ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Bachelor of Technology
(Biomedical 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 Biomedical 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 Biomedical 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 Biomedical 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 Biomedical 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 Biomedical 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

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

S.No.		End exams (External)	Internal	Total
1	Theory	70	30	100
2	Practical	50	25	75
3	Engineering Graphics	70	30	100
4	Industry Mini Project	50	25	75
5	Comprehensive Viva	100	-	100
6	Seminar	-	50	50
7	Project	150	50	200

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 Assessment : 5 marks 4) Attendance : 5 marks
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours.

d) Industry Oriented Mini Project: The Mini Project is to be taken up with relevance to Industry and is evaluated for 75 marks. Out of 75, 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) 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 securesnot less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end examination taken together.
    b) A student shall be promoted 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 ≥ 70%
First Class	60% ≤ Marks < 70%
Second Class	50% ≤ Marks < 60%
Pass Class	40% ≤ 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**
    a) The academic regulations should be read as a whole for the purpose of any interpretation.
    b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
    c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
    d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

Academic Regulations 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:

a) Pursued a programme of study for not less than three academic years and not more than six academic years(para2(a))

b) Registered for 150 credits and secured 150 credits. The marks obtained in all 150 credits shall be considered for the calculation of the final percentage of marks (para2(b))

c) 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 ≥ 70%
First class	60% ≤ Marks < 70%
Second class	50% ≤ Marks < 60%
Pass class	40% ≤ Marks < 50%

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.Tech (BME) PROGRAMME STRUCTURE

I B.Tech (BME) **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	GR14A1007	Engineering Physics	2	1	-	3	4	100
HS	GR14A1005	English	2	1	-	3	4	100
ES	GR14A1009	Computer Programming	2	1	-	3	4	100
ES	GR14A1019	Fundamentals of Electronics Engineering	3	1	-	4	5	100
ES	GR14A1025	Engineering Workshop	-	-	2	2	4	75
BS	GR14A1029	Engineering Physics lab	-	-	2	2	4	75
ES	GR14A1027	Computer Programming lab	-	-	2	2	4	75
		Total	**13**	**6**	**6**	**25**	**37**	**825**

I B.Tech (BME) **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	GR14A1008	Engineering Chemistry	2	1	-	3	4	100
ES	GR14A1010	Data Structures	2	1	-	3	4	100
ES	GR14A1023	Engineering Graphics	1	-	2	3	5	100
ES	GR14A1018	Basic Electical Engineering	3	1	-	4	5	100
HS	GR14A1024	Business Communication and Soft Skills	-	-	2	2	4	75
ES	GR14A1026	IT Workshop	-	-	2	2	4	75
BS	GR14A1030	Engineering Chemistry lab	-	-	2	2	4	75
		Total	**12**	**5**	**8**	**25**	**38**	**825**

II B.Tech (BME) — I Semester

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
PC	GR14A2050	Probability Theory and Stochastic Processes	3	1	-	4	5	100
PC	GR14A2043	Digital Electronics	3	1	-	4	5	100
PC	GR14A2049	Signals and Systems	3	1	-	4	5	100
PC	GR14A2080	Bio-Electricity	2	1	-	3	5	100
PC	GR14A2081	Applied Chemistry	3	1	-	4	5	100
PC	GR14A2082	Medical Sciences Lab	-	-	2	2	4	75
PC	GR14A2053	DIgital Electronics Lab	-	-	2	2	4	75
PC	GR14A2052	Signals & Systems Lab	-	-	2	2	4	75
		Total	**-**	**-**	**-**	**25**	**36**	**725**
MC	GR14A2001	Environmental Science	4	-	-	-	4	100
		Total	**18**	**5**	**6**	**25**	**40**	**825**

II B.Tech (BME) — II Semester

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
PC	GR14A2083	Basic Clinical Sciences	3	1	-	4	5	100
PC	GR14A2086	Analog Integrated Electronics	3	1	-	4	5	100
PC	GR14A2104	Managerial Economics and Financial Analysis	2	1	-	3	4	100
PC	GR14A2084	Medical Imaging Techniques	3	1	-	4	5	100
PC	GR14A2085	Bio Transducers and Applications	3	1	-	4	5	100
PC	GR14A2087	Transducer Applications Lab			2	2	4	75
PC	GR14A2088	Medical Imaging Techni-Ques Lab - -	2	2	4	75		
PC	GR14A2061	Analog Electronics Lab			2	2	4	75
		Total	**-**	**-**	**-**	**25**	**36**	**725**
MC	GR14A2002	Value Education and Ethics	4		-	0	4	75
		Total	**18**	**5**	**6**	**25**	**40**	**825**

III B.Tech (BME) — I Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A3046	Digital Signal Processing	3	1		4	5	100
ES	GR14A3073	Biomedical Equipment	3	1		4	5	100
ES	GR14A2055	Microcontrollers	3	1		4	5	100
ES	GR14A3074	Principles of communication	3	1		4	5	100
ES	GR14A3075	General Surgery and Radiology	2	1		3	4	100
HS	GR14A3100	Advanced English Communication Skills Lab			2	2	4	75
ES	GR14A3076	Biomedical Equipment Lab			2	2	4	75
ES	GR14A2059	Microcontrollers Lab			2	2	4	75
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

III B.Tech (BME) — II Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A3077	Biomedical Signal Processing	3	1		4	5	100
ES	GR14A3043	VLSI Design	3	1		4	5	100
ES	GR14A3078	Bio-Fluids and Mechanics	3	1		4	5	100
ES	GR14A3079	Lasers in Fibre Optics and Medicine	2	1		3	4	100
	Open Elective		**3**	**1**		**4**	**5**	**100**
ES	GR14A3080	Biological Control Systems						
ES	GR14A3081	Reliability Engineering						
ES	GR14A3082	Telemedicine						
ES	GR14A3083	Biomedical Signal Processing Lab			2	2	4	75
ES	GR14A3044	VLSI Design Lab			2	2	4	75
SPW	GR14A3101	Industry Oriented Mini Project			2	2	4	75
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

IV B.Tech (BME) — I Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A4065	Artificial Neural Networks	3	1		4	5	100
ES	GR14A4106	Rehabilitation Engineering	2	1		3	4	100
ES	GR14A3070	Embedded Systems	2	1		3	4	100
		Elective -I	3	1		4	5	100
ES	GR14A2077	Computer Networks						
ES	GR14A2069	Operating Systems						
ES	GR14A4107	Robotics						
		Elective -II	3	1		4	5	100
ES	GR14A4108	Biomaterials						
ES	GR14A4109	Transport Phenoenon in Living Systems						
ES	GR14A4110	Electromagnetic Interference & Compatibility						
ES	GR14A4111	Virtual Bio-Instrumentation Lab			2	2	4	75
ES	GR14A4112	Advanced Communication Systems Lab			2	2	4	75
ES	GR14A4068	Embedded Systems Design Lab			2	2	4	75
		TOTAL	**13**	**5**	**6**	**24**	**35**	**725**

IV B.Tech (BME) — II Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A4114	Medical Image Processing	2	1		3	4	100
		Elective -III	**2**	**1**		**3**	**4**	**100**
ES	GR14A4115	BioMEMS						
ES	GR14A4116	Physiological Systems Modeling						
ES	GR14A4117	Hospital System Management						
		Elective -IV	**2**	**1**		**3**	**4**	**100**
ES	GR14A4118	Intellectual Property Rights						
ES	GR14A4119	Quantitative Engineering Physiology						
ES	GR14A4120	Medical Informatics						
ES	GR14A4121	Medical Image Processing Lab			2	2	4	75
SPW	GR14A4142	Comprehensive Viva			2	2	4	100
SPW	GR14A4143	Seminar			2	2	4	50
SPW	GR14A4144	Major Project			10	12	12	200
		TOTAL	**6**	**3**	**16**	**27**	**36**	**725**

I-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND SINGLE VARIABLE CALCULUS

Course Code: GR14A1001 L:2 T:1 P:0 C:4
I Year I Semester

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, sinax, cos ax, e^{ax}.V(x) Exponential shift - Method of variation of parameters.

Applications - Deflection of beams, Simple harmonic motion (simple pendulum, spring-mass systems) and RLC circuits.

Teaching methodologies

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

Text Books

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

References

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 L:2 T:1 P:0 C:3
I Year I Semester

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

Reference Books

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING PHYSICS

Course Code: GR14A1007 L:2 T:1 P:0 C:3
I Year I Semester

Unit-I

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

ENGLISH

Course Code: GR14A1005 L:2 T:1 P:0 C:3
I Year I Semester

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 L:2 T:1 P:0 C:3
I Year I Semester

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

FUNDAMENTAL OF ELECTRONICS ENGINEERING

Course Code: GR14A1019 L:3 T:1 P:0 C:4
I Year I Semester

Unit-I

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

Unit-II

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

Special Diodes: Characteristics of Tunnel Diode, Varactor Diode, LED, LCD.

Unit-III

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

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

Unit-IV

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

Unit-V

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

Teaching methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR14A1025 L:0 T:0 P:2 C:2
I Year I Semester

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 dentification 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 L:0 T:0 P:2 C:2
I Year I Semester

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.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING LAB

Course Code: GR14A1027 L:0 T:0 P:2 C:2
I Year I Semester

Task- I

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

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

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

(a) Sum of numbers

(b) Difference of numbers

(c) Product of the numbers

(d)Division of the numbers.

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

d) In a mathematical number sequence let the first and second term in the sequence are 0 and 1. Subsequent terms are formed by adding the preceding terms in the sequence. Write a C program to generate the first 10 terms of the sequence.

Task-II

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

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

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

Task- III

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

b) For a certain electrical circuit with an induction (L) and Resistance (R) ,

the damped natural frequency is given by $f=\sqrt{(1/LC - R^2/4C^2)}$. Write a C program to calculate the frequency for different values of C starting from 0.01 to 0.1.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task - IV

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

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

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

Task - V

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

b) Write a C program to sort the names of 5 students in the alphabetical order.

Ex: Rita, Sneha, Priti, Briya, kitti as Briya , Kitti, Priti, Rita, Sneha

c) Write a C program to print all the rotations of a given string.

Ex: Rotations of the string "NEWS" are NEWS EWSN WSNE SNEW

Task - VI

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

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

Task - VII

Write a C program that uses functions to perform the following:

i) Transpose of a matrix
ii) Addition of Two Matrices
iii) Multiplication of Two Matrices

Task - VIII

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

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

Task- IX

a) Using pointers, write a function that receives a character string and a character as argument and deletes all occurrences of this character in the string.

b) Write a function using pointer parameter that compares two integer arrays to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.

Task -X

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

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

Task-XI

a) Write a c program which accepts employee details like (outer structure : name, employid, salary and (inner structure : area, street number, houseno)).Display the employee names and id belonging to a particular area.

b) Let us suppose that a hotel consists of name, address, average room charge and number of rooms. Then write a function to print out hotels with room charges less than a given value.(structures and functions)

Task - XII

a) Write a C Program to display the contents of a file.

b) Write a C Program 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 L:2 T:1 P:0 C:3
I Year II Semester

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 L:2 T:1 P:0 C:3
I Year II Semester

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 CHEMISTRY

Course Code: GR14A1008 L:2 T:1 P:0 C:3
I Year II Semester

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 reatment 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 relation ships applications of conductance-conductometric titrations-(Strong acid Vs Strong Base and Weak Acid Vs Strong Base). EMF of a cell, Electrode- Single Electrode Potential, Standard Electrode potential, Electro chemical series and its applications, Electrochemical Cells-types, Galvanic cell: cell representation, Cell reactions, Cell EMF, Electrolytic cells, Concentration cell. Batteries-types Lithium Cell(Li-thionyl Chloride), Secondary cells: Pb-PbO_2 cell, Fuel cells: H_2-O_2 fuel cells and their applications.

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

Unit-III

Engineering Materials I: Cement-types-portland cement –composition, Setting & Hardening of Portland cement. Ceramics-types-ceramic products - 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 Emmiting 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.
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

DATA STRUCTURES

Course Code: GR14A1010 L:2 T:1 P:0 C:3
I Year II Semester

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 L:1 T:0 P:2 C:3
I Year II Semester

Unit-I

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

Unit-II

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

Unit -III

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

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

Unit-IV

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

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

Unit-V

ISOMETRIC PROJECTIONS: Principles of Isometric Projection Isometric Scale Isometric Views Conventions Isometric Views of Lines, Plane Figures, Simple and Compound Solids Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

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

Teaching methodology
Power point Presentations, Working models, white board & marker

Text Book

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers

References Book

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

BASIC ELECTRICAL ENGINEERING

Course Code: GR14A1018 L:3 T:1 P:0 C:4
I Year II Semester

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

Fundamentals Of Electrical Machines: Construction, Principle, Operation and Applications of

(i) DC Motor,

(ii) Single phase Transformer

(iii) Single phase Induction motor

Text 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

BUSINESS COMMUNICATION AND SOFT SKILLS

Course Code: GR14A1024 L:0 T:0 P:2 C:2
I Year II Semester

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

IT WORKSHOP

Course Code: GR14A1026 L:0 T:0 P:2 C:2
I Year II Semester

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.

References Books

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course Code: GR14A1030 L:0 T:0 P:2 C:2
I Year II Semester

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 Fe2+ 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 tention of the given unknown liquid by stalagnometer.
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)

II-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: GR14A2050 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I
Probability & Random Variables
Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Baye's Theorem, Independent Events, Random Variable, Functions of random variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Binomial, Poisson, Uniform, Gaussian Distribution.

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

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

Unit-IV
Random Processes -Temporal Characteristics
The Random process, classification, deterministic and no ndeterministic processes, distribution and density Functions, stationarity and statistical independence, first-order stationary processes, second-order and wide-sense stationarity, auto correlation function and its properties, cross-correlation

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

Unit-V

Random Processes-Spectral Characteristics and Noise

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

Modelling of Noise

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

Teaching methodologies

- 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
2. 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 L:3 T:1 P:0 C:4
II Year I Semester

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

Course Objectives
- Create minimal realizations of single and multiple output Boolean functions.
- Derive the digital circuits using flip-flops, counters and registers Derive state diagrams and state transition tables for synchronous systems.

Course Outcomes
- Ability to apply knowledge of digital theory enables the process of logical design.
- Ability to analyze and design registers, counters with the help of flip-flops.
- Demonstrate knowledge of hazards and race conditions generated within asynchronous circuits.

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 Xlinix software

Text Books

1. M Morris Mano and Michael D. Ciletti, Digital Design, Fourth Education, Pearson 5th ed2013.
2. Charles H.Roth Jr., Larry L. Kinney, Fundamentals of Logic Design, Cengaue learning 6th edition, 2013
3. J. Bhaskar, "A VHDL Primer", 3rd edition, Addison Wesley, 2007

Reference Books

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS

Course Code: GR14A2049 L:3 T:1 P:0 C:4
II Year I Semester

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

BIO-ELECTRICITY

Course Code: GR14A2080 L:2 T:1 P:0 C:3
II Year I Semester

Unit-I
Bioelectricity generation at the cellular & sub cellular level. Different bio-potentials and their characteristics.
Nernst Equation: Derivations and its significance. Refractory Period Characteristics of Stimulus. Strength-Duration relationship. Electrical equivalent circuit of Axon. Membrane time and space constants.

Unit-II
Biopotential Electrodes: classification & characteristics. Electrode-Electrolyte Interface, Equivalent Circuit Properties of Needle & Micro Electrodes, Application of Bioelectric phenomena: Forward, Inverse problems. Impedance Plethysmography, Measurement of Tissue Resistance.

Unit-III
Characteristics of Action potentials at SA Node, Atria, A V Node, Purkinje fibers and Ventricles. ECG Complexes, 12 lead ECG. Standard leads of Einthoven, Pericardial leads and Augmented limb leads. Relationship between unipolar extremity leads and standard Bipolar leads.

Unit-IV
Hodgkin- huxley formulation, Membrane conductance, Nerve conduction, membrane properties from current-voltage relations, Models of squid axon, Propagation of impulses in unmyelinated and myelinated nerve fiber, Electrical properties of receptors, Intensity-frequency relationship, Electrical properties of synaptic junctions - EPSP and IPSP. Electro Encephalogram: EEG lead system, behavior of EEG signal.

Unit-V
Electrical activity of skeletal muscles, Motor unit potentials, neuromuscular transmission, EMG wave form, Velocity and their changes in normal and abnormal states, Fatigue and conduction, Chemical significance, Gradation of muscular activity.

Text Books

1. Robert Plonsey and Roger Barr, Bioelectricity, McGraw Hill, 1986.
2. John Webster. Medical Instrumentation.- Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.

Reference Books

1. L. A Geddes, Principles of Applied Biomedical Instrumentation, John Willy & Sons,1989.
2. Plonsey Robert and Flemming David G. Bioelectrical phenomena, McGraw Hill, 1969.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED CHEMISTRY

Course Code: GR14A2081 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I

Properties of Water: pH & Buffers, physiological buffer, The Henderson Hasselbalch equation, Determination of pKa values, Structural aspects of carbohydrates, amino acids and lipids. BIOCHEMISTRY OF LIVING CELL: Types of cells, pro and eukaryotes, Sub cellular- fractionation using the differential centrifugation method, Functions of each organelle, chemical composition of cell walls, Membrane lipids, Transport of substances across biological membrane.

Unit-II

Bio-Energetics: Redox potential, components in electron transport systems in mitochondria, respiratory chain, Oxidative phosphorylation-energenics, Chemical nature of enzymes- properties and kinetics of enzymes, Diagnostic and therapeutic uses of enzymes.

Unit-III

Carbohydrate Metabolism: Respiration-types, Glycolysis and Kreb's cycle, energetics involved**.**

Nucleic Acid Chemistry: Protein synthesis, Transcription and Translation, Replication, Polymerase Chain Reaction (PCR), Immunological techniques or immunoassay- radio immune assay (RIA), ELISA and Chemi-luminescence.

Unit-IV

Blood Chemistry: Chemical composition of blood, Separation of serum proteins and lipoproteins by electrophoresis and Ultracentrifugation, Acid-Base balance. Biochemical measurements: Acid-Base Measurements, Electrolyte status of the patients, Urine analysis.

Unit-V

General Methods of biochemical analysis carried out in the estimation of blood constituents, such as glucose etc. principles and different methods of chromatography, Fluorometry, Flame photometry, Automation of Biochemical analysis, Applications of isotopes in biochemistry.

Text Books

1. Albert L. Lehninger, David Lee Nelson, Michael M. Cox; Principles of Biochemistry 2008.
2. Robert Murray , Peter a Mayes, Vetor w Rodwell; Harper's biochemistry, McGraw-hill 2003

Reference Books

1. Rao N. Mallikarjuna ; Medical Biochemistry, new age 2002
2. Lalit M Srivastava, Nibhiriti das & Subrata Sinha, Essentials of practical Biochemistry. CBS pub. 2002.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MEDICAL SCIENCES LAB

Course Code: GR14A2082 L:0 T:0 P:2 C:2
II Year I Semester

Human Anatomy and Physiology
Video/Practical Demonstrations:

1. Skeletal System: Classification of Bones, Joints and Muscles- Structure and function
2. Cardiovascular System: Heart and vascular system, ECG, Blood Pressure, Homeostasis, Cardiac Output, Coronary and Peripheral Circulation, Heart Sounds
3. Recording of B. P. and Effects of Physical Exertion and Posture on this Parameter.
4. Nervous System: Structure and functions of Neurons, Synapse, Reflex action and Receptors, Velocity of Conduction of Nerve Impulses, Nervous control of Heart.
5. Respiratory System: Trachea and Lungs. Respiratory Physiology - details
6. Endocrine System: Endocrine Glands, Physiology of Endocrine Regulatory System.
7. Digestive System: Oesophagus, Stomach, Intestines, Liver, Gall Bladder and Pancreas
8. Lymphatic System: Spleen, glands and Lymph nodes - details
9. Optics of Eye: Retina, Photochemistry of Vision, Accommodation Neurophysiology of Vision, EOG.
10. Structure and functions Internal Ear: Mechanism of Hearing, Auditory pathway, Hearing Tests.
11. Body Mass Index, Glucometer

Applied/Bio Chemistry

12. Quantitative estimation of Glucose, Urea, Creatinine
13. Quantitative estimation of Serum proteins, A/G Ratio
14. Test for presence of (a) Reducing Sugars (b) Proteins. (c) Ketone Bodies
15. Test for presence of (a) Blood. (b) Bile Salts. (c) Bile Pigments
16. Study of Flame photometry-Analysis of Na and K in an unknown sample
17. Study of Plasma protein electrophoresis.
18. Study of Colorimetry
19. Study of Spectrophotometry

Equipment required

1. Sphygmomanometer
2. Stethoscope
3. BMI apparatus
4. Glucometer (digital)
5. Electrophoresis apparatus
6. Chromatograph
7. Colorimeter.
8. Spectrophotometer.
9. pH meter
10. Flame photometer
11. Kymograph
12. Flame photometer

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL ELECTRONICS LAB

Course Code: GR14A2053 L:0 T:0 P:2 C:2
II Year I Semester

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 Gray 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 Xlinix Software

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

SIGNALS AND SYSTEMS LAB

Course Code: GR14A2052 L:0 T:0 P:2 C:2
II Year I Semester

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

ENVIRONMENTAL SCIENCE

Course Code: GR14A2001 L:4 T:0 P:0 C:0
II Year I Semester

Unit-I

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

Unit–II

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

Unit-III

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

Unit–IV

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

Unit-V

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

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

Teaching methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC CLINICAL SCIENCES

Course Code: GR14A2083 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I

Nephrology: Diseases in Nephrology, Principles of dialysis, Haemodialysis, Acetate dialysis, Bicarbonate dialysis. Peritoneal dialysis, Chronic ambulatory peritoneal dialysis, Haemoperfusion, Sequential ultra-filtration. Haemofiltration, Adequacy of dialysis, Clearance, dialysance, Components of dialysing system, Dialysate, composition of dialysate, Types of dialysers, controls and monitoring devices for dialysers. Clinical significance. Renal transplantation: Basic principles.

Unit-II

Neurology: Diseases of nervous system, spinal cord lesions, motor nervous disease, Prolapsed intravertebral disc, Neuropathies, Myasthenia gravis, Diseases of muscle, Disorders of neuromuscular transmission.

Diagnostic Investigations in Neurology: Electro Encephalo Graphy(EEG). Computerized axial tomography, Angiography, Pneumo encephalography, Neuro-Muscular Stimulation, Electromyography, Clinical applications and significance, Diseases of muscle, Motor neuron disorders, The electrical study of reflexes, The silent period, The F response, The H reflex, The axion reflexes.'

Unit-III

Cardiology: Cardio vascular measurements, Normal and abnormal ECG, interpretation of ECG, Prosthetic devices, Monitors, Heart lung machine applications and Clinical significance, CVP and SWAN catheters. Diagnostic applications, Cardiacpacing. Diagnostic indications. Criteria for selection. Therapeutic indications. Complications. Temporary pacing. Permanent pacing.

Unit-IV

Cardiac Assist Devices: Arterial and Ventricular fibrillation, application of cardiac assist devices. Cardiac catheterisation. Echocardiography, Cine angiography, Treadmill and Ergometer Applications and Clinical significance. Diagnostic usage of ultrasound scanners. Doppler ultrasound measurement. Clinical significance. Open heart surgery grafts, bypass surgery. Instrumentation used for open-heart surgery, Organization of I.C.C.U Clinical aspects.

Unit-V

Gastroentrology: G.I.T its clinically significant symptoms, signs and diseases. Nutritional support and parenteral therapy. Height and weight estimations

according to age. Intravenous cannulae, I. V Sets, Infusion pumps, stomach wash tubes. Various endoscopic procedures, liver biopsy etc.

Text Books

1. Strauss, Maurice B. &Louis G. Welt. Diseases of kidney, vol. 1&2 Little Brown.1997
2. James G. Mcleod, Physiological Approach to Clinical Neurology, Butterworth-Heinemann Ltd, 3rd edition, 1981

Reference Books

1. D. Goldstein, mehmet Oz, Cardiac Assist Devices, Blackwell Future,2002.
2. Robert F Rushmer , Cardio vascular Dynamics. WB Saunders, 1976.
3. T.L Dent. W.E. Stodel, J. G.turcotte, Surgical Endoscopy, year book Medical pub,1985.
4. Jones DB, Wu JS, Soper NJ, Laproscopic surgery: Principles and Procedures2nd ed, Marcel Dekker, 2004.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG INTEGRATED ELECTRONICS

Course Code: GR14A2086 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I

Feedback and Power 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

Operational Amplifier: Block diagram representation of op-amp, schematic symbol, Ideal Op-amp characteristics, open-loop and closed-loop op-amp configurations, Equivalent Circuit of an Op-Amp, Ideal Voltage Transfer Curve, differential amplifier, DC, AC analysis of differential Amplifier, differential amplifier with swamping resistors, constant current bias, current mirror, cascaded differential amplifier stages, level translator, Types of ICs, Development of ICs. Differential amplifier with one, two or three Op- Amps, Output Resistance and Bandwidth of Differential Amplifier with feedback.

Unit-III

Practical Op-amp: Introduction, Input offset voltage, input bias current, input offset current, Total output offset voltage, Thermal Drift, Effect of variation in power supply voltage on offset voltage, change in input offset voltage and input offset current with time, other temperature and supply voltage sensitive parameters, Noise, Common-Mode Configuration and Common-Mode-Rejection Ratio.

Frequency Response of Op-Amp: Introduction Compensating Networks, Frequency Response of Internally Compensated Op-Amps, High-Frequency Op-Amp Equivalent Circuit, Open-Loop Voltage Gain as a Function of Frequency, Closed-Loop Frequency Response, Circuit Stability, Slew Rate; Causes of Slew rate

Unit-IV

General Linear Applications Introduction, DC and AC Amplifiers, AC Amplifiers with a Single Supply Voltage, The peak Amplifier, Summing, Scaling, and Averaging Amplifiers; Inverting, Non inverting and Differential Configuration,

Instrumentation Amplifier, Differential Input and Differential Output Amplifier, Voltage-to-Current Converter with Floating Load; Low-Voltage DC voltmeter, Low-Voltage AC Voltmeter, Voltage to Current converter with Grounded Load, Current to Voltage Converter; DAC Using Current-to-Voltage Converter, Integrator, Differentiator, Basic Comparator, zero-Crossing Detector, Schmitt Trigger, Peak Detector, Sample and Hold Circuit.

Unit-V

Active Filters and Oscillators Introduction to Active Filters, First and second order Low-Pass Butterworth filter; filter Design, Frequency Scaling, First and Second-Order High-Pass Butterworth filters, Band-Pass and Band-Stop Filters; Wide Band-Pass, Band-reject and Narrow Band-Pass, Band Reject filters, All-Pass Filters, Oscillators: Oscillator Principles, Oscillator Types, Frequency Stability, Phase shift oscillator, wien Bridge Oscillator, Quadrature Oscillator, Square-Wave generator, Triangular-wave Generator, Sawtooth-wave generator, Voltage controlled Oscillator; Types of Multi -vibrators.

Teaching methodologies

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

Text Books

1. Electronic Devices and Circuits - Salivahanan, N.Suresh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition, 2011.
2. David A Bell, “Solid State Pulse Circuits”, Prentice Hall Inc, Fourth Edition, 2005.
3. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall of India(p) Ltd,3rd Ed., 2002.

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, Mc Graw Hill.
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

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: Gr142104 L:2 T:1 P:0 C:3
II Year II Semester

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

1. Lectures
2. Power Point presentations
3. Seminars
4. Working out problems on black/white boards,
5. Conducting tutorials
6. 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

MEDICAL IMAGING TECHNIQUES

Course Code: GR14A2084 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I

Fundamentals of X-ray: Electromagnetic Radiation, Interactions between X-rays and Matter, Intensity of an X-ray Beam, Attenuation. Generation and Detection of X-rays: X-ray Generation, Fillers, Beam Restrictors and Grids, Intensifying Screens Fluorescent Screens, X-ray detectors.
X-Ray Image Characteristics: Spatial Resolution, Image Noise, Image Contrast, Receiver Operating Curve (ROC), Image Subtraction, Digital Radiography, bone densitometer, CathLab, X-ray diagnostic methods, Biological effects of ionising radiation, Computer radiography.

Unit-II

Radio Nuclide Imaging: Fundamentals of Radioactivity, Generation and Detection of Nuclear Emission, Diagnostic Methods using Radiation Detector.
Radio Nuclide Imaging Systems: Conventional Tomography, Longitudinal Section Tomography, Computed Tomography, SPECT, PET, Attenuation compensation. Characteristics of Radio nuclide Images, Internal Radiation, Dosimetry and Biological effects,

Unit-III

Fundamentals of Acoustic Propagation: Reflection and Refraction, Attenuation, Absorption, Scattering, Non linearity Parameter and Doppler effect. Image Characteristics: Ultrasonic Texture, Speckle reduction, Compensation of Phase Aberration, Tissue Characterization. Transducer Beam Characteristics, Axial and Lateral Resolution, Focusing arrays.

Ultrasonic Diagnostic Methods: Pulse-Echo Systems, Transmission Methods, Doppler Methods, Duplex Methods, Duplex Imaging. Biological effects due to Ultrasound. Reconstruction Techniques: Algebraic, Iterative reconstruction Techniques, Radon Transform and its applications. Back Projection, Filter Back Projection Algorithms.

Unit-IV

Magnetic Resonance Imaging: Fundamentals of Nuclear Magnetic Resonance, Fourier Spectrum of the NMR Signal, Spin Density, Relaxation Times, Pulse Sequences. Generation and Detection of NMR signal: Magnetic field Gradients, The NMR Coil/ Probe, The Transmitter, and The Receiver.

Unit-V

Characteristics of Magnetic Resonance Imaging: Spatial Resolution, Image contrast. Imaging Methods: Data Acquisition, Spin Echo Imaging, Gradient Echo Imaging, Blood Flow Imaging, NMR Spectroscopy, Sensitivity and Resolution, FMRI – Principles and applications, Imaging Safety. Biological Effects of Magnetic Fields.

Text Books

1. K. Kirk Shung, Michael B. Smith, Benjamin Tsui. Principles of Medical Imaging, Pub : Academic Press, 1992
2. Rangaraj M. Rangayyan, Biomedical Image Analysis", CRC Press, Boca Raton, FL, 2005.

Reference Books

1. Avinash C. Kak, Principles of Computerised Tomographic Imaging. IEEE PRESS,1988

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOTRANSDUCERS AND APPLICATIONS

Course Code: GR14A2085 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I

Introduction: Classification, Basic requirements of bio transducers, Quasi state effects (linearity, Hysterisis), Amplitude distortion, Phase distortion, Sampling errors, Input and Output impedance effects, Factors influencing the choice and design of the transducer in Measuring the Physiological Parameters.

Temperature Transducers: (Measurement Principle, Design and Applications): Thermo resistive, Thermo electric, PN junction diode- Thermometers, frequency change temperature Transducers, Chemical Thermometry, Radiation Thermometry.

Unit-II

Displacement, Transducers: Potentiometric Transducers: Resistive, Resistive strain gauges. L V. D. T, Inductive displacement transducer, Capacitive displacement transducers, Ultrasonic methods.

Force & Velocity Transducers: Differentiation and Integration methods, Doppler system, Methods based on the mass bauer effect, Electro magnetic methods. Acceleration transducers: Piezo electric transducers

Unit-III

Pressure Transducers: Occlusive cuff methods. Force balance methods. Direct hydraulically coupled Catheter transducer system, Diaphragm displacement pressure transducers. Electrical transduction methods for Catheter tip transducer. Optical transducers. Implantable pressure transducer, Micro pressure transducer.

Unit-IV

Flow Transducers: Flow probe design and application: Catheter tip electromagnetic Intra vascular probe & electronic system. Doppler shift flow meters, Pressure gradient technique, Intra vascular Thermistor probe, Water filled plethysmography, Air filled plethysmography, Fick & Rapid injection indicator dilution methods.

Unit-V

Biosensors and Telemetry: Transmission of biological data through radio telemetry. Single channel, multi channel systems. Block diagrams and functions of bio signal transmitters and receivers. Biosensors – Enzymes-based bio-sensors, Immuno Sensors, microbial sensors.

Text Books

1. John Webster. Medical Instrumentation.- Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.
2. Tatsuo Togawa, Toshiyo Tamura & P, Ake Oberg, Biomedical Transducers and Instruments, CRC Press, Boca Raton, 1997.
3. Introduction to Measurements and Instrumentation, second edition,Arun K Ghosh, PHI, New Delhi 2007
4. Anthony P.F.Turner, Isao Karube, George S. Wilson Book, Biosensors: Fundamentals and Applications, Oxford University Press,1987.

Reference Books

1. Richard. S. C.Cobbold; Transducers for Biomedical Measurements-principles and application; Krieger pub Co, 1992
2. L. A Geddes, L.E.Baker, Principles of Applied Biomedical Instrumentation, John Wiley & Sons. 1989.
3. Paul R. Mathewson, John W. Finley, Biosensor Design and Application, Oxford University Press, 1992.
4. Donald G. Buerk, Biosensors: Theory and applications, CRC press, 1st Edition, 1995.
5. Jon Cooper (Editor), Tony Cass (Editor), Biosensors (The practical Approach Series), Oxford University press, USA, 2nd Edition, 2004.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRANSDUCER APPLICATIONS LAB

Course Code: GR14A2087 L:0 T:0 P:2 C:2
II Year II Semester

List of Experiments

1. L.V.D.T
2. STRAIN GAUGE
3. Resistance Thermometry (R. T. D)
4. Thermister & Thermocouple
5. Photo Sensors: Photo Diode, and Photo Transistor
6. Solar Cell and LDR
7. pH Measurement
8. Pressure Measurement
9. Level Measurement
10. Speed Measurement
11. Piezo Electric Transducers
12. Inductive & Capacitive Pickup

The transducers/ equipment required to do the above experiments

1. L.V.D.T
2. STRAIN GAUGE (cantilever strain gauge)
3. Resistance Thermometry (R. T. D)
4. Thermister
5. Thermocouple
6. Photo Sensors: Photo Diode, Solar Cell, and Photo Transistor, L. D. R
7. pH Meter
8. Sealed pressure transducer for Pressure Measurement
9. Micro controller based Level Measurement system
10. Electric pickup and magnetic pickup for Speed Measurement
11. Piezo Electric Transducer
12. Inductive & Capacitive Pickup
13. Multimeter

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MEDICAL IMAGING TECHNIQUES LAB

Course Code: GR14A2088 L:0 T:0 P:2 C:2
II Year II Semester

Implementation of the below Algorithms.

1. Algorithms for Low Pas filter, High Pass Filter, Median Filter
2. Prewitt Edge, Quick Edge Detector
3. Miller's Algorithm
4. Cooley -Turkey Algorithm
5. Numerical Implementation of the Two Dimensional F. F. T.
6. Reconstruction Algorithm for Parallel Projections.
7. Reconstruction Algorithm for Fan Beam Projections
8. Re-Sorting Algorithm
9. Back Projection Algorithm.
10. A.R.T. (Algebraic Reconstruction Techniques).
11. S. A. R. T.
12. S. I. R T (Simultaneous Iterative Reconstruction Technique)

Additional requirements along with the computer facilities C compiler MATLAB or equivalent with signal processing and image processing toolboxes.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALOG ELECTRONICS LAB

Course Code: GR14A2061 L:0 T:0 P:2 C:2
II Year II Semester

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

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

VALUE EDUCATION AND ETHICS

Course Code: Gr142002 L:4 T:0 P:0 C:0
II Year II Semester

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

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

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

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

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

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

Reference Books

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

III-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSING

Course Code: GR14A3046 L:3 T:1 P:0 C:4
III Year I Semester

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 Filtersusing 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: JohnG. 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

References

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOMEDICAL EQUIPMENT

Course Code: GR14A3073 L:3 T:1 P:0 C:4
III Year I Semester

UNIT- I
DIAGNOSTIC EQUIPMENT – I: Bio Amplifiers and signal conditioning circuits. Bioelectric Amplifiers - Different types of Bioelectric amplifiers.
RECORDERS & DISPLAY DEVICES: General features of Thermal, Ink Jet, Photo graphic, Dot Recorders. General features of Display Devices for Bio - Signals.

UNIT-II
DIAGNOSTIC EQUIPMENT - II:E.C.G, T.M.T, E.E.G, E.M.G, P.F.T, Phono cardiography. (Working principle, Types of Electrodes used, Calibration, Basic Trouble Shooting). Ophthalmoscope, Retinoscope.
Analytical equipment: pH Meter, Conductivity Meter, Electrophoresis, Chromatography, Flame Photo Meter, Spectro Photometer, Biochemistry Analyzers, Electrolyte Analyzers, Cell Counter, Blood Gas Analyzer. (Working principle, Types of Electrodes. Calibration. Basic Trouble Shooting)

UNIT-III
MONITORING EQUIPMENT: Bedside monitors, Multi parameter monitors, Arrhythmia monitors, Holter monitor. Blood Pressure Monitors, Central monitoring stations in critical care units, Ambulatory monitors, foetal monitors.,Apnea monitors.

UNIT-IV
THERAPEUTIC EQUIPMENT-I: Infusion pumps, Suction Apparatus. Pacemaker: Synchronous -Asynchronous, External -Internal, Demand & Fixed type Pacemaker, Programmable Pacemakers. Defibrillators: AC & DC Defibrillators, Synchronous & Asynchronous. Electrical Safety. Nerve stimulators, Bladder stimulators, Implant able Stimulators,

UNIT-V
THERAPEUTIC EQUIPMENT- II: Short wave Diathermy,Micro wave Diathermy, Ultra Sound Diathermy, Heart Lung machine: Governing principle, Qualitative Requirements, Functional details of thin film membrane type blood oxygenators. I. A. B. P:-principle & application.

Text Books

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

Reference Books

1. Bronzino, Joseph; Handbook of Biomedical Engineering. 2nd edition, CRC Press, 2000.
2. Bio-Medical Instruments Theory & Design. Welkowitz, Walter & Others, 2nd Edition, Academic Press, 1991

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICRO CONTROLLERS

Course Code: GR14A2055 L:3 T:1 P:0 C:4
III Year I Semester

UNIT-I
Introduction and 8086 Architecture: Introduction to microprocessors, 8086 Architecture: Functional diagram, Register organization, Memory segmentation, Programming model, Memory address, Physical memory organization, Signal description of 8086, Timing diagrams, Interrupts of 8086.

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

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

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

UNIT-V
8051 Microcontroller Design: Introduction, Microcontroller specification, Microcontroller Design, Testing the Design, Timing subroutines, Serial Data Transmission.

Applications and Serial Data Communication: Keboards, Displays, Pulse measurement, D/A and A/D Conversions, Multiple Interrupts, Serial data Communication;

Teaching methodologies

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

Text Book

1. D.V.Hall, Microprocssors 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 Book

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

PRINCIPLES OF COMMUNICATION

Course Code: GR14A3074 L:3 T:1 P:0 C:4
III Year I Semester

UNIT-I
Introduction: Block diagram of Electrical communication system, Radio communication :Types of communications, Analog, pulse and digital Types of signals, Fourier Transform forvarious signals, Fourier Spectrum, Power spectral density, Autocorrelation, correlation,convolution.

UNIT-II
Amplitude Modulation: Need for modulation, Types of Amplitude modulation, AM, DSBSC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM : Diode detector, Product demodulation for DSB SC & SSB SC.
Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT-III
Pulse Modulations: Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

UNIT-IV
Digital Communication: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

UNIT-V
Information Theory: Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shanon-Fano and Huffman coding.
Error control coding: Introduction, Error detection and correction codes, block codes, convolution codes.

Text Books

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20threprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

References Books

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and MasoudSalehi, PHI,2nd Ed. 2004.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

GENERAL SURGERY AND RADIOLOGY

Course Code: GR14A3075 L:2 T:1 P:0 C:3
III Year I Semester

UNIT-I
Surgical Procedures: Electrosurgical Generators – Hazards and Safety Measures, Types of Invasive and non-invasive monitoring – Ventilators, Humidifiers, Nebulizers, O.T. Table. Organization of theatres, CSSD.

UNIT-II
Mechanism of Respiration: Gas exchange, Artificial respiration, Diagnostic and Therapeutic indications.
Anesthesia: Anesthesia Types, Pre-anesthetic care and preparation. Postoperative care Laws of gases. Patient monitoring during surgery: Monitoring of respiration and temperature.

UNIT III
Radio therapy: Principles of radiation oncology, Radio sensitivity and radio resistance of tumors and Tissues. Classification of Tumors. Cell survival theory, Oxygen effect. Therapeutic ratio. Normal Tissue tolerance dose. Modification of radiation response Physical, chemical and Biological modifiers.

UNIT-IV
Management on radiation: Radioactive protection. Somatic effects, LD 50. Radiation effects on skin, blood, Reproductive organs and Embryo. Radiation carcinogenesis. Cataract, Genetic effects

UNIT-V
Hazards and permissible exposures. Maximum permissible occupational doses, Protective lines of defense. Protective measures. Physical measurements and medical tests.

Text Books
1. Ronald. D. Miller., Miller's Anesthesia: 2 volume set, 2004.
2. W.J. Meredith &J.B.Massey, Fundamental Physics of Radiology. Johns and Cunningham, 1984

Reference books
1. Ramesh Chandra, Introductory Physics of Nuclear Medicine
2. Lawrence AKaplan etal., Clinical Chemistry: Theory, Analysis, Correlation, 4th Ed, 2002.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

Course Code: GR14A3100 L:0 T:0 P:2 C:2
III Year I Semester

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: Mnual 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, HertaA.,Herbert W. Hildebrandt, and Jane P.Thomas 2009,Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOMEDICAL EQUIPMENT LAB

Course Code: GR14A3076 L:0 T:0 P:2 C:2
III Year I Semester

1. ECG Monitor
2. EEG,
3. EMG
4. Pace Maker
5. DC Defibrillator
6. Short Wave Diathermy Unitf
7. Ultrasound Diathermy Unit
8. Safety Evaluation Circuits
9. Audiometer
10. Pulmonary Function test (PFT)
11. Ultra Sound Scanner
12. Electro surgical unit.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICRO CONTROLLERS LAB

Course Code: GR14A2059 L:0 T:0 P:2 C:2
III Year I Semester

List of experiments on 2G kit

1. LED patterns

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

2. Switches & LEDs

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

3. LCD

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

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOMEDICAL SIGNAL PROCESSING

Course Code: GR14A3077 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I
Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DCT and the K L transform.

UNIT-II
Cardiological Signal Processing: Pre-processing. QRS Detection Methods. Rhythm analysis. Arrhythmia detection Algorithms. Automated ECG Analysis. ECG Pattern Recognition. Heart rate variability analysis.

UNIT-III
Adaptive Noise Canceling: Principles of Adaptive Noise Canceling. Adaptive Noise Canceling with the LMS adaptation Algorithm. Noise Canceling Method to Enhance ECG Monitoring. Fetal ECG Monitoring.

UNIT-IV
Signal Averaging, polishing–mean and trend removal, Linear prediction. Yule–walker(Y–W) equations.
Neurological Signal Processing: Modeling of EEG Signals. Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves. Auto Regressive (A.R.) modeling of seizure EEG. Sleep Stage analysis. Inverse Filtering. Least squares and polynomial modeling.

UNIT- V
Original Prony's Method. Prony's method, Prony's Method based on the Least Squares Estimate. Analysis of Evoked Potentials.

Text Books
1. Rangaraj M. Rangayyan – Biomedical Signal Analysis. IEEE Press, 2001.
2. D.C.Reddy, Biomedical Signal Processing- principles and techniques, Tata McGraw-Hill, 2005.
3. Biomedical Digital Signal Processing, Willis J.Tompkins, PHI,

Reference Books

1. Weitkunat R, Digital Bio signal Processing, Elsevier, 1991.
2. AkayM , Biomedical Signal Processing, Academic: Press 1994
3. Cohen.A, Biomedical Signal Processing -Vol. I Time & Frequency Analysis, CRC Press, 1986.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

VLSI DESIGN

Course Code: GR14A3043 L:3 T:1 P:0 C:4
III Year II Semester

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

UNIT-II
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage Vt, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter-analysis and design, BiCMOS Inverters, Power, Sources of Power Dissipation, Dynamic Power, Static Power, Robustness, Variability, Reliability, Circuit simulation, SPICE tutorials, device models.

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

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

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

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, 3rdEdition, 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

BIOFLUIDS AND MECHANICS

Course Code: GR14A3078 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I

BIO-FLUID MECHANICS: Newton's laws, Stress, Strain, Elasticity, Hookes-law, viscosity, Newtonian fluid, Non- Newtonian fluid, Viscoelastic fluids, vascular tree, Relationship between diameter, velocity and Pressure of blood flow, Resistance against flow.

UNIT-II

FLOW PROPERTIES OF BLOOD: Physical chemical and Rheological properties of blood. Apparent and relative viscosity, Blood viscosity variation: Effect of shear rate, hematocrit, temperature, protein contents of blood. Casson's equation, Problems associated with extracarporeal blood flow.

RHEOLOGY OF BLOOD IN MICROVESSELS: Fahraeus -Lindquist effect and inverse effect, distribution of suspended particles in a narrow rigid tube. Nature of red cells in tightly fitting tubes, hematocrit in very narrow tube

UNIT-III

BIOVISCOELASTIC FLUID: Viscoelasticity, Viscoelastic models Maxwell, Voigt and Kelvin Models, Response to Harmonic variation, Use of viscoelastic models Bio- Viscoelastic fluids: Protoplasm, Mucus, Saliva, Synovial fluids.

UNIT-IV

CARDIAC MECHANICS: Cardiovascular system. Mechanical properties of blood vessels: arteries, arterioles, capillaries and veins. Blood flow: Laminar and Turbulent, Physics of cardiovascular diseases, Prosthetic heart valves and replacements.

RESPIRATORY MECHANICS: Alveoli mechanics, Interaction of Blood and Lung P.V curve of Lung. Breathing mechanism, Airway resistance, Physics of Lung diseases.

UNIT-V

SOFT TISSUE MECHANICS: Pseudo elasticity, non-linear stress-strain relationship, Viscoelasticity, Structure, function and mechanical properties of skin, ligaments and tendons.

ORTHOPEDIC MECHANICS: Mechanical properties of cartilage, diffusion properties of Articular cartilage, mechanical properties of bone, kinetics and kinematics of joints, lubrication of joints.

Text Books

1. Y.C Fung, Biomechanics- Mechanical properties of living tissues,2nded, Springer-Verlag, 1993.
2. D.O Cooney, Biomedical engineering Principles. Marcel Dekker, INC New York.1976.

Reference Books

1. Silver Frederick H. Biomaterials, Medical Devices & Tissue Engineering: Chapman & Hall, London, 1994
2. Fundamentals of Biomechanics by NihatÖzkaya, Margareta Nordin, Dawn Leger,1991.
3. D.A Mc Donald, Blood flow in arteries, Edward Arnold ltd, 1998.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

LASERS AND FIBER OPTICS AND MEDICINE

Course Code: Gr142002 L:2 T:1 P:0 C:3
III Year II Semester

UNIT-I
Optical fibers: Coherent and incoherent bundles, Light transmission and image transmission systems in rigid and flexible endoscopes. Laser and Fiber optics applications in surgery

UNIT-II
Laser: Properties, Laser interaction with tissues, Photo medicine & Photo biology lasers used for medical applications-CO2, Ruby, Nd-YAG, Ar, Kr, He-Ne.

UNIT-III
Application of Lasers in Ophthalmology-laser refractor, laser accuracy testing, Laser treatment of Corneal ulcers, Laser Photo coagulators. Laser & Fiber optics in Dermatology. Fundus camera, OCT(optical coherence tomography)

UNIT-IV
Endoscopy: Bronchoscope, Gastroscope. Laser and Fiber optics applications in Dentistry – Laser Induced carrier inhibition, Laser effects on Dental soft tissues.

UNIT-V
Standards, Potential Hazards of lasers, safety regulations and precautions. Medical surveillance.

Text Books
1. Biomedical Aspects of the Laser, by Leon Goldman, Springer Verlag, 1967
2. Lasers in Medicine by H. K. Koebmer, John Wiley & Sons, 1980.
3. Handbook of Analytical Instrumentation -R. S. Khandpur.

Reference Books
1. Laser Applications in Medicine and Biology vol I, II, III Plenum Press, (1971 & 1974) by M. L. WelBasht.
2. Laser Hand Book, Vol 11, Academic Press London (1972) by F. T. Arrechi
3. Introduction to Lasers and Their Applications by Osheacallen and Rhodes, Addison . Wesley- 1977.
4. Lasers in Photo medicine and Photo Biology by E. D. R. Pratesi& C. A Sacchi, Springer verlac 1980.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOLOGICAL CONTROL SYSTEMS

Course Code: GR14A3080 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I

System Modelling: Introduction to control system-Basic elements in control system –Open and closed loop control systems – Differential equation representation of physical systems – Transfer function –Mathematical modeling of electrical and mechanical systems (Translational and Rotational) –Analogous system- Block diagram representation of systems- Block diagram reduction techniques – Signal flow graph.

UNIT-II

Time Domain Analysis: Standard test signals- First order system - step, ramp and impulse response analysis-Second order system – step response analysis-steady state error –generalized error co-efficients –Effect of adding a zero to system- stability analysis – Routh Hurwitz criterion – Root locus method

UNIT-III

Frequency Domain Analysis: Frequency response –Frequency domain specifications –Correlation between time domain and frequency domain specifications-Bode plot –Stability analysis using Bode plot- transfer function from bode plot-Polar plot – Nyquist stability criterion.

UNIT-IV

Examples of Biological Control Systems. Pupil Control System. Visual Fixation System. Oculo-motor System. Skeletal Muscle Servomechanism. The Semicircular Canal. Free Swinging Limbs. Thermo Regulation.

UNIT-V

Respiration Models and Controls. Cardiovascular Control Systems. Sugar Level Control Mechanism. Endocrine Control System. Excretion Control. Human Operator Tracking Characteristics. Biological Receptors-Receptor Characteristics. Transfer Function Models of Receptors.

Text Books

1. Ogata Katsuhika, Modern Control Engineering, Second Edition, Prentice Hall of India, 1992.
2. Michel C Khoo, Physiological Control Systems -Analysis, simulation and estimation, Prentice Hall of India, 2001.

3. I.J.Nagrath, M. Gopal, “Control Systems Engineering”, Fifth Edition, New Age International, New Delhi, 2007.

Reference Books

1. Milsum John H. Biological Control Systems Analysis, McGraw-Hill, 1996

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

RELAIBILITY ENGINEERING

Course Code: GR14A3081 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I
Discrete and continuous random variables. Probability density function and cumulative distribution function. Mean and variance. Binominal, Poisson, exponential and Weibull distributions.

UNIT-II
Failure and causes of failure. Failure rate and Failure density. Reliability function MTTF. Bath tub curve for different systems. Parametric methods or above distributions. Nonparametric methods from filed data.

UNIT-III
Reliability block diagram. series and parallel system .Net work reduction technique, examples. evaluation of failure rate, MTITE and reliability, active and stand by redundancy , r out of n configuration. Non-series- parallel systems. Path based and cut set methods.

UNIT-IV
Availability, MTFR and NTBF Markov models and state transition matrices. Reliability modes for single component, two component. Load sharing and standby systems. Reliability and Availability models of two unit parallel system with repair and standby system with repair.

UNIT-V
Repairable systems, maintainability, preventive maintenance. Evaluation of reliability and MTTF. Overhauling and replacement. Optimum maintenance policy. Markov model of a power plant with identical units and non-identical unit. Capacity outage probability able. Frequency of failures and cumulative frequency.

Text Books

1. Charles E. Ebeling, Reliability and Maintainability Engineering, Tata Mcgraw Hill, International edition, 1997.
2. Balaguruswamy, Reliability Engineering, Tata Mcgraw Hill publishing company, 1984.
3. SR.N.Allan, Reliability Evalution of Engineering systems, Pitman, publishing, 1996.

Reference Books

1. Endrenyi, Reliability modeling in Electric Power System, John Wiley & sons, 1978.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

TELEMEDICINE

Course Code: GR14A3082 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I
History of telemedicine, Block diagram of telemedicine system, Definition of telemedicine, Tele health, Tele care, organs of telemedicine, scope, Benefits, and limitations of telemedicine.

UNIT-II
Type of information: Audio, Video, Still images, Text and data, fax, type of communications and network, PSTN, POTS, ANT, ISDN, Internet, Air/ wireless communications: GSM satellite, and Micro wave. Different Modulation techniques. Types of antennas depending on requirements, Integration and operational issues: - system integration, store –and - forward operation, Real-time Telemedicine.

UNIT-III
Data Exchange: Network Configuration, circuit and packet switching, H. 320 series (Video phone based ISBN) T. 120, H.324 (Video phone based PSTN). Video Conferencing.

UNIT-IV
Data Security and Standards: Encryption, Cryptography, Mechanisms of encryption, phases of Encryption. Protocols: TCP/IP, ISO-OSI, Standards to followed DICOM, HL7.
Ethical and legal aspects of Telemedicine: Confidentiality, and the law, patient rights and consent, access to medical Records, Consent treatment, jurisdictional Issues, Intellectual property rights.

UNIT-V
Tele radiology: Definition, Basic parts of teleradiology system: Image Acquisition system Display system, Communication network, Interpretation section. Tele pathology: multimedia databases, color images of sufficient resolution: Dynamic range, spatial resolution, compression methods, Interactive control of color, controlled sampling security and confidentiality tools, telecardiologyTeleoncology, Telesurgery.

Text Books

1. Olga (EDT) Ferrer – Roca, M.Sosa (EDT) Iudicissa Hand book of Telemedicine IOS press 2002
2. A.C. Norris, Essentials of Telemedicine and Telecare John Sons & Ltd, 2002

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOMEDICAL SIGNAL PROCESSING LAB

Course Code: GR14A3083 L:0 T:0 P:2 C:2
III Year II Semester

LIST of EXPERIMENTS

1. Computation of Convolution and Correlation Sequences.
2. Analog and Digital Signal Conditioning.
3. Signal Averaging Improvement in the SNR Using Coherent Averaging.
4. Adaptive filters
5. Exponential Averaging.
6. Data Polishing: Mean and Trend Removal.
7. Design of I I R Filter.
8. Design of F I R Filter.
9. PSD Estimation.
10. Data Compression Techniques: AZTEC, TP.
11. Data Compression Technique: CORTES.
12. Data Compression Technique: DCT

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

VLSI LAB

Course Code: GR14A3044 L:0 T:0 P:2 C:2
III Year II Semester

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

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.

IV-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICIAL NEURAL NETWORKS

Course Code: GR14A4065 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS: Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

UNIT-II
FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS : Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or LeastmeanSqure (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

UNIT-III
FEED FORWARD NETWORKS: Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem, Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT-IV
ADALINE AND MADALINE NETWORKS: Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.
COUNTER PROPAGATION NETWORKS : Winner Take – all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

UNIT-V

ASSOCIATIVE MEMORY NETWORKS - I : Types, Architecture, Continuous and Discrete Hopfield Networks, Energy Analysis, Storage and Retrival Algorithms, Problems with Hopfield Networks.

ASSOCIATIVE MEMORY NETWORKS-II: Boltzman Machine, Bidirectional Associative Memory, Adaptive Resonance Theory Networks Introduction, Architecture, Algorithm.

APPLICATIONS OF NEURAL NETWORKS: Implementation of A/D Converter using Hopfield Network, Solving Optimization Problems, Solving Simultaneous Linear Equation, Solving Traveling Salesman Problems using Hopfield Networks, Application in Pattern Recognition, Image Processing.

Text Books

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition.
2. Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH.

Reference Books

1. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International.
2. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.
3. Fundamental of Neural Networks – LaureneFausett, Pearson, 1st Ed.
4. Artificial Neural Networks - B. Yegnanarayana, PHI.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

REHABILITATION ENGINEERING

Course Code: GR14A4106 L:2 T:1 P:0 C:3
IV Year I Semester

UNIT-I

Engineering concepts in rehabilitation Engineering. Anthropometry: Methods for Static and dynamic Measurements: Area Measurements, Measurement of characteristics and movement, Measurement of Muscular Strength and Capabilities. Measurement tools and processes in Rehabilitation engineering: fundamental principles, structure, function; performance and behaviour. Subjective and objective measurement methods. Ergonomic aspects in designating devices: Introduction to Models in Process Control, Design of Information Devices, Traditional Devices, V.D.U' s, Using colour, Design of Controls

UNIT-II

Engineering concepts in sensory rehabilitation Engineering. Sensory augmentation and substitution: Visual system: Visual augmentation, Tactual vision substitution, and Auditory vision substitution. Auditory system: Auditory augmentation, Audiometer, Hearing aids, cochlear implantation, visual auditory substitution, tactual auditory substitution, Tactual system: Tactual augmentation, Tactual substitution.

UNIT-III

Orthopedic Prosthetics and Orthotics in rehabilitation: Engineering concepts in motor rehabilitation, applications. Computer Aided Engineering in Customized Component Design. Intelligent prosthetic knee. A hierarchically controlled prosthetic hand. A self-aligning orthotic knee joint. Externally powered and controlled Orthotics and Prosthetics. FES systems-Restoration of hand function, restoration of standing and walking, Hybrid Assistive Systems (HAS). Active Prostheses: Active above knee prostheses. Myoelectric hand and arm prostheses- different types, block diagram, signal flow diagram and functions. The MARCUS intelligent Hand prostheses

UNIT-IV

ARTIFICIAL LARYNX (pneumatic & electronic): Analyzing artificial electronic larynx, Augmentative communication, control and computer access (AAC): user interface; outputs; acceleration techniques; Intervention and other issues;

UNIT-V

Environmental control systems: Environmental control and Access to computers.

Computer applications in Rehabilitation engineering: Interfaces in compensation for visual perception. Improvement of orientation and mobility, Computer assisted lip reading, Brain computer interface.

Text Books

1. Bronzino, Joseph; Handbook of biomedical engineering. 2nd edition,CRC Press, 2000.
2. Robinson C.J Rehabilitation engineering. CRC press 1995

Reference Books

1. Horia- NocholaiTeodorecu, L.C.Jain , intelligent systems and technologies in rehabilitation engineering; CRC; December 2000.
2. Etienne Grandjean, Harold Oldroyd, Fitting the task to the man, Taylor & Francis,1988.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED SYSTEMS

Course Code: GR14A3070 L:2 T:1 P:0 C:3
IV Year I Semester

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.

Text Book

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

Reference Books

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.

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COMPUTER NETWORKS

Course Code: GR14A2077 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
Introduction: Uses of Computer Networks, Network Hardware, Network Software, ReferenceModels: OSI, TCP/IP, Examples Networks: Arpanet, Internet, ATM.

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

UNIT-II
Data link layer: Design issues, framing, error detection and correction, Elementary Data LinkProtocol, 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 ControlAlgorithms, QoS, & the Network Layer in the Internet.

UNIT-IV
Transport Layer: Transport Services, Elements of Transport Protocols. The Internet TransportProtocols: 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, Thomson A

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OPERATING SYSTEMS

Course Code: GR14A2069 L:3 T:1 P:0 C:4
IV Year I Semester

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, theirevaluation, 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, AccessMatrix, 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. Dhamdhere, 2nd Edition, TMH
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

ROBOTICS

Course Code: GR14A4107 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
BASIC CONCEPTS: Automation and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system, Dynamic stabilization of Robotics.Hydraulic, Pneumatic and electric drivers – Determination HP of motor and gearing ratio, variable speed arrangements, Path Determination - Machinery Vision – Ranging – Laser – Acoustic, Magnetic Fiber Optic and Tactile Sensor

UNIT-II
MANUPULATORS: Construction of Manupulators, Manupulator Dynamic and Force Control, Electronic and Pneumatic manupulators.
ACTUATORS AND GRIPPERS: Pneumatic, Hydraulic Actuators, Stepper Motor Control Circuits, End Effecter, Various types of Grippers, Design consideration.

UNIT-III
Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.
KINEMATICS: Forward and Inverse Kinematic Problems, Solutions of Inverse Kinematic problems, Multiple Solution, Jacobian Work Envelop – Hill Climbing Techniques.

UNIT-IV
PATH PLANNING : Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT-V
CASE STUDY: Multiple Robots – Machine Interface – Robots in Manufacturing and Non-Manufacturing applications – Robot Cell Design Selection of a Robot.

Text Books
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics / Fu K S/ McGraw Hill.

Reference Books

1. Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.
3. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science
6. Introduction to Robotics / John J Craig / Pearson Edu.
7. Robot Dynamics and Control by Mark W. Spong and M. Vidyasagar, John Wiley & Sons.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIOMATERIALS

Course Code: GR14A4108 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I

Properties of Materials. Classes of materials used in medicine: Metals, Polymers, Hydrogels Bio-resorbable and Biodegradable Materials, Ceramics, Natural materials composites thin films, grafts, Coatings medical fibers and Biological functional materials, Smart materials, Nano biomaterials.

UNIT-II

Host reactions to: Inflammation, Wound healing and the Foreign body response.Systemic toxicity and Hypersensitivity. Blood coagulation and Blood-materials Interactions. Tumorogenesis.

Testing biomaterials:In Vitro assessment of tissue compatibility In vivo assessment of tissue compatibility. Testing of blood-materials interactions, Degradation of materials in the biological environment

UNIT-III

Applications of materials in medicine, Dentistry and Biology: Cardiovascular medical devices. Dental implantation adhesive and Sealants. Ophthalmologic applications-intraocular lens implants.Orthopedic biomaterials,

UNIT-IV

Materials for extracorporeal devices. Cochlear implants. Artificial red blood cell substitutes.Performance of drug delivery systems, Sutures. Burn dressings and Skin substitutes.

UNIT-V

Sterilization of implants and Devices implants and Device failure. Surface properties with Biological responses. Implant retrieval and Evaluation.Standards development and regulation of medical products using biomaterials.

Text Books

1. Biomaterials Science: An Introduction to Materials in Medicine Buddy D. Ratner, Frederick J. Schoen, Allan S. Hoffman, Jack E. Lemons
2. Hench L LEthridgc E.C. Biomaterials, an interfacial approach, Academic press 1982

Reference Books

1. Bronzino J D, the biomedical engineering handbook CRC Press.

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TRANSPORT PHENOMENON IN LIVING SYSTEMS

Course Code: GR14A4109 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
Heat Transport: Body temperature regulation modes of heat transfer. Heat transportation in Tissues, Muscles, Skin and other Organs in different environmental temperatures. Models of heat transfer in the body.

UNIT-II
Fundamentals and applications of mass transport. Introduction to Mass Transport. Diffusion with Convection or Electrical Potentials. Transport in Porous Media. Transvascular Transport. Solvent and Solute Transport across the Kidney Glomerulus.

UNIT-III
Processes of mass transfer Diffusion, Osmosia, ElectroOsmasia. Ultra filtration. Reverse Osmosia through natural Membrane systems, Reverse Osmosia through artificial synthetic Membranes.

UNIT-IV
Mass Transport and Biochemical Interactions, Oxygen Transport from the Lungs to the Tissues.

UNIT-V
Mass transfer: Mass transfer in Kidney, Skeletal, Nervous, G. I. system, Cardio Pulmonary system. Mass transfer in dialysers and oxygenators.

Text Books
1. David.O. Cooney, Biomedical engg. Principles: An introduction to fluid, Heat & Masstransport process Vol&2 ; Marcel Dekker inc,.

Reference Books
1. Fournier, Ronald L,.Basic transport phenomena in biomedical engineering.Taylor& Francis. 1998
2. Medical physiology by Ganong
3. Physiology by Best and Taylar

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

Course Code: GR14A4110 L:3 T:1 P:0 C:4
VI Year I Semester

UNIT-I
BASIC CONCEPTS: Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT-II
EMI MEASUREMENTS Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection t6echnique open area site, shielded anechoic chamber, TEM cell.

UNIT-III
EMC STANDARD AND REGULATIONS National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT-IV
EMI CONTROL METHODS AND FIXES Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT-V
EMC DESIGN AND INTERCONNECTION TECHNIQUES Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

Text Books

1. Prasad Kodali.V – Engineering Electromagnetic Compatibility – S.Chand&Co – New Delhi – 2000
2. Clayton R.Paul – Introduction to Electromagnetic compatibility – Wiley & Sons – 1992

Reference Books

1. Keiser – Principles of Electromagnetic Compatibility – Artech House – 3rd Edition – 1994
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I - 1985

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

VIRTUAL BIO- INSTRUMENTATION LAB

Course Code: GR14A4111 L:0 T:0 P:2 C:2
IV Year I Semester

LIST OF EXPERIMENTS

1. Basic Arithmetic Operations.
2. Boolean operations
3. For, While Loops
4. Array operations
5. waveform generations
6. Clusters- bundle/ unbundle
7. Flat and stacked sequences
8. Case structures
9. Filters- LPF, HPF, Median
10. Compressions- DCT
11. Convolution of signals
12. Importing files- Global/ local variables.

Software required is LABVIEW or any Equivalent toolboxes

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ADVANCED COMMUNICATION SYSTEMS LAB

Course Code: GR14A4112 L:0 T:0 P:2 C:2
IV Year I Semester

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 9600every 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 tour 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.

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EMBEDDED SYSTEMS LAB

Course Code: GR14A4068 L:0 T:0 P:2 C:2
IV Year I Semester

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

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MEDICAL IMAGE PROCESSING

Course Code: GR14A4114 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
DIGITAL IMAGE FUNDAMENTAL
Elements of digital image processing systems, Elements of Visual perception, Image sampling and quantization, Some Basic relationships between pixels, Matrix and Singular Value representation of discrete images.

UNIT-II
IMAGE TRANSFORMS
1D DFT, 2D DFT, Cosine, Sine Hadamard, Haar, Slant, KL transform and their properties.

UNIT-III
IMAGE ENHANCEMENT
Histogram – Modification and specification techniques, Enhancement by point processing Image smoothening, Image sharpening, generation of spatial masks from frequency domain specification, Homomorphic filtering, and color image-fundamentals, models.

UNIT-IV
IMAGE RESTORATION AND RECONSTRUCTION OF MEDICAL IMAGES
Image degradation models, Unconstrained and Constrained restoration, inverse filtering, Least mean square filter, Image reconstruction from projections – Radon transforms, Filter back projection algorithm, 3D tomography, Fourier reconstruction of MRI Images.

UNIT-V
MEDICAL IMAGE COMPRESSION TECHNIQUES
Run length, Huffman coding, arithmetic coding, Pixel coding, transform coding, JPEG Standard, predictive techniques, Application of image processing techniques in thermography, SPECT, PET images.

Text Books
1. Rafael C., Gonzalez and Richard E. Woods, Digital Image Processing, Pearson Education Asia, 2001
2. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 1997

Reference Books

1. William K. Pratt, Digital Image Processing, John Wiley, NJ, 1987.
2. Albert Macouski, Medical Imaging systems, Prentice Hall, New Jersey.1983.
3. Sid Ahmed M.A., Image Processing Theory, Algorithm and Architectures, McGraw Hill

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BIOMEMS

Course Code: GR14A4115 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I

Introduction: history of MEMS, market for MEMS, overview of MEMS processes, properties of silicon, a sample MEMS process. Basics of Microtechnology: definitions and terminology, a sample process, lithography and etching.MEMS Biosensors: Bio Flow Sensors, MEMS Images. Introduction to MEMS Pro design software.

UNIT-II

Micromachining: subtractive processes (wet and dry etching), additive processes (evaporation, sputtering, epitaxial growth). Fundamental Devices and Processes: basic mechanics and electrostatics for MEMS, parallel plate actuators, pull-in point, comb drives.

Fundamental Devices and Processes: more electrostatic actuators; MEMS foundries, Cronos MUMPs (multi user MEMS process). MUMPs Multi User MEMS Process: JDS Uniphase MUMPs processing sequence and design rules. MUMPs and SUMMIT: design rules; applications; micro hinges and deployment actuators.

UNIT-III

CMOS MEMS: CMOS foundry processes, integrated IC/MEMS, MEMS postprocessing, applications. Cleanroom lab techniques: clean rooms, gowning procedures; safety, fire, toxicity; acids and bases; photolithography.

MicroOptoElectroMechanical Systems (MOEMS): micro scanners, digital mirror display, retinal scanning display. Grating light valve, corner cube retroreflector, optical switches, other micro-optical devices.

UNIT-IV

Thermal Transducers: bimorphs, “heatuators”, cilia arrays. Piezoresistivity; Scanning Probe Microscopy: scanning tunneling microscope (STM), atomic force microscope (AFM).

Scaling Laws. Wireless MEMS: mechanical and electrical resonators, Q-factor, switches, filters. Power for MEMS: thin film batteries, micro fuel cells, energy fields, microfliuds.

UNIT-V

MEMS Packaging and Assembly: microassembly: serial and parallel, deterministic and stochastic; microgrippers: HexSil process; packaging techniques. The Future of MEMS: bioMEMS - neural implants, gene chips, diagnostic chips; MEMS in space; mechanical computers; invisible and ubiquitous computing.

Text Books

1. HSU, TAI RAN, MEMS AND MICROSYSTEMS Design And Manufacture, Tata McGraw-Hill,2002.
2. Rai-Choudhury, Prosenjit; Mems and Moems Technology and Applications SPIE 2000.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PHYSIOLOGICAL SYSTEMS MODELING

Course Code: GR14A4116 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
The problem of system modeling in Physiology. Types of Nonlinear models of physiological systems. Deductive and Inductive modeling.
Nonparametric modeling: Volterra models. Wiener models. Efficient volterra kernel estimation Analysis of estimation errors.

UNIT-II
Parametric modeling: Basic parametric model forms and Estimation procedures. Volterra kernels of nonlinear differential equations. Discrete-time volterra kernels of NARMAX models. From Volterra kernel measurements to Parametric models. Equivalence between continuous and Discrete -parametric models.

UNIT-III
Preliminary tests and Data preparation. Model specification and Estimation. Model validation and Interpretation. Outline of step-by-step procedure.
Applications: Neurosensory systems: Cardiovascular system, Renal system, Metabolic-Endocrine system.

UNIT-IV
Modeling of multiinput / multioutput systems: The Two-input case. Application s of Two-input modeling to physiological systems. The Multiinput case spatiotemporal and spectrotemporal modeling.

UNIT-V
Modeling of neuronal systems: A General model of membrane and Synaptic dynamics, Functional integration in the Single neuron, Neuronal systems with Pointprocess inputs Modeling of neuronal ensembles. Modeling of Closed-loop systems: Autoregressive form of Closed-loop model, Network model form of Closed-loop systems.

Text Books
1. Vasilis Z. Marmarelis, Nonlinear dynamic modeling of physiological systems, Wiley-IEEE Press, 2004.

Reference Books

1. David T. Westwick, Robert E. Kearney, Identification of Nonlinear Physiological Systems, Wiley-IEEE Press, 2003.
2. Michel C Khoo, Physiological Control Systems -Analysis, simulation and estimation, Prentice Hall of India, 2001.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

HOSPITAL SYSTEM MANAGEMENT

Course Code: GR14A4117 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I

Classification of Hospital Systems: General Hospital -Specialist Hospital - Teaching -Research, Primary Health Centre -Their role, Functions. Role of Biomedical Engineers

Aspects of Hospital Services- Outpatient- Inpatient supportive emergency drug and medical supply Nursing Services Dietry services Transport services

UNIT-II

Biomedical equipment services their purchase, servicing and maintenance –keeping intact and throwing the condemned equipment, Training of men for medical equipments, preventive and periodical maintenance procedures.

Hospital Planning -Location –Orientation, budgeting, communication with in the hospital outside the hospitals, electric power supply for various theatres and rooms, diesel generator, stand by power supply.

UNIT-III

Air conditioning of important theatres and equipment housings, water supply requirements and management, lifts, fire fighting and equipments. Sanitation with in the hospitals, laundry services.

UNIT-IV

Computer and Information Management in Hospitals: Computer aided hospital management: Application Administration/Discharge records of patient's –patients billing -maintenance of patients records, Their history. Maintenance of inventory of medicines and drugs - purchase.

UNIT-V

Electrical Factors in Hospital Design, voltage stabilizer, uninterrupted power supply for intensive care units and computerised monitoring units-safety precautions.

Electrical factors in Hospital Design: interference of systems, protection, grounding of ECG, EEG, ENG and other therapeutic equipments.

Text books

1. S. I, Goel& Ram Kumar, Hospital Administration and Management, Deep and Deep Publications, New Delhi.2002.

2. Principles of Hospital Administration and Management by Ravi Bindra, Adroit publishers, 2004

Reference Books

1. Source book of Modern Technology for Hospitals and Health care by Ashok Sahni, ISHA, BANGALORE, 1992.
2. I.Donald Snook, Opportunities in Hospital Administration Careers, McGraw-Hill, 1997.

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INTELLECTUAL PROPERTY RIGHTS

Course Code: GR14A4118 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
Meaning of intellectual property Rights. Justification of intellectual property Rights. Classification of the rights. Classification of Treaties relating to intellectual property Rights- (i) Stranded setting treaties (ii) Global protection system treaties. (iii)Classification treats. The salient features of the TRIPS Agreement. The two international institutions – (i) The world intellectual property organization (ii) the world trade organization.

UNIT- II
History of the patent system. Patents in all fields of technology.
i. Patent on genetic resources patents on chemicals, designs, patent based on software, business
methods, internet patent, etc.
ii. Exception to exclusive rights conferred to a patent holder.
iii. Ground for revocation of patent.
iv. Remember for infringement of a patent.

UNIT-III
Copyrights and related rights. Nature and scope of protection of copyrights and related rights. Protection of copyrights in the digital media. Defense of fair use. Moral rights of the author. Copyrights societies. Remedies for infringement of Copyrights.

UNIT-IV
Nature and scope of protection of design rights, protection of layout designs (topographies) of integrated circuits , protection of undisclosed information, protection of trade marks, domain names and geographical indications.

UNIT-V
Practical aspects – drafting of a patent. Some exercises on the preliminary rules on preparing an application seeking a patent.

Text Books
1. Cornish W.R., Intellectual property: patents, copyright, trademarks and allied rights, sweet and Maxwell 1993.

2. P. Narayana, Intellectual property law, eastern law house 2nd ed., 1997.
3. Robin Jacob and Daniel Alexander, a guide book to Intellectual property patent trademarks, Copy rights and design, sweet and Maxwell 4th ed., 1993.

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QUANTITATIVE ENGINEERING PHYSIOLOGY

Course Code: GR14A4119 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
Cellular Physiology-I
Introduction to Physiology, Introduction to Modeling and Review of Electric Circuits.
Review of Cellular Physiology, Cellular Metabolism and Kinetics, Membrane Dynamics.

UNIT-II
Cellular Physiology-II
Ion Transport types of transport and Cellular Homeostasis, The Resting Potential.
Regulation of Cell Function and Cell Cycle Detailed aspects of Neoplasia, Uses of DNA Micro-Arrays,

UNIT-III
Neuromuscular Physiology
Review of Nervous System, The Action Potential, and Propagation of Action Potentials measurement by Patch Clamp.Skeletal Muscle, Neuromuscular Junction and Synaptic Transmission, Smooth Muscle, study of Demyelinating Diseases.

UNIT-IV
Cardiovascular Physiology-I
Review of Cardiovascular Physiology, The ECG, causes and classification of Arrhythmias, characteristics of Defibrillation phenomena.

UNIT-V
Cardiovascular Physiology-II
Pressure Volume Relationships, Models of Circulation, Cardiac Output, Cardiac Regulation, Physiological aspects of Myocardial infarction.

Text Books
1. Robert Plonsey and roger Barr, Bioelectricity, McGraw Hill,
2. Text Book of Physiology by Guyton.
3. Text Book of Physiology by West & Todd

Reference books
1. Text Book of Physiology by Choudary.

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MEDICAL INFORMATICS

Course Code: GR14A4120 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
Introduction and Overview of hospital information system. Patient history taking mechanisms.
Patient Data Processing, Database Management, Communication of Medical data across different hospital units. Networking and Integration of patient data.

UNIT-II
Data from Patients, Coding and Classification , The Patient Record.
Patient-Centered Information Systems,Primary Care, Clinical Departmental Systems, Clinical Support Systems, Nursing Information Systems.

UNIT-III
Medical Knowledge and Decision Support, Methods for Decision Support, Clinical Decision-Support Systems, Strategies for Medical Knowledge Acquisition, Predictive Tools for Clinical Decision Support.
Institutional Information Systems, Modeling of Health Care for Information Systems Development, Hospital Information Systems: Clinical Use, Technical Choices, Health Information Resources.

UNIT-IV
Methodology for Information Processing , Logical Operations, Biostatistical Methods, Modeling for Decision Support, Structuring the Computer-based Patient Record, Evaluation of Clinical Information Systems.

UNIT-V
Methodology for Information Systems: Human-Computer Interaction in Health Care ,Costs and Benefits of Information Systems, Security in Medical Information Systems, Standards in Health-care Informatics and Telematics, Project Management,

Text Books

1. Bemmel, J.Van; Musen, M.A. Handbook of Medical Informatics 1st ed. 1997.

Reference Books

1. R.D.Lele ,Computers in Medicine Tata McGraw Hill, 2005.
2. Davidson, P., Best Practice Series: Healthcare Information Systems, Auerbach Publications, 2000

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MEDICAL IMAGE PROCESSING LAB

Course Code: GR14A4121 L:0 T:0 P:2 C:2
IV Year II Semester

LIST of EXPERIMENTS

1. Negative of an image
2. Image Compression- DCT
3. Power transforms
4. LOG transformation
5. Contrast stretching
6. Thresholding / binary Transformation.
7. Image Enhancement –Histogram, Histogram equalization
8. Image Smoothing- filters.
9. Image Sharpening-filters.
10. Image Segmentation.
    a. Point Detection.
    b. Line Detection.
    c. Edge Detection.
11. Gray level Slicing

Additional requirements along with the computer facilities Using Matlab or equivalent with signal processing and image processing toolboxes.