	Thread II	Thread III	Thread IV
	Systems & Programming	**Networks & Technologies**	**Information & Intelligence**	**Communications & Electronics**
1.	Oops through Java	Digital System Design	Data Analytics	Fibre Optic Communications
2.	Satellite Communications	Communications Technologies	Information Theory and Coding	Database Management Systems
3.	Radar Systems	Bio-Medical Electronics	Python Programming	Data Structures
4.	Digital Signal Processors and Architectures	Network Security and Cryptography	Internet of Things	Electronic Measurements and Instrumentation
5.	Navigational Aids	Wireless Communications and Networks	Introduction to Machine Learning	Principles of Optimization Techniques
6.	Embedded System Design	Nano Materials and Technology	Wireless Sensor Networks	Television Engineering

OPEN ELECTIVES – 2 THREADS

S. No.	THREAD 1	THREAD 2
1	Soft Skills and Interpersonal Skills (GR18A3117)	CSE: 1. Principles of E-commerce (GR18A3129) 2. Database Management Systems (GR18A2068) 3. Java Programming (GR18A2075)
2	Human Resource Development and Organizational Behavior (GR18A3118)	IT: 1. Multimedia and Application Development (GR18A3123) 2. Web Programming (GR18A3057) 3. Operating Systems (GR18A2074)
3	Cyber Law and Ethics (GR18A3119)	EEE: 1.Embedded Systems (GR18A4102) 2. Control Systems (GR18A2032) 3. Artificial Intelligence Techniques (GR18A3016)
4	History of Science (GR18A3120)	ECE:1.Artificial Neural Networks (GR18A3124) 2.Software Defined Radio and Cognitive Radio (GR18A3125) 3.Cloud Computing (GR18A3102)
5	Introduction to Art and Aesthetics (GR18A3121)	ME: 1.Operations Research (GR18A3126) 2. Automobile Engineering (GR18A3127) 3. Robotics (GR18A4079)
6	Economic Policies in India (GR18A3122)	CE: 1. Green Building Technology (GR18A3128) 2.Building Materials and Construction Planning (GR18A2007) 3. Introduction to Fluid Mechanics (GR18A2010)

I Year

I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS

Course code: GR18A1001 **L/T/P/C: 3/1/0/4**
I Year I Semester

Course Objectives:

- The ideas of linearity and linear systems, which lie at the core of many engineering concepts
- The concept of latent values of a matrix which is critical in many engineering applications
- The ideas of function approximation using the tools of mean value theorems
- The skill of using a definite integral for various geometrical applications
- The skill of finding the optimal values of multi-variable functions

Course Outcomes:

- Compute the rank of a matrix to determine the existence of solutions of a linear algebraic system
- Determine the eigen values and eigenvectors of a square matrix which arise in several engineering applications
- Determine approximate solution of over determined systems using the pseudo inverse
- Apply the definite integral for various computational problems in geometry and Evaluate some improper integrals using special functions
- Develop the skill of determining optimal values of multivariable functions using classical methods

Unit IV: VECTOR AND MATRIX ALGEBRA

Vector space (definition and examples), linear independence of vectors, orthogonality of vectors, projection of vectors, Gram-Schmidt orthonormalization of vectors, Symmetric, Hermitian, skew-symmetric, skew-Hermitian, orthogonal and unit-ary 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 eigen values 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 forms by orthogonal transformation.

Unit III: MATRIX DECOMPOSITION AND PSEUDO INVERSE OF A MATRIX

Spectral decomposition of a symmetric matrix, L-U decomposition, 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: SINGLE VARIABLE CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem and Taylor's theorem (without proof), their geometrical interpretation and applications, approximation of a function by Taylor's series Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates) Evaluation of improper integral using Beta and Gamma functions.

Unit V: 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

Text/Reference Books:

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa publishing house,
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th edition,Pearson, Reprint, 2002.
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
5. GRIET reference manual.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY

Course code: GR18A1005 **L/T/P/C: 3/1/0/4**
I Year I Semester

Course Objectives:

- To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
- 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.
- To identify and apply various principles of electrochemistry, corrosion and water treatment which are essential for an engineer in industry
- To acquire knowledge of existence of different organic molecules in different stereo chemical orientations useful for understanding reaction path ways.
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

Course Outcomes:

- Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Relate electromagnetic spectra used for exciting different molecular energy levels in various spectroscopic techniques and their application in medicine and other fields.
- Understand the fundamental principles of electrochemistry for energy production and corrosion prevention.
- Recognize various problems related to electro chemistry and corrosion in industry and is able to explain different prevention techniques and apply concepts of chemistry in Engineering.
- Know the origin of different types of engineering materials used in modern technology and Interpret different problems involved in industrial utilization of water.

UNIT-I: ATOMIC AND MOLECULAR STRUCTURE

Atomic and molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Molecular orbitals 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 anharmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy.
Nuclear Magnetic Resonance: Basic concepts of NMR, 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. Fuel cells: hydrogen-oxygen fuel cell - applications and advantages.

Corrosion: Definition, causes and effects of corrosion, Theories 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, melting and boiling points, glass transition temperature, viscoelasticity. Compounding and fabrication by compression moulding and injection moulding, conducting polymers – definition, classification, application.

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

UNIT-V: STEREOCHEMISTRY AND ENERGY RESOURCES

Stereo chemistry: Structural isomers and stereoisomers, representations of 3D structures, configurations and symmetry, chirality, enantiomers, diastereomers, optical activity, conformational analysis of n-butane. Structure, synthesis and pharmaceutical applications of paracetamol and aspirin.

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 engines, Octane rating and cetane number. Composition and Uses of Natural gas, LPG and CNG.

Text/Reference Books:

1. Engineering Chemistry by P.C. Jain and M. Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana reddy, S. Chakroborty. Cengage Publications, 2018.
3. University Chemistry, by B.H. Mahan.
4. Engineering Chemistry by B. Siva Sankar, Mc Graw Hill Publication.
5. Fundamentals of Molecular Spectroscopy, by C.N. Banwell. Mc Graw Hill Publication
6. A Text book 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: GR18A1008 **L/T/P/C: 3/0/0/3**
I Year I Semester

Course Objectives:

- To introduce the fundamentals of Electrical Engineering.
- To solve problems in AC circuits.
- To provide foundation in theory and applications of Transformers and DC machines
- Understand the basic principles of AC Electrical machinery and their applications.
- To import the knowledge of Electrical Installations.

Course Outcomes:

- To understand and analyze basic electric circuits with suitable theorems.
- To solve 1-phase and 3-phase balanced sinusoidal systems.
- To interpret the working principle of Electrical machines.
- To appraise the applications of Induction motors and synchronous generators used in Industries.
- To identify the components of Low Voltage Electrical Installations.

UNIT-I: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.
Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. CIRCUITS

Representation of sinusoidal waveforms, peak 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 RL-C circuit.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: TRANSFORMERS

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: ELECTRICAL MACHINES

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V:ELECTRICAL INSTALLATIONS

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/Reference 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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH

Course code: GR18A1006 **L/T/P/C: 2/0/0/2**
I Year I Semester

Course Objectives:

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

Course Outcomes:

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
- Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect the point of view of others.

UNIT –I: 'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
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: Letter Writing
Vocabulary: Synonyms and Antonyms. Use of phrases for formal and informal letter writing. Eg.., I would like to apply, I regret to inform, This is to bring to your kind notice.etc.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension, Read a letter

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume. Reorganising of sentences /paragraphs in a letter.

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 to form Derivatives-Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-skills of Reading- Skimming and Scanning
Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence

UNIT –IV: 'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

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
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/Reference Books:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course code: GR18A1013 **L/T/P/C: 0/0/3/1.5**
I Year I Semester

Course Objectives:

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

Course Outcomes:

- Ability to perform experiments illustrating the principles of chemistry relevant to the study of science and engineering.
- Determination of parameters like hardness and chloride content in water.
- Understand the kinetics of reactions from a change in concentrations of reactants or products as a function of time.
- Synthesize a drug molecule as an example of organic synthesis methods widely used in industry.
- Determination of physical properties like adsorption and viscosity.

List of Experiments: (any 12 experiments out of 14)

Experiment 1: Determination total hardness of water by complexometric method using EDTA.
Experiment 2: Determination of chloride content of water by Argentometry.
Experiment 3: Redox titration: Estimation of ferrous iron using standard $KMnO_4$.
Experiment 4: Estimation of HCl by Conductometric titrations.
Experiment 5: Estimation of Acetic acid by Conductometric titrations.
Experiment 6: Estimation of Ferrous iron by Potentiometry using dichromate.
Experiment 7: Determination of rate constant of acid catalyzed reaction of methyl acetate.
Experiment 8: Determination of acid value of coconut oil.
Experiment 9: Adsorption of acetic acid by charcoal.
Experiment 10: Determination of surface tension of liquid by using stalagmometer.
Experiment 11: Determination of viscosity of liquid by using Ostwald's viscometer.
Experiment 12: Determination of partition coefficient of acetic acid between n-butanol and water.
Experiment 13: Synthesis of Aspirin
Experiment 14: Synthesis of Paracetamol.

Text/Reference Books:

1. Vogel's text book of Practical Organic Chemistry, 5th Edition.
2. Senior Practical Physical Chemistry, B.D. Khosala, A. Gulati and V. Garg (R. Chand & Co., Delhi)
3. Text book on Experiments and Calculations in Engineering Chemistry- S.S.Dara.
4. An Introduction to Practical Chemistry, K.K. Sharma and D.S. Sharma (Vikas Publications, New Delhi)

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING LAB

Course Code: GR18A1016 **L /T/ P/ C: 0/ 0/ 2/1**

I Year I Semester

Course Objectives:

- To introduce the use of measuring instruments.
- To analyze a given network by applying various electrical laws
- To calculate, measure and know the relation between basic electrical parameters.
- To know the response of electrical circuits for different excitations
- To summarize the performance characteristics of electrical machines.

Course Outcomes:

- Get an exposure to common electrical components and their ratings.
- Get an exposure to basic electrical laws.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the response of different types of electrical circuits to different excitations.
- Compare the basic characteristics of Electrical machines

TASK 1: Verification of Ohms Law
TASK2: Verification of KVL and KCL
TASK3: Transient Response of Series RL and RC circuits using DC excitation
TASK4: Transient Response of RLC Series circuit using DC excitation
TASK5: Resonance in series RLC circuit
TASK6: Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
TASK7: Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
TASK8: Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
TASK9: Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
TASK10: Measurement of Active and Reactive Power in a balanced Three-phase circuit
TASK11: Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
TASK 12: Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
TASK13: Performance Characteristics of a Three-phase Induction Motor
TASK14: Slip-Torque Characteristics of a Three-phase Induction Motor
TASK15: No-Load Characteristics of a Three-phase Alternator

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course code: GR18A1014 **L/T/P/C: 0/0/2/1**
I Year I Semester

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- To sensitize students to the nuances of English speech sounds, word accent, intonation, rhythm and Neutralization of accent for intelligibility.
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
- To improve the fluency of students in spoken English and neutralize their mother tongue influence.
- To train students to use language appropriately for public speaking and interviews.

Course Outcomes:

- Interpret the role and importance of various forms of communication skills.
- Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect the point of view of others.
- Utilize various media of verbal and non-verbal communication with reference to various professional contexts.
- Recognise the need to work in teams with appropriate ethical, social and professional responsibilities.
- 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

Listening Skills Objectives:

1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

- Listening for general content
- Listening for specific information

Speaking Skills Objectives:

- To involve students in speaking activities in various contexts
- To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual/Group activities

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and StrongForms in Context.*Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms inContext.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.
Practice: Situational Dialogues – Role-Play- Expressions in Various Situations – MakingRequests and Seeking Permissions - Telephone Etiquette.

Exercise-III:

CALL Lab:

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

ICS Lab:

Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details.
Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.
Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Interview Skills.
Practice: Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning** (CALL) Lab

Computer systems, headphones and English language learning software for self- study by students.

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs, audio-visual aids with a Podium, LCD and a projector

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR18A1017 **L/T/P/C: 1/0/3/2.5**
I Year I Semester

Course Objectives:

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

Course Outcomes:

- Develop various trades applicable to industries / Manufacturing practices.
- Create Hands on experience for common trades.
- Improve to fabricate components with their own hands.
- Develop practical knowledge on the dimensional accuracies and dimensional tolerances possible with various manufacturing processes
- To build the requirement of quality of work life on safety and organizational needs.

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

i. Carpentry
ii. Fitting Shop
iii. Tin-Smithy
iv. Casting
v. Welding Practice
vi. House-wiring
vii. Black Smithy

2. 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. V Workshop Manual / Venkat Reddy/ BSP.
5. Workshop Manual/K. Venugopal/Dr. Prabhu Raja/G. Sreekanjana.

I Year
II Semester

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Code: GR18A1002 **L/T/P/C: 3/1/0/4**
I Year II Semester

Course Objectives:

- The knowledge to visualize solutions to engineering problems governed by differential equations
- The skill of evaluating multiple integrals needed for applications in mechanics and electro-magnetic field theory
- The knowledge to visualize the functions arising in vector field theory and use mathematical tools for some computations
- The skill of calculating work done by a field and flux across a surface
- The skill of using specialized theorems for fast computation of work and flux

Course Outcomes:

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

UNIT-I: FIRST ORDER ODER

LDE of the first order: Solution of Exact, linear and Bernoulli equations, modelling of Newton's law of cooling, growth and decay models, modelling an R-L circuit
Non - linear differential equations of the first order: Equations solvable for *p*, equations solvable for *x*, equations solvable for *y*

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 $e^{ax}, x^n, cosax, sinax, e^{ax}V(x) \wedge xV(x)$ where $V(x) \equiv cosax \wedge sinax$, 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: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped)

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 fields, irrotational fields, potentials.

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 proofs) and their applications

Text/Reference 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.
5. GRIET reference manual
6. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishers.
7. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED PHYSICS

Course Code: GR18A1003 **L/T/P/C: 3/1/0/4**
I Year II Semester

Course Objectives:

- Demonstrate skills in scientific inquiry and problem solving techniques.
- Identify the role of quantum mechanics and its applications on physical system.
- Summarize the use of semiconductors and optoelectronics devices.
- Interpret the properties of Laser light and its uses in optical fiber communication.
- Outline the properties of electric and magnetic materials.

Course Outcomes:

- Outline the development of quantum mechanics and solve Schrodinger equation for simple potentials.
- Demonstrate the operation mechanism of electronic devices such as transistors and diodes.
- Explain the development and applications of optoelectronic devices.
- Analyze the properties of Laser and its propagation in optical fibers.
- Evaluate the properties of dielectric and magnetic materials for various applications.

UNIT-I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, photoelectric effect Compton effect, 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 box, potential barrier.

UNIT-II: SEMICONDUCTOR PHYSICS

Intrinsic and extrinsic semiconductors: Estimation of carrier-concentration, Dependence of Fermi level on carrier-concentration and variation with temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall Effect, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation and characteristics.

UNIT-III: OPTOELECTRONICS

Radiative, Non-radiative transitions 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 AND FIBER OPTICS

Lasers: Introduction, Interaction of radiation with matter: Absorption, Spontaneous and Stimulated emission, Einstein coefficients, Characteristics of lasers, Resonating cavity, Active medium, pumping, population inversion, Construction and working of laser: Ruby laser, He-Ne laser, application of lasers. Fiber Optics: Introduction, Principle and Construction of an optical fiber, Acceptance angle, Numerical aperture, Types of Fibers,

losses associated with optical fibers, Basic components in optical fiber communication system, Application of optical fibers.

UNIT-V: DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS

Dielectrics: Introduction, Types of polarizations (Electronic, Ionic and Orientation Polarizations) and calculation of Electronic, Ionic polarizability, internal fields in a solid, Clausius-Mossotti relation. Magnetism: Introduction, Bohr magnetron, 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.

Text/ References Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
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.
6. Richard Robinett, Quantum Mechanics
7. Fundamentals of Semiconductor Devices, Second Edition, Anderson and Anderson, McGraw Hill.
8. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Inc.(1995)
9. Semiconductor Physics and Devices, 4e, Neamen and Biswas, McGraw Hill.
10. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupthaon NPTEL

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING

Course Code: GR18A1007 **L/T/P/C: 3/1/0/4**

I Year II Semester

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the algorithms and flowcharts.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes:

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.

Unit I: INTRODUCTION TO PROGRAMMING

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program, Number systems

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops

I/O: Simple input and output with scanf and printf, formatted I/O.

Unit II: ARRAYS, STRINGS, STRUCTURES AND POINTERS

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures.

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type.

Unit III: PREPROCESSOR AND FILE HANDLING IN C

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef **Files:** Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions. Introduction to stdin,stdout and stderr.
Command line arguments.

Unit IV: FUNCTION AND DYNAMIC MEMORY ALLOCATION

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series , Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

Unit V: INTRODUCTION TO ALGORITHMS

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, Basic searching in an array of elements (linear and binary search techniques),Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

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

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR18A1010 **L/T/P/C: 1/0/4/3**
I Year II Semester

Course Objectives:

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

Course Outcomes:

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

UNIT – I: Introduction to Engineering Drawing, Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II: Orthographic Projections, Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures-Auxiliary Planes.

UNIT – III: Projections of Regular Solids, Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV: Development of Surfaces of Right Regular Solids, Prism, Cylinder, Pyramid and Cone, **Intersection of Solids**: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V:
Isometric Projections, 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
2. Engineering Drawing/ N.S.Parthasarathy and Vela Murali/Oxford
3. EngineeringGraphics.ByBasanthAgrawal/CMAgrawal/McGrawHillEducation
4. Engineering Drawing by K.VenuGopal/NewAgePublications.
5. Computer Aided Engineering Drawing / K Balaveerareddy et al-CBS publishers
6. Engineering Graphics and Design by Kaushik Kumar / Apurba kumar Roy / Chikesh Ranjan

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED PHYSICS LAB

Course Code: GR18A1011 **L/T/P/C: 0/0/3/1.5**
I Year II Semester

Course Objectives:

- Compare and tabulate the characteristics of Solar cells, LED and Laser sources.
- Analyze the behavior of semiconductors in various aspects.
- Apply the theoretical concepts of optical fibers in practical applications.
- Recall the basic concepts of LCR and RC circuits through hands on experience.
- Analyze the behavioral aspects of electric and magnetic fields.

Course Outcomes:

- Compare the behavior of p-n junction diode, Solar cells and LED.
- Analyze the behavior of magnetic and electric fields with the help of graphs.
- Determine the work function of a material through photoelectric effect.
- Asses the characteristics of Lasers and infer the losses in optical fibers.
- Estimate the time constant of RC circuit and resonance phenomenon in LCR circuit.

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

Note: Any 8 experiments are to be performed

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING LAB

Course Code: GR18A1015 **L/T/P/C: 0/0/3/1.5**
I Year II Semester

Course Objectives:

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

Course Outcomes:

- Formulate the algorithms for simple problems and translate given algorithms to a working and correct program.
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures and use pointers of different types
- 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: (Practice sessions)

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Task 2: (Simple numeric problems)

a. Write a program for find the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

Task 3: (Simple numeric problems)

a. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
    i. 5 x 1 = 5
    ii. 5 x 2 = 10
    iii. 5 x 3 = 15
b. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Task 4: (Expression Evaluation)

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number

Task 5: (Expression Evaluation)

a. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
b. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task 6: (Expression Evaluation)

a. Write a C program to find the roots of a Quadratic equation.
b. Write a C program to calculate the following, where x is a fractional value.

   1-x/2 +x^2/4-x^3/6
c. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+……+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Task 7: (Arrays and Pointers and Functions)

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
c. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. Transpose of a matrix

   with memory dynamically allocated for the new matrix as row and column counts may not be same.

Task 8: (Arrays and Pointers and Functions)

a. Write C programs that use both recursive and non-recursive functions
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.
   iii. To find x^n
b. Write a program for reading elements using pointer into array and display the values using array.
c. Write a program for display values reverse order from array using pointer.
d. Write a program through pointer variable to sum of n elements from array.

Task 9: (Files)

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

Task 10: (Files)

a. Write a C program that does the following:It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (Hint: use fseek function).The program should then read all 10 values and print them back.
b. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

Task 11: (Strings)

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string in to a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.

Task 12: (Strings)

a. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
b. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
c. Write a C program to count the lines, words and characters in a given text.

Task 13: (Miscellaneous)

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
b. Write a C program to construct a pyramid of numbers as follows:

```
 1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
 4 4 4 4    * * *
```

Task 14: (Sorting and Searching)

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Task 15: (Sorting and Searching)

a. Write a C program that sorts the given array of integers using selection sort in descending order.
b. Write a C program that sorts the given array of integers using insertion sort in ascending order .
c. Write a C program that sorts a given array of names.

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

II Year
I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC DEVICES AND CIRCUITS

Course Code: GR18A2051 **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:

- To understand the components and its functionality such as diodes, BJTs and FETs.
- To classify and compare the functionalities of diodes, BJTs and FETs
- To know the applications of components.
- To know the switching characteristics of components
- To give understanding of various types of amplifier circuits

Course Outcomes:

- Know the characteristics of various components.
- Compare of components V I characteristics.
- Analyze the working principles of various components
- Design various circuits based on the characteristics of the components
- Apply various circuits for different applications

UNIT –I: Diode and Applications

Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem, Comparators.

UNIT –II: Bipolar Junction Transistor (BJT)

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

UNIT –III:

Transistor Biasing and Stabilization

Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors.

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT –IV: Junction Field Effect Transistor

Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor. MOSFET Construction and its Characteristics in Enhancement and Depletion modes

UNIT – V:

FET Amplifiers: Small Signal Model**,** Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. Basic Concepts of MOS Amplifiers.

Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator. Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

Text/Reference Books:

1. Electronic Devices and Circuits Jacob Millman,Christos C Halkias and Satyabrata Jit, McGraw Hill Education,4e(SIE),2015.
2. Electronic Devices and Circuits Theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson**.**
3. The Art of Electronics , Horowitz, 3rdEdition Cambridge University Press
4. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
5. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., 2008, McGraw Hill.
6. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL ELECTRONICS

Course Code: GR18A2030 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

- To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
- To study the combinational logic design of various logic and switching devices and their realization.
- 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.
- To study some of the programmable logic devices and their use in realization of switching functions.
- To Explain and analyze the VHDL programming concepts for the design of digital circuits

Course Outcomes:

- Aware of theory of Boolean Algebra & the underlying features of various number systems.
- Use the concepts of Boolean Algebra for the analysis & design of various combinational & sequential logic circuits.
- Design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
- Analyze the various coding schemes are the part of the digital circuit design
- Design of various circuits with the help of VHDL Coding techniques

UNIT-I: Boolean algebra & Logic Gates

Digital 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, Integrated Circuits, Gate-level Minimization; The Map Method, Four- Variable Map, Five-Variable Map, Product-of-Sums Simplification, Don't-care Conditions, NAND and NOR Implementation, Exclusive-OR Function.

UNIT-II: Combinational logic

Introduction to Combinational circuits, Analysis Procedure, Design Procedure, Code-conversion, 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 VHDL, VHDL for combinational circuits.

UNIT-III: Sequential Logic

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. VHDL for 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, VHDL for Registers and Counters.

UNIT-V: Memory and Programmable Logic

Random-Access Memory, Write and Read Operations, Timing waveform, Types of Memories, Memory Decoding; Internal Construction, Coincident Decoding, Address Multiplexing, Read-Only Memory; Combinational Circuit Implementation, Types of ROMs, 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 VHDL Primer", 3rd edition, Addison Wesley, 2007
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: GR18A2052 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

- To compare the concepts of continuous and discrete-time signals and systems, their properties, representations and analysis methods.
- To visualize of time-domain representation and to analyse the concepts as they relate to difference equations, impulse response and convolution etc.
- To analyze the Skill of frequency-domain representation and analysis using Fourier analysis, Z-transforms.
- To apply the concepts of sampling process of analog signals and A/D and D/A conversions.
- To represent the mathematical and computational skills needed in application areas like communication, signal processing and controls.

Course Outcomes:

- Explain the fundamentals of mathematical models and analyze deterministic CT signals and systems
- Analyze the effect of LTI systems on signals passing through them in frequency and time domains
- Explain effect of sampling in continuous-time signals and apply sampling theorem in signal processing problems
- Discriminate the Fourier, Laplace and Z-transforms as appropriate for various signals and systems
- Solve simple problems, applicable to the field of communication, signal processing and control

UNIT-I: Introduction to Continuous-time Signals and Systems

Typical signals (impulse, step, ramp,sinusoid, exponential, signum, sinc); Time-domain scaling, shifting, and folding; Continuous-time signal characteristics (periodicity, frequency, deterministic, random, symmetry, energy and power); Properties of continuous-time systems (linearity, time invariance, causality and stability). Analogy between vectors and signals; Orthogonal signal space; Signal approximation using orthogonal functions; Mean squared error; Closed set of orthogonal functions; Orthogonality in complex functions.

UNIT-II: Fourier Series, Fourier Transform, and Laplace Transform

Representation of continuous-time periodic signals by Fourier series; Dirichlet's conditions; Properties of Fourier series, Parseval's theorem; Trigonometric and Exponential Fourier series; Complex Fourier spectrum; Fourier transform via Fourier series; Fourier transform of periodic and aperiodic signals; Convergence of Fourier transform; Properties of Fourier transforms, Parseval's theorem; Fourier transforms involving impulse function and Signum function; Introduction to Hilbert Transform; Definition of two-& one-sided Laplace transform, Region of convergence (ROC); Relation between LT and FT.

UNIT-III: Signal Transmission through Linear Systems
Continuous-time Linear Time-Invariant system, Representation by differential equations, Transforms and State-variables; 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: Sampling & Discrete-time Signals
Sampling theorem – Graphical and analytical proof for Band Limited Signals; Impulse-train sampling; Natural and Flat-top Sampling; Reconstruction of signal from its samples; Under-sampling and Aliasing; Band-pass Sampling Theorem; DT signal characteristics (periodicity, frequency, deterministic, random, symmetry, energy and power).

UNIT-V: Z-Transform
Discrete time signal representation using complex exponential and sinusoidal components; z-Transform of a discrete sequence; Region of convergence of z-Transform, Constraints on ROC for various classes of signals; Relationship between z-Transform and DTFT (Fourier spectrum); Transfer function of a LTI system (No difference equations); Properties of z-Transform**,** Inverse z-Transform by Partial Fractions (simple poles only).

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. P. Ramakrishna Rao, Shankar Prkriya, ”Signals and Systems”,2e,Mc Graw Hill (India),2013.
5. M J Roberts, ”Signals and Systems”,2e, TMH, 2012.
6. Hwei P. Hsu,” Signals and Systems”, 3e, McGraw Hill Education,2014.
7. K. Deerga Rao, ”Signals and Systems”, Birkhauser, 2018.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: GR18A2053 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

- To acquire the fundamental knowledge in probability concepts.
- To manage situations involving more than one random variable and functions of random variables in engineering applications.
- To analyze the various concepts like autocorrelation and cross correlation, power spectral density.
- To compare the various noises involved in communication and their effects.
- To analyze the communication signals and its properties through various distribution functions.

Course Out comes:

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

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

UNIT-III: Operations on & Multiple Random– Expectations

Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density - Point Conditioning, 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.

UNIT-IV: Random Processes -Temporal 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.

UNIT-V: Random Processes-Spectral Characteristics and Noise

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.

Modelling of noise:

Introduction to noise, types and sources of noises, noise in communication system, Arbitrary Noise Sources, Resistive and Thermal Noise Source, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

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. Statistical Theory of Communication – S.P Eugene Xavier, New Age Publications, 2003

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NETWORK ANALYSIS AND TRANSMISSION LINES

Course Code: GR18A2054 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

- To understand the basic concepts of RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To understand the two port network parameters.
- To analyze the behavior of the transmission lines and smith chart parameters
- To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

Course Outcomes:

- Define the properties of basic RLC circuits.
- Analyze the Steady state and transient analysis of RLC Circuits.
- Know the characteristics of two port network parameters.
- Analyze the transmission line parameters and configurations.
- Apply the various parameter concepts and its functions in the design of the circuits

UNIT– I:

Network Topology, Basic cutset and tie set matrices for planar networks, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, Ideal Transformer.

UNIT– II:

Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. 2^{nd} order series and parallel RLC Circuits, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT- III

Two port network parameters, Z, Y, A^1 B^1 C^1 D^1, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, $\prod$, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT – IV:

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

UNIT – V:

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. λ/4, λ/2, λ/8 Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

Text/Reference Books:

1. Network Analysis – Van VelKen Burg, 3rd Ed., Pearson, 2016
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.
3. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, MCGRAW HILL Education, 1999.
4. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 8th Edition, 1993.
5. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH
6. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ECONOMICS AND ACCOUNTING FOR ENGINEERS

Course Code: GR18A2004 **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:

- To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
- To provide the insight on theory of production and cost analysis.
- To describe different types of markets and competition, forms of organization and methods of pricing.
- To make the students understand various capital budgeting techniques.
- To describe fundamentals of accounting.

Course Outcomes:

- Scan the economic environment and forecast demand of products through demand forecasting techniques.
- Plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability and list out various costs associated with production and able to compute breakeven point.
- Outline the different types markets and competition, forms of business organization and methods of pricing.
- Aanalyze the profitability of various projects using capital budgeting techniques
- Prepare the financial statements.

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 Book Keeping. 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 LABORATORY

Course Code: GR18A2055 **L/T/P/C: 0/0/2/1**

II Year I Semester

Design (any six) and Simulation (any Ten) using Multisim or Pspice or Equivalent Simulation Software:

Course Objectives:

- To understand the components and its functionality such as diodes, BJTs and FETs.
- To classify and compare the functionalities of diodes, BJTs and FETs.
- To know the applications of components.
- To know the switching characteristics of components.
- To give understanding of various types of amplifier circuits.

Course Outcomes:

- Know the characteristics of various components.
- Compare components V I characteristics.
- Analyze the working principles of various components
- Design various circuits based on the characteristics of the components
- Apply various circuits for different applications

Task-1: Verify the PN Junction diode characteristics A) Forward bias B) Reverse bias.
Task-2: Verify the Zener diode characteristics and Zener as voltage Regulator.
Task-3: Verify the Full Wave Rectifier with & without filters.
Task-4: Verify the Common Emitter Amplifier Characteristics.
Task-5: Verify the Common Base Amplifier Characteristics.
Task-6: Verify the Common Source amplifier Characteristics.
Task-7: Verify the Measurement of h-parameters of transistor in CB, CE, CC configurations.
Task-8: Verify the Switching characteristics of a transistor.
Task-9: Verify the Input and Output characteristics of FET in CS configuration.
Task-10: Verify the SCR Characteristics.
Task-11: Verify the various types of Clippers and at different reference voltage levels.
Task-12: Verify the various types of Clampers and at different reference voltage levels.
Task-13: Steady state output waveform of clampers for a square wave input.
Task-14: Comparison the Operation of different types of Comparators.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL ELECTRONICS LABORATORY

Course Code: GR18A2033 **L/T/P/C: 0/0/2/1**

II Year I Semester

Course Objectives:

- To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
- To study the combinational logic design of various logic and switching devices and their realization.
- 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.
- To study some of the programmable logic devices and their use in realization of switching functions.
- To Explain and analyze the VHDL programming concepts for the design of digital circuits

Course Outcomes:

- Explain theory of Boolean Algebra & the underlying features of various number systems.
- Use the concepts of Boolean Algebra for the analysis & design of various combinational & sequential logic circuits.
- Design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
- Analyze the various coding schemes are the part of the digital circuit design
- Design of various circuits with the help of VHDL Coding techniques

Task-1: Introduction to VHDL Programming

Task-2: XILINX ISE QUICK Start Tutorial

Task-3: Design and Simulation of Combinational Logic Circuits Using VHDL

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

Task-4: Design and Simulation of sequential logic circuits using VHDL

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
x. Ring Counters

- Over View of Cool Runner Kit

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS LABORATORY

Course Code: GR18A2056 **L/T/P/C: 0/0/2/1**

II Year I Semester

Note: All the experiments are to be simulated using MATLAB or equivalent software

Course Objectives:

- To list the techniques in writing a Matlab program.
- To explain LTI systems with Matlab simulation environment.
- To apply different code writing skills in signal representation.
- To analyze the concepts of signals convolutions and its system responses.
- To evaluate the simulation results with various coding and simulation techniques.

Course Outcomes:

- State the fundamentals and explain the classification of signals and systems.
- Analyze the concepts to simulate the Fourier series, Fourier transform in signals and systems.
- Verify the behaviour of LTI system with Matlab simulation environment.
- Carry out sampling of signals with Matlab.
- Discriminate in writing the code for convolution response.

Task-1: Basic Operations on Matrices.
Task-2: Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
Task-3: Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
Task-4: Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
Task-5: Convolution for Signals and sequences.
Task-6: Auto Correlation and Cross Correlation for Signals and Sequences.
Task-7: Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
Task-8: Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
Task-9: Gibbs Phenomenon Simulation.
Task-10: Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
Task-11: Waveform Synthesis using Laplace Transform.
Task-12: Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
Task-13: Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
Task-14: Verification of Sampling Theorem.
Task-15: Removal of noise by Autocorrelation / Cross correlation.
Task-16: Extraction of Periodic Signal masked by noise using Correlation.
Task-17: Verification of Weiner-Khinchine Relations.
Task-18: Checking a Random Process for Stationarity in Wide sense.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

Course Code: GR18A2001 **L/T/P/C: 2/0/0/2**
II Year I Semester

Course Objectives:

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

Course Outcomes:

- Understand the harmonious co-existence in between nature and human being.
- Recognize various problems related to environment degradation.
- Develop relevant research questions for environmental investigation.
- Generate ideas and solutions to solve environmental problems due to soil, air and water pollution.
- Evaluate and develop technologies based on ecological principles and environmental regulations which in turn help 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, water resources: use and over utilization of surface and ground 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.

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, Crazy Consumerism, Environmental Education, Environmental Ethics, Concept of Green Building.

Text books:

1. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS. Publications.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

Reference books:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha, Kaushik, 4th Edition, New age international publishers.
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

DESIGN THINKING

Course Code: GR18A2083 **L/T/P/C: 2/0/0/1**
II Year I Semester

Course Objectives

- To provide a social and thinking space for the recognition of innovation challenges and the design of creative solutions.
- Learn from the overall design process how to create value as entrepreneurs.
- Study a problem from multiple perspectives.
- Learn how to frame the design challenge properly.
- Ideate prototype and Iterate solutions.

Course Outcomes:

- Students will be equipped with all the skills in the design mindset.
- Students propose a concrete, feasible, viable and relevant innovation project/challenge.
- An innovation new ventures, value propositions, new products or services.
- The adoption/adaptation of new technologies to streamline key processes or to disrupt established markets or the competitive landscape.
- The development of a new product, new service or the radical innovation of processes.

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, Ideation tools & exercises. Sample Design Challenge, Introduction to the Design Challenge Themes

UNIT-III

Storytelling and Tools for Innovation: Empathize-Understand customers, Empathy Maps, Empathise-Step into customers shoes- Customer Journey Maps, Define- Analysis & Drawing Inferences from Research

UNIT-IV

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

II Year
II Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTATIONAL MATHEMATICS FOR ENGINEERS

Course Code: GR18A2006 **L/T/P/C: 3/0/0/3**
II Year II Semester

Course Objectives:

- Distinguish between analytical and numerical solutions arising in mathematics.
- Learn methods that provide solutions to problems hitherto unsolvable due to their complex nature.
- Acquire skills that equip to approximate a hidden function from data.
- Understand the usefulness of concepts like interpolation and signal correlations.
- Learn the significance of matrix factorization techniques.

Course Outcomes:

- Apply well known techniques to find real roots of an equation and linear algebraic systems by iterative methods.
- Apply interpolation techniques for univariate and bivariate data using Gaussian and cubic spline methods.
- Apply numerical techniques to find eigen values and corresponding eigenvectors of a matrix.
- Perform matrix factorizations for advanced system solving techniques and apply numerical techniques to compute signal characteristics like correlation and covariance.
- Apply finite differences method to solve IVP in ODE.

UNIT-1: 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: E**igen values and Eigenvectors**
Jacobi iteration method for finding all eigen values and eigenvectors of a symmetric matrix-Power method and inverse power method for finding the largest and smallest eigen values and eigenvectors of a matrix

UNIT-IV: 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

UNIT-V:Matrix factorizations and correlation of signals
L-U decomposition, Cholesky decomposition, QR factorization of a matrix- Singular value decomposition of a matrix- Covariance, cross correlation and auto correlation of signals

Text books

1. M.K.Jain, S.R.K. Iyengar, R.K.Jain-.Numerical methods for scientific and engineering computation-New Age International publishers-Fourth edition-2—3
2. Robert J.Schilling and Sandra L.Harries- Applied numerical methods for engineers using MATLAB 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 RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTROMAGNETIC FIELDS AND WAVES

Course Code: GR18A2057 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

- The skills of conceptual, mathematical and graphical representation of electromagnetic field quantities.
- An understanding of various engineering terms related to static and time varying field and appreciation of various implications of Maxwell's equations.
- Ability of mathematical representation and analysis of electromagnetic waves in unbounded media
- Ability of mathematical representation and analysis of EM waves at media interfaces.
- Ability of mathematical analysis of EM wave propagating in wave guides

Course Outcomes:

- Define and describe electromagnetic field quantities mathematically/graphically/ in words
- Solve simple problems involving EM fields and explain important deductions made from Maxwell's equations.
- Analyze and solve problems of EM wave propagation in unbounded media.
- Analyze and solve problems of EM wave propagation at media interfaces..
- Derive propagation characteristics of EM waves in wave guides.

UNIT–I:

Electrostatics: Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

UNIT–II:

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT–III:

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT–IV:

EM Wave Characteristics : Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT–V:

Waveguides: Electromagnetic Spectrum and Bands. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – Z_o Relations, Effective Dielectric Constant.

Text/Reference Books:

1. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 8th Ed., McGrawHill,2014
2. Principles of Electromagnetics – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015.
3. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed., 2000, PHI.
4. Engineering Electromagnetics – Nathan Ida, 2nd Ed., 2005, Springer (India) Pvt. Ltd., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG AND DIGITAL COMMUNICATIONS

Course Code: GR18A2058 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

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

Course Outcomes:

- Analyze various continuous wave and angle modulation and demodulation techniques.
- Understand the effect of noise present in continuous wave and angle modulation techniques.
- Attain the knowledge about AM , FM Transmitters and Receivers.
- Analyze and design the various Pulse, Digital Modulation Techniques and Baseband transmission.
- 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. Introduction to VSB modulation.

UNIT-II: Angle Modulation

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM, PM and FM.

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

ASK Modulator and Demodulator, FSK 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, Probability of error for ASK, Inter Symbol Interference (ISI).

UNIT-V:

Error Control Codes: Linear Block Codes; Matrix Description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Cyclic Codes; Algebraic Structure, Encoding. Syndrome calculation, Decoding, Convolution Codes; Encoding, Decoding using State, Tree and Trellis Diagrams, Decoding using Viterbi Algorithm.

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

ANALOG AND PULSE CIRCUITS

Course Code: GR18A2059 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

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

Course Outcomes:

- Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
- Design and realize different classes of Power Amplifiers and tuned amplifiers usable for audio and Radio applications.
- Design multivibrators and sweep circuits for various applications.
- 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,f_α,f_β 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:

Multivibrators: Types of Triggering, Analysis and Design of Bistable, Monostable, Astable Multivibrators 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 – 5th Edition, 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. Prakash Rao, 2 Ed., 2008, TMH.
6. Pulse, Switching and Digital Circuits – 5th Edition, David A. Bell, Oxford, 2015.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: GR18A2060 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

- To familiarize the architecture of microprocessors and micro controllers
- To provide the knowledge about interfacing techniques of bus & memory.
- To understand the concepts of ARM architecture
- To study the basic concepts of Advanced ARM processors
- To apply the various programming concepts for different applications

Course Outcomes:

- Understand the internal architecture, organization and assembly language programming of 8086 processors.
- Understand the internal architecture, organization and assembly language programming of 8051controllers
- Understand the interfacing techniques to 8086 and 8051 based systems.
- Understand the internal architecture of ARM processors and basic concepts of advanced ARM processors.
- Apply the various programming concepts for different applications

UNIT -I:

8086 Architecture: 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.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT -II:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT –III:

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT –IV:

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data

processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT–V:

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

Text/Reference Books:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012
3. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed,2004.
4. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
5. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
6. Digital Signal Processing and Applications with the OMAP-L138 Experimenter, Donald Reay,WILEY 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF OPERATING SYSTEMS

Course Code: GR18A2061 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication.
- To learn the mechanisms involved in memory management in contemporary OS.
- To gain knowledge on distributed operating system concepts that includes architecture, mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
- To know the components and management aspects of concurrency management.

Course Outcomes: Upon completing this course, the student will be able to

- Compare the various algorithms and comment about performance of various algorithms used for memory management, CPU scheduling, File handling and I/O operations.
- Apply various concept related with Deadlock to solve problems related with Resources allocation, after checking system in Safe state or not.
- To appreciate role of Process synchronization towards increasing throughput of system.
- Describe the various Data Structures and algorithms used by Different Linux and Unix pertaining with Process, File , I/O management.
- To control the behavior of OS by writing Shell scripts.

UNIT-I:

Computer System and Operating System Overview: Overview of computer operating systems, operating system functions, operating system structure and system calls, Evaluation of Operating Systems.

UNIT-II:

Process Management – Process concept, process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT-III:

Concurrency: Processsynchronization, the critical section problem, Peterson's Solution, Synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

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

UNIT-IV:

Virtual Memory Management: virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT-V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, Introduction to Storage Area Networks (SAN), Introduction to Network Attached Storage.

Text/Reference Books:

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.
3. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
4. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
5. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
6. Operating Systems, A. S. Godbole, 2nd Edition, TMH
7. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
8. Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

Course Code: GR18A2062 **L/T/P/C: 0/0/2/1**
II Year II Semester

Course Objectives:

- To develop an ability to design basic model of analog and digital communication systems.
- To understand practically the generation, detection of various analog and digital modulation techniques using MATLAB.
- To acquire practical knowledge of each block in AM, FM transmitters and receivers.
- To understand the basic implementation of baseband transmissions.
- To analyze the various modulation techniques in different environments and to verify its performance using MATLAB.

Course Outcomes:

- Analyze the spectrum of various continuous wave and angle modulation and demodulation techniques
- Understand the effect of noise present in continuous wave and angle modulation techniques.
- Attain the knowledge of design about AM, FM Transmitters and Receivers using components.
- Analyze and design the various Pulse, Digital Modulation Techniques and Baseband transmission.
- Apply and analyze the various Modulation techniques in different environments using MATALB.

Task-1:

(i) Amplitude modulation and demodulation
(ii) Spectrum analysis of AM

Task-2:

(i) Frequency modulation and demodulation
(ii) Spectrum analysis of FM

Task-3: DSB-SC Modulator & Detector
Task-4: SSB-SC Modulator & Detector (Phase Shift Method)
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: Frequency Shift Keying: Generation and Detection
Task-12: Binary Phase Shift Keying: Generation and Detection
Task-13: Generation and Detection (i) DPSK (ii)QPSK

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG AND PULSE CIRCUITS LABORATORY

Course Code: GR18A2063 **L/T/P/C: 0/0/2/1**
II Year II Semester

Course Objectives:

- To design and verify the outputs of Current Shunt Feedback amplifier and Voltage Series Feedback amplifier.
- To provide experience on working, testing and analysis of different classes of amplifiers.
- Design of various ocsillators such as Wien Bridge oscilator, RC phase shift oscillator, Hartley and Colpitt's Oscillator for different frequencies.
- Design Multivibrators for various applications, synchronization techniques.
- To provide experience on design, testing and analysis of Schmitt Trigger circuit for loop gain less than and greater than one

Course Outcomes:

- To design and verify the outputs of Current Shunt Feedback amplifier and Voltage Series Feedback amplifier
- To design and experience on working, testing and analysis of different classes of amplifiers.
- To design various ocsillators such as Wien Bridge Oscilator , RC phase shift oscillator, Hartley and Colpitt's Oscillator for different frequencies.
- To design Multivibrators for various applications, synchronization techniques.
- To provide experience on design, testing and analysis of Schmitt Trigger circuit for loop gain less than and greater than one

Note: Twelve experiments to be done

Task-1: Current Shunt Feedback amplifier
Task-2: Voltage Series Feedback amplifier
Task-3: Cascode amplifier
Task-4: Darlington Pair
Task-5: RC Phase shift Oscillator
Task-6: Hartley and Colpitt's Oscillators
Task-7: Class A power amplifier
Task-8: Class B Complementary symmetry amplifier
Task-9: Two Stage RC Coupled Amplifier
Task-10: Wien Bridge Oscillator using Transistors
Task-11: Design a Bistable Multivibrator and draw its waveforms
Task-12: Design an Astable Multivibrator and draw its waveforms
Task-13: Design a Monostable Multivibrator and draw its waveforms
Task-14: Response of Schmitt Trigger circuit for loop gain less than and greater than one
Task-15: The output- voltage waveform of Boot strap sweep circuit
Task-16: The output- voltage waveform of Miller sweep circuit
Task-17: Pulse Synchronization of An Astable circuit
Task-18: Response of a transistor Current sweep circuit

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Course Code: GR18A2064 **L/T/P/C: 0/0/2/1**
II Year II Semester

Course Objectives:

- To familiarize the architecture of microprocessors and micro controllers
- To provide the knowledge about interfacing techniques of bus & memory.
- To understand the concepts of ARM architecture
- To study the basic concepts of Advanced ARM processors
- To apply the various programming concepts for different applications

Course Outcomes:

- Understand the internal architecture, organization and assembly language programming of 8086 processors.
- Understand the internal architecture, organization and assembly language programming of 8051/controllers
- Understand the interfacing techniques to 8086 and 8051 based systems.
- Understand the internal architecture of ARM processors and basic concepts of advanced ARM processors.
- Apply the various programming concepts for different applications

Task-1: Using 8086 Processor Kits and/or Assembler

Assembly Language Programs to 8086 to Perform

1. Arithmetic, Logical, String Operations on 16 Bit and 32 Bit Data.
2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Task-2: Using 8051 Microcontroller Kit (3 Tasks)

Introduction to IDE

1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
2. Time delay Generation Using Timers of 8051.
3. Serial Communication from / to 8051 to / from I/O devices.

Task-3: Interfacing I/O Devices to 8051, 7 Segment Display to 8051.

1. Matrix Keypad to 8051.
2. Sequence Generator Using Serial Interface in 8051.

Task-4: AVR Programming

1. LEDs and Switches
2. 2*16 LCD
3. Serial Communication
4. Device control
5. Reading sensors using ADC
6. Digital to Analog Converter
7. DC Motor control

8. Zigbee, Bluetooth
9. Real Time Clock
10. Secure Digital (SD) Card
11. Timers
12. Interrupts

Text/Reference Books:

1. Advanced Microprocessors And Peripherals by A K Ray, Tata McGraw-Hill Education, 2006
2. The 8051 ***Microcontrollers***: Architecture, Programming & Applications by Dr. K.Uma Rao, Andhe Pallavi, Pearson, 2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE ETHICS AND GENDER CULTURE

Course Code: GR18A2002 **L/T/P/C: 2/0/0/2**
II Year II Semester

Course Objectives:

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

Course Outcomes:

- Student will be able to understand the core values that shapes the ethical behaviour.
- Student will be able to realize the significance of ethical human conduct and self-development
- Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
- Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
- 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.

Unit-II: Personality and Behaviour Development
Positive thinking, punctuality, avoiding fault finding, Free from anger, Dignity of labour, religious tolerance, Aware of self-destructive habits.

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

Unit–IV: Introduction to Gender
Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of Gender.

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

Text books

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whit beck, 2e, Cambridge University Press 2015.
3. A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

Reference books

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

III Year
I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER ARCHITECTURE AND ORGANIZATION

Course Code: GR18A3130 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- Discuss the basic concepts and structure of computers.
- Understand concepts of register transfer logic and arithmetic operations.
- Understand the concepts of control techniques and programming
- Explain different types of addressing modes and memory organization.
- Learn the different types of serial communication techniques.

Course Outcomes:

- Understand the theory and architecture of central processing unit.
- Design a simple CPU with applying the theory concepts.
- Use appropriate tools to design verify and test the CPU architecture.
- Learn the concepts of parallel processing, pipelining and inter processor communication.
- Exemplify in a better way the I/O and memory organization.

UNIT I: Introduction

Computing and Computers, Evolution of Computers, VLSI Era, System Design; Register Level, Processor Level, CPU Organization, Data Representation, Fixed Point Numbers, Floating Point Numbers

UNIT II: Data Path Design

Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, booth's algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline design.

UNIT III: Control Design

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control Instruction Pipelines, Pipeline Performance.

UNIT IV; Memory Organization

Random Access Memories, Serial Access Memories, RAM Interfaces, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V: System Organization

Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors,.

Text books

1. John P. Hayes, 'Computer architecture and Organization', TMH Third edition, 1998.
2. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organization", V edition, McGraw-Hill Inc, 1996.

Reference books

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Paraami, "Computer Architecture", BEH R002, Oxford Press.
3. P.Pal Chaudhuri, "Computer organization and design", 2nd Ed., Prentice Hall of India, 2007.
4. G.Kane & J.Heinrich, "MIPS RISC Architecture", Englewood cliffs, New Jersey, Prentice Hall, 1992.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR CONTROL SYSTEMS

Course Code: GR18A3026 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- Understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response.
- Assess the system performance using time domain analysis and methods for improving it.
- Assess the system performance using frequency domain analysis and techniques for improving the performance
- Design various controllers and compensators to improve system performance
- Understand the state space analysis techniques

Course Outcomes:

- Improve the system performance by selecting a suitable controller and/or a compensator for a specific application.
- Apply various time domain and frequency domain techniques to assess the system performance.
- Apply various control strategies to different applications (example: Power systems, electrical drives etc...)
- Test system Controllability and Observability using state space representation and applications of state space representation to various systems.
- Learn the concept and usage of state space analysis methods

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 books

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

VLSI DESIGN

Course Code: GR18A3034 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- To familiarize with the basic MOS Circuits·
- To acquaint with the MOS Process Technology·
- To understand the operation of MOS devices and to impart in-depth knowledge about analog and digital CMOS circuits.
- Learn various types of subsystems and memory elements.
- Understand the needs of testing the IC for fault analysis.

Course Outcomes:

- The student able to understand the fabrication process of IC technology.
- The student has acquaint with the operation of MOS transistor.
- The student able to trade off design goals of VLSI.
- The student able to use Adders, Multipliers and memories etc.
- The student able to understand various testing schemes.

UNIT I

Introduction: Introduction to IC Technology–MOS transistors, NMOS, CMOS & BiCMOS fabrication Technologies; fabrication processes: Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Etching, Planarization, Encapsulation, Integrated Resistors and Capacitors, Manufacturing issues.

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, Sources of Power Dissipation, Dynamic Power, Static Power, Robustness, Variability, Reliability, Circuit simulation, SPICE tutorials, device models.

UNIT III

VLSI Circuit Design Processes, Gate Level Design: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, CMOS Nano technology. Switch logic, Alternate gate circuits, Time delays, driving large capacitive loads, wiring capacitance, Fan–in, Fan–out, Choice of layers.

UNIT IV

Data path Subsystems, Array Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters. SRAM, DRAM, ROM, Serial Access Memories, Content Addressable Memory.

UNIT V

Semicustom Integrated Circuit Design, IC Testing: PLAs, Programmable Array Logic, FPGAs, CPLDs, Standard cells design approach. Need for testing ICs, Test Principles, Wafer-level, Package- level testing, System-level Test Techniques, and Layout Design for improved Testability and Principles of Design for testability (DFT).

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.

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: GR18A3035 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- To understand the basic terminology and concepts of Antennas.
- To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
- To analyze the characteristics of yagi-uda antennas, helical antennas, pyramidal horns, microstrip patch antennas and parabolic reflectors and identify the requirements to facilitate their design.
- To analyze the characteristics of yagi-uda antennas, helical antennas, pyramidal horns, microstrip patch antennas and parabolic reflectors and identify the requirements to facilitate their design.
- To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

Course Outcomes:

- Explain the mechanism of radiation, distinguish between different antenna characteristic parameters, establish their mathematical relations, estimate them for different practical cases.
- Carry out the Linear Array Analysis, estimate the array factor and characteristics and sketch the pattern for 2-element array, N-element BSA, EFA, modified EFA, Binomial Arrays.
- Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of folded dipole, Yagi-Uda Antenna, Helical Antennas, Horn Antennas, and to acquire the knowledge of their analysis, design and development.
- Analyze a microstrip rectangular patch antenna and a parabolic reflector antenna, identify the requirements and relevant feed structure, carry out the design and establish their patterns.
- Classify the different wave propagation mechanisms, identify their frequency ranges, determine the characteristic features of ground wave, ionospheric wave, space wave, duct and tropospheric propagations, and estimate the parameters involved.

UNIT I

Antenna Basics and Thin Linear Wire Antennas: Principle of Radiation, Standing wave and Travelling Wave Current Distributions on wire antennas, Fields due to Hertzian Dipole, Near and Far fields, Far fields of Half Wave Dipole, Quarter Wave Monopole and Folded Half-Wave Parameters–Radiation Resistance, Antenna Polarization, Radiation Patterns, Beam Width, Radiation Intensity. Beam Area, Directivity, Gain, Antenna Aperture, Effective length, Reciprocity in Antennas, Equivalence of characteristics in Transmission and Reception, Relation between Directivity and Maximum Effective Aperture, Friis Transmission Formula, Bandwidth, Antenna Temperature.

UNIT II

Antenna Arrays: Uniform Linear Arrays of Isotropic Sources, Broadside Arrays (BSA). End fire Arrays (EFA), EFAs with Increased Directivity. Principle of Pattern Multiplication, Binomial arrays, Effect of Amplitude Distribution on Side-Lobe-Level and Beam width, Dolph-Chebychev Arrays.

UNIT III

Special Antennas: Travelling Wave Antenna, Yagi-Uda Arrays, Vee and Rhombic Antennas, Small Loop Antenna, Helical Antenna, Log-Periodic Antenna, Micro strip Patch Antenna.

UNIT IV

Aperture Antennas, Antenna Measurements: Slot Antenna, Waveguide Horn Antenna, Reflector Antennas: Flat-sheet/ Corner Reflectors, Parabolic Reflector, Lens Antennas - Dielectric Lenses, Metal-plate Lenses ,Antenna Measurements- Pattern Measurement, Outdoor/ Indoor Test Ranges, Absolute Gain Measurement.

UNIT V

Radio-Wave Propagation: Ground Wave Propagation - Space and Surface Waves, Curved Earth Reflections,; Space Wave Propagation – Plane Earth Reflection, Effect of Earth Curvature, Visible Horizon, Effective Heights of Antennas, VHF Communication between aerials placed far apart; Surface Wave Propagation- Factors affecting Magnitude of Surface Wave; Propagation in Troposphere- Refraction in Troposphere, Standard Atmosphere, Radio horizon, Super Refraction, Condition for Duct Propagation, M-Curves, Tropospheric 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, Ionospheric Measurements, Dominant mechanisms of Propagation in Various Frequency Ranges

Text books

1. Antennas and Wave Propagation - J.D. Kraus, RJ. Marhefka and Ahmad S. Khan. TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Antenna and Wave Propagation – Harish AR and Sachidananda M, Oxford University Press, 2007
3. Electromagnetic Waves and Radiating Systems - E.C. Jordan and K.G. Balmain. PHI, 2nd ed., 2000.

References books

1. Antenna Theory and Design - Warren L. Stutzman, Gary A. Thiele, John Wiley & Sons, 3rd edition. 2013
2. Antenna Theory- Analysis and Design- C.A. Balanis, John Wiley & Sons, 3rd ed. 2005.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTEGRATED CIRCUITS AND APPLICATIONS

Course Code: GR18A3036 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non – linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits

Course Outcomes:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Understanding of the different families of digital integrated circuits and their characteristics.
- Also students will be able to design circuits using operational amplifiers for various applications.
- Learn about various techniques to develop A/D and D/A convertors.
- Develop IC based project kits in above areas according to specifications.

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

OOPS TROUGH JAVA
(Professional Elective - I)

Course Code: GR18A3037 **L/T/P/C: 3/0/0/3**
III Year I Semester

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

Course Outcomes:
- Write java programs and differentiate between object-oriented programming and procedure-oriented programming.
- Apply object-oriented programming features for solving a given problem.
- Incorporate exception handling mechanism.
- Implement Use java standard API library to write complex programs.
- Develop interactive programs using applet and swing.

UNIT-I:
Introduction to OOP: Introduction, Need of object-oriented programming, principles of object-oriented languages, C++ vs JAVA, Applications of OOP, history of JAVA, Java Virtual Machine, Java features, Program structures, Installation of JDK.

UNIT-II:
Programming Constructs: Variables, Primitive data types, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Primitive Type conversion and casting, flow of control- branching, conditional, loops. **Classes and Objects-** Classes, Objects, methods, constructors- constructor overloading, cleaning up unused objects- Garbage collector, class variable and methods- static keyword, this keyword, arrays, Command line arguments.

UNIT-III:
Inheritance: Types of Inheritance, Deriving classes using extends keyword, method overloading, super keyword, final keyword, abstract class. Interfaces: Interface, Extending interface, interface Vs Abstract classes. Packages- Creating Packages, using Packages, Access protection, java I/O package. Exceptions - Introduction, Exception handling techniques - try, catch, throw, throws, finally block, user defined Exception.

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

UNIT-V:

Applets- Applet class, Applet structure, an example Applet program, Applet life cycle. Event Handling- Introduction, Event Delegation Model, Java.awt.event Description, Adapter classes, Inner classes.

Abstract Window Toolkit: Why AWT?,java.awt package, components and containers, Button, Label, Checkbox, Radio buttons, List boxes, choice boxes, Text field and Text area, container classes. Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScrollPane.

Text/Reference Books:

1. Java: The Complete Reference, 10th edition, Herbert Schildt, Mcgraw Hill.
2. Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
3. Java for Programming, P.J.Dietel Pearson Education
4. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
5. Thinking in Java, Bruce Eckel, Pearson Education
6. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SYSTEM DESIGN
(Professional Elective - I)

Course Code: GR18A3095 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

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

Course Outcomes:

- Develop a digital logic and apply it to solve real life problems.
- Analyze, design and implement combinational logic circuits.
- Analyze, design and implement sequential logic circuits.
- Analyze digital system design using PLD.
- 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 Modeling & 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

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

DATA ANALYTICS
(Professional Elective - I)

Course Code: GR18A3038 **L/T/P/C: 3/0/0/3**

III Year I Semester

Course Objectives:

- Understand the Big Data Platform and its Use cases.
- Provide an overview of Apache Hadoop.
- Provide an overview of HDFS.
- Understand Map Reduce Jobs.
- Provide hands on Hadoop Eco Systems.

Course Outcomes:

- Apply the Big Data Analytic techniques for Business Applications.
- List the capabilities of Hadoop and HDFS.
- Describe the use of Map Reduce.
- Examine Job Execution in Hadoop Environment.
- Explore data stores on Hadoop.

UNIT I

INTRODUCTION TO BIG DATA AND HADOOP: Introduction to Big Data Platform – Big Data definition, Challenges of Conventional Systems: Enterprise/structured data, Social/unstructured Data, Unstructured data needs for Analytics, Analytics vs Reporting, Data Analytic Tools, History of Hadoop, Components of Hadoop, Analyzing the Data with Hadoop, Different Echo systems of Hadoop, IBM Big Data Platform Strategy and Introduction to Infosphere Big Insights.

UNIT II

HDFS (Hadoop Distributed File System): Significance of HDFS in Hadoop, Design of HDFS, HDFS Architecture overview, 5 daemons of Hadoop: Name Node, Data Node, Secondary Node, Job Tracker and Task Tracker, their functionality, Data Storage in HDFS: Introduction about Blocks, Data replication, Accessing HDFS: CLI (Command Line Interface) and admin commands, How to store various types of data in HDFS using CLI-command.

UNIT III

Map Reduce Map Reduce Architecture, Map Reduce Programming Model, Map Reduce Java API, Anatomy of Map Reduce Job run, Failures, Job Scheduling, Sort & Shuffle phase, Task Execution. Map Reduce Program using IBM Big Insights. Adaptive Map Reduce.

Introduction to Oozie: Overview of Managing job Execution. Apache Pig: Introduction to Apache Pig, Map Reduce Vs Apache Pig, SQL Vs Apache Pig, Pig Data types, Modes Of Execution in Pig.

UNIT IV

Data Stores on Hadoop Hive: Introduction, architecture, Integration with Hadoop, Hive Tables: Managed Tables, External Tables, Hive Query Language (Hive QL) Hbase: Introduction to HBase, Architecture, HBaseVs RDBMS, HBaseUseCasesHmaster.

Introduction to Zookeeper.

UNIT V
BM APPLICATIONS ON HADOOP
Big SQL: Introduction to Big SQL, Datatypes, Big SQL Statistics.
Big Sheets: Introduction, Processing and Accessing BigSheets, Big SQL Integration.

Text books

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.

References books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jefrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

FIBER OPTIC COMMUNICATIONS

(Professional Elective - I)

Course Code: GR18A3039 **L/T/P/C: 3/0/0/3**
III Year I Semester

Course Objectives:

- To realize the significance of optical fiber communications.
- To understand the construction and characteristics of optical fiber cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM.

Course Outcomes:

- Understand and analyze the constructional parameters of optical fibers.
- Be able to design an optical system.
- Estimate the losses due to attenuation, absorption, scattering and bending.
- Compare various optical detectors and choose suitable one for different applications.
- Learn the design of various types of optical systems.

UNIT I

Overview of optical fibre communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

UNIT II

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss.

UNIT III

Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,. Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED & ILD.

UNIT IV

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT V

Optical system design: Considerations, Component choice, multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples.

Text books

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition,2000.
2.Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

References books

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – GovindP. Agarwal , John Wiley, 3rd Edition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

INTEGRATED CIRCUITS LAB

Course Code: GR18A3040 **L/T/P/C: 0/0/2/1**

III Year I Semester

Course Objectives

- Fundamentals of analog and digital integrated circuits.
- Design methodologies using practical integrated circuits.
- To Gain the practical hands-on experience on 723 Voltage Regulator and three terminal voltage regulators.
- The application areas of integrated circuits.
- To Gain the practical hands-on experience on 555 Timer applications.

Course Outcomes

- Design and analyze the various linear application of op-amp.
- Design and analyze the various non-linear application of op-amp.
- Design and analyze the various application of 555 timer like oscillators and multivibrator circuits
- Design and analyze various combinational logic circuits using Digital Integrated IC's.
- Design and analyze various 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 RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

OOPS THROUGH JAVA LAB

Course Code: GR18A3041 **L/T/P/C: 0/0/2/1**
III Year I Semester

Course Objectives

- 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.
- Understand the principles of inheritance, packages and interfaces Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development and ability to write a computer program to solve specified problems.
- Create database connectivity in java and implement GUI applications.

Course Outcomes

- Write basic Java programs, Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Write Java application programs using OOP principles and proper program structuring.
- Demonstrate the concepts of polymorphism and inheritance.
- Write JAVA programs to demonstrate method overloading, overriding.
- 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. Ex: MADAM is a palindrome.
b) Write a Java program for sorting a given list of names in ascending order.
c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use StringTokenizer class of java.util)

Task 3:
Write java programs that implement the following keywords

a) this keyword **b)** super keyword **c)** static keyword **d)** final keyword

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.

Task5:
a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
c) Write a Java program that displays the number of characters, lines and words in a text file

Task 6:
a) Write a Java program for handling Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions.

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

Task 8:
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 textfields, Num1 and Num2. 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 Display the exception in a message dialog box.

Task 12:
a) Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.

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

Text 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

VLSI DESIGN LAB

Course Code: GR18A3042 **L/T/P/C: 0/0/2/1**
III Year I Semester

Design and implementation of the following CMOS digital/analog circuits using Cadence/Mentor Graphics/Synopsys CAD tools including: Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL Equivalent/VHDL design, Logic Synthesis, Simulation and Verification, Scaling of CMOS Inverter for Different Technologies, Study of Secondary Effects (Temperature, Power Supply and Process Corners), Circuit Optimization with Respect to Area, Performance and/or Power, Layout, Extraction of Parasitics and Back Annotation and Related, Modifications in Circuit Parameters and Layout Consumption, DC/ Transient Analysis, Verification of Layouts (DRC, LVS)

Course Objectives

- Apply the concepts of basic combinational logic circuits, sequential circuit elements, and programmable logic in the laboratory setting.
- To develop familiarity and confidence with designing, building and testing digital circuits, including the use of CAD tools.
- Behavioral, register- transfer, logic, and physical-level structured VLSI design using CAD tools and hardware description language (verilog).
- To analyze the results of logic and timing simulations and to use these simulation results to debug digital systems.
- To learn by using Xilinx Foundation tools and Hardware Description Language (VHDL).

Course Outcomes

- Simulate circuits within a CAD tool and compare to design specifications.
- Analyze various combinational and sequential logic circuits.
- Design, implement, and simulate circuits using Verilog HDL.
- Learn by using Xilinx Foundation tools and Hardware Description Language.
- Analyze the results of logic and timing simulations and to use these simulation results to debug digital systems.

VLSI Programs:

Task1: Introduction to Layout Design Rules

Task2: Layout of CMOS Inverter

Task3: Layout of CMOS NAND/NOR Gates

Task4: Layout of CMOS AND/OR Gates

Task5: Layout of CMOS XOR/XNOR Gates

Task6: Layout of CMOS 1-bit Full Adder

Task7: Layout of Static RAM

Task8: Layout of Latch

Task9: Layout of 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: Analysis of Transmission Gate

Task15: Analysis of 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

CONSTITUTION OF INDIA

Course Code: GR18A2003 **L/T/P/C: 3/0/0/2**
III Year I Semester

Course Objectives:

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

Course Outcomes:

- Students will be able to know the importance of Constitution and Government
- Students will be able to become Good Citizens and know their fundamental rights, duties and principles.
- Students will learn about the role of PM, President, Council of Ministers etc.
- The Students understand the importance of Election Commission.
- 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

MICROWAVE ENGINEERING

Course Code: GR18A3090 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives:

- To learn how to analyze and design microwave devices and circuits using circuit theory.
- To learn how to carry out impedance matching in microwave frequencies.
- To learn filter design and to learn microwave filter implementations.
- To carry out analyses on various three-port and four-port devices.
- To study principles of microwave diodes, transistors and tubes.

Course Outcomes:

- The learner will be able to apply circuit theory to analyze and design microwave circuits.
- The learner will be able to and implement some microwave filters.
- The learner will be in possession of operating principles and application knowledge of microwave diodes, transistors and tubes.
- The learner will be able to design microwave amplifiers and oscillators.
- The learner will be able to design up converters, down converters and frequency multipliers.

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 reprocity and losslessness 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: process of filter design and implementation, expressions for Chebyshev and Butterworth low-pass, high-pass, band pass and band-stop filters in terms of normalization filter component values. Filter design using Richards transformation, Kuroda's identities, 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 Wilinkson power dividers, Single-hole and double-hole Bethole directional couplers, analysis of Quadrature hybrid, analysis of 180^{o} hybrid.

UNIT-IV Microwave diodes, Transistors and Tubes (No derivations)

Diodes: Operating principle and applications of schotty diodes, PIN diodes, Varacter diodes,

Gunn diodes, IMPATT diodes, Tunnel diodes and BARITT diodes and their applications (No derivations)
Transistors: Operating principle and applications of bipolar junction transistors, hetero junction bipolar junction transistors, Field effect transistors, monolithic microwave integrated circuits and RF MEMS.
Tubes: Operating principle and applications of Klystrons and reflex klystrons and TWTs.

UNIT-V Microwave amplifiers, Oscillators, Mixers and Frequency Multipliers
Amplifiers: Two-port power gains, unconditional and conditional stabilities. Single -stage transistor amplifier design for maximum power.
Oscillators: Negative resistance based oscillators, Transistor oscillators, oscillator phase noise, Frequency multipliers and Mixers: Reactive diode multipliers(include Manky-Rowe relations), Upconversion and down conversion processes using mixers, single-ended diode mixer.

Text books

1 "Microwave Engineering", David M Pozar, John Wiley & Sons, 4th ed., 2012
2 "Microwave Devices and Circuits", Samuel Y Liao, Pearson Education, 3rd ed., 1990
3 "RF Circuit Design", Christopher Bowick, Elsevier Inc, 2008

References books

1. "RF Circuit Design- Theory and Applications". Reinhold Ludwig and Pavel Bretchko, Prentice Hall Inc., 2000
2. "Foundations for Microwave Engineering", RE Collin, John Wiley & Sons Inc, 2nd ed., 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSING

Course Code: GR18A3091 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

- To introduce the concepts of various types of discrete signals and systems.
- To use the transformation techniques for analysis of discrete time signals and systems.
- To understand the digital signal processing, sampling and aliasing
- To realize, understand and design analog and digital filters.
- To introduce various concepts of digital filter design techniques and applications

Course Outcomes:

- Use different transforms and analyze the discrete time signals and systems.
- Realize the use of LTI filters for filtering different real world signals.
- Calibrate and resolve different frequencies existing in any signal.
- Design and implement multistage sampling rate converter.
- Design analog and digital filters for various applications

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, Step and 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.

Textbooks

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI,2007.
2. Discrete Time Signal Processing–A.V. 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, Algorithms and Applications, Pearson Education, PHI, 2003

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER NETWORKS

Course Code: GR18A3044 **L/T/P/C: 3/0/0/3**
III Year II Semester

Course Objectives:

- Familiarise with various Network topologies and Network models.
- Identify guided and unguided transmission media used in different networks for communication.
- Understand different Routing technologies involved to route packets
- Distinguish the standard Internet Protocol (IP), Transport Control Protocol (TCP) and User Datagram Protocol for Internet.
- Analyze and understand the basic security algorithms.

Course Outcomes:

- Define basic terminologies of Computer Networks and to apply various networking configurations and transmission media to build a network for an organization.
- Develop error correction and detection techniques and MAC Protocols for specific networks.
- Develop various routing algorithms and give solutions to various transmission problems.
- Apply the application of TCP or UDP protocols.
- Develop some protocols at Application Layer and to deal with security problems related to Web 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, ATM: Reference model, QoS in ATM.
Physical Layer: Guided Transmission Media, Wireless Transmission Media, Communication Satellites. Switching and Multiplexing, Mobile Telephone Network.

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), HDLC protocols, wireless LANS (IEEE 802.11), Bluetooth (IEEE 802.15), The Network and internetwork devices, ATM Header.

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, Quality of Service Techniques.
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, SNMP.

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

Text books

1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

References books

1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
4. Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

SATELLITE COMMUNICATIONS

(Professional Elective - II)

Course Code: GR18A3092 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives:

- To provide an in-depth understanding of different concepts used in a satellite communication system.
- Study of earth segment and space segment components
- To explain the tools necessary for the calculation of basic parameters in a satellite communication system.
- 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.
- Study of satellite access by various users.

Course Outcomes:

- Understand the basics of satellite communication.
- Define orbital mechanics and launch methodologies.
- Analyze the link budget and other parameters of satellite signal for proper communication.
- Understand various communication links and different applications in satellite communication.
- 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 RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMMUNICATION TECHNOLOGIES

(Professional Elective - II)

Course Code: GR18A3093 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives

- Various modulation and demodulation techniques of analog communication.
- Multiple coding techniques used in communication.
- Different parameters of analog and digital communication techniques.
- To understand the multiple access techniques and interference reduction techniques in digital communication.
- To have an insight into the various propagation models used in digital communication.

Course Outcomes

- Use of different modulation and demodulation techniques used in analog communication
- Identify and solve basic communication problems
- Analyze transmitter and receiver circuits
- Compare and contrast design issues, advantages, disadvantages and limitations of analog and digital communication systems
- Develop time division multiplexing concepts in real applications

Unit – I

Digital Modulation Techniques: Digital modulation formats, Coherent binary modulation techniques, Coherent quadrature – modulation techniques, Non-coherent binary modulation techniques, Comparison of binary and quaternary modulation techniques, M-ray modulation techniques, Power spectra, Bandwidth efficiency, M-array modulation formats viewed in the light of the channel capacity theorem, Effect of inter symbol interference, Bit verses symbol error probabilities, Synchronization, Applications.

Unit – II

Coding Techniques: Convolutional encoding, Convolutional encoder representation, Formulation of the convolutional decoding problem, Properties of convolutional codes: Distance property of convolutional codes, Systematic and non-systematic convolutional codes, Performance Bounds for Convolutional codes, Coding gain, Other convolutional decoding algorithms, Sequential decoding, Feedback decoding, Turbo codes.

Unit – III

Linear and Adaptive Equalization: Linear equalization, Decision -feedback equalization, Reduced complexity ML detectors, Iterative equalization and decoding - Turbo equalization. Adaptive linear equalizer, adaptive decision feedback equalizer, Recursive least square algorithms for adaptive equalization.

Unit – IV

Spread Spectrum Signals for Digital Communication: Model of spread spectrum digital communication system, Direct sequence spread spectrum signals, Frequency hopped spread spectrum signals, CDMA, Time hopping SS, Synchronization of SS systems

Unit – V

Digital Communication through Fading Multipath Channels: Characterization of fading multipath channels, The effect of signal characteristics on the choice of a channel model, Frequency non selective, Slowly fading channel, Diversity techniques for fading multipath channels, Digital signals over a frequency selective, Slowly fading channel.

Text books:

1 Simon Haykin, "Digital Communication", Reprint, Wiley, 2013, ISBN: 0471647357, 9780471647355

2. Bernard Sklar, "Digital Communications - Fundamentals and Applications", Pearson Education (Asia) Pvt. Ltd, 2nd Edition, 2014, ISBN: 1292026065, 9781292026060.

Reference Books:

1. John G. Proakis, "Digital Communications", McGraw Hill, 5th Edition, 2008
2. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INFORMATION THEORY AND CODING

(**Professional Elective - II**)

Course Code: GR18A3094 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives

- The principles and applications of information theory.
- Understand the fundamental concept of entropy and information as they are used in communications.
- The quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problems.
- The implications and consequences of fundamental theories and laws of information theory and coding theory with reference to the application in modern communication and computer systems.
- Explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problems.

Course Outcomes

- Apply information theory and linear algebra in source coding and channel coding
- Calculate the information content of a random variable from its probability distribution.
- Relate the joint, conditional, and marginal entropies of variables in terms of their coupled probabilities.
- Analyze various error control encoding and decoding techniques
- Design BCH & RS codes for Channel performance improvement against burst errors.

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, Chain Rules for entropy, 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 the 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:

Systematic linear codes and optimum decoding for the binary symmetric channel; Generator and Parity Check matrices, Syndrome decoding on symmetric channels; Hamming codes; Weight enumerators and the MacWilliams identities; Perfect codes. Cyclic Codes, BCH codes; Reed-Solomon codes, Justeen codes, MDS codes, Alterant, Goppa and generalized BCH codes; Spectral properties of cyclic codes.

UNITIV

Decoding of BCH codes: Berlekamp's decoding algorithm, Massey's minimum shift register

synthesis technique and its relation to Berlekamp's algorithm. A fast Berlekamp – Massey algorithm.

UNIT V

Convolution codes Wozencraft's sequential decoding algorithm, Fann's algorithm and other sequential decoding algorithms; Viterbi decoding algorithm, Turbo Codes, Concatenated Codes.

Text books

1. F.J. MacWilliams and N.J.A. Slone, The theory of error correcting codes,North Holland, 1977.
2. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.
3. Thomas M. Cover, Joy A. Thomas, "Elements of Information Theory", Wiley Publishers.
4. Ranjan Bose," Information Theory Coding, Cryptography", TMH Publication.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATABASE MANAGEMENT SYSTEMS
(Professional Elective - II)

Course Code: GR18A2068 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To understand Structured Query Language for manipulating the Data.
- To study the physical, conceptual and logical database designs
- To provide concepts of Transaction, Concurrency and Recovery Management Strategies of a DBMS
- 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:

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

UNIT I

Introduction to Database and System Architecture: Database Systems and their Applications, Database Vs File System, View of Data, Data Models, Database LanguagesDDL and DML, Transaction Management, Database users and Administrators, Database System Structure.

Introduction to Database Design: ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship set, Extended ER Features, Conceptual Design with the ER Model, Logical database Design.

UNIT II

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

UNIT III

Relational Model: Introduction to Relational Model, Basic Structure, Database Schema, Keys, Relational Algebra and Relational Calculus.

Storage and Indexing: File Organizations and Indexing-Overview of Indexes, Types of Indexes, Index Data Structures, Tree structured Indexing, Hash based Indexing.

UNIT IV

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about FD, Normal Forms, Properties of Decomposition.

UNIT V

Transaction Management: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability.

Concurrency Control: Lock based Protocols, Timestamp based protocols

Recovery System: Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery with concurrent Transactions, Buffer Management.

Text books

1. "Data base Management Systems", Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
2. "Data base System Concepts", Silberschatz, Korth, McGraw hill, V edition. 3.
3. "Introduction to Database Systems", C.J.Date Pearson Education.
4. "Database Systems design, Implementation, and Management", Rob & Coronel 5th Edition.

Reference books

1. "Database Management Systems", P. Radha Krishna HI-TECH Publications 2005.
2. "Database Management System", ElmasriNavate Pearson Education.
3. "Database Management System", Mathew Leon, Leo.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICIAL NEURAL NETWORKS

(**Open Elective - I**)

Course Code: GR18A3124 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives

- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- 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.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
- To demonstrate neural network applications on real-world tasks.
- To provide knowledge for network tunning and over fitting avoidance.

Course Outcomes

- Comprehend the concepts of feed forward neural networks
- Analyze the various feedback networks.
- Understand the concept of fuzziness involved in various systems and fuzzy set theory.
- Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
- 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: perceptron 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 fuzzy logic, 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, Mutation, Generational Cycle, applications.

Text books:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
3. 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, Oxford University Press, 1999.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOUR

(**Open Elective**)

Course Code: GR18A3118 **L/T/P/C: 3/0/0/3**

III Year II Semester

Course Objectives

- To make student aware of the concepts, techniques and practices of human resource development.
- This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.
- OB provides perspectives and skills that enhance understanding of our own behaviour and our ability to influence the behaviour of others in organizational settings
- OB and HRM together can instill sustainability deep within an organizations' culture.
- To equip them with behavioural skills in managing people at work.

Course Outcomes:

- To familiarize the concepts, techniques and practices of human resource development in the current organizational view and to impart and apprise the capable of applying the principles and techniques as professionals for developing human resources in an organization.
- Develop, implement, and evaluate organizational human resource development strategies aimed at promoting organizational effectiveness in different organizational environments.
- To acquaint the student with the determinants of intra -individual, inter-personnel and inter-group behaviour in organizational setting.
- 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.
- To assess the group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations in the frame work of organization.

Unit I -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 II-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.

Unit III - 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 IV- 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 V-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.

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

SOFT SKILLS AND INTERPERSONAL SKILLS

(**Open Elective**)

Course Code: GR18A3117 **L/T/P/C: 2/1/0/3**

III Year II Semester

Course Objectives

The learner will be able to:

- Know the importance of soft skills
- Identify good leadership skills /qualities
- Recognize the importance of interpersonal skills
- Demonstrate the significance of confidence building
- Define and differentiate between a report and a proposal

Course Outcomes:

After the end of the course the learners will be able to:

- Develop soft skills communication skills, leadership skills etc
- Implement goal setting techniques to build a promising career
- Design formal report and proposals with appropriate formal expressions
- Create healthy workplace environment by treating others with respect and dignity
- Evaluate the power of confidence building and self-esteem with examples

Unit 1: 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
- Presentation skills

Unit 2: Leadership development

- Qualities of a good leader
- Decision making and problem solving skills
- Strategic management
- Crisis management

Unit3: Confidence building

- Motivation
- Goal setting
- Self-esteem
- Team skills

Unit 4: Developing reports and proposals

- Understanding reports and proposals
- Planning reports and proposals
- Writing beginning, body and ending
- Formats of reports and proposals

Unit 5: Interpersonal skills

- Understanding professional relationships
- Networking professionally

- Showing basic office courtesies
- Interview skills

Text Books:

1. Soft Skills-Key to success in workplace and life Meenakshi Raman, Raman Upadhyay, CENAGE

Reference books:

1. Soft skills for Everyone Jeff Butterfield, CENAGE Learning
2. Soft skills for Interpersonal Communication S. Balasubramaniam, ORIENT BLACKSWAN

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROWAVE ENGINEERING LAB

Course Code: GR18A3096 **L/T/P/C: 0/0/2/1**

III Year II Semester

Course Objectives

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

Course Outcomes

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

List of Experiments:

Task1: Reflex Klystron Characteristics.

Task2: Gunn Diode Characteristics.

Task3: Attenuation Measurement.

Task4: Directional Coupler Characteristics.

Task5: VSWR Measurement.

Task6: Impedance and Frequency Measurement.

Task7: Waveguide parameters measurement.

Task8: Scattering parameters of Circulator.

Task9: Scattering parameters of Magic Tee.

Equipment required for Laboratories:

Regulated Klystron Power Supply

VSWR Meter -

Micro Ammeter - 0 – 500 μA

Multimeters

CRO

GUNN Power Supply, Pin Modulator

GUNN Oscillator
Reflex Klystron Tube
Frequency Meter
Slotted line carriage
SS Tuner
Directional Coupler
E, H, Magic Tees
Circulators, Isolator
Matched Terminator
Variable Attenuator
Movable Short
Detector Mount

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSING LAB

Course Code: GR18A3097 **L/T/P/C: 0/0/2/1**
III Year II Semester

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

Course Objectives

- To familiarise with Linear and Circular Convolution
- To acquaint with Fourier Transform Concepts
- To implement FIR and IIR filters
- To study the architecture of DSP processor.
- Work with MATLAB functions.

Course Outcomes

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

Experiments Based on 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 I/D 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 Sawtooth 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

COMPUTER NETWORKS LAB

Course Code: GR18A3098 **L/T/P/C: 0/0/2/1**
III Year II Semester

Course Objectives:

- Understand the functionalities of various layers of OSI model
- Understand the operating System functionalities
- Understand Angular JS and develop single page applications using AngularJS
- Describe server side programming for developing web applications
- Develop skills in students in developing applications using concepts like JDBC, Servlets, JSP and Java Beans.

Course Outcomes:

- Ability to understand the encryption and decryption concepts in Linux environment
- Ability to apply appropriate algorithm for the finding of shortest route.
- Ability to configure the routing table.
- To build single-page web applications using AngularJS
- To create web application using JSP

List of experiments

1. Implement bit stuffing and byte (character) stuffing
   a. Write a Program for bit stuffing
   b. Write a Program for Character stuffing.
2. Implement CRC
3. Implement Dijkstra algorithm
4. Implement Distance vector routing
5. Implement RSA security algorithm
6. Connect two nodes in NS3
7. Connecting three nodes considering one node as a central node.
8. Implement star topology
9. Implement a bus topology.
10. Connecting multiple routers and nodes and building a hybrid topology.
11. Implement FTP using TCP bulk transfer.
12. Connecting multiple routers and nodes and building a hybrid topology
13. To analyze network traces using wireshark software.

Lab Setup

1. Laptops
2. Networking
3. NS2/NS3 Simulator/Equivalent
4. Ubuntu/Fedora/RHEL

IV Year

I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

FUNDAMENTALS OF MANAGEMENT AND ENTREPRENEURSHIP

Course Code: GR18A3115 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

- To provide accelerated introduction to the engineering and science students on the basics of management.
- The course provides a framework that will enhance a person's effectiveness in the business world and make familiarize management language.
- To understand the management concepts and applications of concepts in practical aspects of business and development of managerial skills.
- To provide the student with a clear understanding of Entrepreneurship.
- To give hands on experience on how to generate ideas, evaluate business model.

Course Outcomes:.

- The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course.
- To know and adopt motivational theories and leadership styles and apply controlling techniques at right time for better decision making.
- The student will be exposed to the basic concepts of entrepreneurship and its development process.
- The student will be able to evaluate business ideas and attain hands on experience in designing value proposition.
- The student 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, IT 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 and Motivation: 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. The entrepreneur and the law (Trademarks, patents, copy rights) Financial aspects: sources of rising capital, schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, APSFC, 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. Aryasri: Management Science, TMH, 2009.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.
3. P. Vijay Kumar, N. Appa Rao and Ashnab, Chnalill, Cengage Learning India, 2012.

Reference books

1. Kotler Philip and Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz and Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management - Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
5. Samuel C. Certo: Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner: Management, Wiley, 2012.
7. Parnell: Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CELLULAR AND MOBILE COMMUNICATIONS

Course Code: GR18A4034 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives

- To understand the basic cellular system concepts.
- To have an insight into the various propagation models and the speech coders used in mobile communication.
- To understand the multiple access techniques and interference reduction techniques in mobile communication.
- To analyze the cell site and mobile station antennas.
- Be familiar with frequency management issues and channel assignment strategies along with Handoff issues.

Course Outcomes

- Design and analyze Basic Cellular System
- To know frequency reuse and Co-channel Interference and different methods of cell splitting and sectoring.
- Measure the real time Co-Channel Interference.
- Apply the different methods of Handoff mechanisms
- Explore the implementing of these wireless technologies in cellular and mobile 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.

Elements Of Cellular Radio System Design: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III

Cell Site And Mobile Antennas: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

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

RADAR SYSTEMS
(Professional Elective-III)

Course Code: GR18A4035 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives
- To understand the basic subunits of a RADAR system with respect to their functions.
- To study CW radar system and its application along with FMCW radar system for altimeter applications.
- To study Doppler Effect and its applications with respect to pulsed Doppler radar.
- To understand moving target indicator and to study its application.
- To study and understand the effect of noise on radar signal detection. To study the various types of Radar Receivers and Transmitter systems

Course Outcomes
- Demonstrate an understanding of the factors affecting the radar performance using Radar Range Equation.
- Analyze the principle of FM-CW radar and apply it in FM- CW Altimeter.
- Demonstrate an understanding of the importance of Matched Filter Receivers in Radars.
- Familiarize with the different types of Radar Displays and their application in real time scenario
- Design radar systems and to undertake measurements to characterize and verify the performance of radar systems.

Unit I
Introduction to RADAR: General form of RADAR range equation – block diagram of simple pulsed RADAR and determination of range - maximum Unambiguous range, Radar resolution cell volume, pulse repetition frequency

Unit II
Radar Radiation Patterns and Displays: Cosecant squared radiation pattern for RADAR antennas - RADAR displays - synthetic and Raw displays, Radar Types based on frequency, Waveform, prf, applications. Detection and false alarm Probability - integration of RADAR pulses-RADAR cross section of various targets.

Unit III
Radar Systems: Doppler frequency shift and determination of velocity –Block diagram and working principle of CW Doppler RADAR, FMCW Radar and Pulsed Doppler RADAR. MTI Radar block diagram and use of Delay line cancellers- Blind speed.

Unit IV
Digital MTI processing Tracking Radar: Monopulse tracking-Amplitude comparison monopulse system in one/ two coordinates (block diagram)-phase comparison monopulse, Sequential lobing, Conical scan tracking Radar –tracking in range-comparison between Monopulse and conical scan tracking RADARs.

Unit IV

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.

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

BIOMEDICAL ELECTRONICS

(Professional Elective-III)

Course Code: GR18A4036 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

- To understand the basic concepts of biological mechanisms of living organisms from the perspective of engineers.
- To apply knowledge of engineering and science to identify, formulate, and solve problems in these areas.
- To familiarize the concepts on instruments used to record biopotentials and its safety.
- To introduce the students to different medical instruments and their applications.
- To analyze the applicability of the basic devices in various bio-medical applications.

Course Outcomes:

- Understand the principles of potentials and the Electrodes and its types.
- The governing principles and functionality of various Critical Care equipment are perceived.
- Analyze importance of calibration procedures
- Design to solve biological problems with engineering tools.
- Apply the latest technologies of modern medicine

UNIT-1

Different bio-potentials and their characteristics. Nernst Equation and its significance. Refractory Period, Characteristics of Stimulus. Strength-Duration relationship. Biopotential electrodes: classification & characteristics. Electrode-Electrolyte Interface.

UNIT-2

Bio Amplifiers and signal conditioning circuits. Bioelectric Amplifiers - Different types of Bioelectric amplifiers.

RECORDERS & DISPLAY DEVICES: General features of Thermal, Ink Jet, Photo graphic, Dot Recorders. General features of Display Devices for Bio -Signals.

Patient Electrical Safety, Types of Hazards, Natural protective Mechanism, Leakage current, Patient Isolation, Hazards in operation rooms.

UNIT-3

Diagnostic Equipment:- E.C.G, T.M.T, E.E.G, E.M.G, P.F.T, Phono Cardiography. (Working principle, Types of Electrodes used, Calibration,).

MONITORING EQUIPMENT: Bedside monitors, Multi parameter monitors, Arrhythmia monitors, Blood Pressure Monitors, Central monitoring stations in critical care units, Apnea monitors.

UNIT-4

THERAPEUTIC EQUIPMENT: Infusion pumps, Pacemaker: Synchronous -Asynchronous, External -Internal, Demand & Fixed type Pacemaker, Defibrillators: AC & DC Defibrillators, Synchronous & Asynchronous. Nerve stimulators, Bladder stimulators, Short wave Diathermy, Micro wave Diathermy, Ultra Sound Diathermy. Heamo dialyzer: General scheme of operation, Types of exchangers, Block diagram, Heart Lung machine: Governing principle, Functional details of thin film membrane type blood oxygenators. *I. A. B. P:* - principle & application.

UNIT-5

SURGICAL EQUIPMENT: Electro Surgical Generators: - Unipolar, Bipolar. Hazards of electro surgical units & Safety measures. Anesthesia delivery systems, Different types of Ventilators, Humidifiers, Nebulizers,

TELEMETRY: Transmission of biological data through radio telemetry. Single channel, multi-channel systems. Block diagrams and functions of bio signal transmitters and receivers.

Text books

1. Handbook of Bio Medical Instrumentation -R. S. Khandpur. 2003
2. Joseph J. Carr, John Michael Brown; Introduction to Biomedical Equipment Technology, Pearson.2001
3. John Webster. Medical Instrumentation. - Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.

Reference books

1. Bronzino, Joseph; Handbook of Biomedical Engineering. 2nd edition, CRC Press, 2000.
2. Bio-Medical Instruments Theory & Design. Welkowitz, Walter & Others, 2nd Edition, Academic Press, 1991
3. L. A Geddes, Principles of Applied Biomedical Instrumentation, John Willy & Sons,1989.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PYTHON PROGRAMMING

(Professional Elective-III)

Course Code: GR18A4104 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

- To know the basics of Python variables, expressions, statements, develop programs with conditionals and loops.
- To use Python data structures –-lists, tuples, dictionaries.
- To do input/output with files and Regular expressions in Python
- To know the basics of R variables, expressions, statements, develop programs with conditionals and loops.
- To use R concepts like Vectors, Lists, Matrices, Arrays, Data frames, Factors, Packages

Course Outcomes:

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

UNIT I

Introduction to Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass;

UNIT II

Functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing -list comprehension

UNIT III

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Regular expressions.

UNIT IV
Introduction to R, syntax, data types, variables, operators, decision making, loops, Functions: defining functions, built-in functions, user defined functions, String manipulation

UNIT V
Vectors, Lists, Matrices, Arrays, Data frames, Factors, Packages using R

Text books:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA STRUCTURES

(Professional Elective-III)

Course Code: GR18A2066 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives:

- To understand the basic concepts of Data structures.
- Identify different techniques used to analyze the performance of various Searching and Sorting techniques. The various types of Linked lists over arrays.
- To familiarize with basic concepts about stacks, queues, lists, trees and graphs.
- To write algorithms for solving problems with the help of fundamental data structures.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Course Outcomes:

- Analyze and Implement searching techniques for a given problem.
- Develop pseudo code for various sorting techniques.
- Implement various linear data structures and determine the time complexity. Understand the non-linear data structures like trees, graphs.
- Ability to choose appropriate data structures to represent data items in real world problems.
- Ability to have knowledge of tree and graphs concepts.

UNIT –I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structures, Operations: Insertion, Deletion, Traversal. Searching: Linear Search and Binary Search Techniques and their complexity analysis. Sorting: Quick Sort, Merge Sort.

UNIT –II

Stacks and Queues: Stack ADT, operations, Applications of Stacks: Expression Conversion and Evaluation– corresponding algorithms and complexity analysis. Queue ADT, Types of Queues: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues: Algorithms and their analysis.

UNIT –III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion, Deletion; Linked representation of Stack and Queue. Doubly linked list: operations and algorithmic analysis; Circular Linked Lists: operations and algorithmic analysis.

UNIT –IV

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees.

UNIT-V

B Tree: Definition, Operations: Insertion, Searching and Deletion. Graph: Basic Terminologies and Representations, Graph traversal algorithms: BFS and DFS.

Text books:

1. Data Structures and Algorithm Analysis , 2nd edition, Mark Allen Weiss, Pearson
2. Data Structures using C, 1st Edition, Aaron M. Tenenbaum, Pearson
3. Data Structures using C, 2nd Edition, Reema Thareja, Oxford.
4. Data Structures and Algorithms Using C, 5th Edition, R. S. Salaria, Khanna Book Publishing Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

(Professional Elective-IV)

Course Code: GR18A4039 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives:

- To provide sound foundation of digital signal processing (DSP) architectures for designing efficient VLSI architectures for DSP systems.
- To analyze general purpose digital signal processors.
- To understand pipelining, parallel processing and retiming.
- To illustrate the features of on-chip peripheral devices and its interfacing along with its programming details.
- To analyze DSP architectures.

Course Outcomes:

- Learn to represent real world signals in digital format and understand transform-domain (Fourier and z-transforms) representation of the signals;
- Know to apply the linear systems approach to signal processing problems using high-level programming language;
- Learn to implement linear filters in real-time DSP chips;
- Introduce applications of linear filters and their real-time implementation challenges.
- Interfacing Memory and I/O Peripherals to different Programmable DSP Devices

UNIT I

Introduction to Digital Signal Processing: Introduction, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP computational errors, D/A Conversion Errors, Compensating filter.

UNIT II

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 III

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT IV

Introduction to Blackfin Processor-The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic

Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface Parallel I/O interface, Programmed I/O, interrupts and I/O, Direct memory access (DMA).

Text books

1. Digital Signal Processing - Avtar Singh and S. Srinivasan, Thomson Publications, 2004
2. A practical Approach to Digital Signal Processing–K. Padmanabhan, R.Vijayarajeswaran, Ananth,S, New Age International, 2006/2009

Reference books

1. Embedded Signal Processing with the Micro signal Architecture Publisher: Woon–Seng Gan, Sen M. Kuo,Wiley-IEEE Press, 2007

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NETWORK SECURITY AND CRYPTOGRAPHY

(Professional Elective-IV)

Course Code: GR18A4040 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives:

- To understand the fundamentals of Cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

Course Outcomes:

- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Identify the security issues in the network and resolve it.
- Compare and Contrast different IEEE standards and electronic mail security
- Do research in the emerging areas of cryptography and network security.
- Protect any network from the threats in the world.

Unit I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model. Steganography, Classical Encryption Techniques.

Unit II

Modern Techniques: Simplified DES, I3lock Cipher Principles, Data Encryption standard, Strength of DES, Differential and linear Cryptanalysis, 13 lock Cipher Design Principles and Modes of operations.

Algorithms: Triple DES, International Data Encryption algorithm, Blowfish. RC5, CAST-i 28, RC2. Characteristics of Advanced Symmetric block cifers.

Conventional Encryption

Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public Key Cryptography

Principles, RSA Algorithm, Key Management. DIffie Hell man Key exchange, Elliptic Curve Cryptography.

Unit III

Number theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

Message authentication and Hash functions:

Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACS.

Unit IV

Hash and Mac Algorithms MD File, Message digest Algorithm, Secure Flash Algorithm, RIPEMD-160 HMAC. Digital signatures and authentication protocols: Digital Signatures. Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

Unit V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations. Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security Secure Electronic Transaction.

Intruders, Viruses and Worms: Intruders, Viruses anti Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

Text books:

1. Cryptography and Network Security: Principles and Practice - William Stallings, 20(X), PE.

Reference books:

1. Principles of Network and Systems Administration Mark Burgess, Joh Wiel

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTERNET OF THINGS

(Professional Elective-IV)

Course Code: GR18A4041 **L/T/P/C: 3/0/0/3**
IV Year I Semester

Course Objectives:

- To introduce the terminology, technology and its applications of Internet of Things
- To understand different connectivity technology protocols and Communication protocols
- To conceptualize of Wireless Sensor networks and types
- To introduce programming languages: Arduino, Python Languages
- To discuss implementations of IoT in Health Care, Industry, Agricultural.

Course Outcomes:

- Independently understand basics of Internet of Things
- Identify the different types of sensor network topologies and protocols.
- Familiarity with the programming languages and how they can be used to establish a client-server architecture
- Differentiate between Cloud Computing and sensor cloud
- Enumerate the use cases of Internet of Things.

UNIT-1

Introduction to IoT, Sensing, Actuation, Basics of Networking, connectivity technologies: MQTT, CoAP, XMPP, AMQP, Communication Protocols: IEEE 802.15.4, Zigbee, 6LoWPAN, Wireless HART , Z-Wave , ISA 100 , Bluetooth , NFC , RFID.

UNIT-II

Wireless Sensor Networks: Basics components of sensor node, sensor web,Wireless Multimedia Sensor Networks, Stationary and Mobile wireless sensor networks, UAV networks, Machine-to-Machine Communications, Interoperability in IoT.

UNIT III

Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino. Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.

UNIT IV

Introduction to SDN, SDN for IoT, Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog Computing, Smart Cities and Smart Homes.

UNIT V

Connected Vehicles, Smart Grid, Industrial IoT, Case Study: Agriculture, Healthcare, Activity Monitoring.

Text books:

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Professional Elective-IV)

Course Code: GR18A4042 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives:

- To introduce students to monitor, analyze and control any physical system.
- To understand how different types of meters work and their construction
- To provide knowledge to design and create novel products and solutions for real life problems.
- To familiarise students regarding usage of modern tools for electrical projects.
- To Illustrate basic meters such as voltmeters and ammeters.

Course Outcomes:

- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
- Ability to measure frequency, phase with Oscilloscope
- Ability to use Digital voltmeters
- Ability to measure strain, displacement, Velocity, Angular Velocity, temperature, Pressure ,Vacuum, and Flow

UNIT I

Block Schemantics 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, Specifications of Instruments.

UNIT II

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator.

UNIT III

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

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

UNIT IV

Transuducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Special Resistance Thermometers, Digital Temperatue sensing system, Piezoelectric Transducers, Variable Capacitance Transducers.

UNIT V

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

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

Text books

1. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, 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, Pearson Education - 2010.
5. Industrial Instrumentation: T. R. Padmanabham Springer 2009.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFTWARE DEFINED RADIO AND COGNITIVE RADIO

(Open Elective-II)

Course Code: GR18A3125 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives:

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

Course Outcomes:

- Demonstrate an understanding on software defined radio architecture and design principles.
- Design, develop and evaluate a software defined radio system.
- Demonstrate an understanding on cognitive radio components, functions and capabilities.
- Analyze the spectrum management functions using cognitive radio systems and cognitive radio networks.
- 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 LAW AND ETHICS

(**Open Elective**)

Course Code: GR18A3119 **L/T/P/C: 3/0/0/3**

IV Year I Semester

Course Objectives

- To provide the fundamental skill on understanding cyber laws.
- Enables to understand the legal frameworks.
- Helps the student understand different cyber crimes.
- Provides overview on Intellectual Property, copy rights, patents rights etc.
- Discriminate rapid changes in technology and the corresponding changes in crime and the law.

Course Outcomes:

- Identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
- Locate and apply case law and common law to current legal dilemmas in the technology field.
- Apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
- Will be able understand cybercrime and ethical practices.
- The student will be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc.

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 Cyberspace

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. Jonthan Rosenoer, Cyber Law, Springer, New York, (1997).
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook.
6. S. R. Bhansali, Information Technology Act, 2000
7. University Book House Pvt. Ltd. Jaipur (2003).
8. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi.

IV Year
II Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL IMAGE PROCESSING

Course Code: GR18A4087 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To understand the image enhancement techniques.
- To design and implement solutions for digital image processing problems.
- To study and apply the concepts of image restoration.
- To study the image compression procedures.

Course Outcomes:

- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques.
- Interpret Image compression standards, image segmentation and representation techniques.
- Identify and solve applied science and engineering problems.

UNIT I

Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Gray level to binary image conversion. Sampling and quantization. Relationship between pixels. Imaging Geometry.

UNIT II

Image Transforms 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hoteling transform. Image enhancement Point processing. Histogram processing. Spatial filtering. Enhancement in frequency domain, Image smoothing, Image sharpening.

UNIT III

Color image processing: 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.

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.

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 – Tasks Jr., SPIC/IEEE Series, PHI.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NAVIGATIONAL AIDS
(Professional Elective-V)

Course Code: GR18A4088 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To understand the fundamentals of navigation and types of navigation based on Earth's geometry.
- To understand the concepts of inertial navigation systems, and error analysis.
- To become familiar with various reference systems.
- To get complete knowledge on GPS navigation and applications.
- To become familiar with signal detection techniques.

Course Outcomes:

- Explain the various types of navigation systems based on Earth's geometry.
- Understanding the basic principles of inertial navigation and error analysis.
- Ability to analyse the reference systems and understand the ionospheric delay.
- Can work using Instrument Landing System and with satellite navigation systems.
- Understand GPS navigation system and different applications.

UNIT I

Navigational Systems: Review of Navigational Systems: Aircraft navigational system, Geometry of the earth. Navigation equation, Navigation errors, Radio navigation system types and Performance parameters, ILS System, Hyperbolic navigation systems, Loran, Omega, Decca Radio direction finding, DME, TACAN and VORTAC.

UNIT II

Inertial Navigation: Inertial navigation system, Sensing instruments: Accelerometer. Gyro-copes, Analytic and Gimbaled platforms, Mechanization, Error analysis, Alignment.

UNIT III

Global Positioning System (GPS) for Navigation: Overview of GPS, Reference systems. Satellite orbits, Signal structure, Geometric dilution of precision (GDOP), or Precision dilution of recision (PDOP), Satellite ephemeris, Satellite clock, Ionospheric group delay. Tropospheric group delay, Multipath errors and Receiver measurement errors.

UNIT IV

Differential GPS and WAAS: Standard and precise positioning service local area DGPS and Wide area DGPS errors, Wide Area Augmentation System (WAAS) architecture, Link budget and Data Capacity, Ranging function, Precision approach and error estimates.

UNIT V

GPS Navigational Applications: General applications of GPS, DGPS, Marine, Air and Land Navigation, Surveying, Mapping and Geographical information systems, Military and Space.

Text books

1. Myron Kavton and Walter Friend, R. - “Avionics Navigation Systems”, Wiley,1997
2. Parkinson. BW. Spilker - “Global Positioning System Theory and Applications”, Progress in Astronautics, Vol. I and II, 1996.

Reference books

1. Hoffman. B., Wellenhof. H... Lichtenegger and J. Collins - “GPS Theory and Practice”, Springer Verlang Wien New York, 1992.
2. Elliot D. Kaplan - “Understanding GPS Principles and Applications”, Artech House. Inc.,1996.
3. Lieck Alfred. - “GPS Satellite Surveying”, John Wiley, 1990

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

WIRELESS COMMUNICATION NETWORKS
(Professional Elective-V)

Course Code: GR18A4089 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To familiarize the student with the basic taxonomy and terminology of the computer networking area.
- To introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- To allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
- To learn the Wireless LAN Technology and Wireless data services
- To know the Different Mobile Data Networks, Blue Tooth and Mobile ip and wireless access protocol

Course Outcomes:

- Know the security risks threatening computer networks.
- Acquire the methods to design backbone networks, virtual LANs and wireless WANs.
- Use Different Mobile Data Networks, Blue Tooth and Mobile ip and wireless access protocol
- Compare the Wireless LAN Technology and Wireless data services
- An in-depth knowledge of applying the concepts on real time applications

UNIT I

Multiple access techniques for wireless communication: Introduction, FDMA, TDMA, Spread Spectrum, Multiple Access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols.

Introduction to wireless networking: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT II

Wireless Data Services: CDPD, ARDIS, RMD, Common Channel Signalling, ISDN, BISDN and ATM, SS7, SS7 user part, signalling traffic in SS7.

Mobile IP and Wireless Access Protocol: Mobile IP, Operation of mobile IP, Co-located address, Registration, Tunnelling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, Wireless Transaction, Wireless Datagram Protocol.

UNIT III

Wireless LAN Technology: Infrared LANs, Spread spectrum LANs, Narrow band microwave LANs, IEEE 802 protocol Architecture, 802.11 medium access control, 802.11 physical layer.

UNIT IV

Blue Tooth: Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol.

UNIT VI

Mobile Data Networks: Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol.

Text books:

1. Wireless Communications, Principles, Practice – Theodore S. Rappaport, PHI, 2nd Ed., 2002.
2. Wireless Communication and Networking – William Stallings, PHI, 2003.

Reference books:

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999.
2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002.
3. Wireless Communications – Andreaws F. Molisch, Wiley India, 2006.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTRODUCTION TO MACHINE LEARNING

(Professional Elective-V)

Course Code: GR18A4090 **L/T/P/C: 3/0/0/3**

IV Year II Semester

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To be able to read current research papers and understands the issues raised by current research.

Course Outcomes:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- understand modern notions in data analysis oriented computing;
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - **Instance-Based Learning**- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT - IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

UNIT - V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

Text books:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

Reference books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons
Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF OPTIMIZATION TECHNIQUES

(Professional Elective-V)

Course Code: GR18A4091 **L/T/P/C: 3/0/0/3**

IV Year II Semester

Course Objectives:

- Understand LPP and NLPP techniques.
- Understand the difference between local and global optimization methods.
- Compare different optimization methods.
- Illustrate the basic concepts of non linear programming and application to real life problems
- Describe the concept of Genetic Algorithm and apply to practical problems.

Course Outcomes:

- Take optimal decision to increase the production.
- Take optimal decision to get more profit.
- Take appropriate decision for selection of an industry.
- Apply NLP techniques to design IC's.
- Apply Genetic Algorithm for design of IC's.

UNIT-I

Introduction To Optimization, Applications of optimization techniques, statement of the problem, linear programming-standard form of LPP, Motivation of the simplex method, simplex algorithm, two phases of simplex method, sensitivity Analysis.

UNIT-II

Non Linear Programming (NLP): One Dimensional: Unrestricted search, exhaustive search, Fibonacci method, golden section method-Newton and secant methods. Unconstrained optimization: direct search method, simplex method. Gradient of a function, steepest Descent search method (Cauchy) method, Conjugate gradient method.

UNIT-III

NLP-Constrained Optimization: Characteristic of a constrained problem, Direct methods-Random search methods, Sequential linear programming method. Indirect methods: Transformation techniques, interior and exterior penalty function methods.

UNIT-IV

Further Topics in Optimization: Multi objective Optimization-Utility function method, Invent and utility function methods, global criterion method. Simulated Annealing, Optimization of Fuzzy systems.

UNIT-V

Genetic Algorithm (GA): Introduction, optimization of a simple function Representation, Initial population, Geneticoprators: Crossover and Mutation. Travelling salesman problem (TSP), Comparison between Hill climbing, Simulated annealing and Genetic algorithms.

How do GAs work- Chromosome selection, Selection process, Recombination operators, Example of maximization of a nonlinear function.

Text books:

1. Singiresu S. Rao, "Engineering Optimization: Theory and Practice", 3rd edition, New Age International (P) Limited, 2013.
2. Zbigniew Michalewicz, "Genetic Algorithms + Data structures = Evolution Programs", Third Revised and Extended Edition, Springer, 2013.

Reference books:

1. Kalyanmay Deb, "Optimization for Engineering Design-Algorithms and Examples", Second edition, PHI, 2012.
2. Merrium C.W., "Optimum theory and the design of feedback control systems", McGraw Hill, 1964.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED SYSTEMS DESIGN
(Professional Elective-VI)

Course Code: GR18A4092 **L/T/P/C: 3/0/0/3**
IV Year II Semester

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

Course Outcomes:
- Understand basic concept of embedded systems.
- Apply and analyze the applications in various processors and domains of embedded system.
- Analyze and develop embedded hardware and software development cycles and tools.
- Analyze to understand what a microcomputer, core of the embedded system.
- 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 Design 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

NANOMATERIALS AND TECHNOLOGY

(Professional Elective-VI)

Course Code: GR18A4093 **L/T/P/C: 3/0/0/3**

IV Year II Semester

Course Objectives:

- To familiarize students with basics of nano science and technology.
- To familiarize about the various properties of nanostructures.
- To bring out the differences between nano and macro structures.
- To understand the influence of dimensionality of the object at nano scale on their properties.
- To understand the size and shape controlled synthesis of nano materials and their future applications in industry.

Course Outcomes:

- Explain methods of fabricating nanostructures.
- Relate the unique properties of nano materials to the reduce dimensionality of the material.
- Describe tools for properties of nanostructures.
- Correlate properties of nanostructures with their size, shape and surface characteristics.
- Discuss applications of nano materials and implication of health and safety related to nano materials.

UNIT – I

Introduction of nanomaterials and nanotechnologies, Features of nanostructures, Background of nanostructures, Techniques of synthesis of nanomaterials, Tools of the nanoscience, Applications of nanomaterials and technologies.

UNIT – II

Bonding and structure of the nanomaterials, Predicting the Type of Bonding in a Substance crystal structure, Metallic nanoparticles, Surfaces of Materials, Nanoparticle Size and Properties,

UNIT – III

Mechanical properties of materials, theories relevant to mechanical properties, techniques to study mechanical properties of nanomaterials, adhesion and friction, thermal properties of nanomaterials.

UNIT – IV

Electrical properties, Conductivity and Resistivity, Classification of Materials based on Conductivity, magnetic properties, electronic properties of materials, classification of magnetic phenomena.

UNIT – V

Nano thin films, nanocomposites, new application of nanoparticles in different fields.

Text books:

1. Introduction to Nanoscale Science and Technology (Nanostructure Science and Technology) by Massimiliano Ventra, Stephane Evoy and James R. Heflin (Jun 30, 2004).
2. Nanostructures and Nanomaterials: Synthesis, Properties, and Applications (World Scientific Series in Nanoscience and Nanotechnology) by Guozhong Cao and Ying Wang (Jan 3, 2011)
3. Understanding Nanomaterials by Malkiat S. Johal (Apr 26, 2011)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

WIRELESS SENSOR NETWORKS

(Professional Elective-VI)

Course Code: GR18A4094 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.
- To study and understand the medium access control protocols and address physical layer issues.
- To learn key routing protocols for sensor networks and main design issues.
- To learn transport layer protocols for sensor networks, and design requirements.
- To understand the Sensor management, sensor network middleware, operating systems.

Course Outcomes:

- Understand the basics of WSN and supporting protocols.
- Define the MAC protocols and address physical layer issues.
- To explain the routing protocols for sensor networks and design issues.
- Analyse the transport layer and understand the protocols involved in sensor networks.
- Understand the sensor management and operating systems.

UNIT – I

Introduction: Components of a wireless sensor node, Motivation for a Network of Wireless Sensor Nodes, Classification of sensor networks, Characteristics of wireless sensor networks, Challenges of wireless sensor networks, Comparison between wireless sensor networks and wireless mesh networks, Limitations in wireless sensor networks, Design challenges, Hardware architecture, Applications : Structural Health Monitoring, Traffic Control, Health Care, .Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes. Operating Systems: Functional Aspects, Nonfunctional Aspects, Prototypes, Evaluation

UNIT – II

Basic Architectural Framework: Physical Layer, Basic Components, Source Encoding, Channel Encoding, Modulation Medium Access Control: Wireless MAC Protocols, Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols

UNIT – III

Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols Node and Network Management: Power Management, Local Power Management aspects, Dynamic Power Management, Conceptual Architecture

UNIT – IV

Time Synchronization: Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, EventDriven Localization

UNIT – V

Security: Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks , Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security

Text books:

1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2010
2. Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", Cambridge, 2014

Reference books:

1. Ian F. Akyildiz, Mehmet Can Vuran , "Wireless Sensor Networks", Wiley 2010
2. C S Raghavendra, K M Sivalingam, Taieb Znati, "Wireless Sensor Networks", Springer, 2010
3. C. Sivarm murthy & B.S. Manoj, "Adhoc Wireless Networks", PHI-2004
4. FEI HU., XIAOJUN CAO, "Wireless Sensor Networks", CRC Press, 2013
5. Feng ZHAO, Leonidas GUIBAS, " Wireless Sensor Networks", ELSEVIER , 2004

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

TELEVISION ENGINEERING
(Professional Elective-VI)

Course Code: GR18A4095 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To familiarize the students with Television transmitters and receive, and TV signal transmission.
- To make them understand different signal processing step monochrome television,
- To introduce colour television transmitters and receivers.
- To introduce most latest and revolutionary ideas in the field of digital TV, HDTV, WDTV.
- To study various display system and its application.

Course Outcomes:

- Understand TV standards and picture tubes for monochrome TV.
- Distinguish between monochrome and colour Television transmitters and receivers.
- Analyze and Evaluate the NTSC and PAL colour systems.
- Describe and differentiate working principles of latest digital TV, HDTV, and WDTV
- Understand the working principles and applications of latest display like LCD, LED, Plasma and large flat panel monitors.

UNIT -I

Introduction: TV transmitter and receivers, synchronization. Geometric forn and aspect ratio, image continuity, interlaced scanning, picture resolution Composite video signal, TV standards. Camera tubes: image Orthicon Plumbicon, vidicon, silicon Diode Array vidicon, Comparison of camera tubes Monochrome TV camera,

TV Signal Transmission and Propagation: Picture Signal transmission positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW,TV transmitter, TV signal propagation interference, TV broadcast channels, TV transmission Antennas.

UNIT —II

Monochrome TV Receiver: RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits, AGC, noise cancellation, video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM detection, FM Sound detectors, and typical applications.

UNIT -III

Sync Separation and Detection: TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions. Sync Separation, AFC and Deflection Oscillators: Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended AFC circuit, Deflection Oscillators, deflection drive lOs, Receiver Antennas, Picture Tubes

UNIT –IV

Color Television: Colour signal generation, additive colour mixing, video signals for colours, colour difference signals, encoding, Perception of brightness and colours luminance signal, Encoding of colour difference signals, formation of chrominance signals, color cameras, Colour picture tubes. Color Signal Encoding and Decoding: NTSC colour system PAL colour system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, colour burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, U& V demodulators.

UNIT—V

Color Receiver: Introduction to colour receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Digital TV: Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

Text books

1. Television and Video Engineering- A.M.Dhake, 2nd Edition.
2. Modern Television Practice Principles, Technology and ServiceR .R.Gallatin, New Age International Publication, 2002.
3. Monochrome and Colour TV- R.R. Gulati, New Age International Publication, 2002.

Reference books

1. Colour Television Theory and Practice-S.P.BaI, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E.Herndon, McGraw Hill, 1999.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CLOUD COMPUTING
(Open Elective-III)

Course Code: GR18A3102 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

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

Course Outcomes:

- Understand the features, advantages and challenges of cloud computing, compare their operation ,implementation and performance
- Analyze and compare different types of clouds and cloud services.
- Understanding and validate the financial and technological implications in selecting cloud computing paradigm for an organization.
- Interpret and Analyze the security challenges and risks involved in the cloud.
- 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

ECONOMIC POLICIES IN INDIA

(Open Elective)

Course Code: GR18A3122 **L/T/P/C: 3/0/0/3**
IV Year II Semester

Course Objectives:

- To analyse the overall business environment and evaluate its various components in business decision making.
- To provide an analysis and examination of significant contemporary ethical issues and challenges.
- To Emphases the manager's social and environmental responsibilities to a wide variety of stakeholders.
- To know the various Government policies governing industry.
- To know economic terms and its scope.

Course Outcomes:

- Familiarize with the nature of business environment and its components.
- Understand the definition of ethics and the importance and role of ethical behaviour in the business world today.
- Explain the effects of government policy on the economic environment.
- Describe how financial information is utilized in business.
- Explain the legal framework that regulates the insurance industry

Unit 1

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. Development-

Unit: 2

Factors and measure, Meaning of Economic development, National income, Per capital income, Quality of life, Capital Formation – Savings, Investment.

Unit 3

Planning in India, 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 4

Private and Public Sector, Public Sector – role and growth, Achievements of the public sector, Private Sector – Importance Problems, New foreign Trade Policy.

Unit 5

Present Economic Policy, Main feature, Globalization, Expansion of Private sector, more market orient approach. Public distribution system, Industrial policy – 1948, 1956, 1977, 1980, 1990, 1991, 2000-2001 Industrial Licensing, Monetary and Fiscal Policy.

Text books

1. Indian Economy- A. N. Agarwal
2. Indian Economy – Mishra & Puri
3. Indian Development and planning – M. L. Jhingan
4. Indian Economy – R. S. Rastogi Yozna and Kurukshetra Magazines