

# **ACADEMIC REGULATIONS PROGRAM STRUCTURE and DETAILED SYLLABUS**

## **Bachelor of Technology (Electronics and Communication Engineering)**

(Effective for the students admitted from the Academic Year 2014-15)



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
(Autonomous)





**Gokaraju Rangaraju**  
**Institute of Engineering and Technology, Hyderabad**  
**Department of Electronics and Communication Engineering (B.Tech)**  
**GR14 Regulations**

Gokaraju Rangaraju Institute of Engineering & Technology 2014 Regulations (GR14 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Electronics and Communication Engineering with effect from the students admitted to the programmes in 2014-15 academic year.

- 1. Programme Offered:** The programme offered by the Department is B.Tech in Electronics and Communication Engineering, a four-year regular programme.
- 2. Medium of Instruction:** The medium of instruction (including examinations and reports) is English.
- 3. Admissions:** Admission to the B.Tech in Electronics and Communication Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.
- 4. Programme Pattern:**
  - a) Each Academic year of study is divided into two semesters.
  - b) Minimum number of instruction days in each semester is 90.
  - c) The total credits for the Programme is 200.
  - d) All the registered credits will be considered for the calculation of the final percentage of marks.
- 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 200 credits and secure all credits.



- c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B.Tech course.
- d) The degree of B.Tech in Electronics and Communication Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

#### 6. Attendance Requirements:

- a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above but less than 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.		External	Internal	Total
1	Theory	70	30	100
2	Practical	50	25	75
3	Engineering Graphics	70	30	100
4	Industry Oriented Mini Project	50	25	75
5	Comprehensive Viva	100	-	100
6	Seminar	-	50	50
7	Project	150	50	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 and semester-end examinations. 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 : 5 marks Assessment 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, 25 marks are for internal evaluation and 50 marks are for external evaluation. The supervisor continuously assesses the student for 15 marks (Attendance – 5 marks, Continuous Assessment – 5 marks, Report – 5 marks). At the



end of the semester, Mini 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 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, 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 for 50 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 the students and staff and the same is to be evaluated by the Project Review Committee for 25marks. 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 20 marks .The average of the two internal tests shall be considered for the award of marks.
  - Submission of day to day work - 5 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. Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.
- 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 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.
  - A student shall be promoted from II year to III year; or from III year to IV year only if he/she fulfills the academic requirements of minimum credits from the following examinations whether the candidate takes the examination or not.

Phase	Minimum Credits	No. of Examinations				
		I-I	I-II	II-I	II-II	III-I
II to III Year	37	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular —	— —	— —
III to IV Year	62	3 Regular 2 Supply	2 Regular 2 Supply	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular

- 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 Jawaharlal Nehru Technological University Hyderabad, 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	% of Marks Secured
First Class with Distinction	Marks $\geq$ 70%
First Class	$60\% \leq$ Marks $< 70\%$
Second Class	$50\% \leq$ Marks $< 60\%$
Pass Class	$40\% \leq$ Marks $< 50\%$



- 14. Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he 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 re-admission/re-registration to the same or equivalent subjects as and when they are offered.
- 17. General Rules**
- The academic regulations should be read as a whole for the purpose of any interpretation.
  - In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
  - In case of any error in the above rules and regulations, the decision of the Academic Council is final.
  - 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 GR14 for B.Tech (Lateral Entry)

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

### 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:

- Pursued a programme of study for not less than three academic years and not more than six academic years(para2(a))
- Registered for 150 credits and secured 150 credits. The marks obtained in all 150 credits shall be considered for the calculation of the final percentage of marks (para2(b))
- Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech programme (para2(c))

### 2. Academic Requirements

A student shall be promoted from III year to IV year only if he/she fulfills the academic requirement of minimum credits from the following examinations whether the candidate takes the examination or not (para 12(b)).

Phase	Minimum Credits	No. of Examinations		
		II-I	II-II	III-I
III to IV Year	37	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular —

### 3. Award of Degree or 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 Jawaharlal Nehru Technological University Hyderabad, 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	% of Marks Secured
First class with Distinction	Marks $\geq$ 70%
First class	60% $\leq$ Marks < 70%
Second class	50% $\leq$ Marks < 60%
Pass class	40% $\leq$ Marks < 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	Marks
BS	GR14A1001	Linear Algebra and Single Variable Calculus	2	1	-	3	4	100
BS	GR14A1002	Advanced Calculus	2	1	-	3	4	100
BS	GR14A1008	Engineering Chemistry	2	1	-	3	4	100
HS	GR14A1005	English	2	1	-	3	4	100
ES	GR14A1018	Basic Electrical Engineering	3	1	-	4	5	100
ES	GR14A1009	Computer Programming	2	1	-	3	4	100
ES	GR14A1026	IT Workshop	-	-	2	2	4	75
BS	GR14A1030	Engineering Chemistry lab	-	-	2	2	4	75
ES	GR14A1027	Computer Programming lab	-	-	2	2	4	75
		<b>Total</b>	<b>13</b>	<b>6</b>	<b>6</b>	<b>25</b>	<b>37</b>	<b>825</b>

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
BS	GR14A1003	Transform Calculus and Fourier Series	2	1	-	3	4	100
BS	GR14A1004	Numerical Methods	2	1	-	3	4	100
BS	GR14A1007	Engineering Physics	2	1	-	3	4	100
ES	GR14A1010	Data Structures	2	1	-	3	4	100
ES	GR14A1023	Engineering Graphics	1	-	2	3	5	100
ES	GR14A1019	Fundamentals of Electronics Engineering	3	1	-	4	5	100
HS	GR14A1024	Business Communication and Soft Skills	-	-	2	2	4	75
ES	GR14A1025	Engineering Workshop	-	-	2	2	4	75
BS	GR14A1029	Engineering Physics lab	-	-	2	2	4	75
		<b>Total</b>	<b>12</b>	<b>5</b>	<b>8</b>	<b>25</b>	<b>38</b>	<b>825</b>

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
PC	GR14A2047	Electrical Circuits	2	1	-	3	4	100
PC	GR14A2048	Electronic Circuit Analysis	3	1	-	4	5	100
PC	GR14A2049	Signals and Systems	3	1	-	4	5	100
PC	GR14A2050	Probability Theory and Stochastic Processes	3	1	-	4	5	100
PC	GR14A2043	Digital Electronics	3	1	-	4	5	100
PC	GR14A2051	Electronic Circuit Analysis Lab	-	-	2	2	4	75
PC	GR14A2052	Signals and Systems Lab	-	-	2	2	4	75
PC	GR14A2053	Digital Electronics Lab	-	-	2	2	4	75
		<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>36</b>	<b>725</b>
MC	GR14A2002	Value Education and Ethics	4	-	-	-	4	100
		<b>Total</b>	<b>18</b>	<b>5</b>	<b>6</b>	<b>25</b>	<b>40</b>	<b>825</b>

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
PC	GR14A2054	Electromagnetic Theory and Transmission Lines	3	1	-	4	5	100
PC	GR14A2055	Microcontrollers	3	1	-	4	5	100
PC	GR14A2056	Analog Communication	3	1	-	4	5	100
PC	GR14A2057	Analog Electronics	3	1	-	4	5	100
PC	GR14A2058	Special functions and Complex variables	2	1	-	3	4	100
PC	GR14A2059	Microcontrollers Lab			2	2	4	75
PC	GR14A2060	Analog Communication Lab			2	2	4	75
PC	GR14A2061	Analog Electronics Lab			2	2	4	75
		<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>36</b>	<b>725</b>
MC	GR14A2001	Environmental Science	4	-	-	0	4	75
		<b>Total</b>	<b>18</b>	<b>5</b>	<b>6</b>	<b>25</b>	<b>40</b>	<b>825</b>

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

Group	Sub-Code	Subject	L	T	P	C	H	Marks
DC	GR14A2104	Managerial Economics & Financial Analysis	2	1		3	4	100
DC	GR14A3103	Linear Control Systems	3	1		4	5	100
DC	GR14A3041	Digital Communications	3	1		4	5	100
DC	GR14A3042	Antennas and Wave Propagation	3	1		4	5	100
DC	GR14A3043	VLSI Design	3	1		4	5	100
DC	GR14A3044	VLSI Design Lab		2	2	4		75
DC	GR14A3045	Digital Communications Lab		2	2	4		75
BS	GR14A3100	Advanced English Communication Skills Lab		2	2	4		75
<b>Total</b>			<b>14</b>	<b>5</b>	<b>6</b>	<b>25</b>	<b>36</b>	<b>725</b>

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

Group	Sub-Code	Subject	L	T	P	C	H	Marks
DC	GR14A2076	Computer Organization	3	1		4	4	100
DC	GR14A3046	Digital Signal Processing	3	1		4	5	100
DC	GR14A2077	Computer Networks	3	1		4	5	100
DC	GR14A4059	Microwave Engineering	3	1		4	5	100
Open Elective:			2	1		3	4	100
OE	GR14A2069	Operating Systems						
OE	GR14A2063	Database Management Systems						
OE	GR14A2070	OOP through Java						
DC	GR14A3049	Digital Signal Processing Lab			2	2	4	75
DC	GR14A2072	OOP through Java Lab			2	2	4	75
DC	GR14A3101	Industry Oriented Mini Project			2	2	4	75
<b>TOTAL</b>			<b>14</b>	<b>5</b>	<b>6</b>	<b>25</b>	<b>36</b>	<b>725</b>

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

Group	Sub-Code	Subject	L	T	P	C	H	Marks
DC	GR14A3102	Management Science	2	1		3	4	100
DC	GR14A3048	Electronic Measurements & Instrumentation	3	1		4	4	100
DC	GR14A3070	Embedded Systems	3	1		4	5	100
		Elective-I	3	5	1		4	100
OP	GR14A4060	Cellular Mobile Communication						
	GR14A4070	Radar Systems						
	GR14A3057	Software Engineering						
		Elective-II	3	1		4	5	100
OP	GR14A4061	Optical Communications						
	GR14A4064	Digital Design Through Verilog						
	GR14A3059	Web Technologies						
DC	GR14A4066	Microwave Engineering Lab			2	2	4	75
DC	GR14A4067	Communication Protocols Lab			2	2	4	75
DC	GR14A4113	Embedded Systems Lab			2	2	4	75
	<b>TOTAL</b>		<b>14</b>	<b>5</b>	<b>6</b>	<b>25</b>	<b>36</b>	<b>725</b>

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

Group	Sub-Code	Subject	L	T	P	C	H	Marks
DC	GR14A4069	Digital Image Processing	2	1		3	4	100
		<b>Elective-III</b>	<b>2</b>	<b>1</b>		<b>3</b>	<b>4</b>	<b>100</b>
OE	GR14A4062	Multimedia and Signal Coding						
	GR14A4071	Electronic Navigation Systems						
	GR14A4063	Wireless Communications and Networks						
		<b>Elective-IV</b>	<b>2</b>	<b>1</b>		<b>3</b>	<b>4</b>	<b>100</b>
OE	GR14A4082	Mobile Application Development						
	GR14A4072	Digital Signal Processors and Architectures						
	GR14A4075	Satellite Communications						
DE	GR14A4076	Digital Image Processing Lab			2	2	4	75
DE	GR14A4143	Seminar			2	2	4	50
DC	GR14A4142	Comprehensive Viva			2	2	4	100
DC	GR14A4144	Major Project			10	10	4	200
	<b>TOTAL</b>		<b>6</b>	<b>3</b>	<b>16</b>	<b>25</b>	<b>36</b>	<b>725</b>



# I-Year





**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**LINEAR ALGEBRA AND SINGLE VARIABLE CALCULUS**

Course Code: GR14A1001  
I Year I Semester

L:2 T:1 P:0 C:4

**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 factorizations 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  $e^{ax}$ ,  $x^n$ ,  $\sin ax$ ,  $\cos ax$ ,  $e^{ax} \cdot V(x)$  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

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



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### ADVANCED CALCULUS

Course Code: GR14A1002  
I Year I Semester

L:2 T:1 P:0 C:3

#### 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:** Basic principles of tracing Cartesian, polar and parametric curves -Applications of the definite integral to evaluate arc lengths, surface areas of revolution and volumes of revolution.

#### 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 polar 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

### References

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

### ENGINEERING CHEMISTRY

Course Code: GR14A1008  
I Year I Semester

L:2 T:1 P:0 C:3

#### Unit-I

**Water Technology:** Sources of natural water, impurities, hardness: causes, types, expression, units, estimation of hardness of water using complex metric 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(on over view)

#### 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<sub>2</sub> cell, Fuel cells: H<sub>2</sub>-O<sub>2</sub> 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 - white wares, Stone ware, 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 :** Semi conductors, 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 Emitting Diodes (an Over View). 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. 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.



### **Prescribed 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

### ENGLISH

Course Code: GR14A1005  
I Year I Semester

L:2 T:1 P:0 C:3

#### 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, Cengage Learning.
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**

**COMPUTER PROGRAMMING**

Course Code: GR14A1009  
I Year I Semester

L:2 T:1 P:0 C:3

**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. 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**

**BASIC ELECTRICAL ENGINEERING**

Course Code: GR14A1018  
I Year I Semester

L:3 T:1 P:0 C:4

**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, Thevenin'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 Books**

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. Network Theory by Prof. B. N. Yoganarasimham.
3. Engineering Circuit Analysis by William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin by Tata McGraw Hill Company.
4. Electrical Engineering Fundamentals by Vincent Deltoro
5. Circuit Theory by Sudhakar and Shyam Mohan



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### IT WORKSHOP

Course Code: GR14A1026  
I Year I Semester

L:0 T:0 P:2 C:2

#### 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 Open Office:** 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).

**Task 6**

**Network Protocols:** Understand the Open Systems Interconnection (OSI) model, IPv4, IPv6-ipv4toipv6 tunneling protocols to ensure backward compatibility, dual IP stack, subnetmask, gateway, ports, packets, reserved address ranges for local use (including local loopback IP).

**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.

**Teaching methodologies**

1. Power Point presentations.
2. Assignments.
3. Hands on experiment.

**Reference Books**



1. Introduction to Information Technology, IITL 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.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ENGINEERING CHEMISTRY LAB**

Course Code: GR14A1030  
I Year I Semester

L:0 T:0 P:2 C:2

**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  $\text{Fe}^{2+}$  by permanganometry.
4. Determination of strength of an acid by potentiometric titration method
5. Determination of strength of an acid using conductometry.
6. Determination of Strength of an acid in Pb-Acid battery 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 tension 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: GR14A1027  
I Year I Semester

L:0 T:0 P:2 C:2

#### 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  $\lambda$  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  $\lambda$  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:  $\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
- 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 , Kitty, 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 merging of two files in 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: GR14A1003  
I Year II Semester

L:2 T:1 P:0 C:3

**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: GR14A1004  
I Year II Semester

L:2 T:1 P:0 C:3

**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

### ENGINEERING PHYSICS

Course Code: GR14A1007  
I Year II Semester

L:2 T:1 P:0 C:3

#### UNIT-I

**Crystal Structures:** Lattice points, Space lattice, Basis, Bravais lattice, unit cell and lattice parameters, Seven Crystal Systems with 14 Bravais 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 -Mossotti 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, Application 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.

#### Prescribed 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**

**DATA STRUCTURES**

Course Code: GR14A1010  
I Year II Semester

L:2 T:1 P:0 C:3

**Unit-I**

**Introduction to data structures:** Stacks, Stack Operations, Representation of a Stack using Arrays, Stack Applications: Recursion, In-fix 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, Enqueue, Dequeue, Circular Queues, Priority Queues.

**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, arrays, 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), exchange (bubble sort, quick sort), distribution (radix sort ) and merging (merge sort ) Algorithm, 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 GRAPHICS

Course Code: GR14A1023  
I Year II Semester

L:1 T:0 P:2 C:3

#### 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) Involute.

**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
2. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers

### 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**

**FUNDAMENTAL OF ELECTRONICS ENGINEERING**

Course Code: GR14A1019  
I Year II Semester

L:3 T:1 P:0 C:4

**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,  $\Pi$ - 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  $V_{BE}$  and  $I_{co}$ , 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  $A_i$ ,  $R_i$ ,  $A_v$ ,  $R_o$ .

### 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**

**BUSINESS COMMUNICATION AND SOFT SKILLS**

Course Code: GR14A1024  
I Year II Semester

L:0 T:0 P:2 C:2

**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



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### ENGINEERING WORKSHOP

Course Code: GR14A1025  
I Year II Semester

L:0 T:0 P:2 C:2

#### 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.  
Job I I identification of phase, neutral and earth of domestic appliances



and their connection to two pin/three pin plugs.

Job II 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

Job IV 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.
- 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: GR14A1029  
I Year II Semester

L:0 T:0 P:2 C:2

**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.
14. Newtons Ring.



# II-Year





**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ELECTRICAL CIRCUITS**

Course Code: GR14A2047  
II Year I Semester

L:2 T:1 P:0 C:3

**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: GR14A2048  
II Year I Semester

L:3 T:1 P:0 C:4

**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

### SIGNALS AND SYSTEMS

Course Code: GR14A2049  
II Year I Semester

L:3 T:1 P:0 C:4

#### 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
4. Lab experiments with Matlab Software

## 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**

**PROBABILITY THEORY AND STOCHASTIC PROCESSES**

Course Code: GR14A2050  
II Year I Semester

L:3 T:1 P:0 C:4

**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 non-deterministic processes, distribution and density Functions, stationarity and statistical independence, first-order stationary processes, second-order and wide-sense stationarity, auto correlation function and its properties, cross-correlation



function and its properties, covariance functions, Gaussian random processes, random signal response of linear systems, autocorrelation and cross-correlation functions of input and output.

## Unit-V

### **RANDOM PROCESSES-SPECTRAL CHARACTERISTICS AND NOISE**

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

### **MODELLING OF NOISE**

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

### **Teaching methodologies**

- Power Point presentations
- Tutorial Sheets
- Assignments
- 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

### **Reference Books**

1. Probabilistic Methods of Signals and System Analysis-George R. Cooper and Clare D. McGillem, oxford, 3rd Edition, 2007.
2. R.P. Singh and S.D. Sapre, "Communication Systems Analog & Digital", 1995, TMH.

### **Web Resources**

1. [Http://walrandpc.eecs.berkeley.edu/126notes.pdf](http://walrandpc.eecs.berkeley.edu/126notes.pdf)
2. [http://npTEL.iitm.ac.in/courses/Webcoursecontents/IIT%20Guwahati/Probability\\_rp/index.htm](http://npTEL.iitm.ac.in/courses/Webcoursecontents/IIT%20Guwahati/Probability_rp/index.htm)



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### DIGITAL ELECTRONICS

Course Code: GR14A2043  
II Year I Semester

L:3 T:1 P:0 C:4

#### 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, and 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

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

### Text Books

1. M Morris Mano and Michael D. Ciletti, Digital Design, Fourth Edition, Pearson 5th ed 2013.
2. Charles H. Roth Jr., Larry L. Kinney, Fundamentals of Logic Design, Cengage 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**

**ELECTRONIC CIRCUIT ANALYSIS LAB**

Course Code: GR1A2051  
II Year I Semester

L:0 T:0 P:2 C:2

**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 RC Coupled Amplifier
5. Design and Simulate the Cascade Amplifier
6. Design and Simulate Cascade Amplifier
7. Design and Simulate Darlington Pair
8. Design and Simulate RC Phase Shift Oscillator using Transistor
9. Design and Simulate Wien Bridge Oscillator using Transistor
10. Design and Simulate Hartely and Colpitt's Oscillator
11. Design and Simulate Class A power Amplifier
12. Design and Simulate Single Tuned Voltage Amplifier



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SIGNALS AND SYSTEMS LAB**

Course Code: GR14A2052  
II Year I Semester

L:0 T:0 P:2 C:2

**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. Waveform synthesis using Laplace transforms.
12. Finding the Laplace and Inverse Laplace transform of a given signal.
13. Finding the Z and Inverse Z transform of a given signal.
14. Locating the zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transfer function.
15. Generation of Gaussian noise (Real and Complex), computation of its mean, mean squared, Value and its Skew, Kurtosis, and PSD, Probability distribution Function.
16. Sampling Theorem Verification.
17. Removal of noise by Autocorrelation / Cross Correlation.
18. Extraction of periodic signal masked by noise using Correlation



**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: GR14A2053  
II Year I Semester

L:0 T:0 P:2 C:2

**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: GR142002  
II Year I Semester

L:4 T:0 P:0 C:0

#### 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 labour, 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 Saugol, 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**

**ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**

Course Code: GR14A2054  
II Year II Semester

L:3 T:1 P:0 C:4

**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, 2nd ed., 2000



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### MICROCONTROLLERS

Course Code: GR14A2055  
II Year II Semester

L:3 T:1 P:0 C:4

#### Unit-I

**Microprocessors:** Introduction to microprocessors, 8086 Architecture, Register organization, Memory segmentation, Programming Model, Timing diagrams, Interrupts, Instruction formats, Addressing modes, Instruction set, Macros Program, 8255 PPI, Various modes of operation, Interfacing to 8086.

**Interfacing:** keyboard, Display, stepper Motor, D/A converter, Memory, Interrupt structure of 8086, Interrupt service routine, Serial communication standards.

#### 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 8051 microcontroller, 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: GR14A2056  
II Year II Semester

L:3 T:1 P:0 C:4

#### 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, 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 Division 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: GR14A2057  
II Year II Semester

L:3 T:1 P:0 C:4

**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.

**Sweep Generators:** Voltage time base generators: Different sweep circuits, Miller sweep, Bootstrap sweep, Synchronization.

**Unit-III**

**Operational Amplifier:** Block-diagram representation of op-amp, schematic symbol, Ideal Op-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. Prakash Rao, 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, 2nd ed., 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

### SPECIAL FUNCTIONS AND COMPLEX VARIABLES

Course Code: GR14A2058  
II Year II Semester

L:2 T:1 P:0 C:3

#### 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. Chebyshev polynomials (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  $e^z$ ,  $Im z$ ,  $z^2$ ,  $z^n$  ( $n$  is a positive integer),  $\sin z$ ,  $\cos z$ ,  $z + (a/z)$ . 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.Jain and S.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**

### **MICRO CONTROLLERS LAB**

Course Code: GR14A2059  
II Year II Semester

L:0 T:0 P:2 C:2

#### **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 string1 on first line of LCD,
- c) SW2-Display string1 on first line of LCD, SW2

##### **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 LCE,
- 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: GR14A2060  
II Year II Semester

L:0 T:0 P:2 C:2

**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

**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: GR14A2061  
II Year II Semester

L:0 T:0 P:2 C:2

**List of Experiments**

1. Design and verify experimentally the theoretical closed loop gain using LM324AD IC for Operational Amplifier as Inverting, Non-Inverting and voltage follower.
2. Construct & Verify Summing Amplifier using LM324AD IC.
3. Test that, the Subtractor output is the difference of two inputs.
4. Design LM324AD IC as Integrator and Differentiator
5. Design & Verify Astable Multivibrator for 164Hz.
6. Construct and test LM324AD IC as Monostable Multivibrator for  $R=100K$ .
7. Design Function Generator using LM324AD IC.
8. Construct Wien Bridge Oscillator for  $f_0=1$  KHz and study its operation using LM324AD IC.
9. Construct RC Phase Shift Oscillator for  $f_0= 650Hz$  and study its operation using LM324AD IC.
10. Design R-2R ladder type Digital to Analog Converter for  $R=1K\Omega$ .

**List of Experiments (Using BJT)**

1. Design and Simulate the Linear and Non-linear wave shaping circuits
2. Design and Simulate Bistable/Monost/Astable Multivibrator
3. Design and Simulate Schmitt Trigger
4. Design and Simulate Miller Sweep/Bootstrap generator

**Note:** A minimum of 10 (Ten) 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: Waveforms, Multisim



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### ENVIRONMENTAL SCIENCE

Course Code: GR14A2001  
II Year II Semester

L:4 T:0 P:0 C:0

#### 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, Erach Barucha. 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, Dhanpat Rai & 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



# III-Year





**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

Course Code: GR14A2104  
III Year I Semester

L:2 T:1 P:0 C:3

**Unit-I**

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

**Unit-II**

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

**Unit-III**

**Markets & New Economic Environment:** Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types. New Economic Environment: Changing Business Environment in Post-liberalization scenario.

**Unit-IV**

**Capital Budgeting:** Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method and Internal Rate of Return (IRR) (simple problems).



## **Unit-V**

**Introduction to Financial Accounting & Financial Analysis:** Accounting Concepts and Conventions - Double-Entry Book Keeping. Accounting Cycle: Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability ratios. Du Pont Chart.

### **Teaching methodologies**

- Lectures
- Power Point presentations
- Seminars
- Working out problems on black/white boards,
- Conducting tutorials
- Giving homework and/or assignments etc.

### **Text Books**

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Atmanand: Managerial Economics, Excel, 2008.

### **Reference Books**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## LINEAR CONTROL SYSTEMS

Course Code: GR14A3103  
III Year I Semester

L:3 T:1 P:0 C:4

### UNIT I

**Introduction to control system:** Classification, open-loop, closed-loop system  
**Mathematical Models of Physical Systems:** Modeling of mechanical system elements, Electrical systems, Analogous Systems, Transfer function, Procedure for deriving transfer functions, Servomotors, Synchronous.

**Block Diagrams:** Block Diagram and Signal flow graphs: Block Diagrams, of a closed-loop system, block diagrams and transfer functions of multivariable systems, procedure for drawing a block diagram, block diagram reduction  
**Signal Flow Graphs:** construction of Signal Flow Graphs (SFG), Basic properties of signal flow graph, Signal flow graph algebra, construction of signal flow graph

### UNIT II

**Time Response Analysis:** Time response of control system, Standard test signals, Time response of first-order systems, second-order systems, steady state errors and error constraints, types of control systems, effect of adding poles and zeros to transfer functions, dominant poles of transfer functions.

### UNIT III

**Time Response Analysis:** Routh Stability Criterion: Introduction, Bounded Input and Bounded Output(BIBO), Necessary conditions for stability, Routh stability criterion, difficulties in the formulation of the Routh table, applications of the Routh stability criterion to linear feedback system, relative stability analysis. Root locus concepts, construction of root loci, rules for the construction of the root locus, effect of adding poles and zeros to  $G(s)$  and  $H(s)$ .

### UNIT IV

**Frequency Domain Analysis:** Correlation between time and frequency response, Polar plots, inverse polar plots, Bode plots, basic factors of  $G(j\omega)H(j\omega)$ , general procedure for constructing Bode plots, all pass and minimum phase systems, computation of Gain Margin and Phase margin, log magnitude versus phase plots, Nyquist plots: principle of argument, Nyquist stability criterion, Effect of addition of poles and Zeros, Gain margin and Phase margin, Constant M and N circles, The Nichols chart.



## **UNIT V**

**State Space Analysis:** Modern control theory, concepts of state, state variables and state models, state-space representation, state transition matrix and state transition equation, Computation of State Transition Matrix by Laplace Transformation, Transfer function from the state model.

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **Text Books**

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

### **Reference Books**

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



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## DIGITAL COMMUNICATIONS

Course Code: GR14A3041  
III Year I Semester

L:3 T:1 P:0 C:4

### UNIT-I

**Elements of Digital Communication Systems:** Model of Digital Communication Systems, Digital Representation of Analog Signal, Sampling Theorem, Pulse Code Modulation; PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Compounding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

### UNIT-II

**Digital Modulation Techniques:** Introduction, ASK, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Band width and Frequency Spectrum FSK, Non Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK, Differential PSK.

### UNIT-III

**Base band Transmission and Optimal Reception of Digital Signal:** Pulse Shaping for Optimum Transmissions, Base band Signal Receiver, Probability of Error, Optimum Filter, Matched Filter, Probability of error using Matched Filter Optimal of Coherent Reception, Calculation of Error Probability of ASK, BPSK, BFSK, QPSK.

### UNIT-IV

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

### UNIT-V

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



### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **Text Books**

- Digital Communications, 8th Edition, John Wiley & Sons, Simon Haykin, Inc 2007

### **Reference Books**

- Taub and Schilling, Principles of Communication Systems, 2nd Edition, MH, 1986
- Digital and Analog Communication Systems, John Wiley & Sons, Inc, 2002
- Analog and Digital Communications, second edition, Hsuhwei, Schaum's outline, TMH, 2003
- Communication systems 3rd edition, Simon Haykin, John Wiley & Sons, 1999



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ANTENNA AND WAVE PROPOGATION**

Course Code: GR14A3042  
III Year I Semester

L:3 T:1 P:0 C:4

**UNIT-I**

**Antenna Basics and Thin Linear Wire Antennas:** Principle of Radiation, Standing wave and Travelling Wave Current Distributions on wire antennas, Fields due to Hertzian Dipole, Near and Far fields, Far fields of Half Wave Dipole, Quarter Wave Monopole and Folded Half-Wave Dipole

Antenna Parameters–Radiation Resistance, Antenna Polarization, Radiation Patterns, Beam Width, Radiation Intensity. Beam Area, Directivity, Gain, Antenna Aperture, Effective length, Reciprocity in Antennas, Equivalence of characteristics in Transmission and Reception, Relation between Directivity and Maximum Effective Aperture, Friis Transmission Formula, Bandwidth, Antenna Temperature.

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

**Radio-Wave Propagation:** Ground Wave Propagation - Space and Surface Waves, Curved Earth Reflections,; Space Wave Propagation – Plane Earth Reflection, Effect of Earth Curvature, Visible Horizon, Effective Heights of Antennas, VHF Communication between aerials placed far apart; Surface Wave Propagation- Factors affecting Magnitude of Surface Wave; Propagation in



Troposphere- Refraction in Troposphere, Standard Atmosphere, Radio horizon, Super Refraction, Condition for Duct Propagation, M-Curves, Tropospheric Scatter. Sky Wave Propagation–Structure and Layers of Ionosphere, Electrical Properties of Ionosphere, Refraction and Reflection by Ionosphere, Critical Frequency, MUF. LUF, Skip Distance, Maximum Single-hop Distance, Virtual Height, Ionospheric Measurements, Dominant mechanisms of Propagation in Various Frequency Ranges

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **Text Books**

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

### **Reference Books**

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**VLSI DESIGN**

Course Code: GR14A3043  
III Year I Semester

L:3 T:1 P:0 C:4

**UNIT I**

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

**UNIT II**

**Basic Electrical Properties:** Basic Electrical Properties of MOS and BiCMOS Circuits:  $I_{ds}$ - $V_{ds}$  relationships, MOS transistor threshold Voltage  $V_t$ ,  $g_m$ ,  $g_{ds}$ , Figure of merit  $wo$ ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter-analysis and design, BiCMOS Inverters, Power, Sources of Power Dissipation, Dynamic Power, Static Power, Robustness, Variability, Reliability, Circuit simulation, SPICE tutorials, device models.

**UNIT III**

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

**UNIT IV**

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

**UNIT V**

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



### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **Text Books**

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, PHI, 2011,
2. CMOS VLSI Design—A circuits and systems perspective, Neil H.E Weste, David Harris, Fourth Edition, Addison Wesley, 2011.

### **Reference Books**

1. CMOS logic circuit Design- John. P. Uyemura, Springer, 2013.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Design—A. Albert Raj, Latha, PHI, 2008
4. Introduction to VLSI—Mead & Convey, BS Publications, 2010
5. VLSI Design—M. Micheal Vai, CRC Press, 2009.
6. Jan M RABAEY, Digital Integrated Circuits, 2nd Edition, Pearson Education, 2003.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**VLSI LAB**

Course Code: GR14A3044  
III Year I Semester

L:0 T:0 P:2 C:2

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

VLSI Programs:

1. Introduction to Layout Design Rules
2. Layout of Basic Logic Gates
3. Layout of CMOS Inverter
4. Layout of CMOS NOR/NAND Gates
5. Layout of CMOS XOR and MUX Gates
6. Layout of CMOS 1-bit Full Adder
7. Layout of Static/Dynamic Logic Circuit (Register Cell)
8. Layout of Latch
9. Layout of Pass Transistor
10. Layout of any Combinational Circuit (Complex CMOS Logic Gate)-Learning about Data Paths
11. Introduction to SPICE Simulation and Coding of NMOS/CMOS Circuit
12. SPICE Simulation of Basic Analog Circuits: Inverter/Differential Amplifier
13. Analog Circuit Simulation (AC Analysis)-CS&CD Amplifier.
14. System Level Design using PLL
15. Finite State Machine Design

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL COMMUNICATION LAB**

Course Code: GR14A2001  
III Year I Semester

L:0 T:0 P:2 C:2

**List of Experiments**

1. Design and Implementation of Uniform Quantizer.
2. PCM Generation and Detection
3. Differential Pulse Code Modulation
4. Delta Modulation and Demodulation
5. Time Division Multiplexing of 2 Band Limited Signals
6. Design and implementation of ASK Generator and Detector
7. Design and implementation of PSK Generator and Detector
8. Design and implementation of FSK Generator and Detector
9. Quadrature Phase Shift Keying modulation & Detection.
10. Differential Phase Shift Keying
11. Design and Implementation of Convolutional Coders
12. Design and Implementation of Cyclic code Encoder and its corresponding Syndrome Calculator
13. Generation of PN Sequence and Gold Sequences
14. BER Analysis of binary digital Modulation Schemes (ASK, PSK and FSK) in the presence of Additive White Gaussian Noise
15. BER Analysis of Direct Sequence Spread Spectrum Communication system in the presence of AWGN and interference.

**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 and CCStudio



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ADVANCED ENGLISH COMMUNICATION SKILLS LAB**

Course Code: GR14A3100  
III Year I Semester

L:0 T:0 P:2 C:2

**Unit-I**

**Functional English:** Starting a conversation, responding appropriately and relevantly. Body Language, Role play in different situations

**Unit-II**

**Vocabulary:** Synonyms & Antonyms, Word Roots, One word substitutes, Prefixes & Suffixes, Study of word origin, Idioms and Phrases, Analogy.

**Unit-III**

**Group Discussion:** Introduction to Group Discussion its features and qualities desired in a participant of Group Discussion.

**Unit-IV**

**Presentation Skills:** Knowing audience; acquiring content; organizing ideas; foreseeing the possible clarifications sought; adopting of appropriate medium; positive stage presence; Presenting and feedback

**Unit-V**

**Letter Writing & Résumé Writing:** Manual and Emailing; types and formats; content and body of the letter. Email etiquettes; Resume Writing, tools required for writing resume's, role of cover letter in a resume.

**Unit-VI**

**Interview Skills:** Introduction, various types of questions asked in an interview, qualities required to be a competent interviewee.

**Unit-VII**

**Reading comprehension:** Introduction, types of reading, qualities of a good reader

**Unit-VIII**

**Technical Report Writing:** Formats and types of reports



## Reference Books

- English language laboratories: A Comprehensive Manual; NiraKonar, PHI Learning Pvt.Ltd.,Delhi.
- Effective Technical Communication: A Guide for Scientist and Engineers;Barun K. Mitra, OUP.
- Great Answers to Though Interview Questions; Martin John Yate; Seventh Edition;Kogan Page.
- Business Communication; HorySankarMukerjee;OUP.
- Technical Communication, Meenakshi Raman, Sangeeta Sharma, Oxford higher Education.
- Professional Presentations; Malcom Goodale; Cambridge University Press.
- Murphy's English Grammar with CD, Murphy, Cambridge University Press.
- Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw Hill.
- Communication Skills, Sanjay Kumar, PushpLatha, Oxford Higher Education.
- Business communication; Second Edition,Prentice Hall of India , New Delhi.
- English for Engineers Made Easy, AedaAbidi, Ritu Chaudhry, Cengage Learning.
- Effective Business Communication ; Seventh Edition; Murphy, Herta A.,Herbert W. Hildebrandt, and Jane P.Thomas 2009,Tata Mc Graw-Hill Publishing Company Limited, New Delhi.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**COMPUTER ORGANIZATION**

Course Code: GR14A2076  
III Year II Semester

L:3 T:1 P:0 C:4

**Unit-I**

**Basic Structure of Computers:** Computer Types, Functional unit, Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

**Register Transfer Language and Micro operations:** Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, Shift micro operations, Arithmetic logic shift unit.

**Unit-II**

**Basic Computer Organization and Design:** Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

**Micro Programmed Control:** Control memory, Address sequencing, micro program example, design of control unit, Micro program Sequencer, Hard wired control Vs Micro programmed control.

**Unit-III**

**Central Processing Unit Organization:** General Register Organization, STACK organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

**Computer Arithmetic:** Addition and subtraction, multiplication Algorithms, Floating – point Arithmetic operations, BCD Adder.

**Unit-IV**

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input–Output Processor (IOP).

**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Dependencies, Vector Processing.



## Unit-V

**Memory Organisation:** Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map, Auxiliary memory – Magnetic Disks, Magnetic Tapes, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative mapping, Direct mapping, Set associative mapping, Writing into cache and cache initialization, Cache Coherence, Virtual memory – Address Space and Memory Space, Address mapping using pages, Associative Memory page table, Page Replacement.

**Multi Processors:** Characteristics or Multiprocessors, Interconnection Structures, Cache Coherence, Shared Memory Multiprocessors.

## Teaching Methodologies

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

## Text Books

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.

## Reference Books

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publications.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**DIGITAL SIGNAL PROCESSING**

Course Code: GR14A3046  
III Year II Semester

L:3 T:1 P:0 C:4

**UNIT -I**

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

**UNIT -II**

**Discrete Fourier series:** DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.

**Fast Fourier Transforms:** Fast Fourier Transforms (FFT)-Radix-2, Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix -N.

**UNIT- III**

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

**UNIT-IV**

**IIR Digital Filters:** Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method.

**UNIT V**

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

**Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.



### **Text Books**

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

### **Reference Books**

1. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
2. Andreas Antoniou, Digital Signal Processing, TMH, 2006.
3. John G. Proakis, Dimitris G. Manolakis, digital Signal Processing: Principles, Algorithms and Applications, Pearson Education, PHI, 2003



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**COMPUTER NETWORKS**

Course Code: GR14A2077  
III Year II Semester

L:3 T:1 P:0 C:4

**Unit-I**

**Introduction:** Uses of Computer Networks, Network Hardware, Network Software, Reference Models: OSI, TCP/IP, Examples Networks: Arpanet, Internet, ATM.

**Physical Layer:** Guided Transmission media, Wireless Transmission Media, Communication Satellites. The public Switched Telephone Network, the Mobile Telephone Network

**Unit-II**

**Data link layer:** Design issues, framing, error detection and correction, Elementary Data Link Protocol, Sliding Window Protocols. Medium Access sub layer: The Channel Allocation Problem, Multiple Access Protocols, Ethernet, wireless LANs, Bluetooth, Data Link Layer Switching.

**Unit-III**

**Network Layer:** Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, QoS, & the Network Layer in the Internet.

**Unit-IV**

**Transport Layer:** Transport Services, Elements of Transport Protocols. The Internet Transport Protocols: UDP & TCP.

**Unit-V**

**Application Layer:** DNS, Electronic Mail, the World Wide Web, Multi Media, Cryptography.

**Teaching methodologies**

1. White board
2. Power Point presentations
3. Tutorials
4. Assignments



### **Text Books**

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

### **References Books**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks- 3rd Edition, W.A. Shay, ThomsonA



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MICROWAVE ENGINEERING**

Course Code: GR14A4059  
III Year II Semester

L:3 T:1 P:0 C:4

**Unit-I**

**Microwave Transmission Lines:** Rectangular Waveguide- Solution of Wave Equations, Modes of Propagation, Power Transmission and losses, Mode Excitation, Characteristics; Circular Waveguide- Solution of Wave Equations, Modes of Propagation, Power Transmission and losses, Mode Excitation, Characteristics; Strip Line- Propagation Constant, Characteristic Impedance, Attenuation; Micro strip Line- Effective Dielectric Constant, Characteristic Impedance, Attenuation

**Unit-II**

Microwave Network Analysis, Reciprocal & Non-Reciprocal Networks Z-, Y-, S-Matrix Concepts, Properties of S-Matrix, S-Matrix of two, three, four port, Reciprocal and non-reciprocal networks: E- and H- Plane Tees, Magic Tees, Hybrid Rings, Isolators; Wilkinson Power Divider-Even and Odd Mode Analysis; Directional Couplers and 90°, 180° Hybrid, Ferrite Devices.

**Unit-III**

**Microwave Network Analysis, Reciprocal & Non-Reciprocal Networks:** Filter design using Insertion Loss Method, Butterworth and Chebyshev realization of filters, Transformation of Low pass prototype to other filter types, Stepped Impedance Low Pass Filter, Realization of filters with Microstrip lines, Impedance Matching in RF Networks- L Network, Dealing with Complex Loads, 3-element matching, Wideband Matching Networks

**Unit-IV**

**Microwave Tubes and Introduction to Microwave Solid State Devices:** Microwave Tubes-Principles of Operation: Klystron, Reflex Klystron, Travelling Wave Tube, Magnetron; Microwave Diodes: Schottky Diode, PIN Diode; Transferred Electron Devices: Gunn Effect Diode, RWH Theory, Modes of operation; Avalanche Transit-time Devices: IMPATT, TRAPATT

**Unit-V**

**Noise, Distortion, Oscillators, Mixers, Multipliers:** Noise in Microwave Circuits, Noise Figure, Non-linear Distortion; Microwave Oscillators, Oscillator Phase Noise; Frequency Multipliers- Manley-Rowe Relations; Mixers- Single-ended mixer, Balanced Mixer



### **Text Books**

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

### **Reference Books**

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



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## OPERATING SYSTEMS

Course Code: GR14A2069  
III Year II Semester

L:2 T:1 P:0 C:3

### Unit-I

**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and system calls, operating systems generation

### Unit-II

**Process Management:** Process concepts, threads, scheduling-criteria, algorithms, their evaluation, Thread scheduling, case studies: Linux, Windows

**Concurrency:** Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case studies: Linux, Windows

### Unit-III

**Memory Management:** Swapping, contiguous memory allocation, paging, structure of the pagetable, segmentation, virtual memory, demand paging, page replacement algorithms, Case studies: Linux, Windows, Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

**I/O systems:** Hardware, application interface, kernel I/O subsystem, Transforming I/O requests, Hardware operation, performance.

### Unit-IV

**File system Interface:** The concept of a file, Access Methods, Directory structure, file sharing, protection. File System implementation- File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance.

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

### Unit-V

**Protection:** Protection, Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based



Protection, Security- The Security problem, program threats, system and network threats, cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer – security classifications.

### **Teaching Methodologies**

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

### **Text Books**

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems- Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

### **References Books**

1. Operating systems- A Concept based Approach-D. M. Dhamdhare, 2nd Edition, TMH
2. Operating System A Design Approach-Crowley, TMH.  
Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DATABASE MANAGEMENT SYSTEMS**

Course Code: GR15A2063  
III Year II Semester

L:2 T:1 P:0 C:3

**Unit-I**

**Database System Applications:** Database System VS File System, View of Data, Data Abstraction, Instances and Schemas, Data Models: the ER Model, Relational Model, Other Models, Database System Structure, Database Users and Administrator, Transaction Management, Database design and ER diagrams, Attributes and Entity sets, Relationships and Relationship sets, Design Issues, Extended ER Features, Conceptual Design with the ER Model, Logical database design.

**Unit-II**

**Relational Model:** Introduction to the Relational Model, Basic Structure, Database Schema, Keys, Relational Algebra, Relational Calculus. Data on External storage, File organization and Indexing, cluster Indexes, Primary and Secondary Indexes, Index data structures, Hash based Indexing Tree based indexing.

**Unit-III**

Form of Basic SQL Query, Database Languages, DDL, DML, database Access for application Programs, Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregative Operators, NULL values, Comparison using Null values, Logical connectivity: AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Integrity Constraints over relations, Introduction to Views, Destroying /altering Tables and Views.

**Unit-IV**

**Schema refinement:** Problems Caused by redundancy, Decompositions, Problem related to decomposition, reasoning about FDS, FIRST, SECOND, THIRD Normal form, BCNF, Lossless join Decomposition, Dependency preserving Decomposition, Multi valued Dependencies, Fourth Normal Form.

**Unit-V**

**Transaction Concept:** Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock based Protocols, Timestamp based protocols, Validation based protocols, Multiple Granularity Recovery and



Atomicity, Log based recovery, Recovery with concurrent transactions, Buffer Management.

### **Teaching Methodologies**

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

### **Text Books**

1. "Data base Management Systems", Raghurama Krishnan, Johannes Gehrke, TATAMc Graw Hill 3rd Edition
2. "Data base System Concepts", Silberschatz, Korth, McGraw hill, V edition.

### **Reference Books**

1. "Introduction to Database Systems", C.J.Date Pearson Education.
2. "Database Systems design, Implementation, and Management", Rob & Coronel 5th Edition. Thomson.
3. "Database Management Systems", P. Radha Krishna HI-TECH Publications 2005.
4. "Database Management System", ElmasriNavate Pearson Education.
5. "Database Management System", Mathew Leon, Leo.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

Course Code: GR15A2070  
III Year II Semester

L:2 T:1 P:0 C:3

**Unit-I**

**Introduction:** OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

**Classes and Objects:** concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion.

**String handling:** String, StringBuffer, StringTokenizer.

**Unit-II**

**Inheritance:** base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes.

**Interfaces:** defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

**Packages:** Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

**Unit-III**

**Exception handling:** concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

**Multithreading:** differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

**Unit-IV**

**Applets:** concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

**Event Handling:** events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists.



## Unit-V

**Layout manager:** layout manager types-border, grid, flow, card and grid bag.

**Swing:** Introduction, limitations of AWT, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, Text fields, buttons – The JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, ScrollPanels, Trees and Tables.

## Teaching Methodologies

1. White-board, marker, power point presentations

## Text Books

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, up dated edition, T. Budd, Pearson education.

## Reference Books

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.
4. An introduction to Java programming and object oriented application development, R. A. Johnson-Thomson



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL SIGNAL PROCESSING LAB**

Course Code: GR14A3049  
III Year II Semester

L:0 T:0 P:2 C:2

**Experiments Based on Matlab/Lab View/C Programming Equivalent**

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

**Experiments Based On DSP Processor**

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



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



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

Course Code: GR14A2072  
III Year II Semester

L:0 T:0 P:2 C:2

**Recommended Systems/Software Requirements**

Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space JDK Kit. Recommended

**Task-1:** Write java programs that implement the following

1. Constructor
2. Parameterized constructor
3. Method overloading
4. Constructor overloading.

**Task-2**

Write a Java program that checks whether a given string is a palindrome or not.

Ex: MADAM is a palindrome.

Write a Java program for sorting a given list of names in ascending order.

Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use StringTokenizer class of java.util)

**Task-3:** Write java programs that uses the following keywords

1. this
2. super
3. static
4. final

**Task-4**

1. Write a java program to implement method overriding
2. Write a java program to implement dynamic method dispatch.
3. Write a Java program to implement multiple inheritance.
4. Write a java program that uses access specifiers.

**Task-5**

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



1. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
2. Write a Java program that displays the number of characters, lines and words in a text file

#### **Task-6**

1. Write a Java program for handling Checked Exceptions.
2. Write a Java program for handling Unchecked Exceptions.

#### **Task-7**

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

#### **Task-8**

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

#### **Task-9**

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -, \*, % operations. Add a text field to display the result.

#### **Task-10**

1. Write a Java program for handling mouse events.
2. Write a Java program for handling key events.

#### **Task-11**

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.

The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.



### **Task-12**

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

Write a Java program that allows the user to draw lines, rectangles and ovals.

### **Task -13**

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

### **Text Books**

1. Java;the complete reference,8th editon ,Herbert Schildt, TMH.
2. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
3. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education.
4. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited





# IV-Year





# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## MANAGEMENT SCIENCE

Course Code: GR14A3102  
IV Year I Semester

L:2 T:1 P:0 C:3

### Unit-I

**Introduction to Management & Organisation:** Concepts of Management and Organization: Nature, Importance, Functions and Theories of Management; Systems Approach to Management; Leadership Styles; Social Responsibilities of Management. Designing Organisational Structures: Basic concepts relating to Organisation; Departmentation and Decentralisation, Types and Evolution of mechanistic and organic structures of organisation and suitability.

### Unit-II

**Operations & Marketing Management:** Principles and Types of Plant Layout, Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement. Statistical Quality Control: Control Charts for Variables and Attributes (Simple Problems) and Acceptance Sampling, Deming's contribution to quality. Objectives of Inventory Control, EOQ, ABC Analysis, Purchase Procedures, Stores Management and Stores Records - Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of Distribution.

### Unit-III

**Human Resources Management (HRM):** Concepts of Personnel Management, HRM and HRD and Industrial Relations (IR), HRM vs. PMIR. Basic functions of HR Manager: Manpower planning, Recruitment and Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Analysis, Job Description, and Job Evaluation.

### Unit-IV

**Project Management (PERT/CPM):** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

### Unit-V

**Strategic Management and Contemporary Strategic Issues:** Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning



Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Contemporary Management Practices: Basic concepts of MIS, End User Computing, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six Sigma and Capability Maturity Model (CMM) Levels, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

### **Teaching Methodologies**

1. Lecture Method
2. Use of OHP
3. Power Point Presentation
4. Tutorials and Assignments

### **Text Book**

1. Aryasri: Management Science, TMH, 2009.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**

Course Code: GR14A3048  
IV Year I Semester

L:3 T:1 P:0 C:4

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

**Transducers:** Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

**UNIT - IV**

**Bridges:** Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge. **Measurement of Physical Parameters:** Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

**UNIT-V**

**Data Acquisition Systems** Digital Data Acquisition System, Various ways of multiplexing, Computer controlled instrumentation.

**Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.



### **Text Books**

1. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Editio2004.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbins, W.D. Cooper: PHI, 5th Edition, 2003.

### **Reference Books**

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Univ. Press, 1997.
2. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
3. Measurement Systems - Ernest O. Doebelin and Dhanesh N Manik, 6th Ed., TMH.
4. Electronic Measurements and Instrumentation by K. Lal Kishore,
5. Pearson Education - 2010.
6. Industrial Instrumentation: T. R. PadmanabhamSpiriger 2009.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**EMBEDDED SYSTEMS**

Course Code: GR14A3070  
IV Year I Semester

L:3 T:1 P:0 C:4

**Unit - I**

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

**Unit - II**

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

**Unit - III**

**Programming Concepts and Embedded Programming in C, C++ :** Programming in assembly language (ALP) vs High Level Language - C Program Elements:- Macros and functions, Use of Date Types, Structure, Pointers, Function Calls - Concepts of Embedded Programming in C++:- Objected Oriented Programming, Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory needs.

**Unit - IV**

**Real Time Operating Systems:** Definitions of process, tasks and threads – Inter Process Communication:- Shared data problem, Use of Semaphore(s), Priority Inversion Problem and Deadlock Situations, Message Queues, Mailboxes, Pipes, Virtual (Logical) Sockets, Remote Procedure Calls (RPCs) - Operating System Services:- Goals, Structures, Kernel, Process Management, Memory Management, Device Management - Real Time Operating System - RTOS Task scheduling models:- Co-operative Round Robin Scheduling, Cyclic Scheduling with Time Slicing.



## Unit -V

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

### Teaching Methodologies

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### Text Book

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATAMcGraw-Hill, First reprint Oct. 2003
2. Computers as Components-principles of embedded computer system design, Wayne Wolf, Elsevier.
3. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

### References

1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware /Software Introduction, John Wiley, 2002.
4. Embedding system building blocks, Labrosse, via CMP publishers.
5. Embedded Systems, Raj Kamal, TMH.
6. Micro Controllers, Ajay V Deshmukhi, TMH.
7. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
8. Microcontrollers, Raj kamal, Pearson Education.
9. An Embedded Software Primer, David E. Simon, Pearson Education.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**CELLULAR AND MOBILE COMMUNICATION  
(ELECTIVE)**

Course Code: GR14A4060  
IV Year I Semester

L:3 T:1 P:0 C:4

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

**UNI-V**

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

**UNIT-VI**

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



## **UNIT-VII**

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

## **UNIT-VIII**

**Digital Cellular Networks:** GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **TEXTBOOKS**

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

### **REFERENCE BOOKS**

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**RADAR SYSTEMS**  
**(ELECTIVE)**

Course Code: GR14A4070  
IV Year I Semester

L:3 T:1 P:0 C:4

**Unit-I**

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

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

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

**Unit-V**

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

**Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

**Text Book**

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

**Reference Books**

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



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SOFTWARE ENGINEERING**

Course Code: GR14A3057  
IV Year I Semester

L:3 T:1 P:0 C:4

**UNIT-I**

**Introduction to Software Engineering** : The evolving role of software, Changing Nature of Software, Software myths.

**A Generic view of process** : Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

**Process models** : The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**UNIT-II**

**Software Requirements**: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

**Requirements engineering process**: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

**UNIT-III**

**Design Engineering**: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

Performing User interface design : Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

**UNIT-IV**

**Testing Strategies** : A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics : Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**UNIT-V**

**Metrics for Process and Products** : Software Measurement, Metrics for software quality.



**Risk management** : Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

**Quality Management** : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

### **TEXT BOOKS**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

### **REFERENCE BOOKS**

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**OPTICAL COMMUNICATIONS**

Course Code: GR14A4061  
IV Year I Semester

L:3 T:1 P:0 C:4

**UNIT-I**

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

**UNIT-II**

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. [2]. Fiber materials — Glass, Halide, Active glass, Chalcogenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**UNIT-VI**

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission,



error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

### **UNIT-VII**

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

### **UNIT-VIII**

Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. Power point presentations.

### **Text Books**

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

### **Reference Books**

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL DESIGN THROUGH VERILOG HDL**  
**(ELECTIVE)**

Course Code: GR14A2001  
IV Year I Semester

L:3 T:1 P:0 C:4

**UNIT-I**

**Introduction to Verilog HDL:** Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools  
**Language Constructs and Conventions:** Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

**UNIT-II**

**Gate Level Modelling:** Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip-Flops with Gate Primitives, Delay, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.  
**Modelling at Dataflow Level:** Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vector, Operators.

**UNIT-III**

**Behavioural Modelling:** Introduction, Operations and Assignments, Functional Bifurcation, 'Initial' Construct, Assignments with Delays, 'Wait' Construct, Multiple Always Block, Design at Behavioural Level, Blocking and Non-Blocking Assignments, The 'Case' Statement, Simulation Flow, 'If' and 'if-Else' Constructs, 'Assign- De-Assign' Constructs, 'Repeat' Construct, for loop, 'The Disable' Construct, 'While Loop', Forever Loop, Parallel Blocks, Force-Release, Construct, Event.

**UNIT-IV**

**Switch Level Modelling:** Basic Transistor Switches, CMOS Switches, Bidirectional Gates, Time Delays with Switch Primitives, Instantiation with 'Strengths' and 'Delays' Strength Contention with Tri-reg Nets.  
**System Tasks, Functions and Compiler Directives:** Parameters, Path Delays, Module Parameters. System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

**UNIT-V**

**Sequential Circuit Description:** Sequential Models - Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional



Register, Static Machine Coding, Sequential Synthesis.

**Components Test and Verification:** Test Bench - Combinational Circuits Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. PowerPoint presentations.

### **Text Books**

1. T.R. Padmanabhan, B Bala Tripura Sundari, Design through Verilog HDL, Wiley 2009.
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd Edition.

### **Reference Books**

1. Fundamentals of Digital Logic with Verilog Design - Stephen Brown, Zvonkoc Vranesic, TMH, 2nd Edition.
2. Advanced Digital Logic Design using Verilog, State Machines & Synthesis for FPGA - Sunggu Lee, Cengage Learning, 2012.
3. Verilog HDL - Samir Palnitkar, 2nd Edition, Pearson Education, 2009.
4. Advanced Digital Design with Verilog HDL - Michel D. Ciletti, PHI, 2009.



# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

## WEB TECHNOLOGIES

Course Code: GR14A3059  
IV Year I Semester

L:3 T:1 P:0 C:4

### UNIT-I

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

### UNIT-II

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors (DOM and SAX).

**Java Beans:** Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's

### UNIT-III

**Web Servers and Servlets:** Tomcat web server, Introduction to Servlets, Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters, The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

### UNIT-IV

**Introduction to JSP:** The Problem with Servelet, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC Setting Up and JSP Environment, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

**JSP Application Development:** Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages, Sharing Session and Application Data, Memory Usage Considerations

### UNIT-V

**Database Access:** Database Programming using JDBC, Studying Javax.sql.\* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework..



## **TEXT BOOKS**

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT s 1,2 ,3)
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH (Chapters: 25) (UNIT 4)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly (UNITs 5,6,7,8)

## **REFERENCE BOOKS**

1. Programming world wide web-Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
4. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly for chap 8.
5. Murach's beginning JAVA JDK 5, Murach, SPD
6. An Introduction to web Design and Programming –Wang-Thomson
7. Web Applications Technologies Concepts-Knuckles,John Wiley
8. Programming world wide web-Sebesta,Pearson
9. Web Warrior Guide to WebProgrammming-Bai/Ekedaw-Thomas
10. Beginning Web Programming-Jon Duckett WROX.
11. Java Server Pages, Pekowsky, Pearson.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MICROWAVE ENGINEERING LAB**

Course Code: GR14A4066  
IV Year I Semester

L:0 T:0 P:2 C:2

**List of Experiments:**

**Part – A (Any 7 Experiments):**

- Reflex Klystron Characteristics.
- Gunn Diode Characteristics.
- Attenuation Measurement.
- Directional Coupler Characteristics.
- VSWR Measurement.
- Impedance and Frequency Measurement.
- Waveguide parameters measurement.
- Scattering parameters of Circulator.
- Scattering parameters of Magic Tee.

**Equipment required for Laboratories**

- Regulated Klystron Power Supply
- VSWR Meter -
- Micro Ammeter - 0 – 500  $\mu$ A
- Multimeters
- CRO
- GUNN Power Supply, Pin Moderator
- Reflex Klystron
- Crystal Diodes
- Microwave components (Attenuation)
- Frequency Meter
- Slotted line carriage
- Probe detector
- wave guide shorts
- Pyramidal Horn Antennas
- Directional Coupler
- E, H, Magic Tees
- Circulators, Isolator
- Matched Loads

**Lab Methodologies**

1. Assignments
2. Lab experiments with various Simulation software.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**COMMUNICATION PROTOCOLS LAB**

Course Code: GR14A4067  
IV Year I Semester

L:0 T:0 P:2 C:2

**Experiments**

1. Write code to display string on the LCD
2. Write code to display a counter which runs from 0 to 100 on the LCD display( should be three digit number)
3. Serial communication on chip-UART –To transmit single character.
4. Write a code to receive and transmit back a character using serial communication
5. Write a program to transmit a character 'a' serially at a baud rate of 9600 every second using the bit banging technique on PD1 port line.
6. Write a program to receive serial data at a baud rate of 9600 and display the received character on LCD. Use PD0 port line and bit banging technique for the reception.
7. Write a program to read serial data from an ultrasonic range finding module and displaying it.
8. Write a code to interface 7 segment display using I2C.
9. Write a code to interface 7 segment display using SPI.
10. Write arduino code for string which key has been pressed in the GRIET capacitive touch shield and toggle the LED connected to that switch
11. Write a program to transfer data using ZigBee.
12. Write a program to transfer data using Wi-Fi.
13. Write a program to transfer data using Bluetooth using blue term.
14. Write a program to Control of two ac loads using Bluetooth
15. Write a program to display numbers 0 to 9 on the 7 segment display on the GRIET software interface shield using bit banging.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**EMBEDDED SYSTEMS LAB**

Course Code: GR14A4113  
IV Year I Semester

L:0 T:0 P:2 C:2

**Experiments**

1. Program to create a new project and to experiment with CC studio
2. Program to configure system clock and GPIO
3. Program to use a software delay to toggle an LED on the evaluation board
4. Program to enable and configure Timers and Interrupts
5. Program to generate an exception
6. Program to enable and configure ADC and sample sequencer
7. Program to measure and display values from internal temperature sensor and add Hardware averaging
8. Program to use ROM peripheral driver library calls and to note size difference
9. Program to run USB bulk example code and windows side app on evaluation board
10. Program to create code to write to FLASH memory and read/write to EEPROM
11. Program to enable FPU and profile floating point code
12. Program to connect Kentec Display and to experiment with demo project
13. Program to write graphics library code



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL IMAGE PROCESSING**

Course Code: GR14A4069  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

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

**UNIT-II**

Image Transforms 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform.

**UNIT-III**

Image enhancement Point processing. Histogram processing. Spatial filtering.

**UNIT-IV**

Enhancement in frequency domain, Image smoothing, Image sharpening.

**UNIT-V**

Color image processing: Pseudo color image processing, full color image processing.

**UNIT-VI**

Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT-VII**

Image segmentation, Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation.

**UNIT-VIII**

Image compression Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression.



### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. Power Point presentations

### **Text Book**

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Edition, 2002.

### **Reference Books**

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MULTIMEDIA AND SIGNAL CODING**

Course Code: GR14A4062  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

**Introduction to Multimedia:** Multimedia, Word Wide Web, Overview of Multimedia Tools, Multimedia Authoring, Graphics/Image Data Types, and File Formats.

**Colour in Image and Video:** Colour Science-Image Formation, Camera Systems, Gamma Correction, Colour Matching Functions, CIE Chromaticity Diagram, Colour Monitor Specifications, Out-of-Gamut Colours, White Point Correction, XYZ to RGB Transform, Transform with Gamma Correction, L\*A\*B\*Colour Model. Colour Models in Images-RGB Colour Models for CRT Displays, Subtractive colour: CMY Colour model, Transformation from RGB to CMY, Under Colour Removal: CMYK System, Printer Gamuts, Colour models in Video- Video Colour Transforms, YUV Colour Model, YIQ Colour Model, YCBCR Colour Model.

**UNIT-II**

**Video Concepts:** Types of Video Signals, Analog Video, Digital Video  
**Audio Concepts:** Digitization of Sound, Quantization and Transmission of Audio

**UNIT-III**

**Compression Algorithms**

**Lossless Compression Algorithms:** Run Length Coding, Variable Length Coding, Arithmetic Coding, Lossless JPEG, Image Compression.

**Lossy Image Compression Algorithms:** Transform Coding: KLT and DCT Coding, Wavelet Based Coding.

**Image Compression Standards:** JPEG and JPEG2000

**UNIT-IV**

**Videos Compression Techniques:** Introduction to Video Compression, Video Compression Based on Motion Compensation, Search for Motion vectors, H.261- Intra-Frame and Inter-Frame Coding, Quantization, Encoder and Decoder, Overview of MPEG1 and MPEG2.

**UNIT-V**

**Audio Compression Techniques:** ADPCM in Speech Coding, G.726 ADPCM, Vocoder-Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoder, MPEG Audio – MPEG



Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithms, MPEG-2 AAC, MPEG-4 Audio.

### **TEXT BOOKS**

1. Fundamentals of Multimedia – Ze –Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals and Systems – Mrinal Kr. Mandal Springer International Edition 1st Edition, 2009.

### **REFERENCE BOOKS**

1. Multimedia Communication Systems- Techniques, Stds and Networks, K.R.Rao, Zorans, Bojkoric, Dragorad A Milovanovic, 1st Edition, 2002.
2. Fundamentals of Multimedia Ze-Nian Li, Mark S.Drew, Pearson Education, 1st Edition, 2009
3. Multimedia System John F. Koegel Bufond Pearson Education, 1st Edition, 2003.
4. Digital Video Proccession-A. Murat Tekalp, PHI, 1996.
5. Video Proccessiong and Communications – Yaowang, Jorn Ostermann, Ya-Qin Zhang, Pearson, 2002.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ELECTRONIC NAVIGATION SYSTEMS**  
**(ELECTIVE)**

Course Code: GR14A4071  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**Text Book**

1. Myron Kavton and 33Walter Friend, R. - "Avionics Navigation Systems", Wiley, 1997
2. Parkinson. BW. Spilker - "Global Positioning System Theory and Applications", Progress in Astronautics, Vol. I and II, 1996.



## Reference Books

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



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**WIRELESS COMMUNICATIONS AND NETWORKS**

**(Elective)**

Course Code: GR14A4063  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

**Multiple access techniques for wireless communication:** Introduction, FDMA, TDMA, Spread Spectrum, Multiple Access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols. Introduction to wireless networking: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

**UNIT-II**

**Wireless data services:** CDPD, ARDIS, RMD, Common channel signaling, ISDN, BISDN and ATM, SS7, SS7 user part, signaling traffic in SS7. Mobile ip and wireless access protocol: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.

**UNIT-III**

**Wireless Lan Technology:** Infrared LANs, Spread spectrum LANs, Narrow band microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

**UNIT-IV**

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

**UNIT-VI**

**Mobile Data Networks:** Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol. Wireless ATM & Hiper Lan: Introduction, Wireless ATM, HIPERLAN

**TEXT BOOKS**

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



## REFERENCE BOOKS

1. Wireless Digital Communications – KamiloFeher, PHI, 1999.
2. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, Pearson Education, 2002.
3. Wireless Communications – Andrews F. Molisch, Wiley India, 2006.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**MOBILE APPLICATION DEVELOPMENT**  
**(ELECTIVE-II)**

Course Code: GR14A2001  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

**J2ME Overview:** Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit.

**UNIT-II**

**J2ME Best Practices and Patterns:** The Reality of Working in a J2ME World, Best Practices

Commands, Items, and Event Processing: J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

**UNIT-III**

**High-Level Display:** Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

Low-Level Display: Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

Record Management System: Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

**UNIT-IV**

**JDBC Objects:** The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions. JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Sub queries, VIEWS.



## **UNIT-V**

**Generic Connection Framework:** The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process

### **TEXT BOOKS**

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.

### **REFERENCE BOOKS**

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009.
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005.
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, First Edition, J.Knudsen, Pearson.



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL SIGNAL PROCESSORS AND ARCHITECTURE**  
**(ELECTIVE)**

Course Code: GR14A4072  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

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

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

**Analog Devices Family of DSP Devices:** Analog Devices Family of DSP Devices-ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Blackfin Processor-The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.



## **UNIT-V**

### **Interfacing Memory and I/O Peripherals to Programmable DSP Devices:**

Memory space organization, External bus interfacing signals, Memory interface Parallel I/O interface, Programmed I/O, interrupts and I/O, Direct memory access (DMA).

#### **Text Books**

1. Digital Signal Processing-Avtar Singh and S.srinivasan, Thomson Publication,2004
2. A practical Approach to Digital Signal Processing–K. Padmanabahan, R. Vijayarajeswaran, Ananthi. S, NewAge International, 2006/2009

#### **Reference Books**

1. Embedded Signal Processing with the Micro signal Architecture  
Publisher: Woon–Seng Gan, SenM. Kuo, Wiley-IEEEPress,2007



**GOKARAJU RANGARAJU**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**SATELLITE COMMUNICATION**  
**(ELECTIVE)**

Course Code: GR14A4075  
IV Year II Semester

L:2 T:1 P:0 C:3

**UNIT-I**

**Introduction:** Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

**UNIT-II**

**Orbital mechanics and launchers:** Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

**UNIT-III**

Satellite subsystems: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

**UNIT-IV**

**Satellite link design:** Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

**UNIT-V**

**Multiple access:** Frequency division multiple access (FDMA) Inter-modulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

**UNIT-VI**

**Earth station technology:** Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

**UNIT-VII**

**Low earth orbit and geo-stationary satellite systems:** Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs



## **UNIT-VIII**

**Satellite navigation & the global positioning system:** Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

### **Teaching Methodologies**

1. Tutorial sheets uploaded in website.
2. NPTEL video lectures.
3. Power point presentations.

### **Text Books**

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G. Snyderhoud, 2nd Edition, Pearson Publications, 2003.

### **Reference Books**

- Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
- Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
- Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
- Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DIGITAL IMAGE PROCESSING LAB**

Course Code: GR14A4076  
IV Year II Semester

L:0 T:0 P:2 C:2

**LIST OF PROGRAMS**

1. Write program to read, display, resize and perform various conversions on digital image using MATLAB software.
  - Read and display image in MATLAB
  - Resize given image
  - Convert given color image into gray-scale image
  - Convert given color/gray-scale image into black & white image
  - Draw image profile
  - Separate color image in three R G & B planes
  - Create color image using R, G and B three separate planes
  - Flow control and LOOP in MATLAB
2. To write and execute image processing programs using point processing method.
  - Obtain Negative image
  - Obtain Flip image
  - Thresholding
  - Contrast stretching
3. To write and execute programs for image arithmetic operations.
  - Addition of two images
  - Subtract one image from other image
  - Calculate mean value of image
  - Different Brightness by changing mean value
4. To write and execute programs for image logical operations.
  - AND operation between two images
  - OR operation between two images
  - Calculate intersection of two images
5. To write a program for histogram calculation and equalization.
  - Standard MATLAB function
  - Program without using standard MATLAB functions



6. To write and execute program for geometric transformation of image.
  - Translation
  - Scaling
  - Rotation
  - Shrinking
  - Zooming
7. To understand various image noise models and to write programs for image restoration.
  - Remove Salt and Pepper Noise
  - Minimize Gaussian noise
  - Median filter and Weiner filter
8. To write and execute programs to remove noise using spatial filters.
  - Understand 1-D and 2-D convolution process
  - Use 3x3 Mask for low pass filter and high pass filter
9. To write and execute programs for image frequency domain filtering.
  - Apply FFT on given image
  - Perform low pass and high pass filtering in frequency domain
  - Apply IFFT to reconstruct image
10. To write a program for edge detection using different edge detection mask.
11. To write and execute program for converting from RGB to HSI.
12. To write and execute program for Discrete Cosine transform on given image and perform inverse Discrete Cosine transform to reconstruct image.
13. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.
14. To write and execute programs for image transforms.
15. Fuzzy based project to be simulated by the student.

