ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

For

B.TECH FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2002-2003)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

KUKATPALLY, HYDERABAD - 500 072.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

B. Tech. (Regular) Four Year Degree Course (Revised) Academic Regulations

(Effective for the students studying I year
from the Academic Year 2002-2003 and onwards)

1. **Award of B.Tech. Degree:**

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

   i. He has pursued a course of study for not less than four academic years and not more than eight academic years.

   ii. He has registered for and studied all the subjects for a total of 212 credits and secured all the 212 credits.

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in the course and their seat shall stand cancelled.

3. **Courses of study:**

   The following courses of study are offered at present for specialization for the B. Tech. Degree:

   1. Aeronautical Engineering
   2. Bio-Medical Engineering
   3. Bio-Technology
   4. Chemical Engineering
   5. Civil Engineering
   6. Computer Science and Engineering
   7. Computer Science and Systems Engineering

8. Electrical and Electronics Engineering
9. Electronics and Communication Engineering
10. Electronics and Computer Engineering
11. Electronics and Control Engineering
12. Electronics and Instrumentation Engineering
13. Electronics and Telematics Engineering
14. Information Technology
15. Instrumentation and Control Engineering
16. Mechanical (Mechatronics) Engineering
17. Mechanical (Production) Engineering
18. Mechanical Engineering
19. Metallurgical Engineering
20. Metallurgy and Material Technology

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

4. Credits:

	Semester Pattern		Yearly Pattern	
	Periods / Week	Credits	Periods / Week	Credits
Theory	04	04	03	06
Practicals	03	02	03	04
Practicals	06	04	06	08
Project	08	08	—	—

5. Distribution and Weightage of Marks:

i. The performance of a student in each semester / I year shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, project shall be evaluated for 200 marks.

ii. For theory subjects the distribution shall be 20 marks for Internal Evaluation and 80 marks for the End-Examination.

iii. For theory subjects, there shall be 5 objective type tests for a duration of 20 minutes each during the semester. Each test shall contain 20 objective type questions for 20 marks. The best 4 tests will be considered for awarding 20 sessionals marks. For the I year class which shall be on yearly basis, there shall be 6 tests of the same duration and weightage as mentioned above. However, the performance in the best 4 tests will be considered for awarding 20 sessional marks.

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 End Examination marks. Of the 25 marks for internal, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned and another member of the staff of the same department of the same institution.

v. For the subject having design and / or drawing, and estimation, the distribution shall be 20 marks for internal evaluation (10 marks for day-to-day work and 10 marks for internal tests). There shall be two internal tests in a Semester and the better of the two will be taken into consideration. However in the I year class, there shall be three tests and the best two will be taken into consideration for a maximum of 20 marks. The End Examination shall be for a total of 80 marks.

vi. The Engineering Drawing Practice Course wherever offered is to be treated as a practical course. Evaluation method adopted for practicals shall be followed here also.

vii. Out of a total of 200 marks for the project work, 40 marks shall be for Internal Evaluation and 160 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by a board of examiners consisting of Guide, Head of the Department and an external examiner. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

viii. Laboratory marks and the sessional marks awarded by the College are not final. They are subject to scrutiny and scaling by the University wherever felt desirable. The uniform distribution of awarding of Sessional marks and Laboratory marks will be referred to a Committee. The Committee will arrive at a scaling factor and

the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they visit the College.

6. Attendance:

i. A student has to put in a minimum of 75% of attendance in aggregate of all the subjects for acquiring credits in the I year and / or each semester thereafter.

ii. Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iii. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year.

iv. Shortage of Attendance below 65% in aggregate shall in no case be condoned.

v. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled. They may seek re-admission for that semester / I year when offered next.

vi. Condonation of shortage of attendance as stipulated in 6 (ii) above shall be granted on genuine and valid grounds with supporting evidence.

vii. A stipulated fee shall be payable towards condonation of shortage of attendance.

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 or practical design or 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.

ii. A student shall successfully complete all the I year subjects from 3 regular consecutive examinations and 3 supplementary consecutive examinations of I year from the date of admission. If he has failed to do so he shall forfeit the seat in course and his seat shall stand cancelled.

iii. A student shall be promoted from II to III year only if he fulfils the academic requirement of 56 credits from the consecutive regular and supplementary examinations of I year and from the regular examination of II year I semester irrespective of whether the candidate takes the examination or not.

iv. A student shall be promoted from third year to fourth year only if he passes all the subjects of I year and fulfils the academic requirements of total 100 credits (including 56 credits of I year) from the examinations,

a. Two regular and Two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II Year I Semester

c. One regular and one supplementary examinations of II Year II Semester

d. One regular III year I Semester examination.

v. A student shall earn all the 212 credits offered as indicated in the course structure.

vi. Students who fail to earn all the 212 credits offered as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in the course and their seat shall stand cancelled.

8. Withholding of Results:

The result of a student shall be withheld if:

i. He has not cleared any dues to the Institution / Hostel;

ii. A case of disciplinary action against him is pending disposal;

9. Course pattern:

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

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

10. Award of Class:

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

First Class with Distinction	70% and above	From the aggregate marks secured for 212 Credits.
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)

11. Minimum Instruction Days:

The minimum instruction for each semester / I year shall be 90/180 working days excluding examination days.

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

13. There shall be no place transfer within the Constituent Colleges of Jawaharlal Nehru Technological University for B.Tech. Regular / FDH / CCC and P. G. Programmes.

General:

14. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

15. The academic regulation should be read as a whole for the purpose of any interpretation.

16. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

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

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2003-2004 and onwards)

1. The Students have to acquire 156 credits from II to IV year of B.Tech. Programme (Regular) for the award of the degree.

2. Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3. The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4. Promotion Rule:

A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 44 credits from the examinations following

a. Two regular and one supplementary examinations of II Year I Semester

b. One regular and one supplementary examinations of II Year II Semester

c. One regular III year I Semester examination

5. Award of Class:

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

First Class with Distinction	70% and above	From the aggregate marks secured for 156 Credits. (i.e II year to IV year)
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)

6. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (LES)

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

I Year B.Tech ECE

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC1021	English	3	-	6
EC1022	Mathematics – I	3+1*	-	6
EC1023	Solid State Physics	2+1*	-	4
EC1024	Information Technology & Numerical Methods	3	-	6
EC1025	C & Data Structures	3	-	6
EC1026	Network Theory	3	-	6
EC1027	Electronic Devices & Circuits	3	-	6
EC1028	Engineering Drawing Practice	-	3	4
EC1029	Computer Programming Lab.	-	6	8
EC1030	Electronic Devices & Circuits Lab.	-	3	4
		20+2*	12	56

(* TUTORIAL)

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

II Year B.Tech ECE I Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC2121	Mathematics – II	4	-	4
EC2122	Electronic Circuit Analysis	4	-	4
EC2123	Probability Theory & Stochastic Processes	4	-	4
EC2124	Signals & Systems	4	-	4
EC2125	Switching Theory & Logic Design	4	-	4
EC2126	Pulse & Digital Circuits	4	-	4
EC2127	Electronic Circuits Lab.	-	3	2
EC2128	Pulse & Digital Circuits Lab.	-	3	2
		24	6	28

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

II Year B.Tech ECE II Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC2221	Mathematics – III	4	-	4
EC2222	Managerial Economics & Financial Analysis	4	-	4
EC2223	Electrical Technology	4	-	4
EC2224	Control Systems	4	-	4
EC2225	EM Waves & Transmission Lines	4	-	4
EC2226	Communication Theory	4	-	4
EC2227	Networks & Electrical Engineering Lab.	-	3	2
EC2228	Analog Communications Lab.	-	3	2
		24	6	28

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE I Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC3121	Management Science	4	-	4
EC3122	Computer Organization	4	-	4
EC3123	Digital IC Applications	4	-	4
EC3124	Antennas & Wave Propagation	4	-	4
EC3125	Linear IC Applications	4	-	4
EC3126	Digital Communications	4	-	4
EC3127	Linear IC Applications Lab.	-	3	2
EC3128	Digital Communications Lab.	-	3	2
		24	6	28

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE II Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC3221	Communication Systems	4	-	4
EC3222	Electronic Measurements & Instrumentation	4	-	4
EC3223	Digital Signal Processing	4	-	4
EC3224	Microwave Engineering	4	-	4
EC3225	VLSI Design	4	-	4
EC3226	Microprocessors & Interfacing	4	-	4
EC3227	Microprocessors Lab.	-	3	2
EC3228	Electronic Computer Aided Design Lab. (Digital ICs & VHDL Lab.)	-	3	2
		24	6	28

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

IV Year B.Tech ECE I Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
EC4121	Operating Systems	4	-	4
EC4122	Computer Networks	4	-	4
EC4123	TV Engineering	4	-	4
EC4124	Optical Communications	4	-	4
ELECTIVE – I		4	-	4
EC4125	Artificial Neural Networks			
EC4126	Satellite Communications			
ELECTIVE – II		4	-	4
EC4127	Digital Image Processing			
EC4128	Advanced Computer Architecture			
EC4129	Digital Signal Processing Lab.	-	3	2
EC4130	Microwave & Optical Communications Lab.	-	3	2
		24	6	28

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

IV Year B.Tech ECE II Semester

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
ELECTIVE – III		4	-	4
EC4221	Cellular & Mobile Communications			
EC4222	Embedded Systems			
ELECTIVE – IV		4	-	4
EC4223	Radar Engineering			
EC4224	Biomedical Instrumentation			
EC4225	Project & Seminar	-	-	8
		8	-	16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I Year B.Tech ECE **3–0–6 EC1021**

ENGLISH
(Common for All Branches)

The following textbooks of English are prescribed for I B.Tech.Class of all Branches in the Colleges of Engineering and Technology affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, **HYDERABAD.** The exercises given are expected to be covered by the teacher in the classroom, the objective of the course being the development of linguistic skills of the learners.

1. A Textbook of English for Engineers and Technologists, OL.
2. Masterminds, OL.

UNIT – I:

1. Energy, Unit 3: Alternative Sources (from A Textbook of English for Engineers and Technologists, OL).
2. Jagadish Chandra Bose, (a profile from The Trailblazers in Masterminds, OL).

UNIT – II:

1. Computers, Unit 2: New Frontiers (from A Textbook of English for Engineers and Technologists, OL).
2. Chandrasekhara Venkata Raman (a profile from The World of Figures and Physics in Masterminds, OL).

UNIT – III:

1. Technology, Unit 3: Evaluating Technology (from A Textbook of English for Engineers and Technologists, OL).
2. S.S. Bhatnagar (a profile from The Institution Builders in Masterminds, OL).

UNIT – IV:

1. Environment, Unit 1: Pollution (from A Textbook of English for engineers and Technologists, OL).
2. Homi Jehangir Bhabha (a profile from The New Age in Masterminds, OL).

UNIT – V:

1. Industry, Unit 2: Safety and Training (from A Textbook of English for Engineers and Technologists, OL).
2. Salim Ali (a profile from The Living World in Masterminds, OL).

UNIT – VI:

Common Errors

Sentence Completion

Synonyms and Antonyms

Analogy

Report Writing

Comprehension

General Essay

Situational Dialogues

NOTE:

The establishment of an English Language Laboratory in each Affiliated College of Engineering and Technology is recommended with effect from the academic year 2002-03 for the following reasons:

1. to expose the students to TOEFL and GRE model of training and practice.

2. to help the students learn correct pronunciation, accent and intonation.
3. to enable the students to improve and strengthen their communicative skills.
4. to expose the students to different variations in English expression.

It is also recommended that the English Language Laboratory training and practice be treated as a non-examination item of the curriculum.

BOOKS RECOMMENDED:

1. Strengthen Your Writing, by V.R.Narayana Swami (OL).
2. Success with Grammar and Composition, by K.R.Narayanaswamy (OL).
3. Examine Your English, by Margaret Maison (OL).
4. English for Professional Students, by S.S.Prabhakara Rao.
5. TOEFL (ARCO & BARRONS, USA) and Cliff's TOEFL.
6. GRE (ARCO & BARRONS, USA) and Cliff's GRE.
7. Communication Skills for Technical Students, by T.M.Farhathulla (OL).
8. Strategies for Engineering Communication – by Susan Stevenson and Steve Whitemore, John Wiley and Sons.
9. Basic Communication Skills for Technology – by Andrea J. Rutherford, 2/e, Pearson Education Asia.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

I Year B.Tech ECE 3–0–6 EC1022

MATHEMATICS – I
(Common to all Branches)

UNIT – I:

Sequences – Series – Convergence and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence.

Rolle's theorem – Lagrange's Mean Value theorem – Cauchy's Mean value Theorem – Generalized Mean Value theorem (Taylor's Theorem)

UNIT – II:

Functions of several variables – limit and continuity – partial differentiation – Chain rule – Total derivative – Euler's theorem, Jacobian – Functional dependence. Maxima and Minima of functions of two variables with and without constraints, Radius, Centre and Circle of Curvature – Evolutes and Envelopes.

UNIT – III:

Curve tracing – Cartesian, polar and Parametric curves. Applications of integration to lengths, volumes and surface areas in Cartesian and Polar coordinates.

UNIT – IV:

Differential equations of first order and first degree – formation. Exact, linear and Bernoulli.

Applications to Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomial in x, $e^{ax}V(x)$, $xV(x)$, method of variation of parameters.

UNIT – V :

Laplace transform of standard functions – Inverse transform – Linearity – first shifting Theorem. Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Differentiation and integration of transforms –

Multiple integrals : Double and triple integrals – change of variables – Change of order of integration.

UNIT – VI :

Vector Differential Calculus :

Gradient, Divergence, Curl and their related properties of sums, Products, Laplacian and second order operators.

Vector integral Calculus : Vector integration – Line integral – work done – Potential function – area, surface and volume integrals. Green's theorem, Stoke's and Gauss'

Divergence Theorem. Verification of Green's, Stoke's and Gauss' Theorems. Curvilinear Coordinates – Cylindrical, Spherical Coordinates – Expressions of Grad, div, curl in Spherical, Cylindrical and Curvilinear Coordinates.

TEXT BOOKS :

1. A Text Book of Engineering Mathematics Volume – I, 2002

   T.K.V. Iyengar, B. Krishna Gandhi, and others, S. Chand and Company

2. Engineering Mathematics

   B.V. Ramana, Tata McGraw_Hill 2002

3. Engineering Mathematics – I

   C. Sanakraiah, Vijaya Publications-2002

4. Engineering Mathematics – I - 2002

   P. Nageswara Rao, Y. Narsimhulu, Prabhakara Rao

REFERENCES :

1. Engineering Mathematics

   S.K.V.S. Sri Rama Chary, M. Bhujanga Rao, Shankar, B.S. Publications 2000

2. Advanced Engineering Mathematics (Eighth edition)

   Erwin Kreyszig , John Wiley & Sons (ASIA) Pvt . Ltd. 2001

3. Advanced Engineering Mathematics (Second edition)

   Michael D. Green Berg, Prentice Hall, Upper saddle River, New Jersey-1998

4. Sarveswara Rao Koneru

   Engineering Mathematics Orient Longman Pvt. Ltd. 2002

5. Engineering Mathematics – I

   N.P. Bali, Laxmi Publications (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I Year B.Tech ECE **2–0–4 EC1023**

SOLID STATE PHYSICS

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I (A):

Bonding in solids – Cohesive energy – calculation of cohesive energy of ionic solids –application to Sodium Chloride crystal.

UNIT – I (B):

Space lattice – crystal structure – unit cell – lattice parameter – crystal systems – Bravais lattices – stacking sequences, metallic crystals – simple cubic, F.C.C. and B.C.C structures- Structures of Diamond, ZnS, NaCl and CsCl systems.

UNIT – II (A):

Directions and planes in crystals – Miller Indices- distances of separation between successive hkl planes. Imperfections in crystals – point defects – Frenkel and Schottky defects – Energy of formation of a vacancy – Number of vacancies at any given temperature.

UNIT – II (B):

Line defects – Edge and Screw dislocations – Burger's vector. Diffraction of X-rays by crystal planes – Bragg's law – Laue photograph – Powder method.

UNIT – III (A): PRINCIPLES OF QUANTUM MECHANICS

Waves and Particles – de Broglie hypothesis - G.P Thompson's experiment – Davisson and Germer's experiment – Schroedinger's wave equation (Time independent) – Physical significance of the wave function. Particle in potential box.

UNIT – III (B): ELECTRON THEORY OF METALS

Classical free electron theory – Mean free path, relaxation time and drift velocity – Fermi-Dirac distribution (non-mathematical treatment) – Quantum free electron theory of conduction scattering – Sources of electrical resistance – Kronig-Penny model (non- mathematical treatment) – Origin of energy band structure in solids – Concept of effective mass.

UNIT – IV (A): DIELECTRIC PROPERTIES

Introduction – Electronic, Ionic and Orientation polarization – Internal field – Clausius Mosotti equation – Ferro and Piezo electricity (non-mathematical treatment) – Frequency dependence of Dielectric Constant (non-mathematical treatment) – Important requirements of Insulators.

UNIT – IV (B): MAGNETIC PROPERTIES

Permeability – Magnetization – Origin of magnetic moment – Bohr magneton - Electron spin – Classification of magnetic materials – Domain theory of Ferro Magnetism – Hysteresis curve – Ferri and Anti-ferro magnetic substances – Ferrites and their applications – Requirements of magnetic materials for different purposes.

UNIT – V (A): SEMICONDUCTORS

Electrical conductivity of semiconductors – Intrinsic semiconductors – carrier concentration – Extrinsic semiconductors - carrier concentration – Minority carrier lifetime – drift and diffusion – Einstein's Equation – Equation of continuity – Hall effect.

UNIT – V (B): SUPERCONDUCTIVITY

General features – Meissner effect – Penetration depth – Type I and Type II superconductors – Flux quantization – Josephson Effect – BCS theory - Applications of superconductors.

UNIT – VI (A): LASERS

Spontaneous and Stimulated Emission – Einstein's Coefficients – Condition for Population inversion – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT – VI (B): FIBRE OPTICS

Principle of Optical fibre – Step-index fibre – graded-index fibre – numerical aperture – Acceptance angle – Transmission signal in Step-index and graded-index fibre – Optical fibres in communication and sensing applications.

TEXT BOOK:

1. Solid State Physics – by S.O. Pillai (New Age International).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I Year B.Tech ECE **3–0–6 EC1024**

INFORMATION TECHNOLOGY & NUMERICAL METHODS

(Common for EEE, ECE, EIE, E.Cont.E, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:

Parts of a computer: Processor, memory, I/O devices, storage devices, operating system, application software

Types of computer systems: Supercomputer, Mainframe computer, Minicomputer, workstations, Microcomputers, Personal computers, desktop handheld computers.

Input devices: Keyboard, mouse, hand devices optical devices, audio visual devices.

Output devices: monitor, projectors, sound devices, printers, storage devices, files (Lessons 1,2,3,4,5,6,9 and 10 of text book1).

UNIT – II:

Data Processing: Data representation, data processing method, data processing speed, processor power, Intel, AMD, Cyrix, Motorola, RISC processors

Operating system; User interface, program running, file management, hardware management, PC Operating Systems, Dos, Unix Windows, Windows NT

Program development: hardware/software interaction, problem to a program, structured and object oriented approaches, Programming languages, machine and high-level languages

(Lessons 7,8,11,12,15, 27 and 28 of text book1)

UNIT – III:

Database management: Databases, the DBMS, working with a database and enterprise software.

Data communication and Networking: Use of networks, network structures, network topologies, network media, telephone lines, modems, digital telephones, Internet, working of Internet, Internet features, Internet applications, Accessing the Internet, connecting PC to Internet, connecting to WWW.

(Lessons 16,17,18,19 and 20 of text book1)

UNIT – IV: (to be taught online through PC)

Microsoft windows ME and tools: Office 2000, Word 2000, Excel 2000, Powerpoint 2000, Access 2000, Outlook 2000, Frontpage 2000.

(Chapters 4 to 25 of text book 2).

UNIT – V:

Numerical Methods - I

Iterative methods, bisection method, Newton Raphson method, successive approximation method, Gauss Jordan and Gauss Siedel methods; Interpolation, Lagrange interpolation forward difference, backward difference and central difference interpolation methods.

UNIT – VI:

Numerical Methods - II

Numerical Integration by Trapezoidal and Simpson's rules, algorithms, numerical solution to differential equations, Euler method, Runga kutta method, Milne predictor corrector method, algorithms; Comparison of Runga kutta method and predictor corrector method; Regression techniques

TEXT BOOKS:

1. Introduction to Computers – by Peter Norton, Tata McGraw-Hill, 4th Edition, 2001, ISBN: 0-07-044743-8.
2. Introduction to Computers with MS-Office 2000 – by Alexis Leon and Mathews Leon, Tata McGraw-Hill, 2001, 0-07-043445-X.
3. Computer oriented Numerical Methods – by V. Rajaraman
4. Numerical Methods for Scientific and Engineering Computation – by M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International (P) Ltd.

REFERENCES:

1. Using information technology – a practical introduction to computers and communication – by Williams, Sawyer and Hutchins, Tata McGraw Hill, 2000

2. Computers and common sense – by Shelly and Hunt; Prentice Hall of India
3. Fundamentals of Information Technology – by Alexis Leon, Mathews Leon, Leon Press and Vikas Publishing House.
4. Using Information Technology: A Practical Introduction to Computers & communications – by Brian Williams, Stacey Sawyer, and Sarah Hutchinson, Tata McGraw-Hill, 3rd Edition, 2001, ISBN: 0-07-043562-6.
5. Upgrading and Repairing PCs – by Scott Mueller, Pearson Education Asia, 13th Edition, 2002, ISBN: 81-7808-552-6.
6. Trouble Shooting, Maintaining & Repairing PCs – by Stephen J. Bigelow, Tata McGraw-Hill Publishing Company, 5th Edition, 2001, ISBN: 0-07-047367-6.
7. Introduction to Information Technology – by Efraim Turban, R. Kelly Rainer, Jr., Richard Potter, John Wiley & Sons, 2000, ISBN: 9971-51-321-8.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

I Year B.Tech ECE **3–0–6 EC1025**

C & DATA STRUCTURES

(Common for EEE, ECE, EIE, EContE, ICE, CSE, IT, CSSE, ETM, ECM, BME)

UNIT – I:

Algorithm, flowchart, program development steps, basic structures of C language, C tokens, data types, declaration of variables, assigning values, arithmetic, relational and logical operator, increment and decrement operators, control operator, bit-wise operator, expressions, evaluation, input-output operators, IF and SWITCH statement, WHILE, DO-WHILE and FOR statements, C programs covering all the above aspects.

UNIT – II:

One dimensional & Two dimensional arrays, initialisation, string variables, declaration, reading, writing, string handle function, user-defined functions variables & storage classes, example C Programs.

UNIT – III:

Structure definition, initialising, assigning values, passing of structures as arguments, unions, declaring & initialising of pointers, pointer based expressions, arrays, strings, functions and structures, C Program examples, file management in C, opening & Closing, I-O operations on files.

UNIT – IV:

Stacks, represnting stacks in C, Infix, Postfix & Prefix programs, recursion in C, Queue & its sequential representation, circular queue, sequence.

UNIT – V:

Single Linked List, Double linked list, Header, Circular List, applications, binary trees, representation, tree traversals, graph representation, graph traversals, spanning trees.

UNIT – VI:

Search techniques: linear and binary search methods, sorting methods, Exchange sort, selection sort, quick sort, tree sort.

TEXT BOOKS:

1. C & Data Structures – by E. Balagurusamy, TMH 2002.
2. Data structures using C – by A. S. Tanenbaum, PHI
3. Fundamentals of Data Structures – by Horowitz & Sahani

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

I Year B.Tech ECE **3–0–6 EC1026**

NETWORK THEORY

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:

Circuit concept – RLC parameters – Voltage and Current sources – Source transformation – Voltage–Current relationship for Passive elements – Kirchhoff's laws – Network Reduction Techniques – Series, Parallel, Series-Parallel, Star-to-delta or delta-to-star transformations.

Magnetic Circuits – Faraday's Laws of electromagnetic induction – Concept of self and mutual inductances – dot convention – coefficient of coupling – Composite Magnetic Circuits – Analysis of Series and Parallel Magnetic Circuits.

UNIT – II:

RMS and Average values and Form factor of different periodic waveforms, Steady state analysis of R, L and C (in series, parallel and series-parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and phase difference – Concept of Power factor, Real and Reactive powers – j–notation, Complex and polar forms of representation, Complex power – Locus diagrams. Series R-L, R-C, R-L-C and parallel combinations with variation of various parameters – Resonance – Series, Parallel Circuits, Concept of Bandwidth and Q-factor.

UNIT – III:

Three phase circuits: Phase sequence – Star and Delta connection – Relation between line and phase voltages and currents in Balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of 3 phase power, active power and reactive power.

Network topology : Definitions – Graph – Tree, Basic Cutset and Basic Tieset matrices for planar network – Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

UNIT – IV:

Network theorems (without proof): Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for dc and ac excitations.

UNIT – V:

Transient response of RL, RC and RLC circuits (series and parallel combinations) for dc and Sinusoidal excitations – Initial conditions – Classical method and Laplace transform Methods of solutions – Response of RL, RC, RLC for step, ramp, pulse and impulse excitations using Laplace Transform Methods.

UNIT – VI:

Two port network parameters – Z, Y, (ABCD) Transmission and Hybrid Parameters for Resistive Networks – concept of Transformed Network – 2-port network parameters using transformed variables.

Filters – Low pass, High pass and Band pass filters – Constant-k and m-derived filters and composite filter design.

TEXT BOOKS:

1. Engineering Circuit Analysis – by William Hayt and Jack E. Kemmerly, McGraw Hill, 5/e.
2. Electric Circuits – by J. Edminister and M. Nahvi, - Schaum's outlines, TMH, 1999.
3. Network Theory – by N. Srinivasulu, Hi-Tech Pub.

REFERENCES:

1. Network theory – Sudhakar and Shymmohan, TMH publications.
2. Network Analysis: - C.K. Mithal, Khanna Publishers.
3. Network Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I Year B.Tech ECE 3–0–6 EC1027

ELECTRONIC DEVICES & CIRCUITS

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I: ELECTRON DYNAMICS AND CRO

Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only. Electrostatic and magnetic focusing. Principles of CRT, deflection sensitivity (Electrostatic and magnetic deflection). Applications of CRO: Voltage, Current and Frequency Measurements.

UNIT – II: SEMICONDUCTOR DIODES AND RECTIFIERS

Construction, Principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculation, limitations and specifications of – pn junction diode, Zener diode, Varactor diode, Tunnel diode and photo diode. Diffusion and transition capacitances of pn junction diode. Hall Effect. Diode applications : Rectifiers – Half wave, Full wave and Bridge Rectifiers, Filters – L, C, L-Section and p -section filters.

UNIT – III: TRANSISTOR CHARACTERISTICS

Construction, principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculations, applications, limitations and specifications of – BJT, FET, UJT and MOSFETs (different configurations of transistors are to be considered).

SCR, DIAC, TRIACs. Optoelectronic devices.

UNIT – IV: AMPLIFIERS

Biasing, DC equivalent model, criteria for fixing operating point and methods of Bias stabilization, Thermal run away and thermal stability. Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of BJT and FET. RC coupled amplifier – frequency response. Biasing of FET, MOSFET. FET amplifier – frequency response, FET Small signal model.

UNIT – V: FEEDBACK AMPLIFIERS

Concepts of feedback. Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

UNIT – VI: OSCILLATORS

Condition for oscillations. RC and LC type oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz (Hartley, Colpitts), RC-phase shift and Wien-bridge oscillators.

TEXT BOOKS:

1. Electronic Devices and Circuits – by Millman and Halkias, Tata McGraw Hill.
2. Electronic Devices and Circuits – by R.L. Boylestad and Louis Nashelsky, Pearson Ed. Asia, PHI.
3. Electronic Devices and Circuits – by K. Lal Kishore, B.S. Publ.

REFERENCES:

1. Microelectronics – by Millman and Grabel, Tata McGraw Hill.
2. Electronic Devices and Circuits – by Bogart, Universal Bookstall, New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I Year B.Tech ECE **0–3–4 EC1028**

ENGINEERING DRAWING PRACTICE

(Common for EEE, ECE, EIE, EContE, ICE, CSE, IT, CSSE, ETM, ECM, BME)

UNIT – I:

Introduction to Engineering Graphics – Construction of Ellipse, Parabola and Hyperbola. Cycloidal Curves.

UNIT – II:

Orthographic Projections of Points, Lines and Planes – Axis inclined to one plane and inclined to both the planes.

UNIT – III:

Orthographic Projections of Solids: Cylinder, Cone, Prism, Pyramid and Sphere in simple positions and Axis inclined to both the Planes.

UNIT – IV:

Development of Surfaces: Prisms, Cylinder, Pyramid and Cone.

UNIT – V:

Isometric Projections of Lines, Planes and Simple Solids.

UNIT – VI:

Conversion of Orthographic Views into Isometric Views and Vice-Versa.

TEXT BOOKS:

1. Engineering Graphics – by K.L. Narayana & P. Kannayya, SciTech Publishers.
2. Engineering Drawing – by N.D. Bhatt, Charotar Publishers.
3. Engineering Drawing and Graphics – by Venugopal, New Age International Limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

I Year B.Tech ECE **0–6–8 ECE1029**

COMPUTER PROGRAMMING LAB

(Common for EEE, ECE, EIE, EContE, ICE, CSE, IT, CSSE, ETM, ECM, BME)

1. Write a C program that evaluates the following algebraic expressions after reading necessary values from the user:

a) ax+b/ax-b

b) $2.5 \log x + \cos 32^0 + | x^2 - y^2 | + v\,2xy$

c)

2. Write a C program for the following

a) Printing three given integers in ascending order

b) Sum of $1 + 2 + 3 + \_\_\_\_\_ n$

c) $1 + x^2/2! + x^2/4! + \_\_\_\_\_$ upto ten terms

d) $x + x^3/3! + x^5/5! + \_\_\_\_\_$ upto 7^{th} digit accuracy

e) Read x and compute Y =1 for x > 0

Y=0 for x = 0

Y= -1 for x<0

3. Write C program using FOR statement to find the following from a given set of 20 integers.

i) Total number of even integers.

ii) Total number of odd integers.

iii) Sum of all even integers.

iv) Sum of all odd integers.

4. Write a C program to obtain the product of two matrices A of size (3x3) and B of size (3x2). The resultant matrix C is to be printed out along with A and B.

Assume suitable values for A & B.

5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +,-,/,* and %).

6. Write C procedures to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib). Also write the main program that uses these procedures.

7. The total distance traveled by vehicle in 't' seconds is given by distance = $ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance traveled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

8. A cloth show room has announced the following seasonal discounts on purchase of items.

Write a C program using switch and If statements to complete the net amount to be paid by a customer.

Purchase Amount	Discount (Percentage) Mill Cloth	Handloom items
1-100	-	5.0
101-200	5.0	7.5
201-300	7.5	10.0
Above 300	10.0	15.0

9. Given a number, write C program using while loop to reverse the digits of the number. Example 1234 to be written as 4321.

10. The Fibonacci sequence of numbers is 1,1,2,3,5,8... based on the recurrence relation f(n) = f (n-1) + f (n-2) for n>2.

Write C program using d0-while to calculate and print the first m fibonacci numbers.

11. Write C programs to print the following outputs using for loop.

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

```
        1
      2 2
    3 3 3
  4 4 4 4
5 5 5 5 5
```

12. Write a C program to extract a portion of a character string and print the extracted string. Assume that m characters are extracted starting with the nth character.

13. A Maruthi Car dealer maintains a record of sales of various vehicles in the following form:

Vehicle type	Month of sales	Price (Rs)
Maruthi – 800	02 / 87	75,000
Maruthi Van	07 / 87	95,000
Maruthi – DX	04 / 88	1,10,000
Gypsy	08 / 88	85,000

Write a C program to read this data into a table of strings and output the details of a particular vehicle sold during a specified period. The program should request the user to input the vehicle type and the period (Starting month & ending month).

14. Write a function that will scan a character string passed as an argument and covert all lower case characters into their upper case equivalents.

15. Implement the following data structures using Arrays

    i) Stacks ii) Linear Queues iii) Circular queues iv) Dequeue.

16. Implement polynomial addition and multiplication with linked list sparse matrix.

17. Implement binary search tree using linked list and perform the following operations.

    i) Insertion ii) Deletion iii) Inorder Traversal iv) Preorder Traversal

    v) Post Order Traversal.

18. Singly linked list and doubly linked lists

    i) Insertion ii) Deletion iii) Lookup

19. i) Implement stack using singly linked list.

    ii) Implement queue using singly linked list.

20. Implement the following sorting techniques.

    i) Bubble sort ii) Insertion Sort iii) Quick Sort iv) Heap Sort.

21. Implement the following searching method.

    i) Sequential Search ii) Binary Search iii) Fibonacci

22. i) Conversion of Infix expression to Postfix notation.

    ii) Simple expression evaluator, that can handle +,-,/ and *.

23. Implement the algorithms for the following iterative methods using C to find one root of the equation f(x)=x sinx + Cosx=0.

    a) Bisection b) False Position c) Newton-Raphson
    d) Successive approximation.

24. Write programs for implementing Gauss-Jordan and Gauss-Seidal methods for solving simultaneous algebraic equations given below.

    $9x_1+2x_2+4x_3 = 20$

    $x_1+10x_2+4x_3 = 6$

    $2x_1-4x_2+10x_3 = -15.$

25. Write Computer programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

26. Implement in 'C' the linear regression and polynomial regression algorithms.

27. Implement Traezoidal and Simpson methods.

28. Practice of exercises (in text book 2 of theory) related to:

    a) Word 2000 Chapter 7, 8, 9.

    b) Excel 2000 Chapter 12, 13.

    c) Powerpoint- 2000 Chapter 15, 16.

    d) Access 2000 Chapter 18,19.

    e) Outlook 2000 Chapter 21,22,23.

    g) FrontPage 2000 Chapter 25

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

I Year B.Tech ECE 0–3–4 EC1030

ELECTRONIC DEVICES & CIRCUITS LAB

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

1. PN Junction diode characteristics
   A. Forward bias B. Reverse bias.
2. Zener diode characteristics
3. Transistor CB characteristics (Input and Output)
4. Transistor CE characteristics (Input and Output)
5. Transistor CC characteristics (Input and Output)
6. Rectifier without filters (Full wave & Half wave)
7. Rectifier with filters (Full wave & Half wave)
8. FET characteristics
9. UJT characteristics
10. Study of CRO
11. Measurement of h parameters of transistor in CB, CE, CC configurations
12. CE amplifier
13. CC amplifier (emitter follower)
14. Single stage R-C coupled Amplifier.
15. FET amplifier (Common Source)
16. FET amplifier (Common Drain)
17. Wien Bridge Oscillator
18. RC Phase Shift Oscillator
19. Feed back amplifier (Current Series).
20. Feed back amplifier (Voltage Series).
21. Colpitts Oscillator
22. Hartley Oscillator
23. SCR characteristics.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester 4–0–4 EC2121

MATHEMATICS – II

(Common for all Branches)

UNIT – I

Matrices – brief review – Inverse of a matrix by adjoint , elementary row transformations – Rank - Normal form – eachelon form. Augmented matrix – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

UNIT – II

Eigen values, eigen vectors – properties – Cayley-Hamilton Theorem (Inverse and powers of a matrix by Cayley-Hamilton theorem). Quadratic forms – positive, negitive definite – Diagnolization of matrix. Calculation of powers of matrix – Model and spectral matrices. Real matrices – Symmetric, skew-symmetric, orthogonal. Linear Transformation – Orthogonal Transformation. Quadratic forms – Reduction of quadratic form to canonical form – index – signature.

Complex matrices : Hermitian, Skew-Herimitian and Unitary – Eigen values and eigen vectors of complex matrices and their properties.

UNIT – III : Fourier Series

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

UNIT – IV :

Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of variables – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V :

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms. Solution of one dimensional wave, heat equations and two dimensional Laplace's equation by Fourier transforms.

z-transform – Inverse z-transform – properties – Damping rule – shifting rule – Initial and final value theorems.

Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS :

1. A Text Book of Engineering Mathematics Volume – II - 2002

   T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand and Company

2. Engineering Mathematics

   B.V. Ramana, Tata McGraw-Hill -2002

3. Engineering Mathematics – II - 2002

   C. Sankaraiah, Vijaya Publications

4. Engineering Mathematics – II - 2002

   P. Nageswara Rao, Y. Narsimhulu, Prabhakar Rao

REFERENCES :

1. Engineering Mathematics

   S.K.V.S. Sri Rama Chary, N. Bhujanga Rao, P. Bhaskara Rao, B.S. Publications 2000.

2. Advanced Engineering Mathematics (Eighth edition)

   Erwin Kreyszig, John Wiley & Sons (ASIA) Pvt. Ltd. - 2001

3. Advanced Engineering Mathematics (Second edition)

   Michael D. Green Berg, Prentice Hall, Upper saddal River, New Jersey-1998

4 Sarveswara Rao Koneru

   Engineering Mathematics Orient Longman (Pvt.) Ltd. 2002

5 Engineering Mathematics - II

   N.P. Bali, Laxmi Publications (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

II Year B.Tech ECE I Semester **4–0–4 EC2122**

ELECTRONIC CIRCUIT ANALYSIS

UNIT – I: SINGLE STAGE AMPLIFIERS:

Classification of amplifiers – Design of single stage amplifiers, H.F. model of transistor, α and β cut off frequencies of transistor, calculation of BW and concept of Gain Bandwidth Product. Specifications of amplifiers.

UNIT – II: MULTISTAGE AMPLIFIERS:

Cascaded amplifiers, analysis and design (all configurations of BJT and FET to be considered), BW of multistage of amplifiers.

UNIT – III: POWER AMPLIFIERS:

Classification of power amplifiers, Class A, AB, B and C power amplifiers, pushpull and complimentary pushpull amplifiers – Design of heat sinks, power output, efficiency, cross-over distortion and harmonic distortion.

UNIT – IV: TUNED AMPLIFIERS:

Single tuned, double tuned and stagger tuned voltage amplifiers, Interstage design, stability considerations, Class B and Class C tuned power amplifiers.

UNIT – V: REGULATED POWER SUPPLIES:

Voltage Multipliers, voltage regulators, series and shunt voltage regulators, switching regulators, three terminal IC regulators, Adj. I.C. regulators.

TEXT BOOKS:

1. Integrated Electronics – by J. Millman and C.C. Halkias, McGraw-Hill.
2. Electronic Devices and Circuits – by Y.N. Bapat, TMH.
3. Electronic Devices and Circuits – by K. Lal Kishore, BS Publ.
4. Electronic Circuit Analysis and Design – by Donald A. Neaman, McGraw Hill.

REFERENCES :

1. Micro Electronic Circuits – by Serda A.S. and K.C. Smith, Oxford University Press.
2. Micro Electronic Circuits : Analysis and Design – by M.H. Rashid, PWS Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester **4–0–4 EC2123**

PROBABILITY THEORY & STOCHASTIC PROCESSES

UNIT – I:

Concept of probability, Random variables, Discrete and continuous. Probability distribution and density functions, Functions of random variables, joint and conditional probability density functions, Examples of probability density functions – Gaussian and Rayleigh density functions.

UNIT – II:

Statistical average – Mean, Variance. Characteristic function, Correlation between random variables, Sum of two random variables, Central limit theorem.

UNIT – III:

Random processes: Stationary random process, Ergodicity, power spectral density and auto correlation function of random processes. Transmission of random processes through networks.

UNIT – IV:

Noise sources, thermal noise, noise power spectral density, noise temperature, available noise power and available noise power density, available noise bandwidth, noise figure, effective input noise temperature, noise figure of cascaded systems, narrow band noise, Quadrature representation of narrow band noise.

UNIT – V:

Information theory: Entropy, information rate, source coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law, Trade–off between bandwidth and SNR.

TEXT BOOKS:

1. Probability, Random Variables and Random Signal Principles – by P.Z. Peebles.
2. Signals, Systems & Communications – by B.P. Lathi, BS Publ.
3. Principles of Communications Systems – by H. Taub & Donald L. Schilling, McGraw Hill.

REFERENCES:

1. Statistica Theory of Communication – by S.P. Eugene Xavier, New Age Intl. Publ.
2. Probability, Random Variables and Stochastic Processes – by A. Papoulis, S. Unnikrishna Pillai, TMH.
3. Electronic Communication Systems – by Kennedy, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester **4–0–4 EC2124**

SIGNALS & SYSTEMS
(Common for ECE, EIE, EContE)

UNIT – 1: SIGNAL ANALYSIS

Analogy between vectors and signals, orthogonal vector and signal spaces, approximation of a function by a set of mutually orthogonal functions, evaluation of mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions, trignometric and exponential Fourier Series, representation of periodic function by Fourier series, complex Fourier spectrum, representation of arbitrary function, concept of Fourier transform (F.T.), F.T. of simple functions, concept of impulse function, F.T. involving impulse functions, properties of Fourier transforms, concept of convolution in time domain and frequency domain, graphical representation of convolution, sampling theorem and its proof, effect of undersampling.

UNIT – II: SIGNAL TRANSMISSION THROUGH SYSTEMS:

Linear system, impulse response, response 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. Distortionless transmission through a system, signal bandwidth, system bandwidth. Ideal LPF, HPF and BPF characteristics, causality and physical realization, relationship between bandwidth and rise time. Energy density spectrum, Parseval's theorem, power density spectrum.

UNIT – III: CORRELATION OF SIGNALS AND CONVOLUTION:

Cross correlation and auto correlation of functions, properties of correlation function, relation between auto correlation function and energy/power spectral density function.

UNIT – IV: LAPLACE TRANSFORMS:

Review of Laplace transforms, partial fraction expansion, inverse Laplace transforms, 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. and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT – V: z-TRANSFORMS:

Fundamental difference between continuous and discrete time signals, discrete time complex exponential and sinusoidal signals, periodicity of discrete time complex exponential signal, concept of z-transform of a discrete sequence. Distinction between Laplace, Fourier & z-transforms. Region of convergence in z-transforms, constraints on ROC for various classes of signals, Inverse z-transforms, properties of z-transforms.

TEXT BOOKS:

1. Signals, Systems and Communications – by B.P. Lathi, BS Publ.
2. Signals and Systems – by A.V.Oppenheim, A.S.Willsky & S.H. Nawab, PHI, EEE.

REFERENCES:

1. Signals & Systems – by Simon Haykin, Wiley Student Ed.
2. Network Analysis – by M.E. Van Valkenberg, PHI Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester **4–0–4 EC2125**

SWITCHING THEORY & LOGIC DESIGN

(Common for ECE, EEE, EIE, EContE, CSE, CSIT)

UNIT – I:

NUMBER SYSTEMS & CODES:

Review of number systems – binary arithmetic – binary weighted and non-weighted codes – error detecting and error correcting codes.

BOOLEAN ALGEBRA:

Postulates and theorems; representation of switching functions – SOP & POS forms – Karnaugh Map representation – Minimisation using K-maps.

UNIT – II: DESIGN OF COMBINATIONAL CIRCUITS:

Tabular minimization – design of single output and multi output functions – design using conventional AND, OR, NOT, NAND, NOR & EX – OR gates. Design using MSI & LSI devices – Digital multiplexer / selector decoder, demultiplexer – design of 4 bit adder, carry look-ahead adder, magnitude comparator – BCD converter, logic implementations using ROM, PAL & PLA.

UNIT – III: INTRODUCTION TO SEQUENTIAL CIRCUITS:

Combinational versus sequential circuits, Asynchronous versus synchronous circuits - State table and state diagram – state assignment – Memory elements and their excitation functions – T flip flop, D flip flop, RS flip flop, JK flip-flops and their excitation requirements – Design of synchronous sequential circuits like Sequence Detectors and binary counters.

UNIT – IV: CAPABILITIES & MINIMIZATION OF SEQUENTIAL MACHINES:

Melay and Moore machines – capabilities and limitations of finite state machine - state equivalence and machine minimization.

UNIT – V: ALGORITHMIC STATE MACHINES:

ASM chart, Timing considerations, control implementation, Design with multiplexers and PLA control. Introduction to unate functions and threshold logic.

TEXT BOOKS:

1. Switching and Finite Automata Theory – by Zvi Kohavi, TMH edition.
2. Digital Logic and Computer Design – by M. Morris Mano, PHI.
3. Digital Logic Design Principles – by Norman Balbamian and Breadly, John Wiley.

REFERENCES:

1. Intorduction to Switching Theory and Logic Design – by F.J. Hill and Peterson, John Wiley Publications.
2. Digital Logic - Applications & Design – by John M. Yarbrough, Vikas Publications, 1997.
3. Digital Systems Design – by R.P. Jain, TMH.
4. Digital Systems : Principles and Applications – Ronald J. Tocci , Pearson Education / PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

II Year B.Tech ECE I Semester **4–0–4 EC2126**

PULSE & DIGITAL CIRCUITS

(Common for ECE, EEE, EIE, EContE)

UNIT – I: LINEAR WAVESHAPING:

High pass and low pass RC circuits and their responses for sinusoidal, step voltage, pulse, square wave and ramp inputs. High pass RC network as a differentiator. Low pass RC network as an integrator. Attenuators and their applications in CRO probe. RL and RLC circuits and their response for step input, Ringing circuits.

UNIT – II: NON-LINEAR WAVE SHAPING:

Diode clippers, Transistor clippers, clipping at two independent levels, Emitter coupled clipper, Diode comparators, Diode differentiator.

Comparator, applications of voltage comparators, clamping operation, clamping circuits using Diodes with different inputs, clamping circuit theorem, practical clamping circuits, effect of Diode characteristics on clamping voltage.

SWITCHING CHARACTERISTICS OF DEVICES:

Diode as a switch, piecewise linear Diode characteristics, Transistor as a switch, breakdown voltage consideration of transistors, saturation parameters of transistors and their variation with temperature. Design of a transistor switch, Transistor switching times.

UNIT – III: MULTIVIBRATORS:

Bistable, Monostable and Astable multivibrators using Transistors, Schmitt trigger.

UNIT – IV: SWEEP CIRCUITS:

Voltage sweeps, methods of linearization, Bootstrap and Miller circuits, Linear current sweep, application in T.V. , synchronization.

SYNCHRONISATION AND FREQUENCY DIVISION:

Principles of Synchronization, Synchronization of Astable multivibrators – Phase Delay and Pulse jitters – Synchronization of sweep circuits with Symmetrical signals.

UNIT – V: GATES:

Unidirectional and Bi-directional Sampling gates.

BLOCKING OSCILLATORS:

Base timing, Emitter timing, Astable blocking Oscillator.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms – Millman & Taub, McGraw-Hill Publ.

REFERENCES:

1. Wave Generation and Shaping – by L. Strauss.
2. Pulse, Digital Circuits and Computer Fundamentals – by R. Venkataraman.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester **0–3–2 EC2127**

ELECTRONIC CIRCUITS LAB.

The following experiments have to be designed, simulated first using SPICE Software and then to be verified practically with the hardware.

- **STUDY OF SPICE SOFTWARE**
- Design, Simulation, Hardware Development and Testing of
  1. Two stage RC coupled amplifier.
  2. Class A, Class AB Power amplifiers.
  3. Class B Push Pull amplifiers.
  4. Class B Complementary Symmetry Configuration.
  5. Class C Tuned Voltage amplifier.
  6. Class C Power amplifier.
  7. Series regulated power supply.
  8. Shunt regulated power supply.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE I Semester **0–3–2 EC2128**

PULSE & DIGITAL CIRCUITS LAB.

(Common for ECE, EIE, EContE)

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

II Year B.Tech ECE II Semester **4–0–4 EC2221**

MATHEMATICS – III

(Common for ECE, EEE, EIE, EContE, ME, PT, MetE)

UNIT – I:

Special functions : Gamma and Beta functions – Their properties – evaluation of improper integrals. Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT – II:

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 z^c, (c is complex) Principal value.

UNIT – III:

Complex integration : Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Zero – singular point – Isolated singular point – pole of order m – essential singularity.

Complex Power series : Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

UNIT – IV:

Residue – Evaluation of residue by formula and by Laurent series Residue theorem. Evaluation of integrals of the type

a). Improper real integrai $\int_{-\infty}^{\infty} f(x)\,dx$

b). $\int_{\alpha}^{\alpha+2\pi} f(\cos\theta, \sin\theta)\,d\theta$

c). Fourier integrals $\int_{-\infty}^{\infty} e^{imx} f(x)\,dx$

d). Integrals by indentation.

Argument principle – Rouche's theorem – determination of number of zeros of complex polynomials. Fundamental theorem of Algebra, Liouville's Theorem.

UNIT – V:

Conformal mapping: Transformation by e^z, ln z, z^2m^1, z^n (n a positive integer) sin z , cos z , z + a/z. z^{-1}

Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – Determination of bilinear transformation mapping 3 given points.

TEXT BOOKS:

1. A Text Book of Engineering Mathematics Volume – III, 2002

   T.K.V.Iyengar, B.Krishna Gandhi and others, S.Chand and Company

2. Engineering Mathemtics

   B.V. Ramana, Tata McGraw-Hill, 2002

3. Engineering Mathemtics – III, 2002

   C.Sankaraiah, Vijaya Publications

4. Engineering Mathematics – III, 2002

   P.Nageswara Rao, Y. Narsimhulu, Prabhakar Rao

REFERENCES:

1. Advanced Engineering Mathematics (Eighth edition)

   Erwin Kreyszig John Wiley & Sons (ASIA) Pvt. Ltd. 2001

2. Advanced Engineering Mathematics (Second edition)

   Michael D. Green Berg , Prentice Hall, Upper saddal River, New Jersey, 1998

3 Sarveswara Rao Koneru.

   Engineering Mathematics, Orient Longman (Pvt.) Ltd. 2002

4 Engineering Mathematics – III.

   N.P.Bali, Laxmi Publications (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

II Year B.Tech ECE II Semester 4–0–4 EC2222

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common for all Branches)

UNIT – I: INTRODUCTION TO MANAGERIAL ECONOMICS:

Managerial Economics: Definition, Nature and Scope. Demand analysis: Law of demand, demand determinants. Elasticity of demand: Definition, Types, Measurement and Significance – Demand Forecasting methods.

UNIT – II: THEORY OF PRODUCTION:

Firm and Industry – Production Function – Cobb Douglas Production Function – Laws of Returns – Internal and External Economies of scale.

Cost Analysis: Cost Concepts, Fixed versus Variable Costs, Explicit versus Implicit Costs, Out-of-Pocket Costs versus imputed Costs, Opportunity Costs, Sunk Costs and Abandonment Costs.

Break-even Analysis: Concept of Break-even point (BEP) – Break-even Chart – Determination of BEP in Volume and Value – Assumptions underlying and Practical Significance of BEP. (simple problems).

UNIT – III: INTRODUCTION TO MARKETS AND BUSINESS ORGANIZATIONS:

Market Structures – Types of Competition – Features of perfect Competition, Monopoly, Monopolistic Competition, Price – output determination.

Types of Business Organizations – Features, Merits and Demerits of Sole Proprietorship, Partnership and Joint Stock Companies – Types of Companies – Public Enterprises – Types and Features.

UNIT – IV: INTRODUCTION TO CAPITAL:

Capital and its Significance, Types of Capital, Estimation of Fixed and Working capital Requirements, Methods of raising capital.

Introduction to capital Budgeting methods : Payback method, Accounting Rate of Return (ARR) and Net Present Value (NPV) method. (Simple Problems)

UNIT – V: INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS:

Double Entry Book Keeping – Journal – Ledger – Trial Balance – Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.

Ratio Analysis: Computation of Liquidity Ratios (Current Ratio and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debit-Equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS). Analysis and Interpretation.

TEXT BOOKS:

1. Joel Dean, Managerial Economics, PHI, 2001.
2. James C. Van Horne, Financial Management Policy, 12th edition 2002, PHI.
3. Varshney and Maheshwari, Managerial Economics, S. Chand & Co., 2000.
4. Y.K. Bhushan, Fundamentals of Business Organization and Management, S. Chand & Co.
5. Narayana Swamy, Financial Accounting, PHI, 2001.
6. A.R. Aryasri, Managerial Economics and Financial Analysis for JNTU (B.Tech), TMH, New Delhi.
7. R.K. Mishra et al, Readings in Accounting and Finance.
8. R.L. Gupta, Financial Accounting, Vol-I, S. Chand, New Delhi, 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE II Semester **4–0–4** **EC2223**

ELECTRICAL TECHNOLOGY

(Common for ECE, EIE, E.Cont.E, CSE, CSIT, BME)

UNIT-I: DC MACHINES

Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators – DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT-II: TRANSFORMERS:

Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit – Losses and Efficiency and Regulation – OC and SC tests – Predetermination of efficiency and regulation.

UNIT-III: THREE PHASE INDUCTION MOTOR:

Principle of operation of three-phase induction motors – Constructional features – Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT-IV:

Synchronous generators – Constructional features – types – EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

Principle of operation of synchronous motor.

UNIT-V:

Single Phase Induction Motors – Constructional features – Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

TEXT BOOKS:

1. Electrical Technology – Edward Hughes, 7th Edition – Pearson Education / PHI.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCES:

1. Electrical Engineering – Del Toro, 2nd Edition, Prentice Hall of India.
2. Electrical Machines – P.S Bhimbra, Khanna Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE II Semester **4–0–4 EC2224**

CONTROL SYSTEMS
(Common for ECE, EEE, EIE, EContE)

UNIT-I: INTRODUCTION

Concepts of Control systems – Open Loop and closed loop control systems and their differences – Different examples of control systems – Classification of Control systems.

MATHEMATICAL MODELS OF PHYSICAL SYSTEMS

Differential equations – transfer function and block diagram representation of systems considering electrical systems as examples, Block diagram and reduction using algebra – Representation by Signal flow graph - reduction using Mason's gain formula – translational and rotational mechanical systems.

UNIT-II: FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS

What is a Feedback? – Effects of feedback - reduction of parameter variations by use of feedback - Control over system dynamics - by the use of feedback - PID controller.

TRANSFER FUNCTIONS OF ELEMENTS OF CONTROL SYSTEMS

DC Servo motor- AC Servo motor- Synchro Transmitter and Receiver.

UNIT-III: TIME RESPONSE ANALYSIS

Standard test signals – Time response of first order systems – Characteristics Equation of Feedback control systems, Transient Response of second order systems – Time domain specifications – Steady State response – Steady State errors and error constants – Effects of proportional derivative, proportional integral systems.

CONCEPTS OF STABILITY

The concept of stability, Routh stability criterion – qualitative stability and conditional stability.

UNIT – IV: ROOT LOCUS TECHNIQUES

The root locus concept – construction of root loci – effects of adding poles and zeros to G(s)H(s) on the root loci.

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications – Bode diagrams – Determination of Frequency domain specifications and transfer function from the Bode Diagram – Phase margin and Gain margin - Stability Analysis from Bode Plots.

Polar Plots, Nyquist plots and applications of Nyquist criterion to find the stability – Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams, Constant M and N circle – Nichols Charts – Frequency Domain specifications from Nichols Charts.

UNIT-V

DESIGN AND COMPENSATION TECHNIQUES

Introduction and Preliminary design considerations – Lead, Lag, Lead-Lag – Compensation Based on frequency response approach.

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalisation - solving the time invariant state equations – State Transition Matrix.

TEXT BOOKS:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd Edition.
2. Modern Control Engineering – by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
3. Automatic Control Systems – by B.C. Kuo, Prentice Hall of India Pvt. Ltd., 7th Edition, 1997.
4. Control System Engineering - by NISE, 3rd Edition, John Wiley.

REFERENCES :

1. Control Systems by N.K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE II Semester **4–0–4** **EC2225**

E.M.WAVES & TRANSMISSION LINES

UNIT – I: ELECTROSTATICS:

Coulomb's Law and Electric field Intensity – Fields due to Continuous charge distributions, Electric flux density, Gauss law and its applications, Electric potential, Relations between E and V, Maxwell's two eqns. for Electrostatic fields, Energy density, Illustrative problems.

Convection and Conduction currents, Dielectric constant, Isotropic & homogeneous Dielectrics, Continuity eqn. and relaxation time, Poisson's and Laplace's eqns.; Capacitance – parallel plate, Coaxial, Spherical Capacitors.

Illustrative problems.(specified topics Ch. 4, 5, 6 of Ref. 1)

UNTI – II: MAGNETOSTATICS:

Biot-Savart law, Ampere's circuital law and applications, Magnetic flux density, Maxwell's two eqns. for magnetostatic fields, Magnetic Scalar & Vector potentials, Forces due to Magnetic fields, Inductances and Magnetic Energy.

Illustrative problems (Specified topics of Ch. 7, 8 of Ref.1)

UNIT – III: MAXWELL'S EQUATIONS (time-varying fields):

Faraday's law and transformer emf, Inconsistency of Ampere's law and Displacement current density, Maxwell's equations in different final forms and word statements, Conditions at a Boundary Surface – Dielectric-Dielectric and Dielectric-Conductor Interfaces (Ref. 2).

Illustrative problems (Ref. 2,1)

UNIT – IV: E.M. WAVE CHARACTERISTICS:

Wave eqns. for conducting and perfect dielectric media, uniform plane wave – definition, all relations between E & H, sinusoidal variations, wave propagation in lossless and conducting media. Conductors & dielectrics – characterization, Wave propagation in good dielectrics and good conductors, polarization. Reflection and refraction of plane waves (Normal and oblique incidences, for both perfect conductors and perfect dielectrics), Brewster Angle and Total internal reflection, surface impedance.

Poynting vector and Poynting Theorem, power loss in a plane conductor. (Ref. 2)

Illustrative problems. (Ref. 2,1)

UNIT – V: GUIDED WAVES & TRANSMISSION LINES:

Parallel plane waveguides: Introduction, concepts and analysis , TE, TM & TEM modes, concepts of cut-off frequencies, wave impedances, velocities of propagation, Attenuation factor. Expression for attenuation for TEM case. (Ref.2)

Illustrative problems.

Transmission Lines: Primary & secondary constants, Transmission Line eqns., phase and group velocities, losslessness/low loss characterization, distortion and loading, expression for i/p impedance, SC & OC lines, UHF lines as Circuit Elements, l /8 , l /4, l /2 lines – impedance transformations. Smith chart – its configuration and applications, single and double stub matching techniques. (Ref. 3,2)

Illustrative problems (incl. of Smith Chart Applications and Single Stub Matching). (Ref. 3,1)

TEXT BOOKS:

1. Elements of Electromagnetics – by Matthew N.O. Sadiku, Oxford Univ. Press, 2/e.
2. Electromagnetic Waves and Radiating Systems - by E.C. Jordan and K.G. Balmain , PHI.
3. Transmission Lines and Networks - by Umesh Sinha , Satya Prakashan (Tech. India Publication), New Delhi.

REFERENCES:

1. Networks, Lines and Fields – by John D. Ryder, PHI.
2. Electromagnetics – by John D. Kraus, McGraw Hill Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE II Semester **4–0–4 EC2226**

COMMUNICATION THEORY

UNIT – I: AMPLITUDE MODULATION

Introduction to modulation, need for modulation, types of modulation. AM – definition, types. DSB-SC: frequency translation, spectra, BW requirements, power content, demodulation – synchronous demodulator. AM-DSB: conventional AM – BW power content and power relations; Generation - square law modulator, switching modulator, balanced modulator, ring modulator ; Detection - rectifier detector, envelope detector.

(Ref. 1, 2)

UNIT – II : SSB SYSTEMS:

SSB - spectral characteristics; Generation – filter method, phase shift method; demodulation, effects of frequency and phase errors in synchronous detection - DSB-SC, SSB-SC cases. Comparison of AM systems. VSB: generation, spectra, demodulation. Applications of different AM systems. (Ref. 1, 2)

UNIT – III: ANGLE MODULATION:

Definition, types. PM & FM relations. Phase and frequency deviation. Spectrum of FM signal for sinusoidal modulation - sideband features, power content. Narrow band and wide band cases, BW considerations. Spectrum of a constant BW FM, Phasor Diagrams for FM signals. Multiple frequency modulation – linearity. FM with square wave modulation. (Ref. 3, 2)

UNIT – IV: FM GENERATION AND DETECTION

Generation of FM Signals: Direct FM – Parameter Variation Method (Implementation using Varactor, FET); Indirect FM – Armstrong System, frequency multiplication.

FM demodulators : Principles, Types – Slope Detection, Balanced Slope Detection, Phase Discriminator (Foster Seely), Ratio Detector, Comparison of FM Demodulators.

(Ref. 3,4)

UNIT – V: NOISE EFFECTS AND SNR

Effects of noise and SNR calculations for DSB-SC, SSB-SC, conventional AM, FM (threshold effect, threshold extension, pre-emphasis and de-emphasis) and PM. Comparison of all analog modulation systems – BW efficiency, power efficiency, ease of implementation. (Ref. 1, 2)

TEXT BOOKS:

1. Communication Systems Engineering – by John G. Proakis and Masoud Salehi, Pearson Education.

2. Communication Systems - by B.P. Lathi, BS Publ.

3. Principles of Communications Systems – by Taub & Schilling TMH.

4. Electronic Communication Systems – by Kennedy, McGraw Hill Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

II Year B.Tech ECE II Semester **0–3–2 EC2227**

NETWORKS & ELECTRICAL ENGINEERING LAB.
(Six Experiments from each part)

PART - A

1. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
7. Current locus diagram with RL & RC, with R varying in both cases and with C varying.
8. Frequency response of high pass and low pass filters. Computation of bandwidth, cut-off frequencies & analytical verification.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. Speed control of DC shunt motor by

i. **Armature voltage control method.**

ii. **Field flux control method.**

5. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
6. By conducting load test on single-phase transformer, determination of regulation and efficiency of given single-phase transformer (with pure resistive load).
7. Brake test on 3-phase Induction motor (performance characteristics).
8. Regulation of alternator by synchronous impedance method.
9. Load test on DC Shunt Generator. (Determination of load characteristics.)
10. Load test on DC Series Generator. (Determination of load characteristics.)

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II Year B.Tech ECE II Semester 0–3–2 EC2228

ANALOG COMMUNICATIONS LAB.

(At least 10 experiments should be conducted)

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Balanced modulator.
4. Pre-emphasis & de-emphasis.
5. Characteristics of mixer.
6. Receiver measurements.
7. Phase locked loop.
8. Synchronous detector.
9. SSB system.
10. Spectral analysis of AM and FM signals using spectrum analyzer.
11. Design of fiber optics analog link for transmission of analog signals.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III Year B.Tech ECE I Semester 4–0–4 EC3121

MANAGEMENT SCIENCE

(Common for all Branches)

UNIT – I: INTRODUCTION TO MANAGEMENT

Concept of Management and Organization – Functions of Management, Evolution of Management Thought – Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor theory of Motivation, Maslow's Hierarchy of Human needs – Systematic Approach to Management. Principles of Organization – Types of Organization – Types of Organization Structure: Line Organization, Functional Organization and Line and Staff Organization, Matrix Organization - Managerial objectives – social responsibilities.

UNIT – II: INTRODUCTION TO OPERATING MANAGEMENT

Types of plant Layout- Methods of Production: Job, Batch and Mass Production.

Work-Study: Basic procedure involved in Method study and Work Measurement. Statistical quality control. Materials Management - Objectives of Inventory Control – EOQ – ABC analysis - Purchase procedure - Stores Management and Stores Records.

Marketing: Marketing Vs Selling, Marketing Mix, Stages in Product Life Cycle, Channels of Distribution.

UNIT– III: INTRODUCTION TO HUMAN RESOURCE MANAGEMENT (HRM)

The concepts of HRM, Human Resource Development (HRD) and Personnel Management & Industrial Relations (PMIR) - HRM Vs PMIR, Basic functions of HR Manager: Manpower Planning, Recruitment, Selection, training, development, placement, wage and salary administration, promotion, transfer, separation, performance appraisal, grievance handling and welfare administration, job evaluation and Merit reading.

UNIT – IV: INTRODUCTION TO STRATEGIC MANAGEMENT

Corporate Planning Process: Mission, goals, objectives, policy, strategy, programs - Elements of Corporate Planning Process - Environmental Scanning: External Environment Analysis, Internal Environment Analysis, SWOT Analysis- Stages in Strategy Formulation and Implementation.

UNIT – V: INTRODUCTION TO PERT/CPM

Network Analysis - project management – Program Evaluation and Review Technique (PERT) Vs. Critical Path Method (CPM) – Identifying Critical Path – Probability of completing the project within given time under PERT, Project cost Analysis, Project crashing.

TEXT BOOKS:

1. Koontz and O' Donnel, Principles of Management, McGraw-Hill Publ., 2001.
2. Philip Kotler, Marketing Management, 2002 - PHI.
3. Gary Dessler, Human Resource Management, PEA, 2002.
4. L.S. Srinath, PERT/CPM, Affiliated East-West Press, New Delhi, 2000.
5. W. Glueck & L.R. Jauch, Business Policy and Strategic Management, McGraw-Hill, 1998.
6. A.R. Aryasri, Management Science for JNTU (B.Tech), TMH, 2002.
7. O.P. Khanna, Industrial Engineering and Management, Dhanpat Rai, 1999.
8. Chandra Bose, Management and Administration, Prentice Hall, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III Year B.Tech ECE I Semester **4–0–4 EC3122**

COMPUTER ORGANISATION

(Common for ECE, EIE, EContE, CSE, CSIT)

UNIT I:

Concept of Von Newmann Machine, components in a computer, functions of various components, bus structure, arithmetic logic unit, computer arithmetic: addition/subtraction of integers, multiplication and division of integers; floating point arithmetic operations, BCD arithmetic operations.

UNIT II:

Concept of instruction format and instruction set of a computer, types of operands and operations; addressing modes; processor organization, register organization and stack organization; instruction cycle; basic details of Pentium processor and power PC processor, RISC and CISC instruction set.

UNIT III:

Memory devices: Semiconductor and ferrite core memory, main memory, cache memory, associative memory organization; concept of virtual memory; memory organization and mapping; partitioning, demand paging, segmentation; magnetic disk organization, introduction to magnetic tape and CDROM.

UNIT IV:

IO Devices: Programmed IO, interrupt driver IO, DMA, IO modules, IO addressing; IO channel, IO Processor, Dot matrix printer, ink jet printer, laser printer.

UNIT V:

Advanced concepts: Horizontal and vertical instruction format, microprogramming, microinstruction sequencing and control; instruction pipeline; parallel processing; problems in parallel processing; data hazard, control hazard.

TEXT BOOKS:

1. Williams Stallings, Computer Organization and Architecture, PHI, 1998.
2. Carl Hamachar, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw Hill International Edition.
3. G.V. Anjaneyulu, Computer Organization, Himalaya Publishing House.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

III Year B.Tech ECE I Semester **4–0–4 EC3123**

DIGITAL IC APPLICATIONS

UNIT – I: LOGIC FAMILIES:

CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families. Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter Coupled Logic, Comparison of logic families.

UNIT – II: THE VHDL HARDWARE DESCRIPTION LANGUAGE:

Design flow, program structure, types and constants, functions and procedures, libraries and packages, structural design elements, data flow design elements, behavioral design elements, the time dimension and simulation synthesis.

UNIT – III: COMBINATIONAL LOGIC DESIGN:

Decoders, encoders, three state devices, multiplexers, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, combinational multipliers.

VHDL modes for the above ICs.

Design examples (using VHDL): Barrel shifter, comparators, floating-point encoder, dual parity encoder, ones counter.

UNIT – IV: SEQUENTIAL LOGIC DESIGN:

Latches and flip-flops, PLDs, counters, shift registers, and their VHDL models, synchronous design methodology, impediments to synchronous design.

Design examples of static machines using VHDL.

UNIT – V: MEMORIES:

ROMs: Internal structure, 2D-decoding commercial types, timing, and applications.

Static RAM: Internal structure, SRAM timing, standard SRAMs, synchronous SRAMs.

Dynamic RAM: Internal structure, timing, synchronous DRAMs.

Introduction to CPLDs and FPGAs.

TEXT BOOKS:

1. Digital Design – Principles and Practices – by John F. Wakerly, 3rd ed., Pearson Education Asia, 2002.
2. VHDL Primer – by J. Bhasker, Pearson Education.
3. Fundamentals of Digital Logic with VHDL Design – by Stephen Brown, Zvonko Vramesic, TMH.

REFERENCES:

1. Digital System Design Using VHDL – by Charles H. Roth Jr., PWS Publ.
2. Introduction to Logic Design – Alan B. Marcovitz, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

III Year B.Tech ECE I Semester **4–0–4 EC3124**

ANTENNAS & WAVE PROPAGATION

UNIT- I : ANTENNA FUNDAMENTALS

Basic concepts and Antenna Parameters – Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidth, Beam Area, Radiation Intensity, Beam Efficiency, Directivity and Gain, Resolution. Aperture Concepts and types – Aperture area and efficiency, Effective height. Directivity of sources with different patterns. [Ref.1]

Antenna Theorems [Ref.2]

Retarded Potentials, Maxwell's equations approach, Lorentz Gauge condition, Radiation from Small Dipole, Quarterwave Monopole and Halfwave Dipole – Current Distributions, fields, power radiated, Radiation Resistance, Beamwidths, D and Ae. [Ref.2]

Small Loop Antennas – Characteristics, Comparison with short dipoles. [Ref.1]

UNIT – II : ANTENNA ARRAYS

2-element arrays – different cases, Principle of Multiplication of patterns, N-element Linear Arrays – Broadside, Endfire arrays and EFA with increased Directivity, Derivation of their characteristics and comparison. Illustrative Problems. [Ref.2,1]

Binomial Arrays [Ref.3]. Arrays with parasitic Elements, folded dipoles, Yagi-Uda Arrays.

UNIT – III : NON-RESONANT RADIATORS

Introduction, Travelling wave radiators – basic concepts, expression for field strength of longwire antennas and characteristics, V-antennas, Rhombic antennas and design relations.

Helical Antennas – Normal and axial modes, radiation characteristics (qualitative treatment) [Ref.3,1].

UNIT – IV : VHF, UHF and MICROWAVE ANTENNAS

Plane sheet and corner reflectors, Paraboloidal Reflectors – characteristics, types of feeds, spill over, aperture blocking, offset feed, Cassegrainian Feeds. Horn Antennas – types, characteristics, optimum horns. Lens Antennas – features, dielectric and metal plate lenses, applications.

Antenna Measurements – Set up, Distance Criterion, Patterns and Gain Measurements.

UNIT – V : WAVE PROPAGATION

Concepts - factors involved. Ground Wave Propagation – characteristics, wave tilt, flat and spherical earth considerations. Ionosphere – formation of layers and mechanism of propagation, reflection and refraction mechanisms, Critical Frequency, MUF, Optimum Frequency, Skip Distance, Virtual Hight; ionospheric abnormalities. Space Waves – LOS and radio horizon, Field strength calculations. Tropospheric Waves - Radius of curvature of path, M-curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS :

1. Antennas, by John D. Kraus and Ronald J. Marhefka, TMH.
2. Electromagnetic Waves and Radiating Systems, by E.C.Jordan and K.G.Balmain, PHI.
3. Antenna Theory, by Constantine A. Balanis, John Wiley & Sons Publ.
4. Antennas and Wave Propagation, by K.D. Prasad, Satya Prakashan Publ.

REFERENCES:

1. Electronic and Radio Engineering, by F.E. Terman, McGraw-Hill Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE I Semester **4–0–4 EC3125**

LINEAR IC APPLICATIONS

UNIT – I: INTEGRATED CIRCUITS:

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features.

UNIT – II: OP-AMP APPLICATIONS:

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, op-amp circuits using diodes, sample & hold circuits, log & antilog amplifiers, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT – III: ACTIVE FILTERS & OSCILLATORS:

Introduction, Butterworth filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT – IV: TIMERS & PHASE LOCKED LOOPS:

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual locks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

UNIT – V: D to A & A to D CONVERTERS:

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, 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. Linear Integrated Circuits – by D. Roy Chowdhury, New Age International (p) Ltd.
2. Op-Amps & Linear ICs – by Ramakanth A. Gayakwad, PHI.

REFERENCES:

1. Operational Amplifiers and Linear Integrated Circuits – by RF Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications – by Denton J. Daibey TMH.
3. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE I Semester **4–0–4 EC3126**

DIGITAL COMMUNICATIONS

UNIT – I: **PULSE-ANALOG MODULATION:**

Sampling Theorem, Types of sampling, Sampling of Band-Pass Signals, Practical aspects of sampling, Reconstruction of Low-Pass and Band-Pass signals, Time division Multiplexing (TDM), Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) – Characteristics.

UNIT – II: BASEBAND DATA TRANSMISSION:

Introduction, Baseband Binary PAM systems, Duobinary Baseband PAM systems, M-Ary Signalling schemes, Shaping of the Transmitted signal spectrum, Equalization, Eye Diagrams, Synchronization, Scrambler and Unscrambler.

UNIT – III: PULSE-DIGITAL MODULATION:

Quantization, Quantization error, Elements of Pulse Code Modulation (PCM), Bandwidth Requirements of PCM, Noise in PCM systems, Differential PCM Systems (DPCM), Delta Modulation, Adaptive Delta Modulation, Noise in Delta Modulation Systems, Comparison of PCM and DM systems, PCM Vs Analog Modulation, Comparison of different Communication Systems (BW and SNR).

UNIT – IV: DIGITAL CARRIER MODULATION SCHEMES:

Introduction, Optimum receiver for Binary Digital Modulation Schemes, Binary ASK, PSK, FSK, DPSK Schemes, Comparison of Digital Modulation Schemes, Introduction to M-Ary Signalling Schemes.

UNIT – V: ERROR CONTROL CODING:

Introduction, Linear Block Codes, Binary Cyclic Codes, Convolutional Codes.

TEXT BOOKS:

1. Digital and Analog Communication Systems – by K. Sam Shanmugam, John Wiley and Sons.
2. Communication Systems – by Simon Haykin, John Wiley.

REFERENCES:

1. Principles of Digital Communications – by J. Das, S.K. Mullick and P.K. Chatterjee, New Age Intl. Publ.
2. Digital Communications – by John Proakis, TMH.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

III Year B.Tech ECE I Semester 0–3–2 EC3127

LINEAR IC APPLICATIONS LAB.

1. Study of OP AMPs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPs.
8. IC 555 Timer – Monostable Operation Circuits.
9. IC 555 Timer – Astable Operation Circuits.
10. Schmitt Trigger Circuits – using IC 741 and IC 555.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.
14. Three Terminal Voltage Regulators – 7805, 7809, 7912.
15. 4 bit DAC using OP AMP.

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III Year B.Tech ECE I Semester 0–3–2 EC3128

DIGITAL COMMUNICATIONS LAB.

1. Pulse Amplitude Modulation and demodulation.
2. Pulse Width Modulation and demodulation.
3. Pulse Position Modulation and demodulation.
4. Sampling Theorem – verification.
5. Time division multiplexing.
6. Pulse code modulation.
7. Differential pulse code modulation.
8. Delta modulation.
9. Frequency shift keying.
10. Phase shift keying.
11. Differential phase shift keying.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE II Semester **4–0–4 EC3221**

COMMUNICATION SYSTEMS

UNIT – I: RADIO TRANSMITTERS

Frequency allocation of Radio communication systems, Block diagrams and functions of radio transmitters for AM and FM systems, Power calculations.

UNIT – II: RADIO RECEIVERS

TRF and superheterodyne receivers, RF, mixer and IF stages, choice of IF, Image frequency, alignment and tracking of radio receivers, AGC, tone and volume controls, Receiver characteristics and their measurements, FM receivers, Communication receivers, Fading and diversity reception.

UNIT – III: TELECOMMUNICATION SWITCHING SYSTEMS

Classification of telecommunication switching systems, major telecommunication networks.

Space division switching and Time division switching, Time multiplexed space switching, time multiplexed time switching, combination switching.

UNIT – IV: TELEPHONE NETWORKS

Subscriber loop systems, Switching hierarchy and transmission plan, Transmission systems, Numbering plan, Charging plan, Inchannel signalling, common channel signalling, cellular mobile telephony, Introduction to Integrated Switching Digital Network (ISDN).

UNIT – V: ADVANCED COMMUNICATION SYSTEMS

Satellite communication system: Uplink and down link, Transponder, Multiple access. Mobile Radio: Frequency reuse, Cell splitting, Propagation effects. Broadband ISDN -Interactive and distributed services, Continuous and bursty traffic, Point-to-Point and Point-to-Multipoint connects. Synchronous Optical Network (SONET) system.

TEXT BOOKS:

1. Electronic and Radio Engineering – by FE Terman (for Units 1 & 2), McGraw-Hill.
2. Electronic Communication Systems – by Kennedy (for Units 1 & 2), McGraw-Hill.
3. Telecommunication Switching, Systems & Networks – by Thyagarajan Viswanthan, PHI (1999) (for Units 3 & 4).
4. Communication Systems – Simon Haykin (for Unit 5), John Wiley.

REFERENCES :

1. Introduction to Telephone Switching – by B.E. Briely, Addison Wesley.
2. Radio Engineering – by G.K. Mithal, Khanna Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE II Semester **4–0–4** **EC3222**

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

UNIT – I:

Accuracy, Percentage error, Linearity and Precision in Measurements.

Voltage and current measurements: DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Block diagrams, specifications and design considerations of different types of DVMs.

UNIT – II:

Bridges: AC Bridges – Measurement of inductance – Maxwell's bridge, Anderson bridge, Measurement of capacitance – Schering bridge, Measurement of impedance – Kelvin's bridge, Wheatstone bridge, CT & PT, Ratio error and Phase angular error, HF techniques, HF bridges, Problems of shielding and grounding, Q-meter.

UNIT – III:

Frequency & Time measurement: Very low frequency comparator system, Digital frequency and Time interval counters. Frequency synthesizer, Measurement of Delay, Time and Phase. Distortion measurement. Distortion factor meter.

UNIT – IV:

Oscilloscopes: CRO operation, CRT characteristics, Probes, Time base sweep modes, Trigger Generator, Vertical amplifier, Modes of operation, A, B, Alternate and Chop modes, Sampling Oscilloscopes, Storage Oscilloscopes, Spectrum analyser.

Recorders: Introduction to magnetic recording techniques and X-Y plotters.

Display Devices and Display Systems.

UNIT – V:

Transducers (Qualitative Treatment only): Resistance, Inductance, Capacitive Transducers, Active Transducers, Strain Gauges, LVDT, Proximity Measurement, Displacement Measurement, Thermocouples, Piezoelectric Transducers, Measurement of Physical Parameters – Force, Pressure, Velocity, Acceleration, Vacuum Level, Humidity, Moisture.

TEXT BOOKS:

1. Electronic Instrumentation and Measurement Techniques – by W.D. Cooper, PH.
2. Electronic Measurements – by Oliver and Cage, ISE, McGraw Hill.
3. Transducers and Display Systems – by B.S. Sonde, TMH.

REFERENCES:

1. Measuring Systems, Application and Design – by E.O. Doebelin, McGraw Hill.
2. Electrical and Electronic Measurements – by Shawney, Khanna Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE II Semester **4–0–4 EC3223**

DIGITAL SIGNAL PROCESSING

(Common for ECE, EIE, EContE, EEE, BME)

UNIT – I:

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT – II:

Discrete Fourier series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT. Computation of DFT: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT – III:

Applications of z-transforms, solution of difference equations of digital filters. System function, stability criterion, frequency response of stable systems. Realization of digital filters – direct, canonic, cascade and parallel forms.

UNIT – IV:

IIR DIGITAL FILTERS: Analog filter approximations – Butterworth and Chebyshev. Design of IIR Digital filters from analog filters, Bilinear transformation method, step and impulse invariance techniques, Spectral transformations.

UNIT – V:

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques. Comparison of IIR & FIR filters.

Applications of FFT in spectral analysis and filtering. Applications of DSP to speech processing and Radar signal processing.

TEXT BOOKS:

1. Digital Signal Processing – by A.V. Oppenheim and R.W. Schaffer, PHI.
2. Digital Filter Analysis and Design – by A. Antoniou, TMH.

REFERENCES:

1. Digital Signal Processing – by W.D. Stanley et.al. Resin Publ.
2. Digital Signal Processing – by S. Salivahanan et al., TMH.
3. Digital Signal Processing – by Thomas J. Cavicchi, WSE, John Wiley.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III Year B.Tech ECE II Semester **4–0–4 EC3224**

MICROWAVE ENGINEERING

UNIT – I: MICROWAVE TUBES:

Introduction to Microwaves, Microwave region and bands, Applications, Limitations & losses of conventional tubes at UHF, Microwave tubes – O type & M type classifications.

O-type tubes: 2 cavity Klystrons – structure, velocity (Applegate) diagram, Small Signal Theory of Bunching, Principle of working and expressions for o/p power and efficiency. Reflex Klystrons – structure, Applegate diagram, Mathematical theory of bunching, Principle of working, Electronic admittance and expressions for o/p power and efficiency, Effect of repeller voltage, Oscillating modes and o/p characteristics, Electronic and Mechanical tuning. (Ref. 2,1).

Helix Travelling Wave Tubes: Significance & types of Slow Wave structures, TWT – features, Principle of Amplification (qualitative treatment), Suppression of oscillations, gain relations & characteristics.

O- type backward wave oscillator (Carcinotron) – Features, principle of working, voltage tunability. (Ref. 4)

M-type tubes: Microwave Cross Field Tubes (M type), Magnetrons – different types. 8-cavity cylindrical Traveling Wave Magnetron – features, Mechanism of oscillations, Hull cut-off and Hartree resonance conditions (qualitative treatment), PI-mode and its separation, o/p characteristics. (Ref. 1, 2, 4)

UNIT – II: MICROWAVE SOLID STATE DEVICES:

Introduction, classification, types. Gunn Diode – principle, RWH theory, modes of operation and characteristics, Avalanche Transit Time devices – Introduction, IMPATT diodes, TRAPATT diodes. Parametric amplifiers and Masers (descriptive treatment only) - applications.

UNIT – III: MICROWAVE WAVEGUIDES:

Rectangular wave guides – Analysis, TE & TM modes, Impossibility of TEM mode, concepts of cut-off frequencies, dominant mode and degenerate modes, filter characteristics of wave guides, sketches of Electric & Magnetic fields for different modes in the cross section of the rectangular guide, velocities, wavelengths and impedance relations. Power losses in rectangular guide.

Introduction to circular wave guides and dominant mode fields (qualitative treatment only).

Cavity resonators – principles and types – Rectangular and Circular (cylindrical), Applications.

Illustrative problems.

UNIT – IV: WAVEGUIDE COMPONENTS:

Coupling probes & loops, Waveguide windows, Tuning Screws & Posts, Waveguide phase shifters and attenuators.

Microwave Hybrid Circuits: E-plane Tee, H-plane Tee and Magic Tee, Rat race. Directional Couplers. Ferrites – Composition and characteristics, Faraday rotation. Ferrite components – Circulator, Isolator and Gyrator, their applications.

Scattering Matrix - Significance, formulation and properties, S-matrix of waveguide Tee junctions, Directional Coupler, Circulator and Isolator. (Ref.1, 3)

UNIT – V: MICROWAVE MEASUREMENTS:

Description of Microwave Bench – Different blocks and their features, Precautions; Microwave Power Measurement – Bolometer Method. Attenuation Measurement. Frequency, VSWR, Cavity Q and Impedance Measurements.

TEXT BOOKS:

1. Microwave Devices and Circuits – by Samuel Y. Liao, PHI.
2. Microwave Principles – by Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L Krauss, Affiliated East- West Press Pvt. Ltd, New Delhi.
3. Foundations for Microwave Engineering – by R.E. Collins, McGraw-Hill Publ.
4. Electronic and Radio Engineering – by Frederick E.Terman, McGraw-Hill Publ.

REFERENCES :

1. Microwave and Radar Engineering – by M. Kulkarni.
2. Electronic Communications Systems – by George Kennedy, McGraw-Hill Publ.
3. Microwave Engineering – by Annapurna Das and S.K.Das, Tata McGraw-Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

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III Year B.Tech ECE II Semester **4–0–4 EC3225**

VLSI DESIGN

UNIT – I:

Electrical properties of MOS circuits: ID – VD characteristics, Device parameters, V_T, G_M.

Figure of merit W_o, pull-up to pull down ratio, Bipolar, n-MOS, p-MOS, c-MOS, BiCMOS processes - comparison.

UNIT – II:

VLSI Circuit Design process: VLSI Design flow, Layers of abstraction, Stick Diagram. Design goals and layout diagrams, sheet resistance R_s, standard unit of capacitance, Inverter delays, Propagation delays, wiring capacitance, Inverter Design aspects – specifications considering worst case parameters, Inverter in the input stage, output stage, Internal inverter.

UNIT – III:

Semiconductor Integrated Circuit Design: PLA, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

UNIT – IV:

VHDL synthesis, Circuit design flow, Circuit synthesis, Simulation, Layout, design capture tools, design verification tools, Test principles.

UNIT – V:

VLSI Technology : Fabrication sequence, process flow, Oxidation, Lithography Techniques, Diffusion process, Ion Implantation, Encapsulation, Testing, Super Integration Concepts, Integrated Passive components, MOS Resistors, Capacitors, Crossovers, IC Packaging techniques.

TEXT BOOKS:

1. Basic VLSI Design Systems and Circuits – by Douglas A. Pucknell, Kamran Eshraghian, PHI.

2. Modern VLSI Design – by Wayne Wolf, Pearson Education.

REFERENCES:

1. Introduction to VLSI Circuits and Systems – by John P. Uyemura, John Wiley.

2. Application Specific Integrated Circuits – by Michel John Sebastian Smith, Addison Wesley.

3. Introduction to VLSI Design – Eugine D. Fabricus, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

III Year B.Tech ECE II Semester **4–0–4 EC3226**

MICROPROCESSORS & INTERFACING

(Common for ECE, EIE, EEE, EContE, BME, Mechatronics)

UNIT – I:

Evolution of Microprocessors, Architecture of 8086, Register set of 8086, Special functions of general purpose registers, Flag register and function of each flag.

Addressing modes of 8086, Instruction set of 8086, Assembler directives, Simple assembly language programming of 8086 involving looping, picking maximum and minimum, sorting, and evaluation of arithmetic expression.

UNTI – II:

Pin diagram of 8086, Minimum mode and Maximum mode of operation, Timing diagram, Parallel data transfer schemes, Programmed I/O, Interrupt driven I/O, DMA. 8255 PPI, various modes of operations and interfacing to 8086. A/D, D/A converter interfacing. Simple programs using A/D, D/A converters. Stepper motor interfacing.

UNIT – III:

Need for serial I/O 8251 USART architecture and programming features, Interfacing to 8086, TTL – to – RS232C, RS232C-to-TTL conversion. Need for DMA, 8237 DMA controller architecture and programming features, Interfacing to 8086.

UNIT – IV:

Interrupt structure of 8086, Vector Interrupt table, 8259 PICU architecture, Programming features and interfacing, Memory interfacing (static RAM only) – Types of EPROMS & SRAM, 74LS138 decoder, Interfacing EPROMS and SRAMS.

UNIT – V:

8051 Microcontroller Architecture, Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOKS:

1. A.K.Ray and K.M Bhurchandi - Advanced Microprocessors & Peripherals, TMH.
2. Douglas V. Hall – Microprocessors & Interfacing, 2nd Ed. (TMH).
3. John Uffenbeck - The 8086/8088 Family, PHI.
4. Kenneth J.Ayala - 8051 Microcontroller, (Penram International).

REFERENCES:

1. Microcomputer Systems: The 8086/8088 Family Architecture, Programming and Design – by Yu Cheng Liu and Glenn A. Gibson, 2/e, PHI.
2. Microprocessors, Interfacing and Applications – by Ramsingh and B.P. Singh, New Age Publ.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

III/IV Year B.Tech ECE II Semester **0–3–2 EC3227**

MICROPROCESSORS LAB.
(Common for ECE, EIE, EEE, EContE, BME)

I. Microprocessor 8086:

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. Modular Program: Procedure, Near and Far implementation, Recursion.
6. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing:

1. 8259 – Interrupt Controller.
2. 8279 – Keyboard Display.
3. 8255 – PPI.
4. 8251 – USART.

III. Microcontroller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts.
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

III Year B.Tech ECE II Semester **0–3–2 EC3228**

ELECTRONIC COMPUTER AIDED DESIGN LAB.

The following experiments are to be simulated using VHDL and verified experimentally in Digital IC Lab.

1. Gates.
2. D Flip-Flop 7474.
3. Decade counter – 7490.
4. 4 Bit counter – 7493.
5. Shift registers – 7495.
6. Universal shift registers – 74194/195.
7. 3 – 8 Decoder – 74138.
8. 4 Bit Comparator – 7485.
9. 8 x 1 Multiplexer – 74150.
10. 16 x 1 Multiplexer – 74151.
11. RAM (16 x 4) – 74189 (Read and Write operations).
12. Stack and Queue Implementation using RAM.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

IV Year B.Tech ECE I Semester **4–0–4 EC4121**

OPERATING SYSTEMS

(Common for ECE, EIE, EContE)

UNIT – I:

Computer System & Operating System Overview: Overview of Computer System hardware – Instruction execution- I/O function – Interrupts – Memory hierarchy – I/O Communication Techniques. Operating Systems – Objectives and functions, evaluation of operating systems – Example systems.

Process description and Control: Process states – process description – process control – processes and Threads – Examples of process description and control.

UNTI – II:

Memory management: Memory Management requirements – loading programs into main memory – virtual memory – hardware and control structures – OS software – Examples of memory management.

UNIT – III:

Uniprocessor Scheduling: Types of scheduling – Scheduling algorithms – I/O Management and disk scheduling, I/O devices, Organization of I/O functions, OS design issues, I/O buffering, Disk I/O, disk scheduling policies - example systems.

UNIT – IV:

Concurrency: Principles of Concurrency – Mutual exclusion – software and hardware approaches – semaphores – monitors – Message passing – Readers/Writers problem. Principles of deadlock – deadlock prevention, detection and avoidance – dining philosopher's problem – Example systems.

UNIT – V:

File management and Security: Overview of file management – file organization and access – file directories – file sharing – Record blocking – secondary storage management – Example system.

Security: Security Threads – Protection – intruders – Viruses –Trusted systems.

TEXT BOOKS:

1. William Stallings: Operating Systems, PHI Second Edition, 1997.

REFERENCES:

1. Understanding Operating Systems – by Ida M. Flynn and Ann McIver McHoes, Thomson Learning.
2. Operating Systems – by Charles Crowing, TME.
3. Operating System Concepts – by Silberschatz and Galvin, John Wiley.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
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IV Year B.Tech ECE I Semester **4–0–4 EC4122**

COMPUTER NETWORKS

(Common for ECE, EIE, EContE, EEE, CSE, CSIT)

UNIT-I:

Review of protocol layering, Data link layer, Design issues, Elementary data link protocols, Sliding window protocol, Example data link protocols.

UNIT-II:

The medium access sublayer, Channel allocation problem, Multiple access protocols, Review of IEEE standards for LANs, LAN bridges.

UNIT-III:

The network layer, Design issues, Routing algorithms, Congestion control algorithms, The Transport layer, Transport services, Transport protocols.

UNIT-IV:

Internetworking, Internet network layer, Internet transport protocols (TCP and UDP), ATM network layer, ATM transport protocols.

UNIT-V:

The application layer, Security, DNS, SNMP, Electronic Mail, WWW, Multimedia.

TEXT BOOK:

1. Computer Networks: A. S. Tanenbaum, 3rd Edition, PHI.

REFERENCES:

1. An Engineering Approach to Computer Networking, S. Keshav, Pearson Education.

2. Computer Networking a Top-Down Approach Featuring the Internet, J. F. Kurose, K. W. Ross, Pearson Education.

3. Data Communications and Networking, A. S. Godbole, TMH.

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HYDERABAD

IV Year B.Tech ECE I Semester 4–0–4 EC4123

T. V. ENGINEERING

UNIT – I:

Introduction to TV: TV transmitter and receivers, synchronization.

Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution.

TV cameras: Camera tube types, Vidicon, Silicon Diode Array Vidicon, camera optics, monochrome TV camera, color camera.

Picture tubes: Monochromatic Picture tube, Electrostatic focussing, Beam deflection, picture tube characteristics and specifications, colour picture tubes.

UNIT – II:

Composite video signal: Horizontal and vertical sync details, scanning sequence details.

Colour signal generation and Encoding: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.

TV signal transmission and propagation: Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

TV Standards: American 525 line B&W TV system, NTSC colour system, 625-line monochrome system, PAL colour system, TV standards.

UNIT – III:

Monochrome TV receiver: RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits.

PAL-D Colour Receiver: Electron tuners, IF subsystem, Y-signal channel, chroma decoder, separation of U & V colour phasors, synchronous demodulators, subcarrier generation, raster circuits.

TV Receiver Tuners: Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions.

UNIT – IV:

Vision IF subsystem: AGC, noise cancellation, video and intercarrier sound signal detection, vision IF subsystem of Black and White receivers, colour receiver IF subsystem.

Receiver sound system: FM detection, FM sound detectors, typical applications.

Colour signal decoding: PAL – D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, RO phase shift and 180° PAL –SWITCH circuitry, U & V demodulators, colour signal mixing.

UNIT – V:

Sync separation, AFC and Deflection Oscillators: Synchronous separation, noise in sync pulses, separation of frame and line sync pulses, AFC, single ended AFC circuit. Deflection Oscillators, deflection drive ICs. Receiver Antennas.

DigitalTV: Digital Satellite TV, Direct to Home Satellite TV, Digital TV Receiver, Digital Terrestrial TV.

TEXT BOOKS:

1. Modern Television Practice – Principles, Technology and Servicing – by R.R. Gulati, New age International Publication - 2002.
2. Monochrome and Colour TV – by R.R. Gulati, New Age International Publication – 2002.

REFERENCES:

1. Colour Television: Theory and Practice – by S.P. Bali, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

IV Year B.Tech ECE I Semester **4–0–4 EC4124**

OPTICAL COMMUNICATIONS

UNIT – I: INTRODUCTION TO OPTICAL COMMUNICATIONS:

Introduction and Historical Background, elements of an optical fiber communication system, Advantages of Optical Fiber Communications, Applications.

OPTICAL FIBER WAVEGUIDES:

Nature of light, basic optical laws and definitions, optical fiber modes and configurations (Fiber types, Rays and modes, step index and graded index fibers), Ray optics representation, wave representation, Mode theory of circular wave guides, single-mode fibers, Graded – index fibers, fiber materials.

UNIT – II: TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS:

Attenuation - Absorption, scattering and bending losses in fibers, core and cladding losses. Signal distortion in optical waveguides, different types of dispersions, pulse broadening.

UNIT –III: OPTICAL SOURCES AND DETECTORS:

Basic semiconductor properties, LEDs – Structures, light source materials, internal quantum efficiency, modulation capability, transient response, power bandwidth product. Semiconductor Laser Diodes - modes and resonant frequencies, reliability. Physical principles of PIN photo detectors, avalanche photo diodes. Noise in detectors.

UNIT – IV: OPTICAL RECEIVER AND DIGITAL TRANSMISSION SYSTEMS:

Fundamental receiver operation, digital receiver performance calculation, pre amplifier types, analog receivers, point to point links, link power budget, Rise time Budget, transmission distance limits, wavelength division multiplexing.

UNIT – V: OPTICAL FIBER CONNECTIONS AND MEASUREMENTS:

Source to fiber power launching – basics, fiber alignment and joint loss, fiber splices, fiber connectors, Measurement of attenuation and dispersion.

TEXT BOOKS:

1. Optical Fiber Communications – Gerad Keiser, Mc Graw-Hill.
2. Optical Fiber Communications – John M. Senior, PHI.
3. Fiber Optic Communications – D.C.Agarwal.

REFERENCES:

1. Fibre Optic Communications – by D.K. Mynbaev and Lowell L. Scheiner, Pearson Education.
2. Fibre Optic Communication Systems – by Govind P. Agarwal, 3/e, John Wiley Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

IV Year B.Tech ECE I Semester **4–0–4 EC4125**

ARTIFICIAL NEURAL NETWORKS

(ELECTIVE – I)

(Common for ECE, EIE, EContE, BME)

UNIT – I:

Introduction, Neuron models, network architectures, AI and Neural nets.

Learning processes: Error correction learning, Memory based learning, Hebbian learning, Competitive learning, Boltzmann learning, Learning with and without a teacher adaptation, statistical learning theory.

UNIT – II: PERCEPTRONS:

Single Layer Perceptrons: Adaptive filtering problem, linear least square filters, LMS algorithm, learning curves, annealing techniques, Perceptron and Bay's Classifier.

Multilayer Perceptrons: Back propagation algorithm, XOR problem, feature detection, back propagation and differentiation, Hessian Matrix, Cross validation, Network pruning techniques.

UNIT – III: RADIAL BASIS NETWORKS:

Cover's theorem on the separability of patterns, Regularization Theory and Networks, Generalised RBF Networks, Approximation properties of RBF networks, comparison with Multilayer Perceptrons.

UNIT – IV: SELF ORGANISING MAPS

Introduction, self-organizing maps, SOM algorithm, properties of the feature map, learning vector quantization, contextual maps.

UNIT – V: APPLICATIONS OF ANN

Introduction, Direct Applications - Pattern Classification, Associative Memories, Optimization, Control Applications Applications in Speech and Image Processing.

TEXT BOOKS:

1. Neural Networks–A Comprehensive Foundation – by Simon Haykin, Pearson Education.

2. Artificial Neural Networks – by B. Yegnanarayana, PHI.

REFERENCES:

1. Introduction to Neural Systems – by Zurada, Jaico Publ.

2. Neural Networks Design – by M.T. Hagon, H.B. Demuth and Mark Beale, Thompson Learning, Vikas Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,

HYDERABAD

IV Year B.Tech ECE I Semester **4–0–4 EC4126**

SATELLITE COMMUNICATIONS

(ELECTIVE – I)

UNIT – I:

INTRODUCTION:

The Origin of Satellite Communications, a brief history of Satellite Communications, the Current State of Satellite Communications.

ORIBITAL ASPECTS OF SATELLITE COMMUNICATIONS:

Orbitals, Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT – II:

SPACE CRAFT:

Introduction, spacecraft subsystems, attitude and orbit control system, telemetry, tracking and command, power systems, communication subsystems, Spacecraft antennas.

UNIT – III:

SATELLITE LINK DESIGN:

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

UNIT – IV:

MULTIPLE ACCESS:

Frequency division multiple access (FDMA), Time division Multiple Access (TDMA), Code Division Multiple access (CDMA).