SRI KRISHNADEVARAYA UNIVERSITY :: ANANTAPUR
College of Engineering & Technology
Academic Regulations 2015 (R15) for
B. Tech (Regular-Full time)

(With effect from the Academic Year 2015-16 for the students admitted into I year I semester)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfils the following academic regulations:

i. Pursue a course of study for not less than four academic years and in not more than eight academic years. However, for the students of availing Gap year facility this period shall be extended up to 2 year at the most and these two years would not be counted for the maximum time for graduation.

ii. Register for 228 credits and secure all 228 credits.

iii. Students, who fail to fulfill all the academic requirements for the award of the degree within Eight (Ten for GAP year students) academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

2. Courses of study

The following courses of study are offered at present under B. Tech. program with effect from the academic year 2015-16.

S. No.	Branch
01.	Civil Engineering
02.	Computer Science & Engineering
03.	Electrical and Electronics Engineering
04.	Electronics and Communication Engineering
05.	Mechanical Engineering

and any other course as approved by the authorities of the University from time to time.

The entire course of study is of four academic years in semester pattern (for regular students) and of three academic years in semester pattern (for lateral entry students).

3. Credits

	Semester	
	Periods/Week	Credits
Theory	04	04
Practical	03	02
Drawing	03	02
	06	04
Online examination	-	02
Project	12	8

4. Course pattern:

i. The entire course of study is of four academic years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent in it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

iii. When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester / year is offered next after fulfillment of academic regulations.

5. Distribution and Weightage of Marks

i. The performance of a student in each semester for academic year I, II, III, IV shall be evaluated subject wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition Mini Project, Seminar, Comprehensive Viva Voce and Project Work shall be evaluated for 50, 50, 100 and 150 marks respectively.

ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation (25 marks for internal test and 05 marks for assignments) and 70 marks for the External Examination.

iii. For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective paper for 25 marks with duration of 1hour 30 minutes.

First midterm examination shall be conducted for the first half of the syllabus in the middle of the semester and second midterm examination shall be conducted for the second half of the syllabus towards the end of the semester. A weightage of 0.75 for better score and 0.25 for the other score will be considered for awarding the sessional marks in both the midterm examinations. There shall be two assignments in each semester for award of 05marks so that midterm component will be 30marks (25 for midterm examinations + 05 marks for assignments).

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs. The end examination shall be conducted by the laboratory teacher and another internal examiner.

v. The Engineering Drawing/Graphics course, offered is to be treated as a Theory Course. Evaluation method adopted shall be same as for any other Theory Course. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two mid term exams in a semester for a duration of 2 hrs each, evenly distributed over the syllabi, for 15 marks giving a weightage of 0.75 for the better score and 0.25 for the other score will be considered. The sum of day to day evaluation and the internal tests will be the final sessionals for the subject.

vi. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 50 marks. There shall be no external examination for seminar.

vii. There shall be two comprehensive online examinations conducted internally, one in II-II and another in III-II. A student is supposed to secure minimum of 35% marks to secure 2 credits.

viii. There shall be two choice based credit courses (for other branch students), one in II- I and another in III-II. Each department shall offer a minimum of 3 subjects in such courses. A student shall be given a choice to select any one subject from the list of subjects offered by all faculties under choice based credit courses.

ix. There shall be two choice based credit courses (same branch students) in IV- I semester. A minimum of six courses must be offered, out of which 2 courses shall be selected by the students.

x. Massive Open Online Courses (MOOCs) are to be introduced. There shall be 2 MOOCs in the entire course duration.

xi. A minimum of six online courses (MOOCs) must be offered, out of which 2 courses shall be selected by the students in any each semester as stated above. The students shall register for the opted online courses at the college or offered by authorized institutions/Agencies. The Certificate issued by the college/institution/agency after successful completion of the course shall be considered for the award of credits by the College.

xii. Out of a total of 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by Board of Examiners consisting of Project Supervisor, Head of Department and an External Examiner. The evaluation of project work shall be conducted at the end of the IV year II Semester. The Internal Evaluation shall be on the basis of two seminars of each 25 marks, one will be presented to the project supervisor and another will be presented to the Department committee compromising Head of the Department, Project Supervisor, and one senior faculty of the Department.

xiii. Comprehensive Viva Voce will be conducted by the Board of Examiners at the time of evaluation of the Project Work, to test the overall subject knowledge of the entire course.

6. Attendance Requirements:

i. A student shall be eligible to appear for University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

ii. Shortage of Attendance below 62% in aggregate shall in NO case be condoned.

iii. Shortage of attendance in aggregate up to 13% (62% and above and below 75%) in each semester may be granted by the College Academic Committee valid on Genuine grounds with supporting evidence.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek re-admission for that semester when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the University.

7. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**6**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar he should secure 40% in the internal evaluation.

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement of securing **40** credits from the preceding regular and supplementary examinations.

iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing **68 c**redits from the preceding regular and supplementary examinations.

iv. Lateral Entry students shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing **40 credits** from the preceding regular and supplementary examinations.

v. Students who fail to earn 228 credits as indicated in the course structure within eight academic years (10 years for Gap year students) from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

8. Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 1.1.

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which the candidate is presently readmitted.

Candidate who were permitted with GAP year shall be eligible for rejoining into the succeeding year of their B.Tech from the commencement of class work and they will be in the academic regulations into which the candidate is presently rejoining.

9. With–holding of results:

If the candidate has any dues not paid to the College or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and he/she will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

10. GAP Year: Concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The Head of the respective department shall forward such proposals submitted by the students to the College. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit student(s) to avail the Gap Year.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	**% of marks to be secured**
First Class with Distinction	70% and above
First Class	Below 70% but not less than 60%
Second Class	Below 60% but not less than 50%
Pass Class	Below 50% but not less than 40%

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum). If any candidate passes through supplementary examinations beyond the duration of the course, he/she may be awarded class based on the % of marks secured as above, except distinction.

i. Grading System is to be introduced. After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
80-89	A+ (Excellent)	9
70-79	A (Very Good)	8
60-69	B (Good)	7
50-59	C(Average)	6
40-49	D (Satisfactory)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

12. The minimum instruction days including exams for each semester shall be 90 days.

13. There shall be no branch transfers after the completion of admission process.

14. The academic regulations should be read as a whole for purpose of any interpretation.

15. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the University is final.

16. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified..

B.Tech I Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week		Credits
			L	P	
1.		Functional English	4	-	4
2.		Mathematics	4	-	4
3.		Engineering Physics	4	-	4
4.		Problem Solving and Programming	4	-	4
5.		Engineering Graphics	2	3	4
6.		Physics Lab	-	3	2
7.		Programming Lab	-	3	2
8.		Engineering Workshop & IT Workshop	-	3	2
		Total			26

L – Lecture, P – Practical

B.Tech I Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week		Credits
			L	P	
1.		Communicative English	4	-	4
2.		Mathematical Methods	4	-	4
3.		Engineering Chemistry	4	-	4
4.		Data Structures	4	-	4
5.		Network Analysis and Synthesis	4	-	4
6.		Communication Skills Lab	-	3	2
7.		Chemistry Lab	-	3	2
8.		Data Structures Lab	-	3	2
		Total			26

L – Lecture, P – Practical

B.Tech II Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Complex Analysis	4	1	-	4
2.		Electrical Technology	4	1	-	4
3.		Electronic Devices And Circuits	4	1	-	4
4.		Signals And Systems	4	1	-	4
5.		Switching Theory and Logic Design	4	1	-	4
6.		**Choice Based Credit Courses (For Non ECE Students)** 1. Basic Electronics 2. Fundamentals of Digital Electronics 3. Electronic Measurements & Instrumentation	4	1	-	4
7.		Electronic Devices & Circuits Lab	-	-	3	2
8.		Electrical Engineering Lab	-	-	3	2
9.		Human Values and Professional Ethics	2			
		TOTAL	24	6	6	28

L – Lecture, T – Tutorial, P - Practical

B.Tech II Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Managerial Economics & Financial Analysis	4	1	-	4
2.		Computer Organization	4	1	-	4
3.		EM Waves And Transmission Lines	4	1	-	4
4.		Electronic Circuit Analysis	4	1	-	4
5.		Environmental Science	4	1	-	4
6.		Probability Theory & Stochastic Processes	4	1	-	4
7.		Electronic Circuit Analysis Lab	-	-	3	2
8.		Basic Simulation Lab using MATLAB	-	-	3	2
9.		Comprehensive Online Examination				2
		TOTAL	24	6	6	30

L – Lecture, T – Tutorial, P - Practical

B.Tech III Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Analog Communications	4	1	-	4
2.		Control Systems	4	1	-	4
3.		Antennas And Wave Propagation	4	1	-	4
4.		Analog IC Applications	4	1	-	4
5.		Digital IC Applications	4	1	-	4
6.		Microprocessors & Microcontrollers	4	1	-	4
7.		Analog & Digital IC Applications Lab	-	-	3	2
8.		Microprocessors and Microcontrollers lab	-	-	3	2
9.		Advanced Communications Lab			3	
		TOTAL	24	6	9	28

L – Lecture, T – Tutorial, P – Practical

B.Tech III Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Digital Signal Processing	4	1	-	4
2.		Electronic Measurements & Instrumentation	4	1	-	4
3.		Digital Communications	4	1	-	4
4.		Microwave Engineering	4	1	-	4
5.		Computer Network	4	1	-	4
6.		**Choice Based Credit Courses (For Non ECE Students)** 1. Industrial Electronics 2. Fundamentals of Communication Systems 3. Embedded Systems	4	1	-	4
7.		Analog & Digital Communications Lab	-	-	3	2
8.		Digital Signal Processing Lab	-	-	3	2
9.		Comprehensive Online Examination				2
		TOTAL	24	6	9	30

L – Lecture, T – Tutorial, P - Practical

B.Tech IV Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Optical Communications	4	1	-	4
2.		VLSI System Design	4	1	-	4
3.		Management Science	4	1	-	4
4.		Embedded Systems	4	1	-	4
5.		**Choice Based Credit Courses;: (for ECE students)** 1.Digital Image Processing 2.DSP Processors& Architecture 3. Biomedical Instrumentation	4	1	-	4
6.		**Choice Based Credit Courses;: (for ECE students)** 1. Wireless Sensor Networks 2. Artificial Neural Networks 3. Adaptive Signal Processing	4	1	-	4
7.		Microwave & Optical Communications Lab	-	-	3	2
8.		CMOS VLSI Design Lab	-	-	3	2
		Mini Project	-	-	-	2
		TOTAL	24	6	6	30

L – Lecture, T – Tutorial, P – Practical

B.Tech IV Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Satellite Communication	4	1		4
2.		Radar Engineering	4	1		4
3.	MOOCs-I	**Massive Open Online Courses-I** 1. Digital Design Through Verilog 2. MEMS and Micro Systems 3. Information Theory and Coding	4	-	-	4
4.	MOOCs-II	**Massive Open Online Courses-I** 1. Real Time Operating Systems 2. Cellular Mobile Communications 3. Digital System Design with PLDs and FPGAs	4	-	-	4
5.		Project Work	-	-	-	8
6.		Seminar	-	-	-	2
7.		Comprehensive Viva-Voce	-	-	-	4
		TOTAL	8	2	-	30

L – Lecture, T – Tutorial, P – Practical

B.Tech I Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week		Credits
			L	P	
1.		Functional English	4	-	4
2.		Mathematics	4	-	4
3.		Engineering Physics	4	-	4
4.		Problem Solving and Programming	4	-	4
5.		Engineering Graphics	2	3	4
6.		Physics Lab	-	3	2
7.		Programming Lab	-	3	2
8.		Engineering Workshop & IT Workshop	-	3	2
					26

L – Lecture, P – Practical

B.Tech I Year I Sem	FUNCTIONAL ENGLISH	T	C
	(Common for CSE, ECE, EEE, Civil & Mechanical)	4	4

UNIT – I

Environmental Consciousness

Green Cover, Pollution

Tenses, Prepositions, Prepositional Phrases, Writing Letters

UNIT – II

Emerging Technologies

Solar Thermal Power, Cloud Computing

Subject-Verb Agreement, Prefixes and Suffixes, Compound Nouns, Imperatives

UNIT – III

Global Issues

Child Labour, Food Crisis

Synonyms & Antonyms, Verbs: Regular & Irregular, Homonyms, Homophones and Homographs, Direct and Indirect Speech

UNIT – IV

Global Issues

E-Waste, Assistive Technology

Articles, Collocations, Conjunctions, Note-Making, Making Recommendations, If Conditional

UNIT – V

Space Trek

Hubble Telescope, A Home in the Sky

Degrees of Comparisons, Voice, Question Tags

UNIT – VI

Media Matters

The Evolution of Media, Ten Developments in Media, Advertisements

Paragraph Writing, Effective Writing, Writing Reports, Expansion of Proverbs and Idioms, Commonly Confused Words

TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Paper Back 2012 by Anna University.

B.Tech I Year I Sem	MATHEMATICS	T	C
	(Common for CSE, ECE, EEE, Civil & Mechanical)	4	4

Unit-I

Exact,linear and Bernoullis equations,Orthogonal trajectories.Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax},Sinax,Cosax,polynomials in x, $e^{ax}V(x)$,$xV(x)$.Method of variation of parameters.

Unit-II

Taylor's and Maclaurin's series-Functions of several variables-Jacobian-Maxima and Minima of functions of two variables,Lagranges method of undetermined multipliers with three variables only.Radius of curvature.

Unit-III

Multiple integral-Double and triple integrals-Change of variables-Change of order of integration.

Unit-IV

Vector Calculus:Gradient-Divergence-Curl.Vector Integration-Line integral-Area-Surface and Volume integrals.Vector integral theorems: Green's theorem-Stoke's theorem-Gauss Divergence theorem (With out proofs).Applications of Green's, Stoke's and Gauss Divergence theorems.

Unit-V

Laplace Transforms:Definition-Transform of elementary functions-Properties of Laplace Transforms-Transform of derivatives-Transform of integrals-Unit step fuction-multiplication by t^n –Division by t-Evaluation of integrals by Laplace Transforms-Laplace Transform of periodic functions.

Unit-VI

Inverse Laplace Transforms-Partial fractions-Other methods of finding inverse transforms-Convolution theorem-Applications of Laplace transforms to Ordinary differential equations of first and second order.

TEXT BOOKS:

1. A Text Book of Engineering Mathematics,Vol.1,T.K.V.Iyengar,B.Krishna Gandhi and others, S.Chand and Company.
2.Higher Engineering Mathematics,B.S.Grewal,Khanna publishers.
3.Engineerin Mathematics-I,E.Rukmangadachari & E.Keshava Reddy,Pearson Publisher.

REFERENCES:

1.Advanced Engineering Mathematics, by Erwin Kreyszig,Wiley India.
2. Higher Engineering Mathematics, by B.V.Ramana,Mc Graw Hill Publishers.
3.Advanced Engineering Mathematics,by Alan Jeffrey,Elsevier.

B.Tech I Year I Sem	ENGINEERING PHYSICS (Common for CSE, ECE & EEE)	T	C
		4	4

UNIT I

OPTICS: Interference- Interference in thin film by reflection-Newton's rings-Diffraction-Fraunhofer diffraction due to single slit-Fraunhofer diffraction due to double slit and diffraction grating.

UNIT II

CRYSTALLOGRAPHY: Introduction-Space lattice- Unit cell-Lattice parameters –Bravias lattice-Crystal system-Packing fraction of SC, BCC and FCC –Directions and planes in crystals-Miller indices-Interplanar spacing in cubic crystals-X-ray diffraction–Bragg's law.

UNIT III

QUANTUM MECHANICS: Matter waves-de Broglie hypothesis and properties-Heisenberg's uncertainty principle-Schrödinger's time dependent and independent wave equations-Physical significance of wave function-Particle in one dimensional infinite potential well.

UNIT IV

SEMICONDUCTORS: Intrinsic and Extrinsic semiconductors-Drift and Diffusion currents and Einstein's equation-Hall effect-Formation of p-n junction.

MAGNETIC MATERIALS: Basic definitions- Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials-Hysteresis- Soft and Hard magnetic materials.

UNIT V

SUPERCONDUCTIVITY: Introduction-General properties-Meissner effect-Penetration depth-Effect of magnetic field-Type I and Type II superconductors-Flux quantization-Josephson effects-Application of superconductors.

UNIT VI

LASERS: Introduction- Spontaneous and stimulated emission of radiation-Einstein's coefficients-Population inversion-Ruby laser-He-Ne laser-Application of lasers.

FIBER OPTICS: Introduction-Principle of optical fiber-Acceptance angle and Acceptance cone-Numerical aperture-Types of Optical fibers-Application of optical fibers.

Text Books:

1. Engineering Physics-K. Thyagarajan, MacGraw Hill Education (India) Private Limited, New Delhi, 2015.
2. Engineering Physics- K. Vijay Kumar, S. Chand & Co. Ltd.

References:

1. Engineering Physics-P.K. Paliniswamy, 2nd Edition, SciTech Publications
2. Engineering Physics-S. Maninaidu-Pearson Education Private Ltd.
3. Physics for Engineers-N.K. Verma, 1st Edition, PHI Learning Private Ltd.

Unit I- Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method.

Unit II- Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Out, Interactive Mode, Batch Mode and Data Files.

Unit III- Selection Structures : Control Structures, Conditions, The if Statement, if Statements with Compound Statements, Decision Steps in Algorithms, Nested if Statements and Multiple-Alternative Decisions, The switch Statement. Repetition and Loop Statements: Repetition in Programs, Counting Loops and the while Statement, Computing a Sum or a Product in a Loop, The for Statement, Conditional Loops, Loop Design, Nested Loops, The do-while Statement and Flag-Controlled Loops.Simple Data Types: Representation and Conversion of Numeric Types, Representation and Conversion of Type char, Enumerated Types, Iterative Approximations

Unit IV- Top Down Design with Functions: Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Argument. Modular Programming (Functions): Functions with Simple Output Parameters, Multiple Calls to a Function with Input/Output Parameters, Scope of Names, Formal Output Parameters as Actual Arguments, A Program with Multiple Functions. Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Searching and Sorting an Array, Multidimensional Arrays.

Unit V- Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Programming Applications, Pointer to Functions, Command- Line Arguments.Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of Pointers, Character Operations, String-to-Number and Number-to-String Conversions.

Unit VI- Recursion: The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters, Problem Solving with Recursion, A Classic Case Study in Recursion: Towers of Hanoi. Structure and Union: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions Whose Result Values Are Structured, Problem Solving with Structure Types, Parallel Arrays and Arrays of Structures, Union Types.

Unit VII- Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

Unit VIII- Dynamic Memory Allocation, Introduction to Data Structures: Linear and Non Linear Data Structures, Searching and Sorting: Bubble Sort, Selection Sort, Linear Search, Binary Search.

.TEXT BOOKS :

1. Problem Solving and Programming Design in C, J.R.Hanly & ElliotB..Koffman 5th Edition, Pearson Addison Wessley.

REFERENCES :

2. Programming in C and DataStructures, J.R.Hanly, Ashok.N.Kamthane & A.AnandaRao, Pearson Education.
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
4. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
5. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand
6. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill
7. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning

B.Tech I Year I Sem	ENGINEERING GRAPHICS	T	P	C
	(Common for CSE, ECE & EEE)	2	3	4

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering – BIS Conventions. Scales: Plain, Diagonal and Vernier;

UNIT II

Curves used in Engineering Practice.

a) Conic Sections including the Rectangular Hyperbola- General method only, b) Cycloid, Epicycloid and Hypocycloid.

UNIT III

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

Projections of Lines: lines inclined to one or both planes, Problems on projections, Finding True lengths.

UNIT IV

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT V

Projections of Solids: Projections of Regular Solids with axis inclined to one plane.

UNIT VI

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, B.V.R. Guptha, J.K. Publishers

B.Tech I Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week		Credits
			L	P	
1.		Communicative English	4	-	4
2.		Mathematical Methods	4	-	4
3.		Engineering Chemistry	4	-	4
4.		Data Structures	4	-	4
5.		Network Analysis and Synthesis	4	-	4
6.		Communication Skills Lab	-	3	2
7.		Chemistry Lab	-	3	2
8.		Data Structures Lab	-	3	2
					26

L – Lecture, P – Practical

B.Tech I Year II Sem	COMMUNICATIVE ENGLISH (Common for CSE, ECE, EEE, Civil & Mechanical)	T	C
		4	4

UNIT – I

Lessons from the Past
The Importance of History, The Mother of Modern Corporatism
Pure Vowels, Just-A-Minute, Designing Posters

UNIT – II

Energy
In Search of Our Energy Solutions, Wind Energy
Diphthongs, Role Play, Making Conversation/Situational Dialogues

UNIT – III

Engineering Ethics
Learning from Disasters, Biotechnology: Ethical Questions
Consonant Sounds, Debate, Blog Making

UNIT – IV

Travel and Tourism
Ten Reasons Why Travel is a Waste of Time, Atithi Devo Bhava
Syllables, Word Stress Rules, Group Discussion

UNIT – V

Getting Job Ready
Boeing, Arvind Mills
Presentation Skills, Writing Emails, Creativity: Thinking and Writing

UNIT – VI

Getting Job Ready
Toyota Production System, Preparing for the Interviews
Types of Interviews, Mock Interviews, Personality Development.

TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Paper Back 2012 by Anna University.

UNIT -I

Matrices: Elementary row transformations – Rank – Echelon from, normal – Solution of Liner System of Homogenous and Non Homogeneous equations –Eigen values, Eigen vectors – (Excluding proofs of Properties). Cayley – Hamilton Therorem(Excluding proof) – Inverse and powers of a matrices by Cayley-Hamilton therem – Diagonolization of matrix. Calculation of powers of matrix.

UNIT-2

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta method - Milne's Predictor-Corrector Method.

UNIT-3

Fourier series:Determination of Fourier coefficients- Fourier series of Even and odd functions- Fourier series in an arbitrary interval-Even and odd periodic continuation- Half range Fourier sine and cosine expansions.

UNIT-4

Fourier integral thorem (statement only) – Fourier sine and cosine integrals. Fourier transform- Fourier sine and cosine transforms- Properties- Inverse transforms- Finite Fourier transforms.

UNIT-5

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Method of separation of variables-Solutions of one dinesional wave equation, heat equation and two-dimensionsal Laplace equation under initial and boundary conditions.

UNIT-6

z-transform –inverse z-transform-Properties-Damping rule –shifting rule- Initial and final value theorems. Convolution theorem-Solution of difference equations by transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
5. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

REFERNCES:

1. Numerical Methods for Scientific and Engineering Communication, M.K.Jain,S.R.K. Iyengar& R.K.Jain, New Age international Publishers.
2. Mathematical Methods –Pal –Oxford.
3. Introduction to Numerical Analysis –S.S.Sastry Printice Hall of India
4. Mathematical Methods, S.K.V.S.Sri Ramachary, M. Bhujanga Rao, P.B.Bhaskar Rao & P.S.Subramanyam, BS Publications..

Unit –I :- Water

Types Of Impurities In Water, Hardness Of Water And Its Units, Disadvantages Of Hard Water. Estimation Of Hardness By Edta Method. Analysis Of Water- Dissolved Oxygen. Problems On Hardness Of Water. Water Treatment For Domestic Purpose. Sterilisation:- Chlorination, Bleaching Powder, Ozonization. Water For Industrial Purpose:-For Steam Generation, Boilen Troubles – Carry Over (Priming & Foaming) Boiler Coreriosion – Scales And Sludges, Caustic Emfrittlement. Water Treatment :-Internal Treatment :- Colloidal Phospatc, Calgon, Carlronatic, Sodium Aluminates Treatment. External Treatment :- Ion – Exchange And Permutit Process Demineralisation Of Brakish Water – Reverse Osmosis And Electrodialysis.

Unit –II :- Polymers

Basic Concepts Of Polymerisation, Types Of Polymerisation Addition And Condensation Polymerisation.
Plastomers :- Thermosetting And Therimoplastics Compasiti On Properties And Engineering Applications Of Pvc, Teflon, Bakelite And Nylons. Rubber – Processing Of Natural Rubber And Compounding Elastomers – Unas, Buna N, Polynmethane Rubber, Polysulphide Rubber. Conducting Polymers; Synthesis And Applications Of Polyacetylenc And Polyaniline. Liquid Crystals Definition, Properties, Suitable Examples And Engineering Applications.

Unit – III :-Electrochemistry

Electrochemical Cells :- Measurement Of Emf, Standard Electrode Potential, Concentration Cells, Batteries (Ni-Cell), Lithium Batteries. Fuel Cells: (Hydrogen Oxygen Fuel Cell Adn Methanol Fuel Cell. Insulators :- Definition, Properties And Characteristics Of Insulating Materials, Engineering Applications. Corrosion:- Introduction, Type Of Corrosion (Dry Corrosion (Direct Chemical Attack), Hlet Corrosion, Theorics Of Corresion. And Mechanism, Electrochemical Theory Of Corrosion. Galranic Series, Galronic Corrosion Concentration Cell Corrosion, Oxygen Absorption Type. Factors Influencing Corrision – Control Of Corrosion- Cathodic Protection. (Sacrificial Anode And Impressed Current), Inhilitors (Anodic And Cathodic), Electroplating And Electrolese Plating.

Unit – IV:- Nano Materials

Definition, Properities And Applications; Explosives And Propellants : Explosives, Classification, Precantions During Storage, Blasting Fuses, Important Explosives Rocket Propellants, Classification Of Propellants. Lubricants : - Principlesa And Function Of Lubricants – Classification And Properties Of Lubricants – Viscosity, Flash And Fire Points, Cloud And Pour Points, Aniline Point, Neutralisation Number And Mechanical Strength.

Unit –V:- Fuels And Combustion

Definition And Classification Of Fuels. Solid Liquid And Gaseous Fuels, Characteristics Of A Good Fuel.
Metallergical Coke – Characteristics And Manifacture (Otto – Halfmann). Petroleum: Refining Of Petroleum, Gasoline – Octane Number, Diesel -Cetane Number. Petroleum – Refining – Synthetic Petrol. Calorific Value And Its Determination (Bomb Calorimeter – Junkers Gas Calorimeter. Combustion: Flue Gas Analysis By Orsats Apparatus.

Unit –VI:- Chemistry Of Engineering Meterials

Cement : Composition Of Portland Cement, Classification, Preparation (Dry And Wet Processes), Setting And Handling Refractorics :- Definition, Classification With Examples Criteria Of A Good Refractory Material; Causes For The Failure Of A Refractory Material Carbon Clusters: - Fullerenes And Carbon Nano Tubes.

B.Tech I Year II Sem	DATA STRUCTURES (Common for CSE & ECE)	T	C
		4	4

UNIT I

C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete).

UNIT II

Function Over Loading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes.

UNIT III

Review of basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++. Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion.

UNIT IV

Dictionaries, linear list representation, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT V

Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching

UNIT VI

Introduction to Red –Black trees ,Operations – Searching, insertion and deletion, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees. Standard Tries, Suffix Tries, Compressed Tries.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

REFERENCES :

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd.,Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

UNIT-I
INTRODUCTION TO ELECTRICAL CIRCUITS: Circuit concept-R-L-C-parameters-voltage and current sources-independent and dependent sources-source transformation-voltage-current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular), R.M.S., Average values and form factor for different periodic wave forms, Kirchoff's laws-network reduction techniques-Series, parallel, series parallel, Star-to-delta, delta-to-star transformation.

UNIT-II
NETWORK TOPOLOGY & COUPLED CIRCUITS: Graph-Tree, Basic cut-set and Tie-set matrices for planar network–loop and nodal methods of networks with dependent & independent voltage and current sources- nodal analysis, mesh analysis, super node and super mesh for D.C.Excitations-duality & dual networks,Dot convention-coefficient of coupling-analysis of coupled circuits, Concept of self and mutual inductance.

UNIT-III
RESONANCE, STEADY STATE AND TRANSIENT ANALYSIS: Steady state analysis of i.e Parallel RL,RC, RLC & its power and power factor calculations, Resonance-Series, Parallel circuits, Concept of bandwidth and Q-factor, Transient Response of RL, RC Series, RLC Circuits for DC excitations, Initial Conditions,Solution using Differential Equations approach and Laplace Transform method (First and Second Order circuits).

UNIT-IV
NETWORK THEOREMS: Superposition, Thevenin's, Norton's Theorems.Maximum Power Transfer Theorem, Reciprocity Theorem, Compensation Theorem, Milliman's Theorem for DC and Sinusoidal excitations.

UNIT-V
TWO PORT NETWORKS: Two port network parameters, Different types,Conversion of one to another, Reciprocity and symmetric conditions, Interconnection of two port networks in series, parallel and cascaded configurations.

UNIT-VI
SYNTHESIS OF NETWORKS: Hurwirtz polynomial and its test, Burnes positive realness, Driving point immittances of positive real functions, Properties, Necessary and sufficient conditions for positive real functions and its applications, Properties of driving point impedance functions, Driving point synthesis, Synthesis of LC,RL, RC networks foster forms, cauer forms of networks.

TEXT BOOKS:
1. Engineering Circuits Analysis by William Hayt and Jack E.Kemmerly, McGraw Hill, 6th Edition.
2. Network Analysis by A.Sudhakar and Shyam Mohan, TATA McGraw Hill, 4th edition.
3. Network analysis by UmeshSinha, SatyaPrakasan publishers.
4. Electric Circuits by J.Edminister and M.Nahvi-Schuam Series, TATA McGraw Hill.

REFERENCES:
1. Network Analysis by M.E.VanValkenberg, Pearson Education.
2. Electric Circuits by N.Srinivasulu, Reem Publications

B.Tech II Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Complex Analysis	4	1	-	4
2.		Electrical Technology	4	1	-	4
3.		Electronic Devices And Circuits	4	1	-	4
4.		Signals And Systems	4	1	-	4
5.		Switching Theory and Logic Design	4	1	-	4
6.		**Choice Based Credit Courses (For Non ECE Students)** 1. Basic Electronics 2. Fundamentals of Digital Electronics 3. Electronic Measurements & Instrumentation	4	1	-	4
7.		Electronic Devices & Circuits Lab	-	-	3	2
8.		Electrical Engineering Lab	-	-	3	2
9.		Human Values and Professional Ethics	2			
		TOTAL	24	6	6	28

L – Lecture, T – Tutorial, P – Practical

B.Tech II Year I Sem **COMPLEX ANALYSIS** **T C**
4+1* 4

UNIT - I
Functions of a complex variable–Continuity–Differentiability–Analyticity–Properties–Cauchy-Riemann equations in Cartesian and polar coordinates.Harmonic and conjugate harmonic functions–Milne –Thompson method. Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties-General power Zc (c is complex), principal value.

UNIT-II
Complex integration: Line integral-evaluation along a path by indefinite integration-Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula.

UNIT-III
Complex power series: Radius of convergence-Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point-Isolated singular point-pole of order m-essential singularity.

UNIT-IV
Residue- Evaluation of residue by formula and by Laurent series–Residue theorem. Evaluation of integrals of the type :a) improper real integrals b) c) d) integrals by indentation.

UNIT-V
Argument principle–Rouche's Theorem–determination of number of zeros of complex polynomials-Maximum Modulus principle-Fundamental theorem of Algebra, Liouville's Theorem.

UNIT-VI
Con formal mapping: Transformation by ez, ln z ,z2, zn (n positive integer)sin z,cosz, z + a/z, Translation,rotation, inversion and bilinear transformation–fixed -points-cross ratio-properties-invariance of circles and cross ratio–determination of bilinear transformation mapping 3 given point

TEXT BOOKS:
1) A Text book of Engineering Mathematics, Vol – III by T.K.V. Iyengar, B. Krishna Gandhi and others,S.
Chand and company.
2) Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3) Engineering Mathematics by B.V. Ramana, Tata McGraw Hill.

REFERENCES:
1) Advanced Engineering Mathematics by Erwin Kreyszig - Wiley Publications.
2) Engineering Mathematics – III A by Dr.M.K. Venkataraman – The National Publishing co.
3) A text book of Engineering Mathematics by N.P.Bali, Iyengar – Lakshmi Publications (Pvt ltd)

B.Tech II Year I Sem **ELECTRICAL TECHNOLOGY** **T C**
4+1* 4

UNIT –I
DC MACHINES: Principle of operation of DC machine, EMF Equation, Types of Generators, magnetization and load Characteristics of DC Generators.-Numerical problems DC Motor- Types of DC Motors-Characteristics of DC Motors- 3point starters for dc shunt motor-losses and efficiency-Swinburne's test, load test-speed control of DC shunt motor-Numerical problems.

UNIT –II
TRANSFORMERS: Principle of operation of Transformer-constructional features- Phasor Diagram on no load and load – equivalent circuit-losses, efficiency and regulation of a transformer, OC & SC tests on transformer-Numerical problems

UNIT –III
THREE PHASE INDUCTION MOTOR: Principle of operation of 3-phase Induction motor-slip ring and squirrel cage motors- slip torque characteristics-efficiency calculation-starting methods-speed control of induction motor- Numerical problems

UNIT –IV
SINGLE PHASE INDUCTION MOTOR: Principle of operation of 1-phase Induction motor- constructional features-shaded pole motors-capacitor motor-split phase motors-equivalent circuit

UNIT –V
ALTERNATORS: Constructional features- Principle of operation-types-EMF equation- distribution and coil span factors- pre determination of regulation by synchronous impedance method – OC & SC test- Numerical problems

UNIT –VI
BASIC INSTRUMENTS: Introduction, classification of instruments, operating principles essential features of measuring instruments, Moving coil permanent magnet(PMMC) instruments, Moving iron of Ammeters and Voltmeters(All the above topics are only elementary treatment)

TEXT BOOKS:
1. Principle of Electrical Engineering by V.K.Mehta, Rohith Mehta, S.Chand publications.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand publications.
3. Electrical Technology-volume II – B L Theraja- S. Chand.
REFERENCE BOOKS:
1. Electrical Machinery- J B Guptha- katsonbooks .
2. Electrical Machines – I J Nagrath and D P Kothari- PHI Publications.

UNIT -I

SEMICONDUCTOR DIODE CHARACTERISTICS: PN junction Diode equation, VI characteristics of p-ndiode, Static and Dynamic Resistances, Temperature dependence of VI characteristic, Diode equivalent circuits, Diode capacitances, Breakdown Mechanisms in Semi Conductor Diodes, Zener diode characteristics, Principle of operation and Characteristics of Tunnel Diode with the help of energy band diagrams, Varactar Diode, Schottky Barrier Diode, Thermistor.

UNIT- II

RECTIFIERS, FILTERS AND REGULATORS: PNjunctionasaRectifier,Half wave rectifier, ripple factor,full wave rectifier, Bridge rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π- section filter, comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using Zener diode.

UNIT- III

BJT TRANSISTORS: Operation of BJT, Transistor as an amplifier, Junction transistor, Detailed study ofcurrents in a transistor, Input and Output characteristics of transistor in CB, CE, and CC configurations, Relation between Alpha, Beta and Gamma.BJT specification, Transistor as an Amplifier. Principle of operation and characteristics of SCR.

UNIT-IV

TRANSISTOR BIASING AND STABILISATION : DC and AC Load lines, Operating point, Importance ofBiasing,Fixed bias, Collector to Base, Voltage Divider bias, Bias stability, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in VBE, Ico,) Thermal run away, Thermal stability in CE configuration.

UNIT- V

FET TRANSISTORS: operation and characteristics, Pinch-Off voltage, Small signal model of JFET,MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Comparison of Transistors (BJT,FET, and MOSFET). Principle of operation and Characteristics of UJT.

UNIT-VI

OSCILLATORS: Condition for Oscillations. RC and LC type Phase Shift oscillators. Hartley and Colpittsoscillators, Wein bridge oscillator, Crystal oscillators, Frequency and amplitude stability of Oscillators.

TEXT BOOKS :

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and SatyabrathaJit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
3. Electronic Devices and Circuits- David A. Bell, 5th Edition, 2008, Oxford University Press.

REFERENCES :

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, PearsonEducation, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

UNIT-I

INTRODUCTION TO SIGNALS: Analogy between vectors and signals, Orthogonal signal space, Signalapproximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions,Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.

UNIT-II

REPRESENTATION OF SIGNALS USING FOURIER SERIES AND FOURIER TRANSFORMS: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and unit step function.

UNIT-III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, impulse response, Impulseresponse of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system,Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and physical realization-The poly wiener criterion relationship between bandwidth and rise time.

UNIT-IV

CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain andfrequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum,Parseval's theorem, Power density spectrum, Properties of convolution, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-V LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, InverseLaplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal.

UNIT-VI SAMPLING THEOREM AND Z-TRANSFORM: Representation of continuous time signals by itssample -Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of discrete time signals. Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCES:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rd Edn., 2000.
3. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.

UNIT-I

NUMBER SYSTEMS, CODES AND BOOLEAN ALGEBRA: Philosophy of number systems –complement representation of Negative numbers, Binary arithmetic, Binary codes, Error Detecting &ErrorCorrectingcodes,Hamming codes. Fundamental postulates of Boolean algebra, Basic theorems and properties.

UNIT-II

SWITCHING FUNCTIONS AND IT'S MINIMIZATION: Switching functions, Canonical and standard forms, Algebraic simplification Digital Logic Gates, properties of XOR gates, Universal Gates ,Multilevel NAND/NOR realizations. K-map method, Prime Implicants, Don't care combinations, Minimal SOP and POSforms, Tabular Method, Prime - Implicant chart, simplification rules.

UNIT-III

COMBINATIONAL LOGIC DESIGN: COMBINATIONAL LOGIC: Combinational circuits, Analysis procedure, Design procedure, Binary Adder/Sub tractor, Decimal Adder, Binary multiplier, Magnitude comparator, Decoders, Encoders,Multiplexers,Parity bit generator, Codeconverters,Hazards and Hazards free realization.

UNIT-IV

PROGRAMABLE LOGIC DEVICES, THRESHOLD LOGIC: Basic PLD's-ROM, PROM, PLA, PAL Realization of switching function using PLD's. .

UNIT-V

SEQUENTIAL CIRCUITS: Classification of sequential circuits, Basic Flip-Flops, Excitation andCharacteristic Tables. Steps in Synchronous Sequential circuit design. Design of modulo-N counters, Ring andJohnson counters, Universal shift register, Serial Binary adder, Sequence Detector. FSM-capabilities andLimitations, Mealy and Moore models, Minimization of completely specified and incompletely specifiedSequential Machines.

UNIT-VI

ALGOROTHIMIC STATE MACHINES: Salient features of the ASM chart, simple examples, Systemdesign using data path and control subsystems, Control Implementations, Examples of Weighing Machine andBinary multiplier.

TEXTBOOKS:

1. Switching & Finite Automata theory- ZviKohavi, TMH,2nd Edition.
2. Digital Design-Morris Mano, PHI, 3rd Edition,2006.
3. Switching Theory and Logic design-A. Anand Kumar,2008.

REFERENCES:

1. An Engineering Approach to Digital Design-Fletcher, PHI.
2. Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
3. Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications

Unit – I Basic Instruments electrical measurement – measurement of voltage , current , power & energy, voltmeterers& ammeter , wattmeter , energy meter , three phase power measurement , electronics instrument – multimeter, CRO(analog& digital),An overview of voltage regulator.

Unit-II- SEMICONDUCTOR DIODE CHARACTERISTICS: PN junction Diode equation, VI characteristics of p-n diode,, Zener diode characteristics, Tunnel Diode Varactar Diode, Schottky Barrier Diode, Thermistor

UNIT- III

RECTIFIERS, FILTERS AND REGULATORS: PNjunctionasaRectifier,Half wave rectifier, ripple factor, full wave rectifier, Bridge rectifier, Inductor filter, Capacitor filter,L- _section filter, _- section filter, comparison of various filter circuits_ in terms of ripple factors

UNIT- IV

BJT TRANSISTORS: Operation of BJT, currents in a transistor, Input and Output characteristics of transistor in CB, CE, and CC configurations,

UNIT-V INTRODUCTION TO OP-AMPS: Integrated circuits-types, classification, OP-Amp Block diagram, Differential amplifier circuit configurations, Characteristics of OP-Amps, ideal and practical OP-Amp specifications,.

Unit – VI: Binary Systems

Binary Systems Introduction of Digital Computers and Digital Systems Binary umbers Base Conversion Complements R's Complement (R-1)'s Complement Binary Codes Decimal Codes Error Detection codes Reflected Code

TEXT BOOKS:

1.Electronic Devices and Circuits by salivahanan: second edition Tata McGraw-Hill Education, 2011
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.

UNIT-IBinary Systems :

Binary Systems Introduction of Digital Computers and Digital Systems Binary umbers Base Conversion Complements R's Complement (R-1)'s Complement Binary Codes Decimal Codes Error Detection codes Reflected Code

UNIT-II Binary Logic And Boolean Algebra

Binary logic Logic Gates Postulates of Boolean algebra

Two value Boolean algebra Basic theorems of Boolean algebra De-Morgan's Theorems Boolean functions Boolean forms

UNIT-III Boolean Function Implementation

Need for simplification K – Map method 2 – Variable K – map 3 – Variable K – map 4 – variable K – map K – Map using Don't care condition Universal Gates NAND Gate NOR Gate NAND Implementation NOR Implementation

UNIT-IV Basic Combinational Logic

Design procedure of combinational logic Adder ,Half Adder ,Full Adder ,Subtractor ,Half Subtractor ,Full Subtractor Code Conversion BCD – Excess-3 conversion .

UNIT-VCombinational Logic Using MSI And LSI

Binary Parallel Adder ,Magnitude Comparator ,2 Input Comparator ,Decoder ,Encoder ,Multiplexer ,Demultiplexers

UNIT-VISEQUENTIAL CIRCUITS: Classification of sequential circuits, Basic Flip-Flops, Excitation andCharacteristic Tables.

TEXTBOOKS:

1. Switching & Finite Automata theory- ZviKohavi, TMH,2nd Edition.
2. Digital Design-Morris Mano, PHI, 3rd Edition,2006.
3. Switching Theory and Logic design-A. Anand Kumar,2008.

REFERENCES:

1. An Engineering Approach to Digital Design-Fletcher, PHI.
2. Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
3. Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications.

B.Tech II Year I Sem ELECTRONIC MEASUREMENTS & INSTRUMENTATION(CBCC) T C
(For non ECE Students) 4+1* 4

UNIT I: ELECRICAL MEASUREMENTS: Electrical standards: ampere, voltage, resistance, capacitance & inductance standards-Suspension Galvanometer-Torque & deflection of the galvanometer-PMMC mechanism - DC Ammeters-DC voltmeters-Voltmeter sensitivity-Series and Shunt type ohm meters-Multimeters-Alternating current indicating instruments: electrodynamometer, rectifier type-Thermo instruments-Electrodynamometers in power measurements-Watt hour meter-Power factor meter.

UNIT II: BRIDGE MEASUREMENTS: Resistance Measurement: Wheat stone bridge, Kelvin bridge- AC bridges: Condition for bridge balance- Inductance measurement: Maxwell Bridge, Hay Bridge- Capacitance measurement: Schering Bridge- Frequency measurement: Wein Bridge- Problems of shielding and grounding.

UNIT III: ELECTRONIC MEASUREMENTS: FET input electronic volt-ohm-ammeters- AC voltmeters: rectifier type, true RMS type- Digital voltmeters: Ramp, Dual slope integration & SAR types

UNIT IV: OSCILLOSCOPES: Oscilloscope block diagram- Vertical deflection system-Delay line-Horizontal deflection system-Vertical I/p and sweep generator signal synchronization-Oscilloscope probes: 1:1 probes,attenuator probes, active probes, current probes- Oscilloscope controls-Measurement of voltage, frequency, phase .

UNIT V: SIGNAL GENERATORS AND ANALYZERS: Low-frequency signal generators- Function generators- Pulse generators- RF signal generators.

UNIT VI: FREQUENCY & TIME MEASUREMENT: Time & frequency standards – Frequency measurement - time base - Period measurement - Measurement errors.

TEXT BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques- Albert D. Helfrick, Willium D. Cooper-PHI-2002
2. Electronic Instrumentation and Measurements- David A. Bell-PHI-2nd edition-2003.

REFERENCES:

1. A course in Electrical and Electronic Mesurements and Instrumentation- A.K. Sawhney- DhanpatiRai&CO-7th edition-2005
2. Electronic Instrumentation- H Kalsi- TMH-3rd edition
3. Electronic Measurements and Instrumentation- Oliver and Cage- TMH

B.Tech II Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Managerial Economics & Financial Analysis	4	1	-	4
2.		Computer Organization	4	1	-	4
3.		EM Waves And Transmission Lines	4	1	-	4
4.		Electronic Circuit Analysis	4	1	-	4
5.		Environmental Science	4	1	-	4
6.		Probability Theory & Stochastic Processes	4	1	-	4
7.		Electronic Circuit Analysis Lab	-	-	3	2
8.		Basic Simulation Lab using MATLAB	-	-	3	2
9.		Comprehensive Online Examination				2
		TOTAL	24	6	6	30

L – Lecture, T – Tutorial, P – Practical

B.Tech II Year II Sem MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS T C
4+1* 4

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand determinants, Law of Demand and its exceptions.

UNIT II

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT III

Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

UNIT IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT VI

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.Dwivedi:ManagerialEconomics, 6th Ed., Vikas.

B.Tech II Year II Sem **COMPUTER ORGANIZATION** **T** **C**
4+1* **4**

Unit I

Register transfer and Micro-Operations: Register transfer, Bus and Memory transfers, Arithmetic, Logic and Shift micro-operations, Arithmetic logic shift unit.

Unit II

Basic computer organization and design – Instruction codes, Computer registers, computer instructions,timing and control, Instruction cycle, Memory reference instructions, Input /output and Interrupt.

Micro-programmed control: control memory, address sequencing, micro-program example, design of control unit, micro-program sequencer.

Unit III

Central Processing Unit : General register organization, stack organization, Instruction formats, Addressingmodes, data transfer and manipulation, program control.

Computer Arithmetic : Algorithms for fixed point and signed 2's complement binary arithmetic operations, floating point arithmetic operations.

Unit IV

Input/OutputOrganization : Peripheral devices, input/output interface, asynchronous Data transfer, modes of transfer, priority interrupt, DMA.

UNIT V

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory.

Unit VI

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline,RISC pipeline, vector processing and Array Processing, Multiprocessing.

Text Books:

1. Computer System Architecture –M.Morris Mano – 3rd Edition., Pearson, 1993.

Reference Books:

1. Computer Architecture and Organization – John P.Hayes– McGraw Hill
2. Computer Organization –Hemachar– 5th Edition– TMH, 2002

B.Tech II Year II Sem **EM WAVES AND TRANSMISSION LINES** **T** **C**
4+1* **4**

UNIT I

Review of Coordinate Systems, Vector Calculus:

Static Electric Fields : Coulomb's Law, Electric Field Intensity, Fields due to Different Charge Distributions,Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell'sTwo Equations for Electrostatic Fields, Energy Density, Continuity Equation, Poisson's and Laplace's Equations, Related Problems.

UNIT II

Static Magnetic Fields: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic FluxDensity,Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Ampere'sForce Law, Related Problems.

UNIT III

Time Varying EM Fields: Faraday's Law of induction, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces, Poynting Theorem, Related Problems.

UNIT IV

EM Wave Propagation : Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Relations Between E & H. Sinusoidal Variations. Wave Propagtion in Lossless and Conducting Media.Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and GoodDielectrics.Polarization. Related Problems

UNIT V

Guided Waves : Parallel Plane Waveguides Introduction, Transverse Electric waves(TE), Transverse Magnetic waves(TM), TEM Modes – Concepts, expressions and Analysis, Cut-off Frequencies, Velocities,Wavelengths,Related Problems.

UNIT VI

Transmission Lines : Types, Equivalent Electrical circuits, Transmission Line Equations, Primary & Secondary Constants, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, InfiniteLine, Distortion – Distortion less and minimum attenuation condition, Input Impedance Relations, SC and OCLines, Reflection Coefficient, VSWR.

TEXT BOOKS:

1. Elements of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 3rded., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2ndEdition, 2000.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7thed., 2006.
4. Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn. Pte.Ltd., 2005.
5. Transmission Lines and Networks –UmeshSinha, SatyaPrakashan (Tech. India Publications), NewDelhi, 2001

UNIT-1

BJT AND FET AMPLIFIERS: Small signal low frequency transistor amplifier circuits, h-parameter representation of a transistor, Analysis of single stage transistor amplifier (CE, CB, and CC) using hparameters:voltage gain, current gain, Input impedance and Output impedance. Comparison of transistorconfigurations in terms of AI ,Ri , Av , Ro, Small signal model of JFET, Analysis of single stage FET amplifier(CS, CG, and CD) using h-parameters.

UNIT-2

MULTI STAGE AMPLIFIERS: Review of Small Signal Analysis of Transistors, Millers Theorem, DifferentCoupling Methods used in Amplifiers-RC, Direct, Transformer coupled Amplifiers. Analysis of Cascaded RCCoupled amplifiers.High Input Resistance Transistor Circuits.Cascode Transistor Configuration, CE-CCAmplifiers. Two Stage RC Coupled JFET amplifier (in Common Source (CS) configuration), Difference Amplifier

UNIT-3

HIGH FREQUENCY TRANSISTOR CIRCUTS: Transistor at High Frequencies, Hybrid-PieCommon Emitter Transistor Model, Determination of Hybrid- PieParameters, Variation of Hybrid Parameters with |IC|,|VCE| and Temperature. The Hybrid-PieCE Short Circuit Current Gain, CE Current Gain with Resistance Load,Gain Band width product, Design of High frequency Amplifier. Frequency Effects, Amplifier Analysis.

UNIT-4

FEEDBACK AMPLIFIERS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series,voltage shunt, current series, and current shunt feedback amplifiers with discrete components and their analysis,

UNIT-5

LARGE SIGNAL AMPLIFIERS: Importance of Power Amplifiers, Types of Power amplifiers, Class A Power Amplifier, Maximum Efficiency of Class A Amplifier, Transformer Coupled Audio Amplifier, Types of Distortions in amplifiers, Push Pull Amplifier (Class A, Class B), Complimentary Symmetry , Phase Inverters,Class D Operation, Class S Operation, Heat Sinks.

UNIT-6

TUNED AMPLIFIERS: Introduction, Q-Factor, Small Signal Tuned Capacitive Coupled, Tapped SingleTuned Capacitance Coupled Amplifier, Single Tuned Transformer Coupled Amplifier, Effect of Double Tuned CE Amplifier, Application of Tuned Amplifiers. Synchronous Tuning, Stagger Tuning, Stability ofTuned Amplifiers.

TEXT BOOKS :

1. Integrated Electronics – J. Millman and C.C. Halkias, McGraw-Hill, 1972.
2. Electronic Devices and Circuits, Theodore F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Edition, 6th Edition, 2004.

REFERENCES :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/PrenticeHall,9th Edition,2006.
2. Micro Electronic Circuits –Sedra A.S. and K.C. Smith, Oxford University Press, 5th ed.
3. Micro Electronic Circuits: Analysis and Design – M.H. Rashid, Thomson PWS Publ., 1999.
4. Principles of Electronic Circuits –S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
5. Electronic Circuit Analysis and Design – Donald A. Neaman, McGraw Hill.
6. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004

UNIT-I

Introduction of Environmental Studies-Natural Resources: Definition, The Global environment and its segments; Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere Scope and Importance of Environmental Studies – Need for Public Awareness. Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Introduction –deforestation, case studies –Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources :Introduction–Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Introduction,environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT – II

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: 1. Forest ecosystem. 2. Grassland ecosystem. 3. Desert ecosystem. 4. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT – III

Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. – Biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of :1. Air pollution. 2. Water pollution 3. Soil pollution 4.Marine pollution 5. Noise pollution 6.Thermal pollution 7 Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT–V

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.Case Studies. -Wasteland reclamation. –Consumerism and waste products. –Environment Protection Act. –Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT–VI

Human Population and the Environment: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. ,Infectiousdeseases,-Tuber colossi,cancer,Water Borne Deseases-Malaria,Diheria -Women and Child Welfare. - Role of information Technology in Environment and human health. -Case Studies.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. A Basic Course in environmental Studies by S.Deswal and A.Deswal ,DhanpatRai& Co

B.Tech II Year II Sem PROBABILITY THEORY & STOCHASTIC PROCESSES T C
4+1* 4

UNIT I PROBABILITY: Probability introduced through Sets and Relative Frequency: Experiments and SampleSpaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, MathematicalModel of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, TotalProbability, Bayes' Theorem, Independent Events.

UNIT II THE RANDOM VARIABLE : Definition of a Random Variable, Conditions for a Function to be a RandomVariable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties,Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of definingConditioning Event, Conditional Density, Properties.

UNIT III OPERATION ON ONE RANDOM VARIABLE – EXPECTATION : Introduction, Expected Value of aRandom Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance andSkew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of aRandom Variable: Monotonic Transformations for a Continuous Random Variable, NonmonotonicTransformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT IV MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties ofJoint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning,Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two RandomVariables, Sum of Several Random Variables, Central Limit Theorem.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Expected Value of a Function of RandomVariables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, JointlyGaussian Random Variables: Two Random Variables case, N Random Variable case, Properties,Transformations of Multiple Random Variables, and Linear Transformations of Gaussian Random Variables.

UNIT V RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept,Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions,concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationary, (N-Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-ErgodicProcesses, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-CorrelationFunction and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT VI RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Density Spectrum and itsProperties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power DensitySpectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.**Linear Systems with Random Inputs:** Fundamentals of Linear System, Random Signal Response of LinearSystems– Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function ofResponse, Cross-Correlation Functions of Input and Output, and Spectral Characteristics of System Response:Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and output.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai,PHI, 4th Edition, 2002.

REFERENCES:

1. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W.Woods, Pearson Education, 3rd Edition.
2. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition,1999.
3. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003

B.Tech III Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Analog Communications	4	1	-	4
2.		Control Systems	4	1	-	4
3.		Antennas And Wave Propagation	4	1	-	4
4.		Analog IC Applications	4	1	-	4
5.		Digital IC Applications	4	1	-	4
6.		Microprocessors & Microcontrollers	4	1	-	4
7.		Analog & Digital IC Applications Lab	-	-	3	2
8.		Microprocessors and Microcontrollers lab	-	-	3	2
9.		Advanced Communications Lab			3	
		TOTAL	24	6	9	28

L – Lecture, T – Tutorial, P – Practical

B.Tech III Year I Sem **ANALOG COMMUNICATIONS** **T** **C**
4+1* **4**

UNIT I INTRODUCTION TO COMMNICATION SYSTEMS: Communication process, Elements of Communication Systems; Modulation: Need for Modulation, Forms of Modulation: AM, FM, PM, Advantages,Disadvantages and Applications.

UNIT II AMPLITUDE MODULATION AND DEMODULATION: Introduction, Mathematical Representation of AM, Modulation Factors, Percentage of Modulation, Power Relationships, Virtues and imitations of AM.DSB AM: Analog Message Conventions, AM Signals and Spectra, DSB signals and spectra.SSB AM: SSB Signals and Spectra, SSB generation, VSB Generation, Demodulation of AM, Square law detector.

UNIT III FREQUENCY, PHASE MODULATION AND DEMODULATION: FM: Introduction,Mathematical Representation of FM, Modulation Index, Deviation Sensitivity, Deviation Ratio, Bandwidth of FM (Carson's rule), Narrow band FM, Wide band FM, Voltage and Power for FM, Pre-emphasis and Deemphasis,Illustrative Problems.PM: Introduction, Narrow Band PM, Phase Modulation and Indirect FM; FMdemodulators, Slope detector, Balanced slope discriminators, Phase difference discriminators, Ratio detector,PLL Detectors, Distortion and Transmission estimates.

UNIT IV TRANSMITTERS AND RECEIVERS: AM Transmitters: Balanced Modulator, Square Law Modulator, and Product Modulator.

Receivers: Super Heterodyne Receiver, Double Conversion Receiver and Independent Sideband Receiver.FM Transmitters: Direct FM and VCO's, Mixer, Divider, Multiplier. Receivers: Local Oscillator, Slope Detector,Phase Locked Loop, Introduction to IC 565 applications, FM demodulator.

UNIT V NOISE IN ANALOG COMMUNICATION SYSTEMS: Introduction, Noise in Baseband Systems,SystemModel and Parameter, SNR at the output of a Base band System.Noise in AM systems: System model andparameter, Noise in DSB and SSB Systems.Noise in Angle modulation Systems: Output SNR in AngleModulation, Threshold effects in Angle Modulation Systems. Improvement of SNR using Pre-emphasis and
De-emphasis, Comparison of Continuous Wave Modulation.

UNIT VI PULSE MODULATION TECHNIQUES: Definition, Types: PAM, PWM, PPM, Sampling,Nyquist rate, Flat top sampling, Generation and Detection of PAM, PWM, PPM.

TEXT BOOKS:

1. A.Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. "Electronic Communications systems" Modulation and Transmission-Robert Schoenbeck, UBS Publications, New Delhi.

REFERENCES:

1. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. B.P. Lathi, &Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.
4. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003

UNIT I: INTRODUCTION: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Examples-Types of feedback control systems. Mathematical modelling of Electrical & Mechanical (Translational & rotational) systems – Differential equations, Electrical analogous (F-V, F-I) of mechanical system-Use of Laplace transforms in control systems- Transfer function: Concepts, features-Transfer functions of above systems.

UNIT II: BLOCK DIAGRAM & SIGNAL FLOW GRAPH REPRESENTATION: Block diagram representation of electrical systems and reduction techniques-Signal flow graphs and reduction using mason's gain formula-Transfer function of DC servomotor, AC servomotor.

UNIT-III: TIME RESPONSE ANALYSIS: Definition & classification of time response-Standard test signals- Type & order of a system-Transient response of first order and second order systems for step input-Transient response specifications-Steady state response-Steady sate errors and error constants-Effects of PD, PI & PID controllers.

UNIT IV: STABILITY ANALYSIS IN S-DOMAIN: The concept of stability – Routh's stability criterion,special, special cases, advantages and limitations. Root locus technique: The root locus concept, construction of root loci-Effects of adding poles and zero's to G(s) H(s) on the root loci.

UNIT V: FREQUENCY RESPONSE ANALYSIS: Introduction – Steady state response to sinusoidal input (frequency response) – Bode diagrams – Phase margin and gain margin – Stability analysis from bode plots – Determination of transfer function from Bode diagram.

UNIT VI: POLAR AND NYQUIST PLOTS: Polar plots – Nyquist plots – Stability analysis.

TEXT BOOKS:

1) Control systems – U.A. Bakshi&V.U.Bakshi, Technical publications, Pune.
2) Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, 2nd edition.

REFERENCES:

1) Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., edition 1998.
2) Automatic Control Systems by B. C. Kuo, John wiley and sons, 2003.
3) Control Systems Engg. by NISE 3rd Edition – John wiley

B.Tech III Year I Sem ANTENNAS AND WAVE PROPAGATION T C
4+1* 4

UNIT I ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, Two-wire,Current Distribution on a thin wire antenna of different lengths. Antenna Parameters - Radiation Patterns,Patterns in Principal Planes, Main Lobe and Side Lobes, Beam width, Beam Area, Radiation Intensity,Radiation Resistance, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, ApertureEfficiency, Effective Height. Near-field and Far-field regions.

UNIT II BASIC ANTENNA ELEMENTS: Retarded Potentials (Vector and Scalar Descriptions), Hertzian Dipole, Half-wave Dipole, Quarter-wave Monopole; Current Distribution, Evaluation of Field Components,Expression for Radiated Power and antenna parameters for Alternating Current-carrying Element, Half-wave Dipole and Quarter-wave Monopole; Small Loop Antenna, Comparison between Loop Antenna and Dipole,Illustrative problems.

UNIT III ANTENNA ARRAYS: Introduction to Antenna Arrays, Purpose of antenna arrays; N-element Uniform Linear Arrays – Broadside Arrays (BSA), End-fire Arrays (EFA), Derivation of their characteristics,EFA with Increased Directivity, Comparison of BSA and EFA. Principle of Pattern Multiplication, Binomial Arrays; Effects of Uniform and Non-Uniform Amplitude Distributions.Related Problems.

UNIT IV HF, VHF ANTENNAS: Classification of antennas based on different characteristics. HF,VHF Antennas: V-antennas, Rhombic Antennas and Design Relations, Helical Antennas– Significance, Geometry,basic properties; Design considerations, Modes of Helical antennas- Axial Mode and Normal Mode. Yagi–Uda
Antenna Arrays, Folded Dipoles & their characteristics.

UNIT V UHF AND MICRO-WAVE FREQUENCY ANTENNAS: Reflector Antennas: Flat Sheet and Corner Reflectors; Paraboloidal Reflectors– Geometry, Characteristics, Types of feeds. Cassegrain feed system.Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Types- Non-metallic & Metallic lens and Zoning, Patch and slot Antennas. Applications of all antennas, Antenna Measurements - Introduction, Co-Ordinate System, Patterns to be measured, Pattern Measurement arrangement, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI WAVE PROPAGATION: Introduction-Frequency ranges and modes of propagations. Ground Wave Propagation– Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations and Roughness Calculations. Sky Wave Propagation – Formation of Ionosphere Layers and their Characteristics,Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance –Optimum Frequency,LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption. Space wave propagation -Introduction, field strength variation with distance and height, effect of earth's curvature, M-curves and Ductpropagation, scattering phenomena, fading path loss calculations.

TEXT BOOKS

1. Antennas and Wave Propagation- John D. Krauss and Ronald J. Marhefka and Ahmad S. Khan, 3rd Edition, TMH, New Delhi.
2. Antenna Theory - C.A. Balanis, John Wiley & Sons, 2nd ed., 2001.

REFERENCE

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
2. Antennas and Wave Propagation - GSN Raju, Pearson Education India, 2009.
3. Antennas and Wave Propagation – K.D. Prasad, SatyaPrakashan, Tech India Publications, New Delhi, 2001.
4. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
5. Antennas and Wave Propagation by V.Soundararajan, SCITECH Publications

B.Tech III Year I Sem **ANALOG IC APPLICATIONS** **T** **C**
4+1* **4**

UNIT-I

INTRODUCTION TO OP-AMPS: Integrated circuits-types, classification, package types and temperature ranges, power supplies, OP-Amp Block diagram, Differential amplifier circuit configurations, Characteristics of OP-Amps, ideal and practical OP-Amp specifications, DC and AC characteristics, 741 OP-Amp and its features, OP-Amp parameters, input and output offset voltages and currents, slew rate, CMRR, PSRR.

UNIT-II

LINEAR APPLICATIONS OF OP-AMPS: Inverting and non-inverting amplifier, integrator anddifferentiator, difference amplifier, instrumentation amplifier, AC amplifier, Voltage to Current, Current to Voltage converters, Buffers.

UNIT-III

NON LINEAR APPLICATIONS OF OP-AMPS: Non-linear function generation, comparators,Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers, IC 723 voltage regulators.

UNIT-IV

ANALOG FILTERS: Introduction, Butterworth filters-first order, second order LPF, HPF filters. Band pass,Band reject and all pass filters.

UNIT-V

TIMERS AND PHASE LOCKED LOOPS: Introduction to 555 Timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL-Introduction, Block schematic, principles anddescription of individual blocks, Introduction to IC 566, VCO applications and details.

UNIT–VI

D/A AND A/D CONVERTERS: Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and different types of ADCs-parallel comparator type ADC, counter type ADC,successive approximation ADC and Dual slope ADC.DAC and ADC specifications

TEXT BOOKS:

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, 4th edition, PHI, 1987.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.

REFERENCES:

1. Operational Amplifiers & Linear ICs by David A. Bell, 2nd edition, Oxford University Press, 2010.
2. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988

UNIT I

CMOS LOGIC: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT II

BIPOLAR LOGIC AND INTERFACING: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families,Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT III

THE VHDL HARDWARE DESCRIPTION LANGUAGE: Design flow, program structure, types and constants, functions and procedures, libraries and packages.THE VHDL DESIGN ELEMENTS: Structuraldesign elements, data flow design elements, behavioral design elements, and time dimension and simulationsynthesis.

UNIT IV

COMBINATIONAL LOGIC DESIGN: Decoders, encoders, three state devices, multiplexers and demultiplexers, EX-OR gates and parity circuits, comparators, adders &subtractors, ALUs, VHDL modes for the above ICs.

UNIT V

DESIGN EXAMPLES (USING VHDL): Barrel shifter, comparators, floating-point encoder, dual parity encoder, designing with ROM.

UNIT VI

SEQUENTIAL LOGIC DESIGN: Latches and flip-flops, counters, shift register, and their VHDL models.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. Fundamentals of Digital Logic with VHDL Design – Stephen Brown and ZvonkoVramesic, McGraw Hill, 2nd Edition., 2005.

REFERENCES:

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition

UNIT-I

8086 MICROPROCESSOR: Evaluation of microprocessors. Overview of 8085. Register organization of 8086,architecture, signal description of 8086, physical memory organization, general bus operations, I/O addressing capability, special processor activities, 8086-Minimum mode and maximum mode of operation,Timing diagram.

UNIT-II

8086 INSTRUCTION SET AND ASSEMBLER DIRECTIVES: Addressing modes of 8086, Instruction set of 8086, Assembler Directives and operators

UNIT-III

8086 ASSEMBLY LANGUAGE PROGRAMMING: 8086 Assembly language programs involving logical,branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-IV

PROGRAMMABLE PERIPHERAL DEVICES AND THEIR INTERFACING: Memory interfacing to 8086 (static RAM and EPROM). 8255 PPI-various modes of operation and interfacing to 8086. D/A and A/D converter interfacing, Stepper motor interfacing. Interrupt structure of 8086, Vector interrupt table. Interrupt service routines.8259 PIC architecture and interfacing cascading of interrupt controller and its importance.

UNIT-V

8051 MICROCONTROLLER: Architecture of 8051 microcontroller. Pin Diagram of 8051, and external memories, counters and timers, serial communication, interrupts.

UNIT-VI

8051 ASSEMBLY LANGUAGE PROGRAMMING: Instruction set of 8051, Addressing modes of 8051,Assembly Language Programming examples using 8051.Interfacing to LCD,Keyboard,ADC& DAC.

TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with8085 By Ramesh S Gaonkar.
2. Advanced microprocessor and peripherals-A.K. Ray and K.M.Bhurchandi, 2nd edition, TMH, 2000.
3. 8051 microcontroller and embedded systems by mazidi and mazidi ,pearson education 2000.

REFERENCES:

1. Microprocessors Interfacing-Douglas V.Hall, Revised 2nd edition, 2007.
2. The 8088 and 8086 Microprocessors- Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
3. 8051 Microcontroller-Internals, Instructions, Programming and Interfacing by SubrataGhoshal

B.Tech III Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Digital Signal Processing	4	1	-	4
2.		Electronic Measurements & Instrumentation	4	1	-	4
3.		Digital Communications	4	1	-	4
4.		Microwave Engineering	4	1	-	4
5.		Computer Network	4	1	-	4
6.		**Choice Based Credit Courses (For Non ECE Students)** 4. Industrial Electronics 5. Fundamentals of Communication Systems 6. Embedded Systems	4	1	-	4
7.		Analog & Digital Communications Lab	-	-	3	2
8.		Digital Signal Processing Lab	-	-	3	2
9.		Comprehensive Online Examination				2
		TOTAL	24	6	9	30

L – Lecture, T – Tutorial, P – Practical

B.Tech III Year II Sem DIGITAL SIGNAL PROCESSING **T C**
4+1* 4

INTRODUCTION: Review of Discrete time signals and sequences, Frequency domain representation of Discrete time signals and systems.

DISCRETE FOURIER SERIES: Properties of discrete Fourier series, DFS representation of periodicsequences, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT,computation of DFT. Relation between Z-Transform and DFS.

UNIT-II

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimationin frequency FFT algorithms, inverse FFT and FFT for composite N.

UNIT-III

REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, applications of Z-Transforms, solution of difference equations of digital filters, block diagram representation of linear constant-coefficient differenceequations, basic structures of IIR systems, basic structures of FIR systems, allpass filters, tuneable IIR filters,
cascaded lattice realization of IIR & FIR filters.

UNIT-IV

IIR DIGITAL FILTERS: Analog filter approximations-Butterworth and chebyshev, design of IIR digital filters from analog filters, design examples: analog-digital transformations, Illustrative Problems.

UNIT-V

FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters, Illustrative Problems.

UNIT-VI

MULTIRATE DIGITAL SIGNAL PROCESSING FUNDAMENTALS: Basic sample rate alterationdevices, Multirate Structures for sampling rate Converters, Multistage design of decimator and Interpolator,Polyphase Decomposition, Nyquist filters, Applications of DSP.

TEXT BOOKS:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.
3. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.

REFERENCES:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. A Text book on Digital Signal processing – R S Kaler, M Kulkarni,,Umesh Gupta, I K International Publisthing House Pvt. Ltd.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.

B.Tech III Year II Sem ELECTRONIC MEASUREMENTS & INSTRUMENTATION T C
4+1* 4

UNIT I: ELECRICAL MEASUREMENTS: Electrical standards: ampere, voltage, resistance, capacitance & inductance standards-Suspension Galvanometer-Torque & deflection of the galvanometer-PMMC mechanism - DC Ammeters-DC voltmeters-Voltmeter sensitivity-Series and Shunt type ohm meters-Multimeters-Alternating current indicating instruments: electrodynamometer, rectifier type-Thermo instruments-Electrodynamometers in power measurements-Watt hour meter-Power factor meter.

UNIT II: BRIDGE MEASUREMENTS: Resistance Measurement: Wheat stone bridge, Kelvin bridge- AC bridges: Condition for bridge balance- Inductance measurement: Maxwell Bridge, Hay Bridge- Capacitance measurement: Schering Bridge- Frequency measurement: Wein Bridge- Problems of shielding and grounding.

UNIT III: ELECTRONIC MEASUREMENTS: FET input electronic volt-ohm-ammeters- AC voltmeters: rectifier type, true RMS type- Digital voltmeters: Ramp, Dual slope integration & SAR types – Q meter- Vector impedance meter-Vector volt meter- RF power and voltage measurement.

UNIT IV: OSCILLOSCOPES: Oscilloscope block diagram- Vertical deflection system-Delay line-Horizontal deflection system-Vertical I/p and sweep generator signal synchronization-Oscilloscope probes: 1:1 probes,attenuator probes, active probes, current probes- Oscilloscope controls-Measurement of voltage, frequency, phase and pulse- Multi I/p oscilloscopes: dual beam, dual trace- Sampling oscilloscopes- Digital storage oscilloscopes.

UNIT V: SIGNAL GENERATORS AND ANALYZERS: Low-frequency signal generators- Function generators- Pulse generators- RF signal generators- Frequency synthesized signal generator- Heterodyne wave analyzer- Harmonic distortion analyzers- Spectrum analyzer (Basics only).

UNIT VI: FREQUENCY & TIME MEASUREMENT: Time & frequency standards – Frequency measurement - time base - Period measurement - Measurement errors.

TEXT BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques- Albert D. Helfrick, Willium D. Cooper-PHI-2002
2. Electronic Instrumentation and Measurements- David A. Bell-PHI-2nd edition-2003.

REFERENCES:

1. A course in Electrical and Electronic Mesurements and Instrumentation- A.K. Sawhney- DhanpatiRai&CO-7th edition-2005
2. Electronic Instrumentation- H Kalsi- TMH-3rd edition
3. Electronic Measurements and Instrumentation- Oliver and Cage- TMH

UNIT I: DIGITIZATION TECHNIQUES FOR ANALOG MESSAGES-I: Introduction - Importance of Digitization Techniques, Elements of Pulse Code Modulation (PCM) - Generation and Reconstruction, Quantization and coding, Quantization error, PCM with Noise, Companding in PCM,

UNIT II: DIGITIZATION TECHNIQUES FOR ANALOG MESSAGES-II: Delta modulation, AdaptiveDelta Modulation, Differential PCM systems (DPCM)

UNIT III: BASE BAND DIGITAL TRANSMISSION: Digital Signals and Systems – Digital PAM Signals, Transmission Limitations, Power Spectra of Digital PAM, Noise and Errors – Binary Error Probabilities, Matched Filtering, Optimum filtering.

UNIT IV: DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, QPSK, M–ary PSK Systems calculation of error probability of ASK, BPSK, BFSK, QPSK, Coherent AND Non-Coherent ASK (OOK (on-off keying)

BAND PASS DIGITAL TRANSMISSION: Introduction, Signal Space, Coherent Binary Systems – Optimum Binary Detection.

UNIT V: INFORMATION THEORY: Introduction, Information Measure and Encoding, Entropy and Information Rate, Coding for a Discrete Memory Less Channel, Binary Symmetric Channel, Discrete Channel Capacity, Coding for the Binary Symmetric Channels.

UNIT VI: CHANNEL CODING: Error Detection & Correction of Linear Block Codes Hamming Codes, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Matrix Representation of Block Codes, Convolutional Codes, Syndrome calculation, M-ary modulation techniques.

TEXT BOOKS:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005

REFERENCES:

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Herbert Taub& Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
3. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.

Unit-I

Guided Waves: Microwave frequencies and Uses, Waves between parallel conducting planes, TE, TM, TEM waves characteristics, velocity of propagation, group and phase velocity. Wave impedance, Attenuation inParallel plate guides.

Unit – II

Waveguides: TE & TM waves in rectangular and circular wave guides, wave impedance, Attenuation and Q of wave guides, wave guide resonators, power handling capability, transmission line analogy.

Unit – III

Passive Microwave Devices: Terminations, attenuators, Phase changes, Introduction to scattering parameters,Unitary property, derivation of s-matrix for directional couples, Eplane, HPlane, magic Tee, Hybrid ring,microwave propagation is ferrites, faraday rotation, circulators And Isolators, matched termination.

Unit – IV

Microwave Tubes: Velocity modulation, operation and performance of two cavity klystron, reflex klystron oscillator, TWT amplifier, magnetron, mode separation and applications. Introduction to PIN diode, GUNN diode ,IMPATT,TRAPATT.

UNIT V:

M-type Tubes: Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical TravellingWave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode of Operation,Separation of PI-Mode, o/p characteristics.

Unit – V:

Microwave Measurements: Bolometric and Thermocouple methods of measurement of power, frequency attenuation, VSWR, impedance measurements and measurement of scattering parameters for 2,3 and 4 port devices. Principle of Microwave communication, Link design, LOS, Microwave Repeaters

Text Books:

1. Microwave Devices and Circuits – Samuel Y.Liao, Pearson, 3rd Edition, 1990
2. Microwave & Radar Engineering's –M.Kulkarni
3. EM fields, waves and Radiating Systems – EC Jordan and Balamain, Pearson

Reference Books:

1. Microwave Engineering and Applications –O.P.Goundhi–Progamon PR
2. Foundations for Microwave Engineering's –R.E.Collies, McGraw Hill

UNIT I

Introduction to Computer networks, OSI and TCP/IP models, Examples of Networks: Novell Networks,Arpanet.Network Topologies: WAN, LAN, MAN. Physical Layer: Transmission media: copper, twisted pair, fiberoptic.Switching and encoding, Introduction to ISDN and ATM.

UNIT II

DATA LINK LAYER: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stopand wait, Sliding Window, Data link layer in HDLC, Internet, and ATM.

UNIT III

MEDIUM ACCESS CONTROL SUB LAYER: The Channel allocation Problem, Multiple Access protocols:ALOHA, Carrier sense multiple accesses; MAC addresses, IEEE 802.X Standard Ethernet, wireless LANS.Bridges.

UNIT IV

NETWORK LAYER-I: Virtual circuit and Datagram subnets; Routing algorithms: shortest path routing,Flooding, Broad cast, Multi cast, Dynamic routing: Distance vector routing, Hierarchical routing.

UNIT V

NETWORK LAYER-II: Congestion, General Principles of Congestion Control, Congestion Control preventionpolicies, Congestion Control Algorithms. Network layer in the internet: IP addresses, IPv4, IPv6 protocol,interior and exterior routing algorithms. Network layer in the ATM Networks.

UNIT VI

TRANSPORT LAYER: Transport Services, Connection management, TCP and UDP protocols; ATM AALLayer Protocol. The Application Layer: Introduction to Network security, Introduction to DNS, Electronic mail,
World Wide Web.

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:

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

UNIT-I. Semiconductor Power Devices: - Characteristics of power diodes, power transistors, power MOSFET, IGBT, SCRs, TRIACs, DIAC

UNIT-II Turn ON and Turn OFF Circuits: - Turn ON Methods- study of single phase firing circuits using UJT, PUT, Turn OFF Methods- Forced commutation circuits- Parallel Capacitance, resonant turn off, external pulse commutation, auxillarythyristors and load commutation. (Class A to F)

UNIT-III. Applications of Thyristors: - Static circuit breakers, over voltage protectors, zero voltage switch, integral cycle triggering, time delay method, soft start method.

UNIT-IVControlled Rectifier Circuits: a) Single Phase: - Half wave, full wave, half controlled and full controlled converters with R & RL Load, effect of Freewheeling Diode. Calculations of performance parameters expected.
b) Three Phase: - Half wave, full wave, fully controlled converters with Resistive Load only.

UNIT-V. **SCR Choppers:** - Introduction to DC-to-DC converters, Basic chopper circuits, Voltage control methods- Jones chopper, Morgan's chopper, Introduction to multiphase choppers. Step up chopper.

UNIT-VISCR Inverters: - Voltage driven and Current driven Inverters, single phase center tapped inverter circuit, single phase bridge inverters, Macmurray and Macmurray- Bedford inverter circuits, principle of operation of three phase inverters, Voltage control techniques, harmonic elimination methods (Analytical treatment not expected).

Text Books: -

1. P.C.Sen: Power electronics ; TMH
2. Chute and Chute: Electronics in industry; MGH
3. General Electric: SCR manual, PH
4. Ned Mohan: Power electronics; John Willey Pub

B.Tech III Year II Sem FUNDAMENTALS OF COMMUNICATION SYSTEMS (CBCC) T C
(for non ECE students) 4+1* 4

UNIT I INTRODUCTION TO COMMNICATION SYSTEMS: Communication process, Elements of Communication Systems; Modulation: Need for Modulation, Forms of Modulation: AM, FM, PM, Advantages,Disadvantages and Applications.

UNIT II AMPLITUDE MODULATION AND DEMODULATION: Introduction, Mathematical Representation of AM, Modulation Factors, Percentage of Modulation, Power Relationships, Virtues and imitations of AM.DSB AM: Analog Message Conventions, AM Signals and Spectra, DSB signals and spectra.SSB AM: SSB Signals and Spectra, SSB generation, VSB Generation, Demodulation of AM, Square law detector.

UNIT III FREQUENCY, PHASE MODULATION AND DEMODULATION: FM: Introduction,Mathematical Representation of FM, Modulation Index, Deviation Sensitivity, Deviation Ratio, Bandwidth of FM (Carson's rule), Narrow band FM, Wide band FM, Voltage and Power for FM, Pre-emphasis and Deemphasis,Illustrative Problems.PM: Introduction, Narrow Band PM, Phase Modulation and Indirect FM; FMdemodulators, Slope detector, Balanced slope discriminators, Phase difference discriminators, Ratio detector,PLL Detectors, Distortion and Transmission estimates.

UNIT IV TRANSMITTERS AND RECEIVERS: AM Transmitters: Balanced Modulator, Square Law Modulator, and Product Modulator.

Receivers: Super Heterodyne Receiver, Double Conversion Receiver and Independent Sideband Receiver.FM Transmitters: Direct FM and VCO's, Mixer, Divider, Multiplier. Receivers: Local Oscillator, Slope Detector,Phase Locked Loop, Introduction to IC 565 applications, FM demodulator.

UNIT V NOISE IN ANALOG COMMUNICATION SYSTEMS: Introduction, Noise in Baseband Systems,SystemModel and Parameter, SNR at the output of a Base band System.Noise in AM systems: System model andparameter, Noise in DSB and SSB Systems.Noise in Angle modulation Systems: Output SNR in AngleModulation, Threshold effects in Angle Modulation Systems. Improvement of SNR using Pre-emphasis and
De-emphasis, Comparison of Continuous Wave Modulation.

UNIT VI PULSE MODULATION TECHNIQUES: Definition, Types: PAM, PWM, PPM, Sampling,Nyquist rate, Flat top sampling, Generation and Detection of PAM, PWM, PPM.

TEXT BOOKS:

1. A.Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. "Electronic Communications systems" Modulation and Transmission-Robert Schoenbeck, UBS Publications, New Delhi.

REFERENCES:

1. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. B.P. Lathi, &Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.
4. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003

B.Tech III Year II Sem **EMBEDDED SYSTEMS (CBCC)** **T C**
(for non ECE students) **4+1* 4**

Unit , I

Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.
(Chapter I from Text Book 1, Wolf).

Unit , II

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input / Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input /Output, Interrupts.
(Chapter 3 from Text Book 2, Ayala).

Unit , III

Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.
(Chapter 2,4,5,6,7and 8 from Text Book 2, Ayala)

Unit , IV

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions

Unit , V

Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.
(Chapter 6 and 7 from Text Book 3, Simon).

Unit , VI

Basic Design Using a Real,Time Operating System: Principles, Semaphores and Queues, HardReal,Time Scheduling Considerations, Saving Memory and Power,

TEXT BOOKS :

1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller , Kenneth J.Ayala, Thomson.

REFERENCES :

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education

B.Tech IV Year I Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Optical Communications	4	1	-	4
2.		VLSI System Design	4	1	-	4
3.		Management Science	4	1	-	4
4.		Embedded Systems	4	1	-	4
5.		**Choice Based Credit Courses;: (for ECE students)** 1.Digital Image Processing 2.DSP Processors& Architecture 3. Biomedical Instrumentation	4	1	-	4
6.		**Choice Based Credit Courses;: (for ECE students)** 4. Wireless Sensor Networks 5. Artificial Neural Networks 6. Adaptive Signal Processing	4	1	-	4
7.		Microwave & Optical Communications Lab	-	-	3	2
8.		CMOS VLSI Design Lab	-	-	3	2
		Mini Project	-	-	-	2
		TOTAL	24	6	6	30

L – Lecture, T – Tutorial, P – Practical

UNIT I: Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- I ntroduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays.

UNIT II: Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. **Fiber materials** — Glass,Halide, Active glass, Chalgenide glass, Plastic optical fibers.

UNIT III: Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening

UNIT IV: OPTICAL SOURCES AND DETECTORS: Optical sources- LEDs, Structures, Materials,Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability ofLED&ILD. Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect
on Avalanche gain, Comparision of Photodetectors.

UNIT V: Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,.

UNIT VI: Optical system design — Considerations, Component choice, Multiplexing. Point-to- point links,System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples. WDM, Necessity, Principles, Types of WDM, Measurement of
Attenuation and Dispersion

TEXT BOOKS:

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

RERFERENCES :

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

B.Tech IV Year I Sem **VLSI SYSTEM DESIGN** **T** **C**
4+1* **4**

UNIT I

INTRODUCTION : Introduction to IC Technology – MOS, PMOS, NMOS, CMOS technologies-Oxidation,Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Integrated Resistors and Capacitors.

UNIT II

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS Circuits: Ids-Vdsrelationships,MOS transistor threshold Voltage, gm, gds; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT III

VLSI CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams, Design Rules and Layout: Lambda based CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates.

UNIT IV

BASIC CIRCUIT CONCEPTS: Sheet Resistance RS and its concept to MOS, Area Capacitances of layers,standard unit of capacitance _Cg, area capacitance calculations, The Delay unit, Inverter delays, estimation of MOS inverter delay, Wiring Capacitances, Choice of layers.

UNIT V

DESIGNING ARITHMETIC BUILDING BLOCKS: Introduction; The Adders: Definition, The Full adder:Circuit design consideration, The Binary adder: Logic design consideration; The Multiplier: Definition, Partial product generation, Partial product accumulation, Final addition, Multiplier summary. Introduction to FPGAs,CPLDs architectures and Standard Cells.

UNIT VI

INTRODCTION TO LOW POWER VLSI: Introduction, over view of power consumption, low power design through voltage scaling, estimation and optimization of switching activity.

TEXTBOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS digital integrated circuits analysis and design by Sung-Mo Kand and Yusuf Leblebici, Tata McGraw Hill, 3rd edition.

REFERENCES:

1. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.
4. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.
5. Digital Integrated Circuits – A design perspective, John M. Rabaey, AnanthaChandrakasan, BorivojeNikolic Pearson Education, 2rd Edition

UNIT-I: INTRODUCTION TO MANAGEMENT: Concepts of Management – Nature, Importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiment, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation

UNIT-II: BASIC ISSUES IN ORGANIZATION: Designing Organic Structures of Organization (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization, Virtual organization, Cellular organization, Team structure, Boundary less organization and Departmentation, Leadership Styles, Social responsibilities of Management

UNIT-III: OPERATIONS MANAGEMENT: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records, Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

UNIT-IV: HUMAN RESOURCES MANAGEMENT: Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

UNIT-V: PROJECT MANAGEMENT (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

UNIT-VI: WOMEN ENTREPRENEURSHIP: Scope of Entrepreneurship among women- Promotional efforts supporting Women Entrepreneurs in India – Opportunities for women entrepreneurs – Challenges/Problems of Women Entrepreneurs – Successful cases of Women Entrepreneurs.

TEXT BOOK:

1. Aryasri: Management Science, TMH, New Delhi.

REFERENCE BOOKS:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2007.
2. Koontz &Weihrich: Essentials of Management, 6/e, TMH, 2007.
3. Thomas N.Duening& John M.Ivancevich Management—Principles and Guidelines, Biztantra,2007

B.Tech IV Year I Sem **EMBEDDED SYSTEMS** **T** **C**
4+1* **4**

Unit-I

Introduction: Embedded systems overview, design challenge, processor technology, IC technology, DesignTechnology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RT-level),custom single purpose processor design (RT-level), optimizing custom single purpose processors.

UNIT-II

General Purpose Processors : Basic architecture, operation, Pipelining, Programmer's view,developmentenvironment, Application Specific Instruction-Set Processors (ASIPs) – MicroControllers and Digital SignalProcessors.

Unit-III

State Machine And Concurrent Process Models: Introduction, models Vs. languages, Finite state machineswith data path model (FSMD), using state machines, program state Machine model (PSM), concurrent processmodel, concurrent processes, communication among processes, synchronization among processes,implementation, data flow model, real-time systems.

Unit-IV

Introduction to Real – Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, andShared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, InterruptRoutines in an RTOS Environment.

Unit-V

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-TimeScheduling Considerations, Saving Memory and Power,Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software

Unit - VI

Introduction to advanced architectures: ARM Processor and memory organization and
Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems.

TEXT BOOKS

1. Embedded System Design – A Unified Hardware / Software Introduction – Frank Vahid, Tony
2. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elseveir.
3. Microcontrollers, Raj kamal, Pearson Education.
4. An Embedded Software Primer, David E. Simon, Pearson Education

B.Tech IV Year I Sem **DIGITAL IMAGE PROCESSING (CBCC)** **T** **C**
(for ECE students) **4+1*** **4**

UNIT I

DIGITAL IMAGE FUNDAMENTALS: Introduction, Image sensing & acquisition, Concept of graylevels.Gray level to binary image conversion. Sampling and quantization.Relationship between pixels.ImagingGeometry.

UNIT II

IMAGE TRANSFORMS: 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosineTransform, Haar transform, Slant transform, Hotelling transform.

UNIT III

IMAGE ENHANCEMENT: Enhancement in Spatial Domain: Point processing. Histogram processing.Spatialfiltering. Enhancement in frequency domain: Image smoothing, Image sharpening, Basics of color image
processing.

UNIT IV

IMAGE RESTORATION: Degradation model, Algebraic approach to restoration, Inverse filtering, Leastmean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT V

IMAGE SEGMENTATION: Introduction, Detection of discontinuities. Edge linking and boundary detection,Thresholding, Region oriented segmentation.

UNIT VI

IMAGE COMPRESSION: Redundancies and their removal methods, Fidelity criteria, Image compressionmodels, Source encoder and decoder, Error free compression, Lossy compression.

TEXT BOOK :

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

REFERENCES :

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L.Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.
5. Digital image processing by S.Jayaraman, S.Esakkirajan&T.Veera Kumar, Tata McGraw Hill, 2010

B.Tech IV Year I Sem **DSP PROCESSORS & ARCHITECTURE(CBCC)** **T C**
(for ECE students) **4+1* 4**

UNIT I: ARCHITECURE OF DSP PROCESSOR (TMS320C5X): Introduction, Bus structure, CentralArithmetic Logic Unit(CALU),Auxiliary Register ALU (ARAU),Index Register(INDX),Auxiliary RegisterCompare Register(ARCR),Block Move Address Register(BMAR)Block Repeat Registers (RPTC, BRCR,PASR,PAER), Parallel Logic Unit(PLU),Memory- Mapped Registers, Program Controller, Some flag in thestatus registers

UNIT II: COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signalsand coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/DConversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT III: ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features,DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, AddressGeneration Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT IV: PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processingDevices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XXProcessors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions andProgramming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation ofTMS320C54XX Processors.

UNIT V: IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Q-notation, FIR Filters, IIR Filters,Interpolation Filters, Decimation Filters, IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithmfor DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT VI: Interfacing & APPLICATIONS OF PROGRAMMABLE DSP DEVICES: DSP based Biotelemetry receiver, A speech processing system, An Image processing system, Memory interfacing,Synchronous serial interface, MCBSP, A CODEC interface circuit.

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processors, Architecture, Programming and Applications – B. VenkataRamani and M. Bhaskar, TMH, 2004.

REFERENCES:

1. Digital Signal Processing – Jonathan Stein, John Wiley, 2005.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000

B.Tech IV Year I Sem **BIOMEDICAL INSTRUMENTATION (CBCC)** **T** **C**
(for ECE students) **4+1*** **4**

Unit -1

Introduction to Biomedical Instrumentation: Bioelectric-electrodes and physiological transducers: The age of biomedical engineering, development of biomedical instrumentation, biometrics, introduction to the maninstrument system, components of the man instrument system, physiological system of the body.Recording electrodes, electrodes of ECG, microelectrodes pressure, blood flow,temperature transducers, pulse and respiration sensors.

Unit -II

Recording And Monitoring Instruments: Electrocardiograph, phono-cardiograph,electroencephalograph, electromyograph. Oscilloscope for biomedical measurement cardioscope, multichannel displays non-fade display systems. Blood pressure, temperature, respiration rate measurements. Cardiotocograph, methods of monitoring fetal heart rate, fetal heart rate measurement. Interfacing computer with Medical instrumentation and other equipment, computer aided ECG analysis, computerized cathterisation laboratory, computerized patient monitoring system.

Unit -III

Patient Safety, Measurement And Analysis Techniques : Physiological effects of electrical current, shock hazards from electrical equipment, leakage currents, method of accident prevention.Ultrasonic blood flowmeters, Laser Doppler flow-meters, Coulter counter, automatic recognition and differential counting of cells. Function of the kidneys, artificial kidney.

Unit -IV

Biotelemetry And Modern Imaging Systems: Introduction to biotelemetry, physiological parameters adaptable to biotelemetry, the components of biotelemery systems, implantable units, applications of telemetry in patient care. X-ray machine, X-ray computer topography. Physics of ultrasonic waves, medical ultrasound, A-scan, echocardiograph (M-Mode), Bscanner, real-time ultrasonic imaging system, display devices for ultrasonic imaging, biological effects of ultrasound.

Unit-V

Therapeutic Equipment: Cardiac pacemakers: external, implantable, programmable pacemakers, performance aspects of implantable pacemakers, power sources for implantable pacemakers, leads and electrodes.

Unit-VI

Cardiac Defibrillators: DC-defibrillator, implantable defibrillators, and defibrillator analyzer.Laser application in Biomedical field.

Text Books:

1. Biomedical Instrumentation and Measurements – Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer - PHI (1991).
2. Hand book of Biomedical Instrumentation – RS Khandpur - TMH (1991).

Reference Books:

1. Transducers of Biomedical Instruments: Principles and applications – Cobbold, R.S.C. John Wiley
2. Introduction to Biomedical Instrumentation – S.K. Guha

B.Tech IV Year I Sem **WIRELESS SENSOR NETWORK (CBCC)** **T** **C**
(for ECE students) **4+1*** **4**

UNIT I

OVERVIEW OF WIRELESS SENSOR NETWORKS :

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II

ARCHITECTURES

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS-I

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC ,

UNIT IV NETWORKING SENSORS-II

The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT V INFRASTRUCTURE ESTABLISHMENT

Topology Control , Clustering, Time Synchronization, Localization and Positioning,Sensor Tasking and Control.

UNIT VI SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TEXT BOOKS

1.Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.

2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1.KazemSohraby, Daniel Minoli, &TaiebZnati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.

2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003

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B.Tech IV Year I Sem **ARTIFICIAL NEURAL NETWORKS (CBCC)** **T C**
(for ECE students) **4+1* 4**

Unit-I

Biological Neural Network : Organisation of human brain, Neuron functions-cell body, Dendrites, Axon, Cellmembrane, computers and human brains.

Artificial Neural Networks : Characteristics, single layer and multi-layer Artificial Neural Networks, Training:objective, supervised and unsupervised training, overview.**Perceptrons**: perceptron representation, learning, training algorithm, advanced algorithms and applications.

Unit - II

Neural Dynamice: Counters propagation Networks: Introduction, Network structure, Normal operation,training the Kohonen and Grossberg layers, full counter propagation network, applications.

Statistical Methods : Training, applications, applications to non-linear optimisation problems, Back propagation and Cauchy training.

Unit - III

Hopfield Networks: Recurrent network configurations, applications.**Bi-directional Associative Memories**: BAM structure, retrieving a stored association, encoding theassociations, Memory capability, continuous, adaptive and competitive BAM.

Adaptive Resonance Theory: ART architecture and implementation training example, characteristics.

Unit - IV

Fuzzy sets and membership, classical sets, fuzzy sets, fuzzy set operations, properties of fuzzy sets lambdacutsfor fuzzy sets fuzzy logic

Unit-V

Fuzzy Relations: cardinality, operations, properties, fuzzy Cartesian product and composition, fuzzy toleranceand equivalence relations

Unit – VI

Fuzzy measures: Belief and plausibility, evidence theory, probability measures, possibility and necessitymeasures

Text Books:

1. Neural Computing, theory and practice - Phillip D. Wasserman – Van Nostrand Reinhold
2. Fuzzy Logic with Engg. Applications – Timothy Ross – TMH, (Unit IV & V).

Reference Books:

1. Fuzzy Set theory and its applications - H.J.Zimmerman -Allied Publishers
2 Fundamentals of Neural Networks, Architectures, Algorithms and Applications - LaureneFausett - Pearson, 1994
3. Fuzzy Sets, Uncertainty and Information - George I Klir and Tina A. Folger –PHI

B.Tech IV Year I Sem **ADAPTIVE SIGNAL PROCESSING (CBCC)** **T C**
(for ECE students) **4+1* 4**

UNIT - I : PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION

Relationship between the auto correlation and the model parameters – The Yule – Walker method for the AR Model Parameters – The Burg Method for the AR Model parameters – unconstrained least-squares method for the AR Model parameters – sequential estimation methods for the AR Model parameters – selection of AR Model order.

UNIT - II : ADAPTIVE SIGNAL PROCESSING

FIR adaptive filters – steepest descent adaptive filter – LMS algorithm – convergence of LMS algorithms – Application: noise cancellation – channel equalization – adaptive recursive filters – recursive least squares.

Unit-III-Vector space framework for optimal filtering.

Axioms of a vector space, examples, subspace Linear independence, basis, dimension, direct sum of subspaces.Linear transformation, examples. Range space and null space, rank and nullity of a linear operator. Inner product space, orthogonality, Gram-Schmidt orthogonalization.Orthogonal projection, orthogonal decomposition of subspaces.Vector space of random variables, optimal filtering as an orthogonal projection computation problem.

UNIT -IV : MULTIRATE SIGNAL PROCESSING

Decimation by a factor D – Interpolation by a factor I – Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures – Polyphase filter structure.

UNIT -V : SPEECH SIGNAL PROCESSING

Digital models for speech signal : Mechanism of speech production – model for vocal tract, radiation and excitation – complete model – time domain processing of speech signal:- Pitch period estimation – using autocorrelation function – Linear predictive Coding: Basic Principles – autocorrelation method – Durbin recursive solution.

UNIT - VI : WAVELET TRANSFORMS

Fourier Transform : Its power and Limitations – Short Time Fourier Transform – The Gabor Transform - Discrete Time Fourier Transform and filter banks – Continuous Wavelet Transform – Wavelet Transform Ideal Case – Perfect Reconstruction Filter Banks and wavelets – Recursive multi-resolution decomposition – Haar Wavelet – Daubechies Wavelet.

TEXT BOOK

1. John G.Proakis, DimitrisG.Manobakis, Digital Signal Processing, Principles, Algorithms and Applications, Third edition, (2000) PHI.
2. Monson H.Hayes – Statistical Digital Signal Processing and Modeling, Wiley, 2002.

REFERENCES

1. L.R.Rabiner and R.W.Schaber, Digital Processing of Speech Signals, Pearson Education (1979).
2. Roberto Crist, Modern Digital Signal Processing, Thomson Brooks/Cole (2004)
3. Raghuveer. M. Rao, AjitS.Bopardikar, Wavelet Transforms, Introduction to Theory and applications, Pearson Education, Asia, 2000

B.Tech IV Year II Semester Course Structure

S.No.	Abbreviation	Subject	Periods / Week			Credits
			L	T	P	
1.		Satellite Communication	4	1		4
2.		Radar Engineering	4	1		4
3.	MOOCs-I	**Massive Open Online Courses-I** 4. Digital Design Through Verilog 5. MEMS and Micro Systems 6. Information Theory and Coding	4	-	-	4
4.	MOOCs-II	**Massive Open Online Courses-I** 4. Real Time Operating Systems 5. Cellular Mobile Communications 6. Digital System Design with PLDs and FPGAs	4	-	-	4
5.		Project Work	-	-	-	8
6.		Seminar	-	-	-	2
7.		Comprehensive Viva-Voce	-	-	-	4
		TOTAL	8	2	-	30

L – Lecture, T – Tutorial, P – Practical

B.Tech IV Year II Sem SATELLITE COMMUNICATION T C
4+1* 4

UNIT I

INTRODUCTION: Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services,Applications, Modulation Techniques used (Elementary treatment only) ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT II

SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antennas.

UNIT III

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down link, up link design, Design of satellite links for specified C/N.

UNIT IV

MULTIPLE ACCESS: Frequency division multiple access (FDMA): Intermodulation, Calculation of C/N with intermodulation. Time division Multiple Access (TDMA): Frame structure. Satellite Switched TDMA, Onboard processing, Demand Access Multiple Access (DAMA), Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT V

EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems,Terrestrial interface.

LOW EARTH ORBIT AND NON-GEOSTATIONARY SATELLITE SYSTEMS: Orbit considerations, coverage and frequency considerations.

UNIT VI

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation,GPS Position Location principles, GPS Receivers and codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE Wiley Publications, 2nd Edition, 2006.
2. Satellite Communications – Dennis Roddy, McGraw Hill, 3rd Edition, 2001.

REFERENCES:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication – Dr.D.CAgarwal, Khanna Publications, 5th Ed.

UNIT I

INTRODUCTION TO RADAR: Basic Radar, The Simple Form of the Radar Equation, Radar block Diagram, Radar Frequencies, Applications of Radar. THE RADAR EQUATION: Introduction, detection of Signals in Noise, Receiver Noise and the Signal-to-Noise Ratio, Probability Density Functions, Probabilities of detection and False Alarm, Integration of radar Pulses, Radar Cross-section of Targets, Radar Cross-section Fluctuations, Transmitter Power, Pulse Repetition Frequency, Antenna Parameters, System Losses.

UNIT II

CW AND FREQUENCY-MODULATED RADAR: The Doppler Effect, CW Radar, Frequency-Modulated CW Radar, Air-Borne Doppler Navigation, Multiple –Frequency CW Radar.

UNIT III

MTI AND PULSE DOPPLER RADAR: Introduction to Doppler and MTI Radar, Delay-line Cancellers, Staggered Pulse-Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations of MTI Performance, MTI from a moving Platform(AMTI), Pulse Doppler Radar.

UNIT IV

TRACKING RADAR: Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations of Tracking Accuracy, Low-Angle Tracking, Tracking in Range, Other Tracking Radar Topics, and Comparison of Trackers.

UNIT V

RECEIVERS AND DETECTION OF RADAR SIGNALS IN NOISE: The Radar Receiver, Noise Figure,Mixers, Low-Noise Front-Ends, Displays, Duplexers and Receiver Protectors; Matched-Filter Receiver, Correlation Detection, Detection Criteria, Detector Characteristics, Performance of Radar Operator, Automatic Detection, Constant-False-Alarm-Rate (CFAR) Receiver, ECMS & ECCMS.

UNIT VI

INFORMATION FROM RADAR SIGNALS: Introduction, Basic Radar measurements, , Theoretical accuracy of Radar measurements, Ambiguity diagram, Pulse compression, Target recognition.

TEXT BOOKS:

1. Introduction to Radar systems by Merrill I.Skolnik, Second edition, Tata McGraw Hill.
2. Introduction to Radar systems by Merrill I.Skolnik, Third edition, Tata McGraw Hill