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/Universityor 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	EnvironmentalSciences,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 fulfills the following academic requirements:
   a) He/She pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.
   b) A student has to register for all the 160 credits and secure all credits.
   c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B. Tech course.
   d) The Degree of B. Tech in 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 fulfill all the requirements for the award of the degree.

6. Attendance Requirements

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

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

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

b) **Distribution and Weightage of marks**

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

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

Assessment Procedure:

S. No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	30	Internal Examination & Continuous Evaluation	1) Two mid semester examination shall be conducted for 20 marks each for a duration of 2 hours. Average of the two mid exams shall be considered **i) Subjective - 15 marks** **ii) Objective - 5 marks** **2) Tutorials - 5 marks** **3) Continuous Assessment – 5 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours
2	Practical	30	Internal Examination & Continuous Evaluation	**i) Internal Exam-10 marks** **ii) Record - 5 marks** **iii) Continuous Assessment - 15 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 marksshall be for internal evaluation and 70 marksfor 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	(i) Regular course of study of second year second semester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

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

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

Earning of Credit:

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

Computation of SGPA and CGPA:

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

i) S_k the SGPA of 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 ofthe 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.

	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	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	25	50	75
6	GR18A1016	Basic Electrical Engineering Lab	0	0	2	2	1	25	50	75
7	GR18A1014	English Language and Communication Skills Lab	0	0	2	2	1	25	50	75
8	GR18A1017	Engineering Workshop	1	0	3	4	2.5	25	50	75
		Induction Programme								
Total			**12**	**2**	**10**	**24**	**19**	**220**	**480**	**700**

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	25	50	75
6	GR18A1015	Programming for Problem Solving Lab	0	0	3	3	1.5	25	50	75
Total			**10**	**3**	**10**	**23**	**18**	**170**	**380**	**550**

II YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Electronic Devices and Circuits	3	0	0	3	3	30	70	100
2		Digital Electronics	3	0	0	3	3	30	70	100
3		Signals and Systems	3	0	0	3	3	30	70	100
4		Probability Theory and Stochastic Processes	3	0	0	3	3	30	70	100
5		Network Analysis and Transmission Lines	3	0	0	3	3	30	70	100
6		Economics and Accounting for Engineers	3	0	0	3	3	30	70	100
7		Electronic Devices and Circuits Lab	0	0	2	2	1	25	50	75
8		Digital Electronics Lab	0	0	2	2	1	25	50	75
9		Signals and Systems Lab	0	0	2	2	1	25	50	75
Total			**18**	**0**	**6**	**27**	**21**	**255**	**570**	**825**
10		Environmental Science	2	0	0	2	0	30	70	100

II YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Computational Mathematics for Engineers	3	0	0	3	3	30	70	100
2		Electromagnetic Fields and Waves	3	0	0	3	3	30	70	100
3		Analog and Digital Communications	3	0	0	3	3	30	70	100
4		Analog and Pulse Circuits	3	0	0	3	3	30	70	100
5		Micro Processors and Microcontrollers	3	0	0	3	3	30	70	100
6		Principles of Operating Systems	3	0	0	3	3	30	70	100
7		Analog and Digital Communications Lab	0	0	2	2	1	25	50	75
8		Analog and pulse circuits Lab	0	0	2	2	1	25	50	75
9		Microprocessors and Microcontrollers Lab	0	0	2	2	1	25	50	75
Total			**18**	**0**	**6**	**28**	**21**	**255**	**570**	**825**
10		Value Ethics and Gender Culture	2	0	0	2	0	30	70	100

III YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Computer Organization	3	0	0	3	3	30	70	100
2		Control Systems	3	0	0	3	3	30	70	100
3		Digital Signal Processing	3	0	0	3	3	30	70	100
4		Antennas and Propagation	3	0	0	3	3	30	70	100
5		Integrated Circuits and Applications	3	0	0	3	3	30	70	100
6		Elective-I	3	0	0	3	3	30	70	100
7		Integrated Circuits Lab	0	0	2	2	1	25	50	75
8		Communications Lab	0	0	2	2	1	25	50	75
9		Digital Signal Processing Lab	0	0	2	2	1	25	50	75
		Total	**18**	**0**	**6**	**27**	**21**	**255**	**570**	**825**
10		Constitution of India	2	0	0	2	0	30	70	100

III YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Microwave Engineering	3	0	0	3	3	30	70	100
2		VLSI Design	3	0	0	3	3	30	70	100
3		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		Microwave Engineering Lab	0	0	2	2	1	25	50	75
7		VLSI Design Lab	0	0	2	2	1	25	50	75
8		Computer Networks Lab	0	0	2	2	1	25	50	75
9		Mini Project with Seminar	0	0	6	6	3	30	70	100
		Summer Internship	-	-	-	-	-			
Total			**15**	**0**	**12**	**27**	**21**	**255**	**570**	**825**

IV YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Fundamentals of Management and Entrepreneurship	3	0	0	3	3	30	70	100
2		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		Project Work (Phase-I)	0	0	12	12	6	30	70	100
Total			**15**	**0**	**12**	**27**	**21**	**180**	**420**	**600**

IV YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		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		Project Work (Phase-II)	0	0	12	12	6	30	70	100
Total			**12**	**0**	**12**	**24**	**18**	**150**	**350**	**500**

PROFESSIONAL ELECTIVES – 4 THREADS

S. NO.	Thread 1 Systems & Programming	Thread 2 Networks & Technologies	Thread 3 Information & Intelligence	Thread 4 Communications & Electronics
1	Oops through Java	Database Management Systems	Data Analytics	Fibre Optic Communications
2	Satellite Communications	Communications Technologies	Information Theory and Coding	Spread Spectrum Communications
3	Radar Systems	Bio-Medical Electronics	Scripting Languages	Speech Signal Processing
4	Digital Signal Processors and Architectures	Network Security and Cryptography	Artificial Neural Networks	Electronic Measurements and Instrumentation
5	Navigational Aids	Wireless Communications and Networks	Introduction to Machine Learning	Wavelets
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 Communication	CSE: 1. E-Commerce 2. Database Management Systems 3. Java Programming
2	Human Resource Development and Organizational Behaviour	IT: 1. Multimedia and Application Development 2. Web Programming 3. Operating Systems
3	Cyber Law and Ethics	EEE: 1.Embedded Systems 2. Control Systems 3. Artificial Intelligence Techniques
4	History of Science	ECE: 1. Principles of Satellite Communications 2. Scientific Computing 3. Wavelets
5	Introduction to Art and Aesthetics	ME: 1.Operations Research 2. Automobile Engineering 3. Robotics
6	Economic Policies in India	CE: 1. Green Building Technology 2.Building Materials and Construction Planning 3. Introduction to Fluid Mechanics

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS

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

Course Objectives: To provide the student with

- 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: After learning the contents of this paper the student must be able to

- Compute the rank of a matrix to determine the existence of solutions of a linear algebraic system
- Determine the eigenvalues 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 eigenvalues and eigenvectors (without proof), diagonalization of a matrix, orthogonal diagonalization of symmetric matrices, Similarity of matrices,Quadratic Forms: Definiteness and nature of a quadratic form, reduction of quadratic form to canonical 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

CHEMISTRY

Course Code: GR18A1005 **L/T/P/C: 3/1/0/4**

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.
- Recognise 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.
- Understand the processing of fossil fuels for the effective utilization of chemical energy.

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**

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.
- STo 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

ENGLISH

Course Code: GR18A1006 **L/T/P/C: 2/0/0/2**

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development,fostering ideas and practice of language skills in various contexts and cultures.*

Course Objectives: The course will help to

- 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 practice 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: Students should be able to

- 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 others point of view.

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 andPrepositions.

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-pronounAgreement 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 toform Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiersand Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places andEvents – **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-PrécisWriting.

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 ofReports

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 RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

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

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 a 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)

TASK 1: Determination total hardness of water by complexometric method using EDTA.

TASK 2: Determination of chloride content of water by Argentometry.

TASK 3: Redox titration: Estimation of ferrous iron using standard $KMnO_4$

TASK 4: Estimation of HCl by Conductometric titrations

TASK 5: Estimation of Acetic acid by Conductometric titrations

TASK 6: Estimation of Ferrous iron by Potentiometry using dichromate

TASK 7: Determination of rate constant of acid catalyzed reaction of methyl acetate

TASK 8: Determination of acid value of coconut oil.

TASK 9: Adsorption of acetic acid by charcoal

TASK 10: Determination of surface tension of liquid by using stalagmometer

TASK 11: Determination of viscosity of liquid by using Ostwald's viscometer.

TASK 12: Determination of partition coefficient of acetic acid between n-butanol and water.

TASK 13: Synthesis of Aspirin

TASK 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)

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BASIC ELECTRICAL ENGINEERING LAB

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

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 1**2:** Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
TASK13: Performance Characteristics of a Three-phase Induction Motor
TASK14: Torque-Speed Characteristics of a Three-phase Induction Motor
TASK15: No-Load Characteristics of a Three-phase Alternator

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ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

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

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

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 others point of view.
- 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

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- 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

The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)

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:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs andaudio-visual aids with a Public-Address System, a LCD and a projector etc.

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ENGINEERING WORKSHOP

Course Code: GR18A1017 **L/T/P/C: 1/0/4/3**

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. Workshop Manual / Venkat Reddy/ BSP

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Code : GR18A1002 **L/T/P/C : 3/1/0/4**

Course Objectives: To provide the student with

- 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: After learning the contents of this paper the student must be able to

- 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 ODE

LDE of the first order:Solution of Exact, linear and Bernoulli equations, modeling of Newton's law of cooling, growth and decay models, modeling 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 $e^{ax}, x^n, cosax, sinax, e^{ax}V(x)\ and\ x\,V(x)$ where $V(x) \equiv\ cosax\ and\ sinax,$ the method of variation of parameters LDE with variable coefficients:Cauchy's homogeneous equation, Legendre's homogeneous equations

UNIT-III: MULTIPLE INTEGRALS

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

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

Applications: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 parallelepipeds

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 Boooks

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

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APPLIED PHYSICS

Course Code: GR18A1003 **L/T/P/C: 3/1/0/4**

Course Objectives: At the end of the course the student is expected to

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

- 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, Characterizes 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**

Course Objectives:

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

Course Outcomes:

The Student will learn:

- 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 and command line arguments 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.

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, (3^{rd} 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 (16^{th} Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4^{th} Edition

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERINGGRAPHICS

Course Code:GR18A1010 **L/T/P/C: 1/0/4/3**

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. EngineeringDrawingbyK.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**

Course Objectives: At the end of the course the student is expected to

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

- 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: GR18A1015L/T/P/C: 0/0/3/1.5

Prerequisite: Basic operations of computer and knowledge of mathematics

Laboratory Objectives: The students will learn the following:

- 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.

Laboratory Outcomes The candidate is expected to be able to:

- 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 fiend 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    * *
 *
```

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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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC DEVICES AND CIRCUITS

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

II Year I Semester

Prerequisite: Basic operations of computer and knowledge of mathematics

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: After completion of the course, the students will be able to:

- 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 Electrionics , 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: **L/T/P/C: 3/1/0/4**

II Year I Semester

Prerequisites:

- Basics of number systems and Electronic devices and circuitry
- Basics of De-Morgan's Laws

Course Objectives: The Objective of this course is to provide the student:

- 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: At the end of the course, students will be able to

- 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 BinaryNumbers, 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, DesignProcedure, 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, SerialAddition, 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: **L/T/P/C: 3/1/0/4**

II Year I Semester

Prerequisites:

- Calculus, Trigonometry, complex algebra
- Fundamentals of Fourier, Laplace and Z transforms

Course Objectives: The Objective of this course is to provide the student

- To compare the concepts of continuous and discrete-time signals and systems, their properties, representations and analysis methods.
- To visualization of time-domain representation and analysis 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 control.

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

- 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 as 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-timeperiodic 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-Invariantsystem, 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 forBand 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 sinusoidalcomponents; 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: **L/T/P/C: 3/1/0/4**

II Year I Semester

Prerequisites:

- Fundamentals of Probability theory
- Basics of Fourier series, transforms

Course Objectives: The Objective of this course is to provide the student:

- 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: At the end of the course, students will be able to

- 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 SampleSpaces, 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 AutocorrelationFunction, 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: **L/T/P/C: 3/1/0/4**

II Year I Semester

Course objectives:

- To understand the basic concepts on 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.

CourseOutcomes: Upon successful completion of the course, students will be able to:

- 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, ABCD, 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, π, 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: **L/T/P/C : 3/0/0/3**

Course Objectives:

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

Course Outcomes:

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

1. Scan the economic environment and forecast demand of products through demand forecasting techniques.
2. 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.
3. Outline the different types markets and competition, forms of business organization and methods of pricing.
4. Aanalyze the profitability of various projects using capital budgeting techniques
5. 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: **L/T/P/C: 0/0/2/1**

II Year I Semester

List of Experiments (Twelve experiments to be done):

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: After completion of the course, the students will be able to:

- 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 ELECTRONICSLABORATORY

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

II Year I Semester

Course Objectives: The Objective of this course is to provide the student:

- 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: At the end of the course, students will be able to

- 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 fli
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: **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: The Objective of this course is to provide the student

- To list the techniques in writing a matlab programming
- To explain LTI systems with matalab 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: At the end of the course, students will be able to

- State the fundamentals and explain the classification of signals and systems
- Analyze the concepts to simulate the Fourier series, Fourier transform in singles and systems
- Verify the behavior 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 realiazability 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 : **L-3, T -0, P-0, C-0**

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:

Based on this course, the Engineering graduate will

- 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 helps in sustainable development.

UNIT-I

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

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, 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

COMPUTATIONAL MATHEMATICS FOR ENGINEERS

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

Course objectives

The objective of this course is to provide the student to

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

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

1. Apply well known techniques to find real roots of an equation and linear algebraic systems by iterative methods
2. Apply interpolation techniques for univariate and bivariate data using Gaussian and cubic spline methods
3. Apply numerical techniques to find eigenvalues and corresponding eigenvectors of a matrix
4. Perform matrix factorizations for advanced system solving techniques and apply numerical techniques to compute signal characteristics like correlation and covariance
5. 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 Jordan iterative methods to solve a linear algebraic system

UNIT-II:Interpolation and Cubic spline

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

UNIT-III:Eigenvalues and Eigenvectors

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

UNIT-IV:Numerical 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: **L/T/P/C: 3/1/0/4**

II Year II Semester

Course Objectives: This course aims to impart the following to the students

- 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: The student will be able to

- 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, 2ndEd., 2000, PHI.
4. Engineering Electromagnetics – Nathan Ida, 2ndEd., 2005, Springer (India) Pvt. Ltd., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG AND DIGITAL COMMUNICATIONS

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

II Year II Semester

Prerequisite: Signals and Systems

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

- 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

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, Vestigial side band modulation – Time and Frequency domain description. Noise in AM, DSB and SSB Systems.

UNIT-II: ANGLE MODULATION

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves- Armstrong Method, Detection of FM Waves: Balanced slope detector, Phase locked loop, Comparison of FM and AM. , Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT- III:TRANSMITTERS

Classification of Transmitters, AM Transmitters, FM Transmitters – Variable reactance, Phase Modulator and FM

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison with AM Receiver.

UNIT-IV: 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, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT-V:DIGITAL MODULATION TECHNIQUES

ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.

Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams, Cross Talk.

Text/Reference Books:

1. Analog and Digital Communications – Simon Haykin, John Wiley, 2005.
2. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition,2009,PHI.
3. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, Mcgraw-Hill, 2008.
4. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
5. Electronics & Communication System – George Kennedy and Bernard Davis , TMH 2004
6. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG AND PULSE CIRCUITS

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

II Year II Semester

Pre-requisite: Electronic Devices and Circuits

Course Objectives:

- 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 multivirabor circuits for various applications

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

- 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 useable for audio and Radio applications.
- Design multivibrators and sweep circuits for various applications.
- Apply and analyze various amplifiers and multivirabor 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 CONTROLLERS

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

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

- Understands the internal architecture, organization and assembly language programming of 8086 processors.
- Understands the internal architecture, organization and assembly language programming of 8051/controllers
- Understands the interfacing techniques to 8086 and 8051 based systems.
- Understands 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: **L/T/P/C: 3/1/0/4**

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, d eadlock 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 systems functions, operating systems structures and systems 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-VI:
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: **L/T/P/C: 0/0/2/1**

II Year II Semester

Note:

- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB, Comsim or any other simulation package and then to be realized in hardware

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

- 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

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: **L/T/P/C: 0/0/2/1**

II Year II Semester

Course Objectives:

- 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 multivirabor circuits for various applications

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

- 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 useable for audio and Radio applications.
- Design multivibrators and sweep circuits for various applications.
- Apply and analyze various amplifiers and multivirabor circuits for various applications

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 MICRO CONTROLLERS LABORATORY

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

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

- Understands the internal architecture, organization and assembly language programming of 8086 processors.
- Understands the internal architecture, organization and assembly language programming of 8051/controllers
- Understands the interfacing techniques to 8086 and 8051 based systems.
- Understands 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 weeks)

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. Times
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 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

- To enable the student 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-IIPersonality 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