ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Bachelor of Technology

(Electronics and Communication Engineering)

(Effective for the students admitted from the Academic Year 2015-16)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

For all Undergraduate Programmes (B. Tech)
GR15 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology - 2015 Regulations (GR15 Regulations) are given hereunder. These regulations govern all the Undergraduate Programmes offered by various departments of Engineering with effect from the students admitted to the programmes from 2015-16 academic year.

1. **Programme Offered:** The Undergraduate programme offered by the department is B.Tech, a four-year regular programme in that discipline.

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

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

4. **Programme Pattern:**
   a) A student is introduced to "Choice Based Credit System (CBCS)" for which he/she has to register for the courses at the beginning of each semester as per the procedure.
   b) Each Academic year of study is divided into two semesters.
   c) Minimum number of instruction days in each semester is 90.
   d) The total credits for the Programme is 200. Typically each semester has 25 credits.
   e) 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).
   f) A student has a choice of registering for credits from the courses offered in the programme ensuring the total credits in a semester are between 21 and 29.
   g) All the registered credits will be considered for the calculation of final CGPA.
   h) All courses are to be registered by a student in a semester as per the procedure at the beginning of the semester. All the courses are broadly classified as

S.no	Code	Area	% of credits in the Programme Min	Max
1	HS	Humanities and Social Sciences	5	10
2	BS	Basic Sciences	15	20
3	ES	Engineering Sciences	15	20
4	PC	Professional subjects – Core	30	40
5	PE	Professional Subjects – Elective	10	15
6	OE	Open Elective	05	10
7	PW	Project Work	10	15
8	MC	Mandatory Course*	02	06

*Credits/ Marks are not counted for grading / Pass percentage

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) A student shall be declared eligible for the award of B.Tech degree, if 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 200 credits and secure all credits.
   c) A student has to acquire a minimum of 5.00 SGPA in each semester for the award of B. Tech degree.
   d) 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.
   e) The Degree of B.Tech shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, to 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 re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

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

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

b) **Distribution and Weightage of marks**

S.no	Components	Internal	External	Total
1	Theory	30	70	100
2	Practical	25	50	75
3	Engineering Graphics	30	70	100
4	Industry Oriented Mini Project	25	50	75
5	Comprehensive Viva	-	100	100
6	Seminar	-	100	100
7	Major Project	50	150	200

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 Exams & Continuous Evaluation	1) Two mid semester examinations shall be conducted for 20 marks each for duration of 2 hours. Average of the two mid exams shall be considered i) Subjective - 15 marks ii) Objective - 5 marks 2) Tutorials - 5 marks 3) Attendance - 5 marks
		70	Semester-end examination	The semester-end examination is for a duration of 3 hours

2	Practical	25	Internal Exams & Continuous Evaluation	1) Lab Internal :10 marks 2) Record : 5 marks 3) Continuous Assessment : 5 marks 4) Attendance : 5 marks
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours.

d) **Industry Oriented Mini Project:** The Mini Project is to be taken up with relevance to Industry and is evaluated for 75 marks. Out of 75 marks, 25 marks are for internal evaluation and 50 marks are for external evaluation. The supervisor continuously assesses the students for 15 marks (Attendance – 5 marks, Continuous Assessment – 5 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 50 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor.

e) **Comprehensive Viva:** The comprehensive viva shall be conducted by a Committee consisting of HOD and two senior faculty members of the department. The student shall be assessed for his/her understanding of various courses studied during the programme of study. The Viva-voce shall be evaluated for 100 marks.

f) **Seminar:** For the seminar, the student shall collect information on a specialized topic and prepare a technical report and present the same to a Committee consisting of HOD and two senior faculty and the seminar coordinator of the department. The student shall be assessed for his/her understanding of the topic, its application and its relation with various courses studied during the programme of study for100 marks.

g) **Major Project:** The project work is evaluated for 200 marks. Out of 200, 50 marks shall be for internal evaluation and 150 marks for the external evaluation. The supervisor assesses the student for 25 marks (Attendance – 5 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 25 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 150 marks, Project Review Committee consists of HOD, Project Coordinator and Supervisor.

h) **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.
- Attendance - 5 marks.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting 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. **a) Supplementary Examinations:** A student who failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the college.
    b) Improvement Examinations: A student who failed to secure SGPA of at least 5.00 in a semester can reappear for the external examination of the required courses of the semester for an improvement in SGPA, with the approval from HOD and faculty advisor.

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:**
    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 semester only when he/she satisfies the requirements of all the previous semesters.
    c) A student shall be promoted from I year to II year if and only if he/she secures 25 credits from all the I year regular and supplementary examinations.
    d) A student shall be promoted from II year to III year if and only if he/she secures 45 credits up to and including II year I Semester or 60 credits upto and including II year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
    e) A student shall be promoted from III year to IV year if and only if he/she secures 75 credits upto and including III year I Semester or 90 credits upto and including III year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
    f) **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>=80 and Marks <= 100
A+ (Excellent)	9	Marks>=70 and Marks < 80
A (Very Good)	8	Marks>=60 and Marks < 70
B+ (Good)	7	Marks>=55 and Marks < 60
B (Above Average)	6	Marks>=50 and Marks < 55
C (Average)	5	Marks>=45 and Marks < 50
P (Pass)	4	Marks>=40 andMarks < 45
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 creditsof all courses registered by a student, i.e.,

$$\mathbf{SGPA\ (S_k) = \sum_{i=1}^{n} (Ci * Gi) / \sum_{i=1}^{n} Ci}$$

Where C_i is the number of credits of the i 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 a student over all the semesters of a programme, i.e.,upto and inclusive of S_k, where $k \geq 2$.

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

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

13. 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 (the marks awarded are from the aggregate marks secured for the 200 credits):

	Class Awarded	CGPA Secured
13.1	First Class With Distinction	CGPA ≥ 8.00 with no F or below grade/ detention anytime during the programme
13.2	First Class	CGPA ≥ 8.00 with rest of the clauses of 13.1 not satisfied
13.3	First Class	CGPA ≥ 6.50and CGPA < 8.00
13.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
13.5	Pass Class	CGPA ≥ 5.00 and CGPA < 5.50

14. **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.

15. **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.

16. **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.

17. **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 GR15

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) Registered for 150 credits and secured 150 credits. The marks obtained in all 150 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**
   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 semester only when he/she satisfies the requirements of the previous semester.
   c) A student shall be promoted from II year to III year if and only if he/she secures 25 credits up to and including II year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
   d) A student shall be promoted from III year to IV year if and only if he/she secures 45 credits up to and including III year I Semester or 60 credits up to and including III year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.

3. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes (the marks awarded are from the aggregate marks secured for the 150 credits):

	Class Awarded	CGPA Secured
3.1	First Class With Distinction	CGPA ≥ 8 with no F or below grade/ detention anytime during the programme
3.2	First Class	CGPA ≥ 8 with rest of the clauses of 3.1 not satisfied
3.3	First Class	CGPA ≥ 6.50 and CGPA < 8
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

B.Tech (ECE) PROGRAMME STRUCTURE

I B.Tech (ECE) **I Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
BS	GR15A1001	Linear Algebra and Single Variable Calculus	2	1	-	3	4	30	70	100
BS	GR15A1002	Advanced Calculus	2	1	-	3	4	30	70	100
HS	GR15A1005	English	2	1	-	3	4	30	70	100
BS	GR15A1008	Engineering Chemistry	2	1	-	3	4	30	70	100
ES	GR15A1009	Computer Programming	2	1	-	3	4	30	70	100
ES	GR15A1018	Basic Electrical Engineering	3	1	-	4	5	30	70	100
ES	GR15A1025	Engineering Workshop	-	-	2	2	4	25	50	75
ES	GR15A1027	Computer Programming Lab	-	-	2	2	4	25	50	75
BS	GR15A1030	Engineering Chemistry lab	-	-	2	2	4	25	50	75
		Total	**13**	**6**	**6**	**25**	**37**	**255**	**570**	**825**

I B.Tech (ECE) **II Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
BS	GR15A1003	Transform Calculus and Fourier Series	2	1	-	3	4	30	70	100
BS	GR15A1004	Numerical Methods	2	1	-	3	4	30	70	100
ES	GR15A1019	Fundamentals of Electronics Engineering	3	1	-	4	5	30	70	100
BS	GR15A1007	Engineering Physics	2	1	-	3	4	30	70	100
ES	GR15A1023	Engineering Graphics	1	-	2	3	5	30	70	100
ES	GR15A1010	Data Structures	2	1	-	3	4	30	70	100
ES	GR15A1026	IT Workshop	-	-	2	2	4	25	50	75
BS	GR15A1029	Engineering Physics lab	-	-	2	2	4	25	50	75
HS	GR15A1024	Business Communication and Soft Skills	-	-	2	2	4	25	50	75
		Total	**12**	**5**	**8**	**25**	**38**	**255**	**570**	**825**

II B.Tech (ECE) **I Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
PC	GR15A2050	Probability Theory and Stochastic Processes	3	1	-	4	5	30	70	100
PC	GR15A2043	Digital Electronics	3	1	-	4	5	30	70	100
PC	GR15A2049	Signals and Systems	3	1	-	4	5	30	70	100
PC	GR15A2047	Electrical Circuits	2	1	-	3	4	30	70	100
PC	GR15A2048	Electronic Circuit Analysis	3	1	-	4	5	30	70	100
PC	GR15A2051	Electronic Circuit Analysis Lab	-	-	2	2	4	25	50	75
PC	GR15A2052	Signals and Systems Lab	-	-	2	2	4	25	50	75
PC	GR15A2053	DIgital Electronics Lab	-	-	2	2	4	25	50	75
Total			**14**	**5**	**6**	**25**	**36**	**225**	**500**	**725**
MC	GR15A2002	Value Education and Ethics	4	-	-	0	4	30	70	100
MC	GR15A2106	Gender Sensitization Lab	-	-	2	2	4	25	30	75

II B.Tech (ECE) **II Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
PC	GR15A2054	Electromagnetic Theory and Transmission Lines	3	1	-	4	5	30	70	100
PC	GR15A2055	Microcontrollers	3	1	-	4	5	30	70	100
PC	GR15A2056	Analog Communication	3	1	-	4	5	30	70	100
PC	GR15A2057	Analog Electronics	3	1	-	4	5	30	70	100
PC	GR15A2058	Special functions and Complex variables	2	1	-	3	4	30	70	100
PC	GR15A2059	Microcontrollers Lab			2	2	4	25	50	75
PC	GR15A2060	Analog Communication Lab			2	2	4	25	50	75
PC	GR15A2061	Analog Electronics Lab			2	2	4	25	50	75
Total			**14**	**5**	**6**	**-**	**-**	**25**	**36**	**725**
MC	GR15A2001	Environmental Science			4		-	0	4	75

SYLLABUS

I-Year

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND SINGLE VARIABLE CALCULUS

Course Code: GR15A1001 L:2 T:1 P:0 C:3

Prerequisites: Vector algebra, Matrix algebra and Pre-calculus

Course objectives: The objective of this course is to provide the student with

- Introduce the ideas of linearity and linear systems, which lie at the core level of many engineering concepts
- Explore the extensions of differential calculus, which form the stepping stones to a broader subject called " approximation theory"
- Learn the skill of seeing a mathematical equation in many commonly occurring natural phenomena and acquire preliminary skills to predict their behavior
- Provide an over view of mean value theorems and its applications
- Discuss the significant applications of higher order differential equations.

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

- Recognize the concepts of matrix rank to analyze linear algebraic systems
- Compute eigen values and vectors for engineering applications
- Illustrate the concepts of Mean Value Theorems to Describe the Medical Imaging and Industrial Automation.
- Differentiate various differential equations using elementary techniques (Exact or linear constant coefficient equations)
- Demonstrate model and solve linear dynamical systems
- Apply concepts of higher order differential equations to solve typical problems in Electrical circuits.
- Identify the physical phenomena of Simple harmonic motion by concepts of Differential equations.

Unit-I

Linear Algebra and Matrix eigen value problem: Rank of a matrix,Consistency of a system of linear equations-Pseudo inverse of a matrix-Condition number of a matrix-Approximate solution of an over determined system of linear equations using the pseudo inverse-Solution of a system of homogeneous linear equations.

Vector norms, Linear dependence of vectors, Gram-Schmidt orthogonalization of vectors, Matrix norms.Determination of eigen values and eigen vectors of a square matrix-Properties of eigen values and eigen vectors of real and complex matrices.

Unit-II

Matrix factorization and Quadratic Forms: Diagonalization of a matrix- Orthogonal diagonalization of symmetric matrices-Computation of matrix powers- Computation of Singular value decomposition - QR factorization.

Quadratic forms-Definiteness of a quadratic form-Rank, index and signature of a quadratic form-Reduction of a quadratic form into a canonical form by Lagrange's method and by an orthogonal transformation.

Unit-III

Differential Calculus of functions of a single variable: Mean value theorems (Rolles', Lagrange's, Cauchy's, Taylor's and Maclaurin's theorems Geometrical Interpretation without proof) - Approximation of functions by Taylor's and Maclaurin's theorems-Series expansion of functions.

Unit-IV

Linear differential equations of the first order and their applications: Formation of ODE-Methods to solve first order LDE (exact, reducible to exact, linear and Bernoulli equations). Applications - Growth and decay models - Newton's law of cooling - Applications to electrical circuits (LR and RC circuits) - Geometrical applications - Orthogonal trajectories.

Unit-V

Linear differential equations of the higher order and applications: Equations with constant coefficients-Particular integrals for functions of the type e^{ax}, x^n, sinax, cos ax, $e^{ax}.V(x)$ Exponential shift - Method of variation of parameters.
Applications - Deflection of beams, Simple harmonic motion (simple pendulum, spring-mass systems) and RLC circuits.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar- Narosa Publishing House
2. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications.

References Books

1. Introduction to Linear Algebra-Gilbert Strang
2. Schaum's outline series on Linear Algebra
3. GRIET reference manual

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED CALCULUS

Course Code: GR15A1002 L:2 T:1 P:0 C:3

Prerequisites: Analytical 2-D and 3-D geometry, differential and integral calculus

Course Objectives: The objective of this course is to provide

- Introduce the techniques of tracing a curve using its geometrical properties
- Visualize multivariable functions in the context of function optimization
- Learn the skill of performing integration in 2-D and 3-D and apply them to estimate Characteristics of vector fields
- Introduce the concepts of vector differential calculus
- Demonstrate the Vector Integral Theorem with physical Interpretation.

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

- Identify the techniques of curve tracing and geometry to precisely estimate areas and volumes
- Solve problems on function optimization with and without constraints
- Demonstrate the knowledge of multiple integrals in solving problems in vector fields
- classify the concepts of differential calculus with physical Interpretation
- Categorize the verification and evaluation of Vector integral theorems geometrically.
- Explain the real significance of applications of multiple integrals.
- Classify the concepts of application of Integration.

Unit-I

Differential Calculus of functions of several variables and Function Optimization: Partial differentiation - Hessian matrix-Total differentiation-Jacobians. Optimization of functions of several variables without constraints- Constrained optimization of functions of several variables with equality constraints-The Lagrange's multiplier method.

Unit-II

Curve tracing principles and Applications of integration: Preliminary treatment of curve tracing Cartesian, polar and parametric curves -Applications of the definite integral to evaluate arc lengths, surface areas and volumes generated by revolution of plane area.

Unit-III

Multiple integrals and applications: Evaluation of Double integrals in Cartesian and polar coordinates-Changing the order of integration- Change of variables - Evaluation of triple integrals in Cartesian, cylindrical and spherical coordinates. Application of multiple integrals to evaluate plane areas and volumes of solids.

Unit-IV

Vector Calculus: Vector differentiation in Cartesian coordinates-Gradient, Divergence and Curl and their physical interpretation-Directional derivatives-Angle between surfaces, Vector Identities, Irrotational fields and scalar potentials. Vector integration-Evaluation of line integrals-Work done by conservative fields-Surface integrals.

Unit-V

Vector Field theorems: Green's theorem in the Plane-Divergence theorem of Gauss-Stoke's theorem (Without Proofs).

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar Narosa Publishing House
2. Schaum's outline series on Vector Analysis
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications

Reference Books

1. Advanced Engineering Mathematics: Erwin Kreyszig-Wiley
2. Calculus and Analytical Geometry-Thomas & Finney-Narosa
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH

Course Code: GR15A1005 L:2 T:1 P:0 C:3

Prerequisites: Familiarity with basic language and communication skills.

Course objectives: The objective of this course is to provide the student with

- Identify the importance to acquire Basic Language Skills in English.
- Relate the vocabulary, Grammar and Structures in English.
- Practice to analyze and express their ideas in the new context.
- Demonstrate the learnt public speaking skills in an enthusiastic manner.
- Integrate oral and written communication skills.

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

- Read and comprehend a wide range of text and know the importance of lifelong learning.
- Improve English language proficiency with an emphasis on LSRW skills.
- Interpret academic subjects with better understanding.
- Express ideas fluently and appropriately in terms of various social and professional areas.
- Revamp English language skills to meet the corporate needs.
- Present themselves in various formal, social and professional situations.
- Improve literary sense through wide range of selections from various genres.

Unit-I

1. Chapter entitled Sir C.V. Raman: A Path breaker in the saga of Indian Science from "Enjoying Every day English", Published by Sangam Books, Hyderabad.
2. Chapter Entitled Mother Teresa from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

   Tutorial-1: Present a small biographical sketch of an inspiring personality **Tutorial-2:** Prepare an essay on "Charity begins at home."

Unit-II

Grammar & Vocabulary Development: Articles: Types of Articles and their usages; Tense and Aspect; Subject and Verb Agreement; Prepositions
Vocabulary Development: Synonyms and Antonyms; One-word substitutes; prefixes and suffixes; words often confused; idioms and phrases.
Speaking & Writing skills: Information transfer: verbal to graphical presentation and from graphical presentation to verbal. Public Speaking: Body Language, Presentation Skills and its Features.

Tutorial-3: Worksheet on the usage of Tenses, Articles and Prepositions

Tutorial-4: Exercises on vocabulary

Tutorial-5: Interpretation of data from different formats

Unit-III

1. Chapter Entitled The Connoisseur from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Sam Pitroda from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur.

Tutorial-5: Story Analysis

Tutorial-6: Present a person who bears risk taking ability to solve the problems of people/society

Tutorial-7: Describe a strange event that occurred in your life

Unit-IV

1. Chapter Entitled Bubbling Well Road from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Amartya Kumar Sen from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

Tutorial-9: Oral Presentation on "Does the quality of Unity in Diversity helped us to acquaint easily with the trends of globalization?"

Tutorial-10: Develop an essay "The ways to impart moral and ethical values amongst the students."

Unit-V

1. Chapter entitled The Cuddalore Experience from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Martin Luther King Jr. (I have a dream) from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

Tutorial-11: Presentation on "The possible ways to educate students about Disaster Management."

Tutorial-12: Write or present "Is every present leader was a follower?"

Text Books

1. Enjoying Every day English by A. Rama Krishna Rao- Sangam Books
2. Inspiring Speeches and Lives by Dr.B. Yadava Raju, Dr.C. Muralikrishna, Maruthi Publications.

Reference Books

1. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
2. Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw Hill.
3. Technical Communication, Meenakshi Raman, Sangeeta Sharma, Oxford higher Education.
4. English for Engineers Made Easy, Aeda Abidi, Ritu Chaudhry, CengageLearning.
5. Communicate or Collapse, Pushp Latha, Sanjay Kumar, PHI Learning Pvt.Ltd.
6. Communication Skills, Sanjay Kumar, Pushp Latha, Oxford Higher Education.
7. A Hand Book for Engineers, Dr. P. Eliah, BS Publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY

Course Code: GR15A1008 L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Engineering Chemistry Theory Course

Course Objectives: The objective of this course is to provide

- Explain the chemistry of water analysis essential for the functioning of certain core industries.
- Demonstrate how the chemistry of batteries and fuel cells provide energy vital for devices.
- Introduce a variety of engineering materials used in modern technology including
- Semiconductors, conducting polymers, liquid crystals, etc., to relate the molecular and crystal structure and properties to their engineering applications.
- Illustrate materials processing methods for industrial production of plastics, rubbers, silicon

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

- Analyse water for the industry required specifications.
- Understand the fundamental principles of electrochemistry for energy production and corrosion prevention.
- Know the origin of different types of engineering materials used in modern technology.
- Design new materials for novel applications.
- Develop the skills required for synthesis and analysis of materials.
- Relate the structure of materials to their properties and applications.
- Understand the processing of fossil fuels for the effective utilization of chemical energy
- Know the necessity of sustainable, environmentally-friendly energy sources like solar energy.

Unit-I

Water Technology: Sources of natural water, impurities, hardness: causes, types, expression, units, estimation of hardness of water using complexometric titration method, problems on hardness, Boiler feed water, boiler troubles(scale, sludge, carry over, Caustic Embrittlement, Boiler Corrosion). Internal treatment methods(carbonate, phosphate, calgon), Softening of water – Lime Soda, Ion- Exchange process. Alkalinity of water and its determination, Potable water- its characteristics and steps involved in Municipal Water Treatment, Chlorination-Break Point Chlorination, sterilization by ozonation. Desalination of Brackish water - Reverse Osmosis. Waste water-types of effluents, domestic and industrial effluents(an overview)

Unit-II

Electrochemistry & Corrosion: Concept of Conductances-specific, equivalent, molar conductances and their inter relationships applications of conductance-conductometric titrations-(Strong acid Vs Strong Base and Weak Acid Vs Strong Base). EMF of a cell, Electrode- Single Electrode Potential, Standard Electrode potential, Electro chemical series and its applications, Electrochemical Cells-types, Galvanic cell: cell representation, Cell reactions, Cell EMF, Electrolytic cells, Concentration cell. Batteries-types Lithium Cell(Li-thionyl Chloride), Secondary cells: Pb-PbO_2 cell, Fuel cells: H_2-O_2 fuel cells and their applications.

Causes and effects of corrosion-types of corrosion- chemical (Dry) corrosion-types and their mechanism, Electrochemical (Wet) corrosion and its mechanism, factors affecting the rate of corrosion – nature of metal and nature of environment. Corrosion Control Methods-Cathodic Protection: Sacrificial Anodic, Impressed Current Cathodic protection. Metallic Coatings –Anodic and Cathodic coatings, Methods of application of metallic coatings- Hot Dipping method(Galvanisation), Cementation(Sheradising), Electroplating(Cu coating), Organic Coatings: Paints – its constituents and their functions.

Unit-III

Engineering Materials I: Cement-types-portland cement –composition, Setting & Hardening of Portland cement. Ceramics-types-ceramic products - whitewares, Stonewares, properties and applications of ceramics. Refractories-classification,properties(refractoriness,RUL,thermal spalling, thermal conductivity) and their application.

Lubricants: Classification with examples, mechanisms of lubrication (thick film, thin film, extreme pressure), properties of lubricants- viscosity, flash point, fire point, cloud point, pour point (Definition and significance).

Unit-IV

Engineering Materials II: Electronic materials : Semiconductors, Preparation of Pure Ge and Si by Zone Refining, Czochralski Crystal Pulling, Doping Techniques-Epitaxy, Diffusion & ion implantation.

Polymer Materials: Monomer, polymer, types of polymerization-addition and condensation, Plastics-Thermoplastic resins, Thermo set resins. Compounding & fabrication of plastics (compression & Injection moulding), Preparation, Properties, Engineering applications of Hi Density Poly Ethylene(HDPE), Poly Vinyl Chloride(PVC), Bakelite & Nylon 6,6. Liquid Crystal Polymers and their applications, Organic Light Emmiting Diodes (an Overview). Biodegradable polymers-their advantages and their applications. Elastomers – preparation, properties and applications of Butyl rubber, Thiokol rubber, Styrene-Butadiene Rubber. Conducting Polymers-classification with examples-mechanism of conduction in trans poly acetylene and their applications.

Unit-V

Energy sources: Fossil Fuels: Coal –types, analysis of coal- proximate and ultimate analysis and their significance, Calorific value of fuel – HCV, LCV, Determination of Calorific Value using BOMB calorimeter, Theoretical calculation of Calorific Value by Dulong's formula, Numerical Problems. Petroleum-its composition-synthetic petrol – Bergius and Fischer Tropsch's process method , cracking (Definition) and its significance, knocking and its mechanism in Internal Combustion engines, Octane Rating of Gasoline, Composition, and applications of natural gas, LPG, CNG. Bio-fuels: preparation of Bio-diesel by transesterification method, advantages of Bio-fuel.

Teaching Methodologies

1. White Board with marker, OHP & Power Point Presentation
2. Conducting quizzes,
3. Conducting Experiments
4. Assignment uploaded in website.

Text Books

1. A text book of engineering chemistry by PC Jain and Monica Jain, Dhanpat Rai publishing company.

Reference Books

1. A text book of engineering chemistry by SS Dara and SS Umre, S Chand publications.
2. A text book of engineering chemistry by Dr Y Bharathi kumari and Dr Ch Jyothsna, VGS publications.
3. A text book of engineering chemistry by R.P.Mani, K.N.Mishra, B.Rama Devi, V.R.Reddy, cengage learning publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING

Course Code: GR15A1009 L:2 T:1 P:0 C:3

Prerequisites: Knowledge of Mathematics required

Course Objectives: The objective of this course is to provide

- Basic computer system concepts.
- Design algorithms and draw flowcharts in a language independent manner.
- Concepts of C-programming language such as variables, operators, branching, looping, functions, arrays, pointers, structures and files.
- Convert recursive function to non-recursive function and vice versa
- Manipulate files.
- Examine the functions available in C-library.
- Interpret and debug the given program.

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

- Describe the basic computer system concepts.
- Recite algorithm, draw flowchart and write the program for a given scenario.
- Use the concepts of C-programming language and functions available in C-library to develop the programs.
- Experiment recursive and non-recursive functions
- Create and update files.
- Examine the static memory allocation and dynamic memory allocation of variables.
- Find the errors and trace the output of the program.

Unit-I

Introduction to Computers: Computer Hardware and Software, System Software, Programming Languages, Program Development steps, Algorithms, Flowcharts.

Introduction to C: History of C, Structure of C-Program, Keywords, Identifiers, Data types, Constants, Variables, Operators, Expressions, Precedence and order of evaluation, Type Conversion and Type Casting .

Unit-II

Managing I/O: Input-Output statements, Formatted I/O.
Decision making statements: if, if-else, if-else-if, nested if, switch
Iterative Statements: while, do- while, for**.**
Unconditional statements: break, continue, goto.

Unit-III

Arrays: Introduction, One-Dimensional arrays, Declaring and Initializing arrays, Multidimensional arrays

Strings: Introduction to Strings, String operations with and without using String Handling functions, Array of strings.

Unit-IV

Functions: Introduction, Function definition, Function declaration, Function Calls, Return values and their types, Categories of Functions, Nested Functions, Recursion, Storage Classes, Passing arrays to Functions.

Pointers: Pointers and addresses, Pointer expressions and Pointer arithmetic, Pointers and Functions, void pointer, Pointers and Arrays, Pointers and Strings, Array of pointers, Pointers to Pointers.

Dynamic memory allocation: malloc, calloc, realloc, free.

Unit-V

Structures: Basics of Structures, Nested Structures, Arrays of Structures, Arrays within Structures, Structures and Functions, Pointers and Structures, Self-referential Structures, Unions. **Files:** Introduction, Types of Files, File Access Functions, I/O on Files, Random Access to Files, Error Handling, Command Line Arguments.

Teaching Methodologies

1. White board and marker
2. Power point presentations

Text Books

1. The C Programming Language, BRIAN W. KERNIGHAN Dennis M.Ritchie, Second Edition, PHI.
2. Computer Programming and Data structures by E Balaguruswamy, published by Mc GrawHill.
3. Programming in C, Ashok N Kamthane, 2nd edition, Pearson Publication.

Reference Books

1. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, Oxford University Press.
2. Let Us C, Yashwanth Kanetkar, 10th Edition, BPB Publications.
3. C& Data structures, P.Padmanabham, B.S. Publications.
4. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
5. Programming with problem solving, J.A.Jones & K.Harrow, Dreamtech Press.
6. Programming in C, Stephen G.Kochan, III Edition, Pearson Education.
7. Problem solving and program design in C, Jeri. R. Hanly, Elliot B.Koffman, Pearson Publication.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING

Course Code: GR15A1018 L:3 T:1 P:0 C:4

Course Objectives: BEE (Basic Electric Engineering) is common to first year branches of UG Engineering(except BT). At the end of the course the student is expected to

- Introduction of the fundamentals of Electrical Engineering.
- Skill of Practical implementation of fundamental theory concepts.
- Solve problems in the fundamentals of electrical engineering.
- Understand the basic principles of general electrical machinery.
- Understand the applications of electrical engineering in real time.
- Visualization of common real time application of Electrical machinery.

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

- Comprehend the basics of Electrical Engineering and practical implementation of Electrical fundamentals.
- Develop numerical solutions to fundamental electrical engineering.
- Make use of basic principles involved in electrical engineering concepts.
- Examine the methods to solve AC circuits.
- Analyse various circuits using network theorems.
- Know the basics of electric machines used in industries.
- Summarize the different applications of commonly used electric machinery.

Unit-I

Basic Laws: Ohm's law , Kirchhoff's voltage and current laws , Nodes-Branches and Loops , Series elements and Voltage Division , Parallel elements and Current Division , Star-Delta transformation, Independent sources and Dependent sources , Source transformation.

Unit-II

AC Fundamentals-I: Review of Complex Algebra , Sinusoids , Phasors , Phasor Relations of Circuit elements , Impedance and Admittance , Impedance Combinations , Series and Parallel combination of Inductors and Capacitors, Mesh analysis and Nodal Analysis.

Unit-III

AC Fundamentals-II: RMS and Average values, Form factor, Steady State Analysis of Series, Parallel and Series Parallel combinations of R, L,C with Sinusoidal excitation, Instantaneous power, Average power, Real power, Reactive power and Apparent power, concept of Power factor, Frequency.

Unit-IV

Resonance and Network Theorems: Resonance in Electric circuits: Analysis of Series and Parallel Resonance, Theorems: Superposition theorem, Thevinin's theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity theorem.

Unit-V

Fundamentals Of Electrical Machines: Construction, Principle , Operation and Applications of –(i) DC Motor,(ii) Single phase Transformer (iii) Single phase Induction motor

Text Book

1. Fundamentals of Electric Circuits by Charles K.Alexander, Matthew N.O.Sadiku, Tata McGraw Hill Company.

Reference Books

1. Circuit Theory (Analysis and Synthesis) by A.Chakrabarti – Dhanpat Rai & Co
2. Basic Electrical Engineering by Nagasarkar, Oxford Publishers
3. Network Theory by Prof.B.N.Yoganarasimham.
4. Engineering Circuit Analysis by William H.Hayt.Jr, Jack E.Kemmerly and Steven M.Durbin by Tata McGraw Hill Company.
5. Electrical Engineering Fundamentals by Vincent Deltoro 6.Circuit Theory by Sudhakar and ShyamMohan

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

IT WORKSHOP

Course Code: GR15A1026 L:0 T:0 P:2 C:2

Prerequisites:

- Fundamentals of Computer and its parts.
- Identification of peripherals of computer.

Course Objectives: The objective of this course is to provide

- Introduce the students to a PC, its basic peripherals and to install different software.
- Enhance the ability of the students in effective usage of Internet using web browsers and tools.
- Design professional word documents; excel spread sheets and power point presentation using Microsoft office tools.
- Illustrate the basic knowledge about the networking devices – Routers and Switches
- Develop basic networks using different cables and different networking devices.
- Illustrate the basic knowledge of HTML and to create a static website.
- Illustrate the basic knowledge on DBMS concepts and store the data in database.

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

- Recognize different peripherals and install different system and application softwares.
- Analyze and explore the use of web browsers and related tools for information extraction.
- Create different documents, presentations and spreadsheet applications.
- Recognize different network devices and their usage.
- Recognize and use different cables.
- Design a static webpage.
- Design and develop Database.

PC Hardware introduces the students to a personal computer and its basic peripherals, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on working PC to install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced. Productivity tools module would enable the students in crafting professional word documents, spread sheets and slide presentations.

Task-1

Installation of OS Every student should install Ubuntu and RedHat Linux on the computer. Lab instructors should verify the installation and follow it up with viva.

Task-2

Hands on experience on OpenOffice: Every student should install open office on the computer. Students would be exposed to create word documents with images, tables, formula and with additional word processing features, Power point presentation, Excel and access. Lab instructors should verify the installation and follow it up with viva.

Task-3

Internet Based Applications: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

Task-4

Networking-Network Infrastructure: Understand the concepts of Internet, intranet, and extranet, local area networks (LANs), Wide area networks (WANs), Wireless networking, network topologies and access methods

Task-5

Network Hardware: Understand switches, routers, media types. static routing, dynamic routing (routing protocols), default routes; routing table and how it selects best route(s); routing table memory, network address translation (NAT).Introduction to Cisco Packet Tracer, design LAN using routers and switches.

Task-6

Network Protocols: Understand the Open Systems Interconnection (OSI) model, IPv4, IPv6, tunnelling, dual IP stack, subnet mask, gateway, ports, packets, reserved address ranges for local use (including local loopback IP) Understanding Cisco Router and Switches.

Task-7

Network Services: Understand names resolution, networking services, TCP/IP-Tools (such as ping), tracert, pathping, Telnet, IPconfig, netstat, reserved address ranges for local use (including local loopback IP), protocols.

Task-8

Database -Core Database Concepts: Understand how data is stored in tables, Understanding DML and DDL statements.

Task-9

Creating and Insertion of Data: Understanding Data types, tables and how to insert data in to the tables.

Task-10

HTML Basic HTML Tags: Understand what are the tags used for creation of website.

Task-11

Designing a Static web page: Understand how to create static web page using forms and tables.

Teaching methodologies

- Power Point presentations.
- Assignments.
- Hands on experiment.

References Books

1. Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.
2. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
3. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
4. Comdex Information Technology Course tool kit Vikas Gupta, WILEY Dreamtech
5. IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme- CISCO Press, Pearson Education
6. PC Hardware and A+Handbook – Kate J. Chase PHI(Microsoft)
7. ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc- Graw Hill
8. Introduction to Database Systems, C.J.Date Pearson Education.
9. Networking Fundamentals, Wiley, by Microsoft Official Academic Course, 1st Edition .

Suggested Tutorials on Lab:

Tutorial/Lab 1: Installation of Ubuntu and RedHat Linux on the computer. Lab instructors should verify the installation and follow it up with viva

Tutorial/Lab 2: Students would be exposed to create word documents with images, tables, formula and with additional word processing features, Power point presentation, Excel and access. Lab instructors should verify the installation and follow it up with viva.

Tutorial/Lab 3: Understand the concepts of networking topics. **Tutorial/Lab 4:** DDL and DML statements

Tutorial/Lab5: Designing of static web page and verify it.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course Code: GR15A1030 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals in Engineering Chemistry Laboratory

Course Objectives: The objective of this course is to provide

- Introduce practical applications of chemistry concepts to engineering problems.
- Know the laboratory practices implemented in a research and industrial chemistry laboratory.
- Explain the water analysis techniques for removing impurities.
- Demonstrate redox chemistry for analysing engineering materials like cement.
- Explain the measurement of physical properties like viscosity and surface tension of lubricants.

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

- Perform analysis of water to the required industrial standards.
- Apply the redox and acid-base titrations for analysing materials used in routine usage like cement, coal, acid in lead acid battery, etc.,
- Develop the skills required for assessing the quality of materials used in industries.
- Design novel ways of instrumental methods of analysis.
- Know the correlation between the measured property and the corresponding application.
- Understand scientific method of designing experiment and learn the skill necessary to perform it.
- Know how to innovate to design alternative energy sources utilizing chemistry for sustainable environment for future generations

List Of Experiments

1. Estimation of Total Hardness in sample water by complexometry
2. Estimation of percentage available chlorine in Bleaching Powder.
3. Estimation of Fe^{2+} by permanganometry.
4. Determination of strength of an acid by potentiometric titration method
5. Determination of strength of an acid by using conductometry.
6. Determination of Strength of an acid in Pb-Acid battery by titrimetric method
7. Determination of percentage of Iron in Cement sample by colorimetry..
8. Estimation of Calcium in port land cement.

9. Determination of Viscosity of the given unknown liquid by Oswald's viscometer.
10. Determination of surface tention of the given unknown liquid by stalagmometer.
11. Preparation of Thiokol rubber.
12. Determination of percentage Moisture content in a coal sample.

Reference Books

1. Laboratory Manual on Engineering Chemistry, by Dr Sudha Rani, Dhanpat Rai Publishing house.
2. A Text book on Experiments and calculations in Engineering Chemistry, by SS Dara, S Chand publications.
3. Laboratory Manual of Organic Chemistry, by Raj K Bansal, Wiley Eastern Limited, New age international limited.
4. Engineering Chemistry practical manual prepared by faculty of engineering chemistry, GRIET(A) - (for college circulation only)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING LAB

Course Code: GR15A1027 L:0 T:0 P:2 C:2

Prerequisite: Basic operations of computer and knowledge of mathematics

Course Objectives: The objective of this course is to provide

- The fundamentals of C programming language and analyze the given problem.
- Interpret, analyze and write the program for a given scenario.
- Exemplify static and dynamic memory allocation.
- Examine the functions available in C-library.
- Write a program in recursive and non-recursive manner
- Manipulate files.
- The concepts of searching and sorting algorithms for solving real time problems.

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

- Use the programming concepts and c-library for writing the programs.
- Analyze and debug the given program.
- Develop an efficient program.
- Differentiate static and dynamic memory allocation.
- Compare the recursive and non-recursive programming approaches
- Create and update files
- Apply searching and sorting techniques for real time scenario.

Task- I

a) The heights of three students are 165, 148, 154 cm. respectively. Write a C program to sort the heights of the students in descending order.

b) Write a C program to find the roots of a quadratic equation using if-else.

c) The program should request the user to input two numbers and display one of the following as per the desire of user.

(a) Sum of numbers

(b) Difference of numbers

(c) Product of the numbers

(d) Division of the numbers.

Write a C program using switch statement to accomplish the above task.

d) In a mathematical number sequence let the first and second term in the Sequence are 0 and 1. Subsequent terms are formed by adding the preceding terms in the sequence.

Write a C program to generate the first 10 terms of the sequence.

Task-II

a) Write a C program to construct pyramid of numbers.

b) The reliability of an electronic component is given by reliability $r=e^{-\lambda t}$ where λ is the component failure rate per hour and t is the time of operation in hours. Determine the reliability at various operating times from 0 to 3000 hours by plotting a graph using a C program. The failure rate λ is 0.001. Plot the graph with a special symbol.

c) Write a C program to accept the date of birth and the current date to find the age of the person . The output should specify the age of a person in terms of number of years, months and days.

Task- III

a) Write a C program to calculate the following Sum: $Sum=1-x^2/2!+x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

b) For a certain electrical circuit with an induction (L) and Resistance (R) , the damped natural frequency is given by $f=\sqrt{(1/LC - R^2/4C^2)}$. Write a C program to calculate the frequency for different values of C starting from 0.01 to 0.1.

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 - IV

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C Program to search whether a given number is present in set of integers

c) Write a C Program to sort a given list of integers.

Task - V

a) Write a C program to count the lines, words and characters in a given text.

b) Write a C program to sort the names of 5 students in the alphabetical order.
Ex: Rita, Sneha, Priti, Briya, kitti as Briya , Kitti, Priti, Rita, Sneha

c) Write a C program to print all the rotations of a given string.
Ex: Rotations of the string "NEWS" are NEWS EWSN WSNE SNEW

Task - VI

a) Write a C program to perform the following operations:
i) To insert a sub-string in a given main string at a given position.
ii) To delete n Characters from a given position in a given string.

B) Write a C program to determine if the given string is a palindrome or not?

Task - VII

Write a C program that uses functions to perform the following:
i) Transpose of a matrix
ii) Addition of Two Matrices
iii) Multiplication of Two Matrices

Task - VIII

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To print the Fibonacci sequence
iii)To find the GCD (greatest common divisor) of two given integers.

Task- IX

a) Using pointers, write a function that receives a character string and a character as argument and deletes all occurrences of this character in the string.
b) Write a function using pointer parameter that compares two integer arrays to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.

Task -X

Write a C program that uses functions to perform the following operations on two complex numbers

i) Addition
ii) Subtraction
iii) Multiplication
iv) Division
(Note: represent complex number using a structure.)

Task-XI

a) Write a c program which accepts employee details like (outer structure : name, employid, salary and (inner structure : area, street number, houseno)).Display the employee names and id belonging to a particular area.
b) Let us suppose that a hotel consists of name, address, average room charge and number of rooms. Then write a function to print out hotels with room charges less than a given value.(structures and functions)

Task - XII

a) Write a C Program to display the contents of a file.
b) Write a C Program for merging of two files into a single file.
c) Write a C Program to append data into a file.

Task - XIII

a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.
(Note : The file name and n are specified on the command line.)

Task-XIV

a) Write a C program to develop Tic Tac Toe game
b) Write a C program to solve Towers of Hanoi

Text Books

1. Programming in C, Ashok N Kamthane, 2nd edition, Pearson Publication.
2. The C Programming Language, BRIANW. KERNIGHAN Dennis M.Ritchie, Second Edition, PHI.
3. Computer Programming and Data structures by E Balaguruswamy, published by Mc GrawHill.

Reference Books

1. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, Oxford University Press.
2. Let Us C, Yashwanth Kanetkar, 10th Edition, BPB Publications.
3. C& Data structures, P.Padmanabham, B.S. Publications.
4. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
5. Programming with problem solving, J.A.Jones & K.Harrow, Dreamtech Press.
6. Programming in C, Stephen G.Kochan, III Edition, Pearson Education.
7. Problem solving and program design in C, Jeri. R. Hanly, Elliot B. Koffman, Pearson Publication.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRANSFORM CALCULUS AND FOURIER SERIES

Course Code: GR15A1003 L:2 T:1 P:0 C:3

Prerequisites: Differential and integral calculus, multiple integrals and linear differential equations

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

- Introduce improper integrals and specially to Beta and Gamma Functions
- Introduce the idea of domain transformation for easy problem solving
- Learn the skill of decomposing a periodic and non-periodic function in to fundamental Components using Fourier series and Fourier transform
- Introduce PDE and acquire the skill of finding analytical solutions of such equations
- Identify the real time problem and formulate the mathematical model.

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

- Calculate definite integral values using Beta and Gamma Functions
- Develop the skill of evaluating Laplace and inverse Laplace transform to solve linear systems under initial and boundary conditions
- Illustrate the concepts of Laplace Transform to find the solutions of physical problems such as Electrical circuits.
- Interpret the Fourier series and Fourier transform in the context of signals and systems.
- Solve difference equations by Z-Transform.
- Formulate Partial differential equations by eliminating arbitrary functions and arbitrary constants.
- Determine the solution of Boundary value problems (PDE) by Fourier Transform Method.

Unit-I

Improper Integrals and Beta, Gamma Functions: Beta and Gamma functions – Their properties – Evaluation of improper integrals in terms of Beta and Gamma functions.

Unit-II

Laplace Transform: Definition and existence of the Laplace Transform-Elementary functions-Properties of the Laplace transform-Convolution integral - Convolution theorem-Heaviside's unit step-function-Dirac delta function. The inverse Laplace transform-Properties-Method of partial fractions- Heaviside's inversion formula-Inversion by convolution theorem. Application of the Laplace transform to solve initial value problems and boundary value problems in ODE. Solution of a system of linear differential equations-Solution of problems in electrical circuits by Laplace transforms method.

Unit-III

Z-Transform and Fourier series: Definition-Z transform of elementary sequences-Properties-The inverse Z Transform, Application of Z transform to solve difference equations Definition of orthogonal functions-The concept of Weight function-Fourier series of periodic functions-Fourier expansion of periodic functions-Half range Fourier series expansions.

Unit-IV

Fourier Transform: Exponential Fourier series-The continuous one dimensional Fourier transform-Properties-Convolution-Parseval's identity- Fourier Sine and Cosine transforms.

Unit-V

Partial differential equations: Formation of PDE-Solution of Lagrange's linear equations-Method of separation of variables to solve IBVP like 1-D heat, 1-D wave and BVP like 2-D Laplace's equations. Application of Fourier transform to the solution of partial differential equations.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R. K. Jain and S. R. K. Iyengar Narosa Publishing House.
2. Advanced Engineering Mathematics: Erwin Kreyszig-Wiley
3. Schaum's outline series on Laplace transforms

Reference Books

1. Higher Engineering Mathematics: B. S. Grewal-Khanna Publications
2. Higher Engineering Mathematics: C. Das Chawla-Asian Publishers
3. GRIET reference manual

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUMERICAL METHODS

Course Code: GR15A1004 L:2 T:1 P:0 C:3

Prerequisites: Elementary calculus, Partial differentiation, Geometry and ordinary differential equations.

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

- Explain the distinction between analytical and approximate solutions arising in mathematics
- Acquire skills that equip us to approximate a hidden function using data
- Learn methods that provides solutions to problems hitherto unsolvable due to their complex Nature.
- Create ability to model, solve and interpreted the Engg Problem.
- Introduce the various applications of interpolation in Science and Engg.

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

- Develop the skill of determining approximate solutions to problems having no analytical Solutions in different contexts
- Solve problems related to cubic spline fitting and approximation of functions using B-splines and least squares
- Develop the skill of finding approximate solutions to problems arising in linear differential Equations
- Identify how the numerical methods play a vital role in many areas in engineering for example Dynamics, elasticity, heat transfer, electromagnetic theory and quantum mechanics.
- Interpret the mathematical results in physical or other terms to see what it practically means and implies.
- Explain the concept of interpolation is useful in predicting future out comes base on the present knowledge.
- Solve the model by selecting and applying a suitable mathematical method.

Unit-I

Root finding techniques and Numerical solution of linear algebraic systems: Bisection method-Regula Falsi- Fixed point iteration method-Newton Raphson method - Rate of convergence of the above methods (without proof). LU decomposition method-Cholesky's method-Jacobi and Gauss Seidel iteration methods- Convergence of iterative methods (without proof).

Unit-II

Interpolation and Cubic Splines: Finite differences - Forward, backward and central differences, Relationship between operators- Interpolation with uniform data-Newton's forward and backward difference interpolation formulas- Gauss forward, Gauss backward and Stirling's central interpolation formulas- Lagrange and Newton's divided difference interpolation formulas for non-uniform data- Cubic spline interpolation.

Unit-III

Curve fitting and B-spline approximation: Method of least squares- Fitting a straight line, and second degree parabola, exponential and power curves to data-Approximation of functions by B-Splines (Linear and Quadratic cases only).

Unit-IV

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

Unit-V

Numerical solution of initial and boundary value problems in ODE: Initial Value Problems: Picard's method of successive approximation, Solution by Taylor series method, Euler method, Runge-Kutta methods of second and fourth orders. Predictor-corrector methods, Combinations of first and second order P-C methods. Boundary Value Problems in ODE: Finite difference methods for solving second order linear ODE.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar- Narosa Publishing House.
2. Advanced Engineering Mathematics: Erwin Kreyszig- Wiley.
3. Introductory methods of Numerical Analysis (5th edition)-S.S.Sastry- PHI.

Reference Books

1. Applied Numerical Methods using MATLAB- Yang, Cao, Chung & Morris – Wiley Interscience
2. Numerical methods in Engineering with MATLAB-Jaan Kiusalaas -Cambridge University Press.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

FUNDAMENTALS OF ELECTRONICS ENGINEERING

Course Code: GR15A1019 L:3 T:1 P:0 C:4

Prerequisites

- Fundamentals of Modern Physics
- Fundamentals of Electrical Networks

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

- To Define the semiconducting device constructing techniques
- To Describe the diode forward and reverse bias characteristics
- To Generalize the mathematical equations in design of transistor amplifier circuit design
- To Analyze the mechanism of flow of current through the p-n junction and relating this phenomena to the characteristics and operation of the diodes, bipolar and uni polar transistors.
- To Explain the principles of the regulated power supply, Zener diodes and regulation.
- To Compare the concept of biasing techniques in BJT, FET and MOSFET so as to able to analyze advanced electronic circuits.

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

- Comprehend the fundamentals of construction of the semiconducting materials,
- Fabrication of elements working principles and operation of semiconductors.
- Analyze the concept with the working principles of forward and reverse bias characteristics.
- Know the basic skills in design and analysis of the filters circuits, biasing circuits
- Discriminate the principle, construction and operation BJTs, FETs and MOSFETs
- Interpret the different techniques for FET and MOSFET circuit designs
- Create the performance and analysis-volt amp characteristics of a BJT and FET amplifiers.
- Analyze the small signal low frequency Transistor amplifiers using h-parameters.

Unit-I

Semiconductors and pn Junction Diode: Semiconductor Physics: n and p type semiconductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, Open- circuited p-n junction, Energy band diagram of PN diode, forward bias and reverse bias, Current components in p-n diode, Law of junction, Diode equation, Volt-ampere characteristics of p-n diode, Temperature dependence of V-I characteristic, Transition and Diffusion capacitances, Breakdown Mechanisms in Semiconductor Diodes (Avalanche and Zener breakdown), Zener diode characteristics,

Unit-II

Diode Applications, Special Diodes: Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π-section filter, and comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using zener diode, Series and Shunt voltage regulators
Special Diodes: Characteristics of Tunnel Diode, Varactor Diode, LED, LCD.

Unit-III

Bipolar Junction Transistor: Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Detailed study of currents in a transistor, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha and Beta and Gamma, typical transistor junction voltage values,

Junction Field Effect Transistors (JFET): JFET characteristics (n and p channels), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Introduction to SCR and UJT.

Unit-IV

Biasing and stabilization : BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, Compensation techniques, Compensation against variation in VBE and Ico, Thermal run away, Thermal stability.

Unit-V

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

Teaching Methodologies

- Power Point presentations
- Tutorial Sheets
- Assignments
- Lab experiments with Multisim software

Text Books

1. David A. Bell; Electronic Devices and Circuits, Oxford University Press, 5th edition, 2008.
2. R.L. Boylestad and Louis Nashelsky; Electronic Devices and Circuits, Pearson/Prentice Hall, 9th Edition, 2006.

Reference Books

1. T.F. Bogart Jr J.S.Beasley and G.Rico; Electronic Devices and Circuits – Pearson Education, 6th edition, 2004.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING PHYSICS

Course Code: GR15A1007 L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Physics and Mathematics.

Course Objectives: The objective of this course is to provide

- Describe the various bonds between the atoms, structures of crystals and their packing factors.
- Identify the behavior of Free electrons through various theories thereby know the classification of materials.
- Discuss the origin of Electrical and Magnetic properties of various materials.
- Interpret the properties of laser light and how it is used for communication in optical fiber networks.
- Explain the latest developments of Nano-technology.

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

- Identify and describe various bonds between the atoms and properties of various materials.
- Explain the behavior of free electrons and how they are responsible for exhibition of various properties.
- Classify various magnetic materials and apply knowledge gained in various fields.
- Differentiate different dielectric materials and its utilization.
- Analyze why Laser light is more powerful than normal light and its applications in various fields.
- Demonstrate the applications of optical fibers in communication.
- Extend the knowledge of characterization techniques to know the composition of Nano material.

Unit-I

Crystal Structures: Lattice points, Space lattice, Basis, Bravias lattice, unit cell and lattice parameters, Seven Crystal Systems with 14 Bravias lattices , Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Miller Indices, Inter planar spacing of Cubic crystal system.

Defects in Crystals: Classification of defects, Point Defects: Vacancies, Substitution, Interstitial, Concentration of Vacancies, Frenkel and Schottky Defects, Edge and Screw Dislocations (Qualitative treatment), Burger's Vector.

Principles of Quantum Mechanics: Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, Heisenberg's Uncertainty Principle, Schrodinger's Time Independent Wave Equation-Physical Significance of the wave Function-Particle in One Dimensional Potential Box.

Unit-II

Electron Theory of Metals: Classical free electron theory, Derivation of Ohm's law, Mean free path, Relaxation time and Drift velocity, Failures of Classical free electron theory, Quantum free electron theory, Fermi-Dirac distribution, Fermi energy, Failures of Quantum free electron theory.

Band Theory of Solids: Electron in a periodic potential, Bloch Theorem, Kronig-Penny Model(Qualitative Treatment), origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators, Effective mass of an Electron.

Semiconductor Physics: Intrinsic Semiconductors and Carrier Concentration, Extrinsic Semiconductors and Carrier Concentration, Fermi Level in Intrinsic and Extrinsic Semiconductors, Hall Effect and Applications.

Unit-III

Dielectric Properties: Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Types of polarization: Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities (Electronic & Ionic) -Internal Fields in Solids, Clausius -Mosotti Equation, Piezo-electricity and Ferro- electricity.

Magnetic Properties: Magnetic Permeability, Magnetic Field Intensity, Magnetic Field Induction, Intensity of Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magnetron, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Hysteresis Curve on the basis of Domain Theory of Ferro Magnetism, Soft and Hard Magnetic Materials, Ferrites and their Applications.

Unit-IV

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.
Fiber Optics: Structure and Principle of Optical Fiber, Acceptance Angle , Numerical Aperture, Types of Optical Fibers (SMSI,MMSI,MMGI), Attenuation in Optical Fibers, Applications of Optical Fibers, Optical fiber Communication Link with block diagram.

Unit-V

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Bottom-up Fabrication: Sol-gel Process; Top-down Fabrication: Chemical Vapor Deposition, Physical, Chemical and Optical properties of Nano materials, Characterization (SEM, EDAX), Applications.

Teaching Methodologies

1. Power Point Presentation.
2. Assignments uploaded in website.

Text Books

1. **Engineering Physics:** P.K.Palanisamy, Scitech Publishers.
2. **Engineering Physics:** S.O.Pillai, New age International.
3. **Applied Physics:** T.Bhima Sankaram,G Prasad,BS Publications

Reference Books

1. **Solid State Physics:** Charles Kittel, Wiley & Sons (Asia) Pte Ltd.
2. **Fundamentals of physics:** Halliday, Resnick, Walker.
3. **Optical Electronics:** A.J Ghatak and K.Thyagarajan, Cambridge University Press.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR15A1023 L:1 T:0 P:2 C:3

Prerequisites: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability.

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

- To distinguish and differentiate the importance of engineering drawing.
- The course of study elevates the interpretation level of manuscripts into engineering drawing.
- Distinguish the basic principles and different steps involved in principle of planes of projections.
- By Interpreting the basic principles, can focus on cause to extend and relate the information of objects.
- Visualize the difference views of a given object through Orthographic and isometric projections

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

- Demonstrate different types of lines, the use of different types of pencils and drafter to represent
- Illustrate the basic drawing techniques, conic sections, cycloid curves, involutes and engineering
- Explain the basic concept of principle of planes of projections in front view and top view.
- Make use of orthographic projections of points, lines , planes and solids
- Analyze the structure which was hypostatically designed ex: development of surfaces, section of
- Explain the logic to convert pictorial vies to orthographic projections and orthographic projections to
- Evaluate conversions of isometric views to orthographic views helps in inventing new machinery.

Unit-I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance Drawing Instruments and their Use Conventions in Drawing Lettering BIS Conventions. Curves used in Engineering Practice & their Constructions: a) Conic Sections, b) Cycloid, Epicycloid and Hypocycloid, c) Involutes.

SCALES: Different types of scales. Plain Scale, Diagonal Scale & Vernier Scale

Unit-II

ORTHOGRAPHIC PROJECTIONS: Principles of Orthographic Projections Conventions First and Third Angle Projections. Projections of Points and Lines inclined to both planes, True lengths, traces.

Unit -III

PROJECTIONS OF PLANES: Planes parallel, perpendicular and inclined to one of the reference planes. Plane inclined to both the reference planes.

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes.

Unit-IV

SECTIONS OF SOLIDS: Types of section planes, Section by a plane perpendicular to V.P., Section by a plane perpendicular to H.P.

DEVELOPMENT OF SURFACES: Development of Surfaces of Right Regular Solids Prisms, Cylinder, Pyramid, Cone and their parts.

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.

TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views Conventions.

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

1. Engineering Drawing, N.D. Bhat / Charotar

Reference Books

1. Engineering Drawing and Graphics, Venugopal / New age.
2. Engineering Drawing- Johle/Tata Macgraw Hill.
3. Engineering Drawing, Narayana and Kannaiah / Scietech publishers. Engineering Drawing, Narayana and Kannaiah / Scietech publishers.
4. Engineering Drawing Basanth Agrawal/ C M Agrawal; 2e Mc Graw Hill Education

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA STRUCTURES

Course Code: GR15A1010 L:2 T:1 P:0 C:3

Prerequisites: Intermediate programming in a high-level language and introduction to computer science. Topics include program structure and organization, data structures (lists, trees, stacks, queues) C is the principal programming language.

Course Objectives: The objective of this course is to provide

- Summarize the basic data structures.
- Articulate the recursive methods.
- Analyse a problem and prioritize the appropriate data structures.
- Implement the applications of various data structures.
- Enumerate the advantages and disadvantages of data structures.
- Express the importance of data modelling and data structures in advanced programming.
- Demonstrate and correlate basic sorting, searching and hashing algorithms.

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

- Inferring various data structures.
- Demonstrate data structures operations like insertion, searching, deletion and traversing.
- Exemplifying and experiment basic data structures.
- Compare and contrast the benefits of dynamic and static data structures implementations
- Demonstrate different methods for traversing trees
- Compare and contrast the various data structures performance.
- Recite data structures concepts in other domains like databases, compiler construction.

Unit-I

Introduction to data structures: Stacks, Stack Operations, Representation of a Stack using Arrays, Stack Applications: Recursion, Infix to postfix Conversion, Evaluating Arithmetic Expressions.

Unit-II

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using arrays, Applications of Queues, Circular Queues, Priority Queues**,** Enqueue, Dequeue.

Unit-III

List: Introduction, single linked list, representation of a linked list in memory, Operations-insertion, deletion, display, search, circular linked list, Double linked list, Applications advantages and disadvantages of single linked list, Implementation of stack, queue using linked list.

Unit-IV

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in-order and pre(post)order traversals.

Unit-V

Sorting and Searching: Insertion (Insertion sort), selection (heap sort) and selection soft, exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) Algorithms, Searching: Linear, binary search, indexed sequential search.

Teaching Methodologies

1. White Board
2. Marker
3. LCD Projector
4. OHP Projector

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR15A1025 L:0 T:0 P:2 C:2

Prerequisites

Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

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

- Introduction to general machining skills in the students
- Develop a skill in dignity of labour,precision,safety at work place,team working and development of right attitude
- To provide the students with hands on experience on different trades of engineering like Carpentry,Tinsmithy,Welding and Housewiring
- Production of simple models
- To perform different practical techniques

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

- Design and model different prototypes in the Carpentry trade such as Cross lap joint, Dove tail joint
- Create various types in the trade of Fitting such as Straight fit,V-fit
- Construct various basic prototypes in the trade of tin smithy such as rectangular tray and open scoop etc.
- Analyze to make in the trade of Tin Smithy such as Rectangular tray and Open Cylinder
- Apply various House Wiring techniques such as Connecting one lamp with one switch,
- Develop various basic house wiring techniques such as two lamps with one switch, Connecting a Fluorescent tube, Series Wiring, Go down wiring
- Demonstrate to develop various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Butt joint and Corner joint

Unit-I

Carpentry Shop – 1:

1.1. Introduction to various types of wood such as Teak, Mango, Sheesham, etc. (Demonstration and their identification).

1.2. Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed. Job I Marking, sawing, planning and chiselling & their practice

1.3. Introduction to various types of wooden joints, their relative advantages and uses. Job II Preparation of half lap joint Job III Preparation of Mortise and Tenon Joint

1.4. Safety precautions in carpentry shop.

Unit-II

Fitting Shop – 2:

2.1. Introduction to fitting shop tools, common materials used in fitting shop.

2.2. Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or square piece of an accuracy of + 0.5 mm

Job III Filing practice (production of flat surfaces). Checking by straight edge.

Job IV Making a cutout from a square piece of MS Flat using hand hacksaw such as T-fit and V-fit

2.3.Care and maintenance of measuring tools like callipers, steel rule, try square.

Unit-III

House wiring – 3:

3.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, PVC Conduits.

3.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, and relays including earthing.

JobI Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

JobII Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.

Job III Two lamps in series and parallel connection with one way switch

JobIV Two lamps in series and one lamp in parallel connection with one way switch.

Job V Stair case lamp connection with two way switch.

Unit-IV

Tin- smithy – 4:

4.1 Introduction to tin -smithy shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.

4.2 Introduction and demonstration of hand tools used in tin -smithy shop.

4.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.

corrugated sheet, aluminium sheets etc.

corrugated sheet, aluminium sheets etc.

4.4. Preparation of a rectangle tray and open scoop/ funnel.

Reference Books

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi
5. Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi.
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING PHYSICS LAB

Course Code: GR15A1029 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals of Physics and Mathematics.

Course objectives: The objective of this course is to provide the student with

- Record and tabulate physical quantities like resistance, capacitance, a.c voltage and frequency by using digital multimeter and CRO.
- Classify the behavior and characteristics of dielectric and magnetic materials for its optimum utilization.
- Apply the theoretical concepts of optical fibers in practical applications.
- Analyze the behavior of semiconductors in various aspects.
- Revise the basic properties of light like interference, diffraction through hands on experience.

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

- Identify the usage of CRO, digital multi meter to record various physical quantities.
- Distinguish the characteristics and behavior of dielectric materials in a practical manner.
- Calculate losses in optical fiber and interpret them to the optical communication systems.
- Quantify the type of semiconductor and measurement of energy gap in a semiconductor.
- Investigate the properties of light like interference and diffraction through experimentation.
- Examine the behavior of magnetic materials with the help of graph.
- Analyze the characteristics of light emitting diodes for their optimum utilization.

List of Experiments

` 1. Determine the energy gap of a given semiconductor.
2. Calculate the energy loss in a given Ferro magnetic material by plotting B-H curve.
3. Calculate the Numerical Aperture of a given optical fiber.
4. Determine the Dielectric constant and Curie temperature of PZT material.
5. Calculate the Acceptance angle of a given optical fiber.
6. Draw V-I & L-I Characteristics of LASER diode.
7. Determine the bending losses in a given optical fibers.

8. Determine the Air-gap losses in a given optical fibers.
9. Determine the Hall Coefficient in Ge semiconductor by using Hall Experimental setup.
10. Determine the carrier concentration, mobility of charge carrier in Ge semiconductor.
11. Measure Ac voltage and frequency through CRO.
12. Measure Resistance and Capacitance by using digital multimeter.
13. Diffraction Grating.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BUSINESS COMMUNICATION AND SOFT SKILLS

Course Code: GR15A1024 L:0 T:0 P:2 C:2

Prerequisites: Familiarity with basic language and communication skills.

Course objectives: The objective of this course is to provide the student with

- Recognize the role and importance of language and communication skills.
- Know the importance and application of phonology.
- Employ the acquired knowledge in classroom with reference to various social and professional spheres.
- Develop the sense of right usage of formal communication.
- Equip with the skills of listening, critical thinking and writing.
- Acquire the ability to work in teams.

Course outcomes: At the completion of this course the student will be able to

- Interpret the role and importance of various forms of communication skills.
- Utilize various media of verbal and non-verbal communication with reference to various professional contexts.
- Enabled to tote professional responsibilities in ananalytical manner.
- Accredit the activity of sequencing ideas in an efficacious style.
- Evaluate and use a neutral and correct form of English.
- Formulate behavior in various formal situations.
- Integrate business communication & soft skills to meet the requirement of corporate communication.

Unit-I

Just A Minute (JAM): Introduction to public speaking, analyzing and assimilating ideas, audience, voice modulation, Pronunciation and enunciation.

Unit-II

Phonetics: Introduction to speech sounds; identification of sound symbols; vowel and consonants

Unit-III

Roleplay: Introduction to role play; situation handling; non-verbal communication

Unit-IV

Debate: Introduction and features of Debate; Types of Debate; Understanding critical thinking; building sustainable arguments; assessing credibility of the argument; overcoming obstacles

Unit-V

Describing a Person, Situation, Process and Object: Introduction to techniques of clear, brief and impersonal description to a listener or reader.

Unit-VI

Letter Writing: Manual and Emailing, types and formats, content and body of the letter. Email etiquette.

Unit-VII

Report Writing: Formats and types of reports

Unit-VIII

Mind Mapping: Assimilation of thoughts, expansion of ideas on central idea, suggesting parameters to carry forward the thinking process without deviation.

Reference Books

1. Business Communication; Hory Sankar Mukerjee; Oxford University Press
2. Business Communication; Meenakshi Raman, Prakash Singh; Oxford University Press
3. English and Soft skills; SP DHanavel; Orient Blackswan
4. Soft Skills for Everyone; Jeff Butterfield; Cengage Learning
5. Communication Skills; Viva Career Skills Library
6. Personality Development and Soft Skills; Barun K Mitra; Oxford University Press
7. Six Thinking Hats, Penguin Books, Edward De Bono
8. English for Engineer's; Aeda Abidi, Ritu Chaudhry; Cengage Learning
9. Communication Skills ; Sanjay Kumar , Pushpalatha; Oxford University Press
10. Business English : The Writing Skills you need for today's work place: Geffner, Andrea: Fifth edition, Barron's Educational Series, Newyork

Software Used

1. Sky Pronunciation Suite
2. Clarity
3. Mastering English

SYLLABUS

II-Year

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: GR15A2050 L:3 T:1 P:0 C:4

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 understand the principles of random signals and random processes.
- To be acquainted with systems involving random signals and to analyze the response of random inputs to linear time invariant systems.
- 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.
- To compare the performance of various distributions

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.
- Solve the problems involving multiple random variables.
- 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
- Compare the various distributions and its performance characteristics

Unit-I

PROBABILITY & RANDOM VARIABLES

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Baye's Theorem, Independent Events, Random Variable, Functions of

random variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Binomial, Poisson, Uniform, Gaussian Distribution.

Unit-II

OPERATIONS ON SINGLE VARIABLE – EXPECTATIONS

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

Unit-III

OPERATIONS ON & MULTIPLE RANDOM– EXPECTATIONS

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

Unit-IV

RANDOM PROCESSES -TEMPORAL CHARACTERISTICS

The Random process, classification, deterministic and no ndeterministic processes, distribution and density Functions, stationarity and statistical independence, first-order stationary processes, second-order and wide-sense stationarity, auto correlation function and its properties, cross-correlation function and its properties, covariance functions, Gaussian random processes, random signal response of linear systems, autocorrelation and cross-correlation functions of input and output.

Unit-V

RANDOM PROCESSES-SPECTRAL CHARACTERISTICS AND NOISE

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

MODELLING OF NOISE

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

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments
4. Experiments with Matlab software

Text 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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL ELECTRONICS

Course Code: GR15A2043 L:3 T:1 P:0 C:4

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 basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes and error detecting and correcting binary codes.
- 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 the VHDL programming concepts for the design of digital circuits
- To analyze the various VHDL syntaxes for the design of efficient digital circuitry

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.
- Explain the concepts of VHD Language
- Analyze the various coding schemes are the part of the digital circuit design
- Design of various circuits with the help of VHDL Coding techniques

Unit -I

Boolean algebra & Logic Gates: Digital systems, Number- Base Conversions, Signed Binary Numbers, Binary Codes, Axiomatic Definition of Boolean Algebra, Basic Theorems, Boolean Functions, Canonical and standard Forms. Logic Gates: Digital Logic Gates, Integrated Circuits,

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

Unit-II

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

Unit-III

Sequential Logic: Flip-Flops, Triggering of Flip Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Fundamentals of Asynchronous Sequential Logic: Introduction, Analysis procedure, Circuits with Latches, Design Procedure.
VHDL for sequential circuits

Unit-IV

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

Unit-V

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

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments
4. Lab experiments with Xlinix software

Text Books

1. M Morris Mano and Michael D.Ciletti, Digital Design, Fourth Education, Pearson 5th ed2013.
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

Reference Books

1. Zvi Kohavi and Niraj K Jha, Switching and Finite Automata Theory, 3rd Edition, TMH,2010.
2. Frederick J. Hill and Gerald R Peterson, Introduction to Switching theory and logic design, 3rd Edition, John Wiley and sons, 1981.
3. C. H. Roth, “Digital System Design using VHDL”, PWS Publishing, 2003

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS

Course Code: GR15A2049 L:3 T:1 P:0 C:4

Prerequisites

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

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

- The concepts of continuous and discrete-time signals and systems, their properties, representations and analysis methods.
- Visualization of time-domain representation and analysis concepts as they relate to difference equations, impulse response and convolution, etc.
- Skill of frequency-domain representation and analysis using Fourier analysis, Z-transforms.
- The concepts of sampling process of analog signals and A/D and D/A conversions.
- 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
- Mathematically represent discrete-time (DT) signals
- Discriminate the Fourier, Laplace and Z-transforms as appropriate for various signals and systems
- Interpret the importance of various transformation techniques in signal processing.
- 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-time periodic signals by Fourier series; Dirichlet's conditions; Properties of Fourier series, Parseval's theorem; Trigonometric and Exponential Fourier series; Complex Fourier spectrum; Fourier transform via Fourier series; Fourier transform of periodic and aperiodic signals; Convergence of Fourier transform; Properties of Fourier transforms, Parseval's theorem; Fourier transforms involving impulse function and Signum function; Introduction to Hilbert Transform; Definition of two-& one-sided Laplace transform, Region of convergence (ROC); Relation between LT and FT.

Unit-III

Signal Transmission through Linear Systems: Continuous-time Linear Time-Invariant system, Representation by differential equations, Transforms and State-variables; Impulse response, Convolution; Transfer function, frequency response; Ideal vs. realizable LPF, HPF and BPF characteristics; Signal bandwidth, system bandwidth, rise-time, gain-bandwidth; Distortion; Causality and Paley-Wiener criterion for physical realization.

Unit-IV

Sampling & Discrete-time Signals: Sampling theorem – Graphical and analytical proof for Band Limited Signals; Impulse-train sampling; Natural and Flat-top Sampling; Reconstruction of signal from its samples; Under-sampling and Aliasing; Band-pass Sampling Theorem; DT signal characteristics (periodicity, frequency, deterministic, random, symmetry, energy and power).

Unit-V

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

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text 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.

Reference Books

1. M. J. Roberts, “Signals and Systems”, Second Edition, Tata-McGraw Hill, 2012.
2. Simon Haykin and Barry Van Veen, “Signals and Systems”, Edition, John Wiley and Sons, 2002.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL CIRCUITS

Course Code: GR15A2047 L:2 T:1 P:0 C:3

Prerequisites

- Basic properties of Resistor, Inductor, Capacitor
- Fundamentals of Electrical Circuit Concepts
- Fundamentals of calculus

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

- To distinguish basic concepts, techniques and applications of Electrical circuits
- To describe various fundamental techniques for analysis of electrical circuits.
- To Apply the working principles of linear constant coefficient differential equations with the help of Laplace Transforms in electric circuits
- To analyze lucid and comprehensive treatment of AC circuits in the frequency domain and compute transient response for first and second order circuits.
- To solve and compile the techniques like cut-set, tie-set, pole zero parameters and its stability
- To Compare the transient analysis with different network models

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

- Comprehend the mathematical expression for voltages and currents in RL, RC and RLC circuits to find the transient response of inductor and capacitor in dc circuits.
- Analyze the concept with working principles of linear constant coefficient differential equations with the help of Lapalce transforms.
- Know the basic skills of an ac circuits with independent/dependent voltage current sources by drawing impedance/admittance diagrams or using various laws/ techniques like source conversion
- Acquaint with AC circuits in the frequency domain and compute transient response for first and second order circuits.
- Discriminate the concepts like cut-set, tie-set, pole zero parameters and stability analysis
- Interpret the pole zero network functions, transfer and driving point functions
- Interpolate the two-port network parameters, conversion between parameters, Interconnection of two port networks.

Unit-I

Network Elements: Resistance, Capacitance, Self-inductance, Mutual inductance, Dotrule, Coefficient of coupling, Analysis of multi-winding coupled (series and parallel) circuits; Natural response and forced response.

DC Transients: Inductor, Capacitor, Source free RL, RC and RLC response,

Evaluation of initial conditions, application of Unit-step function to RL, RC and RLC circuits, Concepts of Natural, Forced and Complete response.

Unit-II

Linear constant coefficient differential equations: time domain analysis of simple RL, RC and RLC circuits, Solution of network equations using Laplace transform

Unit-III

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

Unit-IV

Network Topology: Network terminology - Graph of a network - Incidence and reduced incidence matrices – Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tiesets.

Network Functions: Poles and zeros of network functions, Network functions for the one- and two-ports, Restrictions on pole and zero locations for driving point functions and transfer functions.

Unit-V

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

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments
4. Lab experiments with Pspice Software

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC CIRCUIT ANALYSIS

Course Code: GR15A2048 L:3 T:1 P:0 C:4

Prerequisites

- Fundamentals of Electronics
- Basics on Electrical Circuits

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

- To define the techniques in design, construction & analysis of single stage and multi stage amplifier circuits using BJTs and FETs.
- To illustrate frequency response of amplifiers so that they can design & construct amplifier circuits to amplify signals at various frequencies.
- To practice the concepts of feed back in amplifiers & effect of negative feedback on the performance of an amplifier.
- To categorize oscillator circuits using BJTs & FETs to generate signals at various frequencies.
- To design, construct & analyze power amplifier circuits using BJT to achieve better power efficiency over 70%.
- To describe the amplifier design concepts with the help of h-parameters
- To design various power and voltage amplifiers with the help of known values

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

- Comprehend the fundamental concepts in feedback amplifier circuits.
- Analyze the oscillators design, frequency responses calculations with the help of mathematical expressions.
- Describe the various cascade amplifier circuits using BJT and FET models
- Apply the h-parameter model to power amplifiers circuit design
- Discriminate the concepts quality factor, form-factor in small signal tuned amplifier analysis and design.
- Interpret the tuned amplifiers and tuned cascaded networks functionality
- Create the circuit design analysis, testing and utilization of the circuits in various levels.

Unit-I

Feedback Amplifiers: Classification of Amplifiers, Feedback concept, Transfer Gain with feedback, General characteristics of negative feedback amplifiers, Effect of Feedback on input and output Resistances, Method of Analysis of Feedback Amplifiers, Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components and their analysis.

Unit-II

Oscillators: Condition for oscillations. RC-phase shift oscillators with Transistor and FET with necessary derivation for frequency of oscillation, Hartley and Colpitts oscillators, Wein bridge oscillator, Crystal oscillators, Frequency and amplitude stability of oscillators, Negative Resistance in Oscillator .

Unit-III

Multistage Amplifiers: Cascading Transistor Amplifiers, Choice of Transistor configuration in Cascade amplifier, High input Resistance Transistor Circuits – Darlington pair, Cascode amplifier, Frequency response and analysis of RC Coupling, Direct coupling and Transformer coupling, Difference amplifier Two Stage RC Coupled JFET amplifiers (in Common Source (CS) configuration).

Unit-IV

Power Amplifiers: Class A large signal Amplifiers, Second harmonic Distortions, Higher order harmonic Distortion, Transformer Coupled Audio power amplifier, Efficiency, Push-pull amplifiers, Class B Amplifiers, Class AB operation, Efficiency of Class B Amplifier, Complementary Symmetry push pull amplifier, stability and Heat sink.

Unit-V

Tuned Amplifiers: Introduction, Q-Factor, Small Signal Tuned Amplifier – Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers.

Text Books

1. Electronic Devices and Circuits - Salivahanan, N.Suresh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition, 2011.
2. John D Ryder, “Electronic Fundamentals and Applications: Integrated and Discrete Systems” 5nd Edition, PHI, 2003. (UNIT- V for Tuned Amplifiers)

Reference Books

1. Robert L Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 10th Edition, 2009, Pearson India.
2. Donald L. Schilling and Charles Belove, “Electronic Circuits - Discrete and Integrated”, 3rd Edition, 2002, TMH.
3. Electronic Circuit Analysis and Design – Donald A. Neaman, McGraw Hill.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRONIC CIRCUIT ANALYSIS LAB

Course Code: GR15A2051 L:0 T:0 P:2 C:2

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

- To list the techniques for multistage amplifiers and oscillators
- To associate the amplifier circuit designs
- To apply mathematical equations in circuit designs
- To analyze the concepts like stability and gains
- To compile the various programming modules
- To validate the simulation results and graphical representations

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

- Comprehend the fundaments of multistage amplifiers, feedback, power amplifiers and oscillator circuits
- Analyze the circuit design process and simulate the common base, common emitter and common collector amplifier circuits
- Know the origin of failure of a circuit when it is in an application
- Acquaint with the design and simulate the RC coupled and Cascade amplifier circuits
- Discriminate the design and simulate various oscillator circuits
- Interpret to design and simulate Darlington pair,
- Create the design and simulate the cascade, class A power amplifier circuits, and single tuned voltage amplifier circuits

I. List of Experiments

1. Design and Simulate the Common Base Amplifier
2. Design and Simulate the Common Emitter Amplifier
3. Design and Simulate the Common Source Amplifier
4. Design and Simulate two stage RC Coupled Amplifier
5. Design and Simulate the Cascade Amplifier
6. Design and Simulate Darlington Pair
7. Design and Simulate RC Phase Shift Oscillator using Transistor
8. Design and Simulate Wien Bridge Oscillator using Transistor
9. Design and Simulate Hartely and Colpitt's Oscillator
10. Design and Simulate Class A power Amplifier.
11. Design and Simulate Class-B Push Pull Amplifier.
12. Design and Simulate Single Tuned Voltage Amplifier.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS LAB

Course Code: GR15A2052 L:0 T:0 P:2 C:2

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 report the concepts of signals through various systems
- To evaluate the simulation results with various coding and simulation techniques

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

- Comprehend the fundamentals to explain the classification of signals and systems
- Analyze the concepts to simulate the Fourier series, Fourier transform in singles and systems
- Know the behavior of LTI system with matlab simulation environment
- Acquaint with sampling of signals with matlab
- Discriminate in writing the code for convolution response
- Interpret to write code and analyze the graphical representation of gibbs phenomenon in signals and systems
- Create in writing the code for simulation and synthesis of Laplace transforms

List of experiments

1. Basic operations on matrices.
2. Generation of various signals and sequences (periodic and aperiodic), such as unit impulse, unit step, square, saw tooth, Triangular, sinusoidal, ramp, sinc.
3. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/sequence and real and imaginary parts of signal.
5. Convolution between signals and sequences.
6. Auto correlation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.

10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Finding the Laplace and Inverse Laplace transform of a given signal.
12. Finding the Z and Inverse Z transform of a given signal.
13. Locating the zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transfer function..
14. Sampling Theorem Verification.

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

Lab Methodologies

1. Assignments
2. Lab experiments with Matlab Software

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL ELECTRONICS LAB

Course Code: GR15A2053 L:0 T:0 P:2 C:2

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 through various experiments.
- To perform the combinational logic design of various logic and switching devices and validate the outputs
- To perform the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices and validate the outputs
- To design and validate the counters and registers for synchronous and asynchronous circuits
- To design the combinational logic circuits using VHDL programming syntaxes.
- To designs sequential circuits using VHDL programming syntaxes.
- To describe the various VHDL programming concepts

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

- Study the theory of Boolean algebra and to study representation of switching functions through various experiments.
- Perform the combinational logic design of various logic and switching devices and validate the outputs
- Perform the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices and validate the outputs
- Design and validate the counters and registers for synchronous and asynchronous circuits
- Design the combinational logic circuits using VHDL programming syntaxes.
- Design the sequential circuits using VHDL programming syntaxes.
- Describe the various VHDL programming concepts

List of Experiments

1. DESIGN AND SIMULATION OF COMBINATIONAL CIRCUITS USING VHDL

Experiment 1: Realization of Gates
Experiment 2: Half adder, Full adder
Experiment 3: Magnitude
comparator Experiment 4: Decoder
Experiment 5: Multiplexer
Experiment 6: Demultiplexer
Experiment 7: Binary to Grey Code
Converter Experiment 8: Parity Checker

2. DESIGN AND SIMULATION OF SEQUENTIAL CIRCUITS USING VHDL

Experiment 9: D and T Flip-Flops
Experiment 10: Frequency Divider
Experiment 11: Left Shift Register
Experiment 12: Serial to Parallel Shift
Register Experiment 13: Binary Counter
Experiment 14: Asynchronous BCD Up Counter
Experiment 15: Synchronous Down Counter

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

Lab methodologies

1. Assignments
2. Lab experiments with Xilinx Software

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE EDUCATION AND ETHICS

Course Code: GR15A2002 L:2 T:0 P:0 C:0

Prerequisites: General awareness on Moral Science

Course Objectives: The objective of this course is to provide

- Define and classify values, ethics
- Explain about self analysis, importance of values
- Organise constructive thinking and team work to create mutual happiness and prosperity
- Elaborate on ethics and professional ethics using case studies.
- Importance of continuous learning, choosing right work and career.

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

- Choose the right value system by self analysis and right understanding
- Make use of positive thinking, dignity of labour for building harmony and peace in self, family and society
- Analysing the importance of personality on effective behavior
- Identify and solve ethical dilemmas by finding value based and sustainable solutions in professional life.
- Find sustainable technological solutions for saving environment
- Compile value and ethical systems for continuous happiness and prosperity
- Take part in effective team work bringing out win-win solutions for complex problems

Unit-I

Values and self development –social values and individual attitudes, Work ethics, Indian vision of Moral and non-moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Unit-II

Personality and Behavior Development-Soul and scientific attitude, God and scientific attitude, Positive thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoiding fault finding, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth, Aware of self destructive habits, Association and cooperation, Doing best, Saving nature.

Unit-III

Character and Competence-Science Vs God, Holy books Vs blind faith, Self management and good health, Equality, Nonviolence, Humanity, Role of women,
All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

Unit-IV

Professional consciousness Ethics: Ethical Human conduct, Development of human consciousness, Implications of value based living, Holistic technologies, Production systems, Universal human order, Code of conduct.

Unit-V

Legislative procedures: Rights and Rules, Human Rights, Valuable groups, Copy rights, IPR, RTI Act, Lokpal, Ombudsman.

Text Books

1. Chakraborty,S.K., Values and Ethics for Originations Theory and Practice, Oxford University Press, New Delhi, 2001
2. R R Gaur, R Saugal, G P Bagaria, "A foundation course in Human values and Professional Ethics", Excel books, New Delhi, 2010.

Reference Books

1. Frankena, W.K., Ethics, Prentice Hall of India, New Delhi, 1990.
2. Kapoor, S.K., Human rights under International Law and Indian Law, Prentice Hall of India, New Delhi, 2002.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

GENDER SENSITIZATION

Course Code: GR15A2106 L:0 T:0 P:3 C:2

Course Objectives

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

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

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I

UNDERSTANDING GENDER: Gender: Why should we study it? (Towards a world of Equals: Unit – 1) Socialization: Making women, making men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities. Just Relationships: Being Together and Equals (Towards a World of Equals: Unit – 12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Further Reading: Rosa Parks – The Brave Heart.

Unit-II

GENDER AND BIOLOGY: Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit – 4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit – 10) Two or Many? Struggles with Discrimination.Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit – 13)

Unit-III

GENDER AND LABOUR: Housework: the Invisible Labour(Towards a World of Equals: Unit – 3) "My Mother doesn`t Work". "Share the Load". Women`s Work: Its Politics and Economics (Towards a World of Equals: Unit – 7) Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit-IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No! (Towards a World of Equals: Unit – 6) Sexual Harassment, not Eve – teasing – Coping with Everyday Harassment – Further Reading: "Chupulu" Domestic Violence: Speaking Out (Towards a World of Equals: Unit – 8) Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading. New Forums for justice. Thinking about Sexual Violence (Towards a World of Equals: Unit – 11) Blaming the Victim – "! Fought for my Life ……" – Further Reading. The Caste Face of Violence.

Unit-V

GENDER STUDIES: Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5) Point of View. Gender and the Structure of Knowledge. Further Reading. Unacknowledged Women Artists of Telangana.Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9) Reclaiming a Past. Writing other Histories. Fur**,** her Reading. Missing Pages from Telangana History.

Text Books

1. Towards a World of Equals: A Bilingual Textbook on Gender" Telugu Akademi, Hyderabad Written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu.

Reference Books

1. Sen, Amartya. "More than Once Million Women are Missing". New York Review of Books 37.20 (20 December 1990). Print. `We Were Making History……' Life Stories of Women in the Telangana People`s Struggle. New Delhi : Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where India Women Work." Women`s Studies Journal (14 November 2012) Available online at: http://blogs. Wsj.com/India real time/2012/11/14/by – the –numbers – where- Indian- women-works
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollints.co.in/BookDetail.asp?Book Code=3732

4. Vimala “Vantilu (The Kitchen)”. Omen Writing in India: 600BC to the Present, Volume II The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women`s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, India Council of Medcial Research 1993. B.Tech (ANE) R-15 Malla Reddy College of Engineering and Technology (MRCET) 113
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7. Menon, Nivedita. Seeing Like a Feminist. New Delhi. Zubaan-Penguin Books, 2012.
8. Jayaprabha, A. “Chupulu (Stares)”. Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayam and AnupamManuhaar. “Women and Wage Discrimination in India: A Critical Analysis”. International Journal of Humanilities and Social Science Invention 2, 4(2013).
10. Gautam, Liela and Gita Ramaswamy. “A ‘Conversation’ between a Daughter and Mother”. Broadsheel on Contemporany Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed.Madhumeeta Sinha and Asma Rasheed. Hydrabad: Anveshi research Center for Women`s Studies, 2014.
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12. Jeganathan Pradeep, Partha Chatterjee (Ed). “Community, Gender and Violence Subaltern Studies XI”. Permanent Block and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf A Room of One`s Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SPECIAL FUNCTIONS AND COMPLEX VARIABLES

Course Code: GR15A2058 L:2 T:1 P:0 C:3

Prerequisites: Co-ordinate Geometry, Calculus, Linear Differential Equations

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

Provide an overview of differential equations which occur in physical and engineering problems?

- Explain solution of certain special types of differential equations like Bessel's differential equations Legendre differential equations and Chebeshev differential equations, and also on study of complex variables.
- Provide an overview of functions of complex variables which helps in solving many complex problems in heat conduction, fluid dynamics and electrostatics?
- Introduce the concepts of complex Integration and Applications of complex integration
- Identify the significant applications of Complex Power Series.

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

- Solve linear differential equations using power –series methods.
- Approximate polynomials in terms of Legendre, Bessel and chebyshev.
- Evaluate Real definite Integrals using Cauchy's Residue Theory.
- Interpret geometrically the Complex functions and their qualitative behavior in the Complex Plane.
- Describe Singularity and Residue Theory.
- Solve potential functions, stream functions and velocity potential.
- Illustrate the concepts of residues in the context of determination of real integrals.

Unit-I

Special Functions I

Solution to Cauchy-Euler Problem.Introduction to series solution of differential equations. Legendre polynomials (as solution of second order differential equation) properties Rodrigue's formula recurrence relations orthogonality.

Unit-II

Special Functions II

Bessel Functions properties recurrence relations orthogonality. Chebyshevpolynomials (as solution of second order differential equation) properties recurrence relations orthogonality.

Unit-III

Functions of a Complex variable

Continuity differentiability Analyticity Cauchy-Riemann equations Maxima-minima principle Harmonic and conjugate harmonic functions Milne-Thompson method. Elementary functions. General power Z^n Principal value.Logarithmic function.

Conformal mapping

Transformations e^z, *lm z*, z^2, z^n(n is a positive integer), sinz, cosz, z + (a/z).

Translation, rotation, inversion and bilinear transformation fixed point cross ratio invariance of circles and cross ratio determination of bilinear transformation mapping of 3 given points

Unit-IV

Complex integration

Line integral evaluation along a path Cauchy's integral theorem Cauchy's integral formula Generalized integral formula.

Complex power series

Radius of convergence - Expansion in Taylor series, Maclaurin's series,Laurent series.

Unit- V

Singular points, Residues and Applications of Complex Integration

Singular points isolated singular point pole of order m essential singularity. (Distinction between real analyticity and complex analyticity). Residue Evaluation of residue by formula and by Laurent series Residue theorem.

Evaluation of real integrals of the types

(a) Improper integrals $\int_{-\infty}^{\infty} f(x)dx$. (b) $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$.

(c) $\int_{-\infty}^{\infty} f(x)*\cos(mx)dx$. (d) Integrals by indentation.

Teaching methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.JainandS.R.K.Iyengar-Narosa Publishing House
2. Advanced Engineering Mathematics: Erwin Kreyszig- Wiley Publications
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications

Reference Books

1. Schaum's Outline series on complex variables.
2. Higher Engineering Mathematics: B.S.Grewal, Khanna Publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Course Code: GR15A2054 L:3 T:1 P:0 C:4

Prerequisites

- Basics of Vector Calculus

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.
- Appreciation of various implications of Maxwell's equations.
- Ability of mathematical representation and analysis of electromagnetic waves in unbounded media
- Understanding principles of transmission line theory as applied to RF signal propagation.
- Practical use of Smith chart to solve transmission line problems
- Ability of mathematical analysis of EM wave propagating between parallel plates.

Course Outcomes: The student will be able to

- Define and describe electromagnetic field quantities mathematically/graphically/ in words
- Solve simple problems involving EM fields.
- 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 along transmission lines.
- Solve transmission line problems using Smith chart.
- Derive propagation characteristics of EM waves in parallel plate wave guides.

Unit-I

Electrostatics: Coulomb's Law, Electric Field Intensity, Electric Field due to Various Charge Distributions, Electric Flux Density, Gauss' Law and Applications, Scalar Electric Potential, Energy Density, Current, Current Density, Continuity Equation, Conductivity, Power Absorbed in Conductor, Dielectric Polarization, Permittivity, Relaxation Time, Electrostatic Boundary Conditions, Poisson's and Laplace's Equations, Capacitance, Method of Images.

Unit-II

Magneto statics: Magnetic Flux Density, Magnetic Field Intensity, Magnetic Field due to Various Current Configurations, Biot-Savart Law, Ampere's Circuital Law and Applications, Vector Magnetic Potential, Forces due to Magnetic Fields, Magnetization, Permeability, Magneto static

Boundary Conditions, Inductance, Magnetic Energy.

Maxwell's Equations (Time Varying Fields): Faraday's Law, Displacement Current Density, Maxwell's Equations in Various Forms, Boundary Conditions, Potential Relations, Conductor/Dielectric Characterization, Loss Tangent.

Unit-III

Uniform Plane Waves: Solutions in Lossy and Lossless Media, Propagation Characteristics, Intrinsic Impedance, Skin Depth, Propagation in Dispersive Media, Poynting Vector and Theorem, Wave Polarization- Linear, Elliptical and Circular.

Reflection/ Transmission of Plane Waves: Reflection at Normal Incidence, Standing Waves, Surface Impedance, Power Absorbed in a Plane Conductor, Propagation Vector, Reflection at Oblique Incidence, Brewster Angle, Total Internal Reflection.

Unit-IV

Transmission Lines-1: Transmission Line Parameters, Transmission Line Equations, Characteristic Impedance, Propagation characteristics, Lossless/ Low Loss Line Analysis, Conditions for Distortionless Transmission and Minimum Attenuation. Finite Transmission Line, Input Impedance, Short Circuit and Open Circuit Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements - $\lambda/2$, $\lambda/4$, $\lambda/8$ Lines. Impedance Transformations and Matching.

Unit-V

Transmission Lines-2: Smith Chart– Theory and Applications, Single Stub Matching. Propagation between Parallel Plates, Modes, Cut-off Frequencies, Phase and Group Velocities, Wavelengths, Wave Impedances.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. 'Elements of Electromagnetics', Mathew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2007
2. 'Engineering Electromagnetics', William H. Hayt Jr. and John A. Buck, McGraw-Hill, 8th ed., 2012
3. 'Theory and Problems of Electromagnetics', Joseph A Edminister, 2nd ed., Tata Mc-Graw Hill, 1993

Reference Books

1. 'Engineering Electromagnetics', Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005
2. 'Electromagnetic Field Theory Fundamentals', Bhag Singh Guru, Huseyin R Hiziroglu, Cambridge Univ. Press, 2004
3. 'Electromagnetics', John D Kraus, McGraw Hill, 4th ed., 1992
4. 'Electromagnetic Waves and Radiating Systems', E.C. Jordan and K.G. Balmain, PHI, 2nded, 2000

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICRO CONTROLLERS

Course Code: GR15A2055 L:3 T:1 P:0 C:4

Prerequisites

- Fundamentals of Digital Electronics
- Basics of programming

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

- To explain the concepts of 8086 instruction sets and architectures
- To compare architectures of microprocessors and microcontrollers
- To apply the instruction set of 8051 microcontrollers
- To analyze assembly language programming concepts
- To describe the various interrupt delays for microprocessors and microcontrollers
- To interface various devices with 8051 microcontrollers
- To create various programs to run several applications

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

- Compare the functionally and architectures of microprocessors and microcontrollers
- Analyze assembly language programming techniques
- Explain the implementation of 8051 instruction set
- Analyze assembly language programming concepts
- Acquainted with design of microcontrollers
- Interface various devices with microcontrollers
- Design various programs to run several applications

Unit-I

Microprocessors: Introduction to 8086 Architecture, Introduction to Microprocessors, 8086 Architecture: Functional diagram, register organization, memory segmentation, programming model, memory addresses, physical memory organization, signal description of 8086, timing diagrams, interrupts of 8086.

Unit-II

Introduction and 8051 Architecture: Introduction to microcontrollers, comparing microprocessors and microcontrollers, 4,8,16 and 32 bit microcontrollers, Development systems for Microcontrollers, Architecture; Architecture of 8051, pin configuration of 8051microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input/output and interrupts.

Unit-III

Moving Data and Logical Operations: Introduction, Addressing modes, External Data moves, Code Memory Read-only Data Moves, PUSH and POP Opcodes, Data Exchanges, Logical Operations; Introduction, Byte-Level Logical Operations, Bit- Level Logical Operations, Rotate and Swap Operations.

Unit-IV

Arithmetic Operations, Jump and Call Opcodes: Introduction, Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Jump and Call opcodes, introduction, The jump and call program range, Jumps, Calls and Subroutines, call and returns, Interrupts and Returns.

Unit-V

8051 Microcontroller Design: Introduction, Microcontroller specification, Microcontroller Design, Testing the Design, Timing subroutines, Serial Data Transmission.
Applications and Serial Data Communication: Keyboards, Displays, Pulse Measurement, D/A and A/D Conversions, Multiple Interrupts, Serial data Communication;

Teaching methodologies

- Power Point presentations
- Tutorial Sheets
- Assignments

Text Books

1. D.V.Hall, Microprocessors and Interfacing, TMH,2nd edition 2006.
2. Kenneth J. Ayala, The 8051 Microcontroller Architecture Programming and Applications, 2nd Edition, Penram International Publishers (I), 1996.

Reference Books

1. A. K. Ray and K. M. Bjurchandani, TMH, 2nd edition, Advanced Microprocessors and Peripherals TMH, 2006.
2. Mohammed Ari Mazidi and Janci Gillispie, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG COMMUNICATION

Course Code: GR15A2056 L:3 T:1 P:0 C:4

Prerequisites

- Basics of probability theory and stochastic processes
- Basics of Signals and Systems

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

- To study various Amplitude modulation and demodulation systems.
- To study various Angle modulation and demodulation systems.
- To explain depth analysis in noise performance of various receivers.
- To analyze various pulse modulation and demodulation systems.
- To explain the basic structure of a communication chain and its components: sources of messages, modulation, channel, demodulation and sink.
- To describe the modulation (AM, DSB-SC, SSB and VSB) and demodulation techniques
- To classify and discuss different types of transmitters and receivers as applicable to analog communication systems.

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

- Analysis and design of various modulation and demodulation techniques.
- Analyze and demonstrate a good background in analyzing the block diagram of communication system.
- Know the mathematical concepts bend the analog communication process
- Acquaint with formulate the frequency modulation and angle modulation signals
- Discriminate the design skills to illustrate the electronic component and method to implement different communication systems.
- Interpret with differentiate types of transmitters and receivers used for particular application.
- Create the spectrum and noise performance of particular communication system.

Unit-I

Amplitude Modulation: Introduction to communication system, Need for modulation, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector, Double side band suppressed carrier modulators, Time domain and Frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

Unit-II

SSB Modulation: Frequency domain description, Frequency discrimination method for generation of SSB Modulated Wave, Time domain description, Phase discrimination method for generating SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

Unit-III

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

Unit-IV

Noise in Modulation: Noise in Analog communication Systems, Noise in AM (DSB and SSB) Systems, , Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

Unit-V

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Divison Multiplexing. Frequency Division Multiplexing.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Communication Systems - Simon Haykin, John Wiley, 5th Ed. 2009
2. Principles of Communication Systems–Taub& Schilling, GautamSahe, TMH, 3rd 2007

Reference Books

1. Analog and Digital Communication, K. Sam Shanmugam, Wiley ,2005
2. Electronics Communication Systems -Fundamentals through Advanced, Wayne Tomasi, 5th Edition, 2009, PHI.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG ELECTRONICS

Course Code: GR15A2057 L:3 T:1 P:0 C:4

Prerequisites

- Fundamentals of Electronics
- Basics on Electrical Circuits

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

- To explain the basic concepts of linear and non linear wave shaping circuits
- To analyze the working principles of clippers and clappers
- To describe and compare the Bi-stable, Mono-stable and Astable circuits and its applications
- To design various multivibrators fro the given attributes
- To explain the ideal and practical Op-Amp characteristics
- To perform the various Op-Amp circuits in different applications
- To compare the negative and positive feedback amplifiers

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

- Explain the basic concepts of linear and non linear wave shaping circuits
- To analyze the working principles of clippers and clappers
- Describe and compare the Bi-stable, Mono-stable and Astable circuits and its applications
- Design various multivibrators from the given constraints
- Explain the ideal and practical Op-Amp characteristics
- Perform the various Op-Amp circuits in different applications
- Compare the negative and positive feedback amplifiers

Unit-I

Linear and Nonlinear Waveshaping Circuits: Elementary signals used in waveshaping circuits, Qualitative and quantitative discussions for all test signals (step, ramp, exponential, pulse input, symmetrical square wave) for RC and RL circuits, Attenuators, Design aspects of High pass & Low pass RC circuits, Diode clippers and clampers (all types) characteristics and applications.

Unit-II

Multivibrators: Design and analysis of Bistable, Monostable & Astable Multivibrators, Schmitt trigger, comparator, using transistors.

Unit-III

Operational Amplifier: Block-diagram representation of op-amp, schematic symbol,IdealOp-amp characteristics, open-loop and closed-loop Op-amp configurations, differential amplifier, DC, AC analysis of differential Amplifier, differential amplifier with swamping resistors, constant current bias, current mirror, cascaded differential amplifier stages, level translator.

Unit-IV

Op-Amp with Negative Feedback: Introduction, block diagram representation of feedback configurations, voltage-series feedback amplifier & characteristics; voltage-shunt feedback amplifier & characteristics; differential amplifier & configurations.

Unit-V

Applications of Op-Amp: Introduction, Summing, Scaling, and Averaging amplifiers; Inverting, Non inverting and Differential configuration, Instrumentation amplifier, Sample and Hold circuit. Converters: (A/D and D/A): Successive Approximation, Binary weighted resistors and R – 2R ladder.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. David A Bell, “Solid State Pulse Circuits”, Prentice Hall Inc, Fourth Edition, 2005.
2. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall of India(p) Ltd,3rd Ed., 2002.
3. Microelectronic Circuits, Sedra and Smith, Oxford University 6th ed., 2013

References Books

1. Pulse and Digital Circuits – A. Anand Kumar, 2nd ed., 2008, PHI.
2. Fundamentals of Pulse and Digital Circuits – Ronald J. Tocci, 3 ed.., 2008.
3. Pulse and Digital Circuits – Motheki S. PrakashRao, 2006, TMH.
4. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009
5. Microelectronic Analysis and Design, M H Rashid, Cengage learning, 2nded, 2011
6. Linear Integrated Circuits, D. Roy and Choudhury, Shail B. Jain, 4th Edition, New Age International (P) Limited, 2010.
7. Operational Amplifiers and Linear Integrated Circuit Theory and Applications, Denton J Dailey, McGraw-Hill, 1989. 8. Applications and Design with Analog Integrated Circuits, J. Michael Jacob, 2nd Edition, PHI, 2003.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICRO CONTROLLERS LAB

Course Code: GR15A2059 L:0 T:0 P:2 C:2

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

- To comprehend the fundamentals in programming for microcontrollers
- To analyze the code and build simple real time applications using microcontrollers
- To develop the skills to write and to upload the programs on LED patterns, Switches and LEDs
- To Create the LCD and UART based programs
- To interpret with various applications using TRIAC, ADC and DAC
- To Discriminate the Control based programs
- To Interpret with RF 433 MHz, Bluetooth and ZigBee transmitter and Receiver

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

- Comprehend the fundamentals in programming for microcontrollers
- Analyze the code and build simple real time applications using microcontrollers
- Know the skill to write, upload the programs on LED patterns, Switches and LEDs
- Describe the LCD and UART based programs
- Interpret with various applications using TRIAC, ADC and DAC
- Discriminate the Control based programs
- Interpret with RF 433 MHz, Bluetooth and ZigBee transmitter and Receiver

List of experiments on 2G

kit 1. LED patterns

a) Blinking LEDs, b) Serial lights,
c) Half on/Half off, d) Alternate on/off

2. Switches & LEDs

a) Press switch to make corresponding LED on,
b) Press switch to make corresponding LED off
c) First switch press, last LED on,
d) First switch press, last LED off

3. LCD

a) Character &string display on LCD,
b) SW1-Display strring1 on first line of LCD,
c) SW2-Display strring1 on second line of LCD

4. UART

a) Echo Program,
b) Take command from PC & glow corresponding LED,
c) Press Switch & display switch number on PC,
d) Display data received by UART on LCD

5. TRIAC

a) 220V AC bulb switch on/off,
b) 220 V AC fan speed control with fixed step size.

6. ADC

a) Raw ADC value display on LCD,
b) Raw ADC value display on Hyper Terminal,
c) Engineering unit conversion and display on LCD,
d) Engineering unit conversion and display on Hyper Terminal
e) Limit checking for temperature value and switching on fan using triac
f) Limit checking for ambient light value and switching on light using triac.

7. DAC

a) Fixed step incremented DAC, output seen on multi-meter,
b) DAC input value received from Hyper Terminal
c) DAC input value taken from switches

8. DC motor

a) DC motor control-CW, CCW and stop using switches,
b) DC motor control- CW, CCW and stop using commands received from Hyper Terminal

9. ZigBee

a) Receive data on ZigBee from PC ZigBee dongle and display data on LEDs
b) Receive data on ZigBee from PC ZigBee dongle and display data on LCD
C) Read ADC and transmit data using ZigBee
D) Triac based control of fan and light using data received on ZigBee

10.RF 433MHz

a) Receive data on RF from another kit with RF transmitter. Connect PCs to both kits. Type in data in Hyper Terminal of Transmitter kit & see on Hyper Terminal of Receiver kit
b) Read switches on transmitter kit, send their status on RF to receiver kit and control motor using switch status

11. Bluetooth

a) Transfer data to PC using Bluelink,
b) Receive data from PC using BlueLink & display on LCD

c) Transfer data from mobile phone(using a J2ME app) and receive using Blue link and control motor operation
d) Transfer data from mobile phone(using a J2ME app) and receive using BlueLink and control electrical appliance operation

12. Ethernet

a) Transfer data to PC using WIZI05SR and display on Hyper Terminal,
b) Implement an embedded web server

13. RTC

a) Read and display RTC data on LCD,
b) Read and display RTC data on Hyper Terminal,
c) Set RTC using Hyper terminal and display data on Hyper Terminal,
d) Implement an Event Logger with Time Stamp display

14. SDcard

a) Transfer data to PC, store on SDcard and retrieve it back(block transfer)
b) Implement FAT file system on SDcard c) Implement data acquisition system and store data in a CSV file on SD card with time stamp

Note: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Practical Examination

Lab methodologies

- Assignments
- Lab experiments with Arduino software

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG COMMUNICATION LAB

Course Code: GR15A2060 L:0 T:0 P:2 C:2

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

- To explain the modulation, demodulation techniques used in communication system.
- To Visualization of pre-emphasis and de-emphasis circuits use in the communication
- To analyze the signal modulation techniques will be emphasized
- To explain the concept of mixer functionality
- To describe the working principle of PLL, Digital phase detector and synchronous detectors
- To discriminate the various modulation techniques
- To interpret with various angle modulation and demodulation techniques

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

- Comprehend the fundamentals in explain the functionality of modulation and demodulation environment
- Analyze the concepts, write and simulate the concepts of AM and AM-Demodulation process in Communication.
- Know the origin and simulation of FM and FM-Demodulation process in communication
- Acquaint with AM and FM basic functionalities
- Discriminate the AM and FM functionalities
- Interpret with various angle modulation and demodulation systems
- Create the writing and simulation environments in PWM, PPM, Mixer and ring modulation

List of Experiments

1. AM modulator and demodulator
   a) To construct AM modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.
   b) To determine the modulation index of AM by classical method and trapezoidal method.

2. FM modulator and demodulator
   a) To construct frequency modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.

3. Sample & hold and PAM
   a) To construct sample and hold circuit and to trace the message and sample and hold signal.

b) To construct PAM circuit and to trace the input and PAM signal.

4. Pre-emphasis and de-emphasis
   a) To construct pre-emphasis and de-emphasis circuit and to determine the frequency response.

5. Tuned and wideband amplifiers
   a) To construct tuned and wideband amplifiers and to determine the frequency response.

6. Frequency mixer and ring modulator
   a) To construct a frequency mixer and to test its operation.
   b) To construct a ring modulator and to trace the DSB-SC waveform.

7. Simple and delayed AGC: To construct simple and delayed with and without AGC circuit and to test its impact.

8. PWM and PPM: To construct PWM and PPM circuit and trace the output waveforms.

9. SSB SC Modulation and Demodulation

10. Design of Mixer

11. PAM and Reconstruction

12. Effect of Noise on the Communication Channel

13. Diode Detector Characteristics.

14. Squelch Circuit

Note: A minimum of 12 (Twelve) experiments have to be performed and recorded by the candidate to attain eligibility for Practical Examination**.**
All the above experiments can be performed either on trainer kits/matlab.

Lab methodologies

- Assignments
- Lab experiments with Hardware and Software: Hard ware: Kits
- Software: Matlab & Codecomposer Studio

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG ELECTRONICS LAB

Course Code: GR15A2061 L:0 T:0 P:2 C:2

Course Objectives: The student will be able to

- Introduce the fundamentals and basic properties of op-amps to students.
- Enable the students to design various circuits using op-amp for several applications.
- Enable the students to design multi vibrator circuits.
- Study and analyze wave shaping and sweep circuits.
- Implement positive feedback circuits using BJT.
- Enable the students to design oscillators for the desired frequencies.
- Explore the circuitry which converts a digital signal to analog signal.

Course Outcomes: The student will be able to

- Analyze and select analog devices using circuit specifications based on circuit requirements.
- Conduct experiments on different types of multi vibrators.
- Design Digital to Analog Converters(DAC)
- Design pulse stretcher and squar wave generating circuits.
- Design oscillators and function generator circuits.
- Identify the positive and negative feedback circuits.
- Discriminate the design of simple circuits like summers, subractors, and multi vibrators using op-amps.

List of Experiments

1. Design and simulate linear and non-linear wave shaping circuits.
2. Design and simulate Bistable/Monostable and Astable Multi vibrator(using BJT)
3. Design and simulate Schmitt trigger(using BJT)
4. Design and simulate Miller sweep/Bootstrap sweep generator(using BJT)
5. Design and verify experimentally the theoretical closed loop gain using LM324AD IC for Operational Amplifier as Inverting, Non-Inverting and voltage follower.
6.. Construct & Verify Summing Amplifier using LM324AD IC.
7.. Test that, the Subtractor output is the difference of two inputs.
8. Design LM324AD IC as Integrator and Differentiator
9. Design & Verify Astable Multivibrator for 164Hz.
10. Construct and test LM324AD IC as Monostable Multivibrator for R=100K.
11. Design Function Generator using LM324AD IC.

12. Construct Wien Bridge Oscillator for f0=1 KHz and study its operation using LM324AD IC.
13. Construct RC Phase Shift Oscillator for f0= 650Hz and study its operation using LM324AD IC.
14. Design R-2R ladder type Digital to Analog Converter for R=1KΩ.

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

Lab methodologies

1. Assignments
2. Lab experiments with Hardware and Software: Hard ware: Analog Discovery.
3. Software: Multisim 14

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

Course Code: GR15A2001 L:2 T:0 P:0 C:0

Prerequisites: Basic knowledge on basic sciences and natural resources

Course Objectives

- To understand about the importance and scope of Environment.
- To identify, analyze and solve the problems in Environment.
- To participate in team oriented activities aiding constructive thinking and recognize the value of continuing education.

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

- Importance of environment, its purpose, design and perspectives
- Environmental issues related to the exploitation of natural resources and development of the mankind
- Role of professionals in protecting the environment from degradation
- The solutions for environmental problems created by local, national and global developmental activities.
- Critically evaluate literature on environmental problems;
- Develop relevant research questions for environmental investigation
- Use methods and tools of environmental research, including statistical analysis, GIS, and other techniques;

Unit-I

Introduction to Environment, Ecology and Ecosystems: Definition, Importance and Scope of Environmental Studies, Public Awareness and Participation. Ecology, Concept of Ecosystem, Classification of Ecosystem, Structure, Components and Function of Ecosystem. Typical Ecosystem, Food Chain, Food Web. Biodiversity- Types and values.

Unit–II

Natural Resources: Definition, Occurrence, Classification of resources, Important natural resources for human society, Utilization-positive and negative effects of Water resources, Mineral resources, Forest resources, Energy resources, Land resources. Role of individuals in conservation of important natural resources.

Unit-III

Environmental Pollution: Definition, Classification of Pollution, Types of Pollution and Pollutants. Causes, effects and control of – Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution and Nuclear Pollution.

Unit-IV

Environmental Problems and Management Policies: Natural Disasters-Types, causes and effects; Global warming, Climate change-El Nino-La Nina, Ozone layer- location, role and degradation; Deforestation and desertification. Management: Technological solutions, Preventive methods, control techniques; Green Belt development, Rainwater harvesting, Renewable and alternate resources.

Unit-V

National Policy on Environment Protection and Sustainability: Air (Pollution and prevention) act 1981; Water (Pollution and prevention) Act 1974; Pollution Act 1977; Forest Conservation Act; Wildlife Protection Act; Municipal solid waste management and handling Act; Biomedical waste management and handling Act; Hazardous waste management and handling rules. Role of IT in environment, environmental ethics, environmental economics.

Sustainable development: Cause and Threats to sustainability; Strategies for achieving sustainable development; Concept of Green buildings and Clean Development Mechanism (CDM).

Teaching Methodology

1. White board and marker
2. OHP and Field visit

Text Books

1. Text Book of Environmental Studies, ErachBarucha. University Press
2. Text book of Environmental Science and Technology by M.Anji Reddy 2007

Reference Books

1. Biotechnology & Environmental Chemistry. Surinder Jeswal& Anupama Deswal, DhanpatRai & Co Pvt. Ltd.
2. A Text Book of Environmental Science. Aravind Kumar. APH Publishing Corporation.
3. Glimpses of Environment. Dr. KVSG. Murali Krishna. Environmental Protection Society