

**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

**INSTRUMENTATION &
CONTROL 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 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 / 1 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:

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

I YEAR B.TECH

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

code	Subject	T	P	C
IC 1021	English	3	-	6
IC 1022	Mathematics-I	3+1*	-	6
IC 1023	Solid State Physics	2+1*	-	4
IC 1024	Information Technology and Numerical Methods	3	-	6
IC 1025	C and Data Structures	3	-	6
IC 1026	Network Theory	3	-	6
IC 1027	Electronic Devices and Circuits	3	-	6
IC 1028	Engineering Drawing Practice	-	3	4
IC 1029	Computer Programming Lab	--	6	8
IC 1030	Electronic Devices and Circuits Lab	-	3	4

20+2* 12 56

Tutorial

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**

II B.TECH I SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

Code	Subject	T	P	C
IC2121	Mathematics-II	4	-	4
IC2122	Managerial Economics & Financial Analysis	4	-	4
IC2123	Signals and Systems	4	-	4
IC2124	Prime Movers & Mechanical Measurements	4	-	4
IC2125	Electrical & Electronic Measurements	4	-	4
IC2126	Transducers & Instrumentation Components	4	-	4
IC2127	Networks Lab	-	3	2
IC2128	Instrumentation Lab-I	-	3	2
Total		24	6	28

2002-2003

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

II B.TECH II SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

Code	Subject	T	P	C
IC2221	Control Systems	4	-	4
IC2222	Mathematics-III	4	-	4
IC2223	Switching Theory & Logic Design	4	-	4
IC2224	Object Oriented Programming & Applications	4	-	4
IC2225	Electrical Technology	4	-	4
IC2226	Linear & Digital IC Applications	4	-	4
IC2227	Control System Lab-I	-	3	2
IC2228	IC Applications Lab	-	3	2
Total		24	6	28

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.TECH I SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

Code	Subject	T	P	C
IC3121	Management Science	4	-	4
IC3122	Electronic Equipment Design	4	-	4
IC3123	Computer Organization	4	-	4
IC3124	Analytical Instrumentation	4	-	4
IC3125	Industrial Electronics	4	-	4
IC3126	Process Control Instrumentation	4	-	4
IC3127	Process Control Lab	-	3	2
IC3128	Instrumentation Lab-II	-	3	2
Total		24	6	28

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.TECH II SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

Code	Subject	T	P	C
IC3221	Power Plant Instrumentation	4	-	4
IC3222	Digital Signal Processing	4	-	4
IC3223	Robotics & Embedded Systems	4	-	4
IC3224	Microprocessors & Interfacing	4	-	4
IC3225	Digital & Optimal control systems	4	-	4
IC3226	Communication Systems	4	-	4
IC3227	Microprocessors Lab	-	3	2
IC3228	Control Systems Lab-II	-	3	2
Total		24	6	28

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

IV B.TECH I SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

Course Structure

Code	Subject	T	P	C
IC4121	Neural Networks & Fuzzy Logic Control	4	-	4
IC4122	Adaptive Control Systems	4	-	4
IC4123	Computer Aided Design of Control Systems	4	-	4
IC4124	PC Based Instrumentation	4	-	4
	Elective-I	4	-	4
IC4125	Chemical & Pharmaceutical Industrial Instrumentation			
IC4126	Bio-Medical Instrumentation			
	Elective-II	4	-	4
IC4127	Instrumentation & Controls in Electrical Systems			
IC4128	Hydraulics & Pneumatic Control Systems			
IC4129	Instrumentation Lab-III	-	3	2
IC4130	Control System Lab-III	-	3	2
	Total	24	6	28

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

IV B.TECH II SEMESTER

INSTRUMENTATION AND CONTROL ENGINEERING

COURSE STRUCTURE

Code	Subject	T	P	C
	Elective-III	4	-	4
IC4221	Instrumentation & Controls in Manufacturing Systems			
IC4222	Digital Image Processing			
	Elective-IV	4	-	4
IC4223	Electronic Warfare			
IC4224	Opto-Electronics & Laser Instrumentation			
IC4225	Project & Seminar			8
	Total	8	-	16

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

I B.Tech (ICE)

3-0-6

IC1021

**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 Whittemore, John Wiley and Sons.
9. Basic Communication Skills for Technology – by Andrea J. Rutherford, 2/e, Pearson Education Asia.

MATHEMATICS-I
(Common for 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 - 2002P. 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 B.Tech (ICE)

2-0-4

IC1023

**SOLID STATE PHYSICS
(Common to EEE,ECE,EIE, ECnE, CSE, IT, BME, ECM and ICE)**

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.B.Tech (ICE)****3-0-6 IC1024****INFORMATION TECHNOLOGY AND NUMERICAL METHODS**
(Common for ECE,EEE,EIE,E Cont E,BME,CSE, ICE & IT)**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 Seidel 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, Runge kutta method, Milne predictor corrector method, algorithms; Comparison of Runge 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 Rainey, Jr., Richard Potter, John Wiley & Sons, 2000, ISBN: 9971-51-321-8.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

I B.Tech (ICE)

3-0-6 IC1025

C AND DATA STRUCTURES

(Common for ECE, EEE, EIE, EcontE, CSE, IT, ICE & 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, representing 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 representaltion, 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

NETWORK THEORY

(Common for ECE,EIE,E.Con.E,EEE,CSE,ICE, IT&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 Analysis – by G.K. Mital, Khanna Pub.
2. Network Theory – by N.C. Jagan and C. Lakshminarayana, BS Publ.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

I B.Tech (ICE)

3-0-6 IC1027

ELECTRONIC DEVICES AND CIRCUITS

(Common for ECE, EEE, EIE, EcontE, CSE, IT, ICE & 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 π -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

Biassing, 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. Biassing 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.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

I.B.Tech (ICE)

0-3-4 IC1028

ENGINEERING DRAWING PRACTICE

(Common for ECE,EEE,EIE,E Cont E, BME, CSE, ICE & IT)

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.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

I.B.Tech (ICE)

0-6-8 IC1029

COMPUTER PROGRAMMING LAB

(Common for ECE,EEE,EIE,E Cont E, BME,CSE, ICE & IT)

1. Write a C program that evaluates the following algebraic expressions after reading necessary values from the user:
 - a) $ax+b/ax-b$
 - b) $2.5 \log x + \cos 32^\circ + |x^2 - y^2| + \sqrt{2xy}$
 - c) $1/\sqrt{2n} e^{- (x-m)/\sqrt{2}\sigma^2}$
2. Write a C program for the following
 - a) Printing three given integers in ascending order
 - d) Sum of $1 + 2 + 3 + \dots + n$
 - e) $1 + x^2/2! + x^4/4! + \dots$ upto ten terms
 - f) $x + x^3/3! + x^5/5! + \dots$ upto 7th digit accuracy
 - g) 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, (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/sec²). 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.

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

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

9. Given 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 do-while to calculate and print the first m fibonacci numbers.
11. Write C programs to print the following outputs using for loop.

1	1
2 2	2 2
3 3 3	3 3 3
4 4 4 4	4 4 4 4
5 5 5 5 5	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 – DX	07 / 87	95,000
Gypsy	04 / 88	1,10,000
Maruthi Van	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 convert 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 $f(9x)=x$
 $\sin x + \cos x = 0$. 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.
- $$\begin{aligned} 9x_1 + 2x_2 + 4x_3 &= 20 \\ x_1 + 10x_2 + 4x_3 &= 6 \\ 2x_1 - 4x_2 + 10x_3 &= -15. \end{aligned}$$
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 Trapezoidal 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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

I B.Tech (ICE)

0-3-4 IC1030

ELECTRONIC DEVICES AND CIRCUITS LAB

(Common for ECE, EEE, EIE, EcontE, CSE, IT, ICE & 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.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

II B.Tech (ICE) I-SEMESTER

4-0-4 IC2121

Mathematics – II

(Common for all branches)

UNIT – I:

Matrices – brief review – Inverse of a matrix by adjoint, elementary row transformations – Rank - Normal form – echelon 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, negative definite – Diagnolization of matrix. Calculation of powers of matrix – Modal and sprectral 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-Hermitian and Unitary – Eigen values and eigen vectors of complex matrices and their properties.

2002-2003

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.

2002-2003

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. Greenberg, Prentice Hall, Upper saddle 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 B.Tech (ICE) I-SEMESTER 4-0-4

IC2122

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 (Debt-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.

SIGNALS & SYSTEMS

(Common for ECE, EIE, E.Cont.E, and ICE)

UNIT – I: 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, trigonometric 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 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 B.Tech (ICE) I-SEMESTER 4-0-4**IC2124****PRIME MOVERS AND MECHANICAL MEASUREMENTS****UNIT-I HYDRAULIC TURBINES AND PUMPS**

Impact of Jets, Classification- Pelton wheel – Francis and Kaplan turbines – Working Principle – Specific speed – Performance and Characteristic curves.

Reciprocating pumps – Types – Main components – Working principle – Air Vessels – Slip – Indicator diagrams – Centrifugal pumps – Main Components – Working Principle – Performance and Characteristic Curves.

UNIT-II STEAM POWER PLANT

Block Diagram and Principle of Operation – Boilers – Classification – Working principle with sketches – High Pressure Boilers – Mountings and Accessories – Condensors and Cooling Tower, working principles. Elements of nuclear power plant.

UNIT-III STEAM TURBINES AND GAS TURBINES

Carnot, Rankine and Joule cycles. Classification – Impulse and Reaction Turbines – Mechanical Details – Principle of Operation – Simple Impulse Turbine – Methods to reduce rotor speed, compounding velocity compounding, pressure compounding and pressure – velocity compounding.

Simple Gas Turbine plant – Principle of working – ideal and actual cycles – open and closed.

UNIT-IV FLOW,PRESSURE,SPEED VELOCITY AND ACCELERATION MEASUREMENT

Bourden pressure gauge. Orifice meters, Ventury meters, Flow nozzle, Rotometers, Relative Velocity- Translational & Relational Velocity measurement-Revolution counters & Timers-Magnetic &

Photoelectric pulse counting, stroboscopic methods-
Accelerometers of different types-Gyroscopes.

UNIT-V FORCE, TORQUE, FREQUENCY & VIBRATION MEASUREMENT

Force measurement-Different methods-Vibration measurement-
Vibrators shaper-piezo-electric and variable reluctance pick-ups.
Torque measurement-Mechanical, optical & electrical methods-
Frequency measurements-Oscilloscope method-frequency counters.

REFERENCE BOOKS :

1. Hydraulic machines – by Banga & Sharma
2. Heat Engines – by Khurmi
3. Measurement Systems-Application an design, 4th Edition,
by Doeblin, McGraw Hill International, 1990.
4. Mechanical and Industrial measurement, by Jain R.K.,
Khanna Publishers, 1986.

ELECTRICAL & ELECTRONIC MEASUREMENTS

UNIT - I: ELECTRICAL INSTRUMENTS

Suspension galvanometer, Torque and deflection of galvanometer, Permanent magnet moving coil mechanism, DC ammeters, DC voltmeters, Voltmeter sensitivity, Series and Shunt type ohmmeters, multimeters, alternating current indicating instruments, thermo instruments, Electrodynamometers in power measurements, Watt hour meter, Power factor meters, instrument transformers.

UNIT - II: ELECTRONIC INSTRUMENTS

FET input volt-ohm-ammeters, AC milli voltmeters, True RMS Voltmeters, Digital volt-ohm-ammeters – Vector impedance meter, phase angle meters, Digital and Analog R.F. power and Voltage measurements, Q meter.

UNIT - III: OSCILLOSCOPES

Oscilloscope block diagram, Cathode Ray Tube (CRT) circuits, vertical deflection system, delay line, multiple trace, horizontal deflection system, oscilloscope probes, special: storage oscilloscope, sampling oscilloscope, digital storage oscilloscope.

UNIT - IV: SIGNAL GENERATORS AND ANALYSERS

Sine & square wave audio generators and radio frequency synthesized signal generators, function generators, Heterodyne Wave Analyzers, Spectrum analyzers, Harmonic distortion analyzers.

2002-2003

UNIT – V: FREQUENCY AND TIME MEASUREMENTS

Basic standards, standard time base generators, frequency measurements, time measurements, period measurements, measurement errors.

TEXT BOOKS:

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

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II B.Tech (ICE) I-SEMESTER 4-0-4 IC2126

TRANSDUCERS & INSTRUMENTATION COMPONENTS

UNIT – I

Block diagram of instrumentation system, classification of transducers

Performance characteristics of instrument: Static Characteristics – static calibration. Accuracy, precision, errors in overall system. Static sensitivity, linearity, threshold, resolution, Hysteresis, Dead space, span and range.

UNIT – II ELECTRICAL TRANSDUCERS

RESISTIVE TRANSDUCERS: Potentiometers, strain gauges and their types resistance thermometers – RTDs, thermistors, Hot wire anemometers.

INDUCTIVE TRANSDUCERS:

Transformer types, electromagnetic types, Magnetostrictive variable remannacne & variable permeability.

CAPACITIVE TRANSDUCERS: Variable dielectric, variable gap, variable area types.

PIEZO ELECTRIC TRANSDUCERS: Piezo electric effect, piezo resistive effect, piezo electric materials

UNIT – III THERMAL & RADIATION TRANSDUCERS

Thermal expansion tranducers – thermometers, bimetallic strips. Thermoelectric sensors thermocouuples – laws and their reference junction considerations, optical pyrometers, two colour radiation pyrometers. Photosensors (Photodiode phototransistor infrared LEDs)

UNI – IV MECHANICAL & PNEUMATIC COMPONENTS

Pivots & Bearings, Linkages, Cams, Gears, Belt Chain & Friction Drives, dials, Scales, Pointers & indicating Mechanism, Ratchets, Counters, Escapement, integrators, Rack & Pinion, Geneva Mechanism.

Flapper nozzle, bellows, boosters, pneumatic relays, flip-flops, safety relief valves & Pilot valves, pneumatic cylinders motors, pneumatic operated valves.

UNI – V ELECTRICAL & ELECTROMECHANICAL COMPONENTS:

Transformers-Pulse transformers, Relays & Switches, Potentiometers, Synchros-Magnetic Amplifiers, AC & DC Servo motors, Stepper motors.

REFERENCE:

1. Herman K.P. Neubert "Instrument Transducers – An introduction to their performance and design" Oxford University Press.
2. B.C Nakra & K.K.Chowdary "Instrumentation Measurement and Analysis"
3. Gibson, T.E and Tetuer F.B, Control System Components, McGraw Hill New York 1993.
4. Greenwood., Mechanical details for product design, McGraw Hill, New York, 1990.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**II B.Tech (ICE) I-SEMESTER****0-3-2 IC2127****NETWORKS LAB**

(Common for ECE, EEE, EIE, E.Cont.E & ICE)

The following experiments are required to be conducted as compulsory experiments:

1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
 2. Time response of 1st 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 theorem.
 5. Verification of Max. Power transfer theorem, Verification on DC, Verification on AC with Resistive and Reactive loads.
 6. Experimental determination of Thevenin's & 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 LP and HP filters. Computation of Bandwidth, cut-off frequencies and analytical verification.
- In addition to the above eight experiments, any two of the experiments from the following list are required to be conducted :
9. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Coefficient of coupling.
 10. Harmonic Analysis of non-sinusoidal Wave form signals using Harmonic analyzer and plotting frequency spectrum.
 11. Determination of form factor for non-sinusoidal wave form by taking the magnetization current in a transformer, as the applied voltage is varies. Experimental determination by measurement of RMS, average values. Verification from the wave form output.
 12. Generation of non-linear periodic waveform for the square wave using clipping and clamping. Control of average value of the output waveform.

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HYDERABAD

II B.Tech (ICE) I-SEMESTER 0-3-2 IC2128

INSTRUMENTATION LAB – I

(Minimum 10 experiments should be conducted)

1. DC meters using D' Arsonval Galvanometers.
2. AC meters using D' Arsonval Galvanometers.
3. Ohm meter.
4. RLC and Q measurement using Q – meter.
5. Study of CRO – Voltage, frequency and phase measurement.
6. Strain gauges.
7. Resistance Thermometer Devices.
8. LVDT.
9. Capacitive transducers.
10. Piezo – Electric Transducers.
11. Bordon tube.
12. Acceleration transducer.

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II B.Tech (ICE) II-SEMESTER 4-0-4 IC2221

CONTROL SYSTEMS

(Common for ECE, EIE, EContE & ICE)

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:

- Control Systems Engineering – by I. J . Nagrath and M. Gopal New Age International (P) Limited, Publishers, 2nd Edition.

- Modern Control Engineering – by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
- Automatic Control Systems – by B.C. Kuo, Prentice Hall of India Pvt. Ltd., 7th Edition, 1997.
- Control System Engineering - by NISE, 3rd Edition, John Wiley.

REFERENCES :

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

II B.Tech (ICE) II-SEMESTER 4-0-4 IC2222

MATHEMATICS - III

(Common for all branches)

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 integral $\int_{-\infty}^{\infty} f(x) dx$

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

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^m , z^n (n a positive integer) $\sin z$, $\cos z$, $z + a/z$. 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 Mathematics

- B.V. Ramana, Tata McGraw-Hill, 2002
 3. Engineering Mathematics – 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. Greenberg , Prentice Hall, Upper saddle 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 B.Tech (ICE) II-SEMESTER**4-0-4****IC2223****SWITCHING THEORY AND LOGIC DESIGN****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 Bready, John Wiley.

REFERENCES:

1. Introduction 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 B.Tech (ICE) II-SEMESTER**4-0-4****IC2224****OBJECT ORIENTED PROGRAMMING & APPLICATIONS****UNIT-I : INTRODUCTION TO OBJECT ORIENTED PROGRAMMING**

Language and thought – Eskimos and snow – Computer languages- New paradigm – Viewing the World – Responsibilities, Messages, Methods, Classes and Instances – Hierarchies – Inheritance – method binding, over riding and exceptions – Summary computation as simulation – coping with complexity ; Object Oriented Design – Case study in RDD – CRC Cards – Recording Responsibility – Components and behaviour – Software components.

UNIT-II: CLASSES AND METHODS

Classes and methods – example of A playing card – Interface and implementation – classes and methods in C++ (or classes & methods in JAVA) – Message-passing syntax in Object Pascal ; Message-passing syntax in C++(JAVA) ; Issues in creation and initialization creation and initialization in C++ (or JAVA) – Eight queens puzzle – using Generators ; Eight queen puzzle in C++ (or JAVA).

UNIT-III : INHERITANCE

Intuitive description of Inheritance – Subtypes and Substitutability, Inheritance in various languages – Forms, Benefits and cost of Inheritance – Multiple Inheritance in C++ (or JAVA).

UNIT-IV : MECHANISM FOR SOFTWARE REUSE

Mechanism for software reuse – composition and inheritance described, Composition and inheritance contrasted – Subclasses and Subtypes – Issues in binding and message Lookup –

Method binding – Reverse polymorphism – Binding and message lookup in C++ (or JAVA).

UNIT-V : POLYMORPHISM

Polymorphism in programming languages-High level and low level abstractions – Generics and Templates – Polymorphism in C++ (or JAVA) – Pattern and frame works – Application, simulation of frame work – Design patterns – A detailed case study – The LAF – Classes in the LAC – Class button – Classes menu and menu item.

TEXT BOOKS:

1. Barkakati - Object Oriented Programming, PHI.
2. Introduction to object oriented programming, Timothy budd, Pearson Publishers.

ELECTRICAL TECHNOLOGY

UNIT-I: DC MACHINES

Principle of operation of DC generator – emf equation – types of generators – Magnetisation and Load characteristics – applications – DC motor – torque equation – types of characteristics – three point starter – efficiency calculation – Speed control.

UNIT-II : TRANSFORMERS

Single phase transformer – Principle of operation – types – constructional features – emf equation – phasor diagram on no-load and load – equivalent circuit – losses and coefficienty – regulation – OC & SC tests – predetermination of efficiency and regulation.

UNIT-III : THREE PHASE INDUCTION MOTORS

Three phase induction motor – constructional features – Principle of operation – types – slip-torque characteristics – coefficienty calculation – starting methods.

UNIT-IV : SYNCHRONOUS MACHINES

Synchronous generators – constructional features – types – emf equation – distribution and coil span factors – regulation by synchronous impedance method – Principle of operation of synchronous motor – methods of starting.

UNIT-V : SINGLE PHASE MOTORS

Single phase induction motors – constructional features – Shaded-pole motors – Capacitor motors – AC Servo motors – AC tachometers, synchros, stepper motors – characteristics and applications.

TEXT BOOKS :

1. Electrical Machines – by S.K. Bhattacharya, TMH Publications.
2. Electrical Machines & Power Systems – by Del Toro, PHI

REFERENCE BOOKS:

1. Electrical Machines by I.J. Nagrath & D.P. Kothari, TMH Publication, 2nd edition.
2. Electrical Machines – by P.S. Bindra, Khanna Publishers.
3. Electrical Technology – by Edward Hughes, Addison – Wesley, Longman, Inc., 7th edition, 1998.
4. Electrical Machines – by P.K. Mukherjee & S. Chakravorti, Dhanpat Rai & Son.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD****II B.Tech (ICE) II-SEMESTER****4-0-4****IC2226****LINEAR & DIGITAL I.C. APPLICATIONS****UNIT – I: OPERATIONAL AMPLIFIERS**

Design aspects of Monolithic Opamps, Ideal characteristics, Specifications, Offset Voltages and currents, frequency compensation techniques, measurement of op amp parameters, applications of op amps – inverting, non-inverting amplifiers, integrators, function generators, logarithmic amplifiers, instrumentation amplifiers, signal conditioning circuits, detectors.

UNIT – II:

555 Timer, 556 Function generator ICs and their applications. Three terminal regulators. IC 565 phase locked loops and their typical applications. IC 1496 (Balanced Modulator) Applications.

UNIT – III: ACTIVE FILTERS

LPF, HPF, BPF, BEF, ALL Pass filters, and Higher order filters and their design. VCSV and IGMF configurations.

UNIT – IV: LOGIC FAMILIES

DTL, TTL, ECL, IIL, MOS Logic families, Parameters and their comparison, Tristate logic, Interfacing of Logic Families, Flip-Flops.

UNIT – V:

Analog multiplexers, Sample and hold circuits, D/A converters – Resistive divider and ladder networks, A/D converters, counters – Ramp type, Dual slope, Integration technique, Successive approximation, Parallel comparison technique.

REFERENCE BOOKS:

1. Micro Electronics – by Jacob Millman (ISE).
2. Op Amps and Linear Integrated Circuits – by Ramakanth Gayakwad (PHI).
3. Integrated Circuits – by Botkar (Khanna).
4. Applications of Linear Integrated Circuits – by Clayton.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**HYDERABAD****II B.Tech (ICE) II-SEMESTER****0-3-2 IC2227****CONTROL SYSTEM LAB – I**

1. Characteristics of synchro tranducer, Synchro receiver and control transformers.
2. Gain control of the output of D.C. Amplifier with and without chopper stabilization
3. Programming a P.L.C.
4. Torque – displacement characteristics of stepper motor using A/D converters
5. Open loop control of a relay servomechanism (On-off control of a tem in a heater bath).
6. Advantages of feedback on the performance of an open loop speed control system (D.C. Motor speed control system).
7. Response of a first order System, with R.C. Components (Simulated transfer function) on X-Y plotter/Servoscope.
8. Operation of pneumatically operated pressure control system using pressure sensitive bellows and LVDT and sensors.
9. Error comparators – gauged potentiometer and system using a flapper nozzle in the pressure sensing circuit.
10. Modelling of a distillation column as a lumped parameter multi variable system.
11. Pneumatically operated PID controller, with independent gain control of P.I. and D control loops, for a step input response.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

II B.Tech (ICE) II-SEMESTER 0-3-2 IC2228
IC APPLICATIONS LAB

1. Integrator and differentiator using 741 OPAMP.
2. A) Astable using 555.
- B) Monostable using 555.
3. Function generator using 741 OPAMP.
4. Voltage regulator using 723.
5. Inverter Transfer Characteristics and study of logic gates.
6. Study of flip-flops using ICs.
7. 7490 Counter.
8. Half Adder, Full Adder and subtractor.
9. BCD to 7 segment decoder using IC 7447.
10. Three Terminal regulators 7805, 7809, 7912, 565 PLL, 566 VCO.
11. D/A Converter.
12. A/D Converter.
13. Study of PLAS.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.Tech (ICE) I-SEMESTER 4-0-4 IC3121
MANAGEMENT SCIENCE

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, Herzberg'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 B.Tech (ICE)

I-SEMESTER

4-0-4 IC3122

ELECTRONIC EQUIPMENT DESIGN

UNIT – I: SYSTEMATIC PRODUCT DESIGN

Product design methodology, Design concepts and Guidelines, Design morphology, Economic and Technical feasibility, Structure and functions of electronic instrument. Utility concepts in reliability, Mortality curve, MTTF, MTBF, Series, Parallel and standby systems.

CONTROL PANEL DESIGN

Ergonomic aspects for design of electronic equipment, Displays, Visual, Conduitory and tactical displays. Layout considerations of instruments.

UNIT – II: ELECTRONIC TEST EQUIPMENT (CIRCUIT DESIGN)

CRO, FET Voltmeter, Wave-analyzers, Logic Analyzer, LCR bridge, electronic relay system, IC-regulated power supply, Frequency meter, electronic counter, signal generators, Xerox machine, Fax, Electronic weighing machine, Electronic Workshop machine, Electronic Workshop equipment.

UNIT – III: INSRTUMENTAL PERFORMANCE

Noise reduction methods - grounding, isolating and shielding techniques. Environmental problems - Vibration pump, Thermal fatigue, Creep and EMI (Electromagnetic Interference), Chemical Humidity and Pressure.

UNIT – IV: PRINTED CIRCUIT BOARDS - FABRICATION TECHNOLOGY

Layout considerations and rules: General rules for design considerations of analog and digital PCBs. Art work, production, fabrication technology for single sided, double sided and multi layered PCBs including PCB base materials, Etching, plating, Photo printing, Screen printing, Anodizing of front panels. PC based artwork production.

2002-2003

UNIT- V: DESIGN OF COILS, TRANSFORMERS AND FABRICATION TECHNOLOGY

Design concepts of audio and pulse transformers and coils for R.F. applications, Magnetic and insulation materials, tests for these transformers. Magnetic amplifiers.

REFERENCES:

1. Design and Technology of PCB – by Bosshart, CEDT Publications.
2. Ergonomics, CEDT Publications.
3. Grounding, Shielding and Isolation, CEDT Publications.
4. Human Factors in Engineering and Design, CEDT Publications.
5. Series Coil Transformer Design, CEDT Publications.
6. Instrumentation Devices and Systems – by Rangan and Sarma, McGraw Hill Publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD****III B.Tech (ICE) I -SEMESTER 4-0-4 IC3123****COMPUTER ORGANIZATION****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;

2002-2003

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.

2002-2003

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

III B.Tech (ICE) I -SEMESTER 4-0-4 IC3124

ANALYTICAL INSTRUMENTATION

UNIT – I: pH AND CONDUCTIVITY & DISSOLVED COMPONENT ANALYSER

Conductivity meters – pH meters – Dissolved oxygen, hydrogen analyzers – Sodium analyzer – Silica analyzer and sampling systems.

UNIT – II: GAS ANALYSERS

Thermal conductivity types – CO monitor – NO_x analyzer – H₂S analyzer system and sampling – Industrial analyzer circuits.

UNIT – III: CHROMATOGRAPHY

Gas chromatography – Liquid chromatography – their principles and applications – oxygen analyzer – paramagnetic type – detectors and sampling systems.

UNIT – IV: SPECTROPHOTOMETERS

UV, VIS Spectrophotometers – Single beam and double beam instruments – Instrumentation associated with the above Spectrophotometers – Sources and detectors – Sources and detectors for IR Spectrophotometers – Commercial instruments – FT IR Spectrometer – Flame emission and atomic absorption Spectrophotometer – Atomic emission Spectrophotometer - sources for Flame Photometers and online calorific value measurements.

UNIT – V: PRINCIPLE OF NUCLEAR MAGNETIC RESONANCE

Instrumentation associated with NMR Spectrophotometer – Introduction to mass spectrometers – Nuclear radiation

detectors – Ionization chamber – GM Counter – Proportional Counter – Solid state detectors.

REFERENCES:

1. Instrumental Methods of Analysis – by Willard H.H., Merrit L.L., Dean J.A.. and Seattle F.L., CBS Publishing and Distributors, 6/e, 1995.
2. Instrument Technology – by Jones B.E., Butterworth Scientific Publ., London, 1987.
3. Mechanical and Industrial Measurements – by Jain R.K., Khanna Publishing, New Delhi, 2/e, 1992.
4. Principles of Instrumental Analysis – by Skoog D.A. and West D.M., Holt Sounder Publication, Philadelphia, 1985.
5. Instrumental Analysis – by Mann C.K., Vickerks T.J. & Gullick W.H., Harper and Row Publishers, New York, 1974.
6. Handbook of Analytical Instruments – by Khandpur.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

III B.Tech (ICE) I -SEMESTER 4-0-4 IC3125

INDUSTRIAL ELECTRONICS

UNIT – I: DC AMPLIFIERS

DC amplifiers, drift compensation techniques, differential amplifier.

UNIT – II: REGULATED POWER SUPPLIES

Series and shunt type, Protection techniques, Switching mode voltage regulator, Servo voltage stabilizer, Monolithic voltage regulators (fixed and variable).

UNIT – III: SCR AND THYRISTOR

Principles of operation and characteristics of SCR. Triggering of SCR, Diac and Triac, Commutation. Thyristor – Characteristics – Phase controlled half and full wave rectification.

UNIT – IV: APPLICATIONS OF SCR IN POWER CONTROL

Static circuit breaker, Over load protection, Inverters, Converters and Chopper circuits. Other applications of SCR, Industrial applications of Triac and Diac. (Single Phase Applications Only).

UNIT – V: INDUSTRIAL APPLICATIONS

Timing circuits, Welding control, Electronic DC motor control, Induction and Dielectric heating. Ultrasonic generators and applications.

REFERENCES:

1. Integrated Circuits and Semiconductor Devices – by Deboo and Burroughs (ISE).
2. Industrial Electronics – by G.K. Mital (Khanna Publications).
3. Thyristors and Applications – by M. Rammurthy.
4. Integrated Electronics – by Millman and Halkias, McGraw Hill, ISE.
5. Engineering Electronics – Ryder.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.Tech (ICE) I -SEMESTER 4-0-4 IC3126

PROCESS CONTROL INSTRUMENTATION

UNIT – I: PROCESS DYNAMICS

Process variables – Load variables – Dynamics of simple pressure, flow level and temperature process – interacting and non-interacting systems – continuous and batch process – self-regulation – Servo and Regulator operation - problems.

UNIT – II: CONTROL ACTIONS AND CONTROLLERS

Basic control actions – characteristics of two position, three position, Proportional, Single speed floating, Integral and Derivative control modes – PI, PD, PID control modes – Problems – Pneumatic, Hydraulic and Electronic Controllers to realize various control actions.

UNIT – III: OPTIMUM CONTROLLER SETTINGS

Evaluation criteria – $1/4^{\text{th}}$ decay ratio, IEA, ISE, ITAE – determination of optimum settings for mathematically described process using time response and frequency response. Tuning process curve reaction method – continuous oscillation method – damped oscillation method – problems.

UNIT – IV: FINAL CONTROL ELEMENTS

I/P Converter - pneumatic, electric and hydraulic actuators – valve positioner – control valves – characteristic of control valves – valve body – Globe, Butterfly, diaphragm, Ball valves – Control valve sizing – Cavitation, flashing - problems.

UNIT – V: MULTILOOP CONTROL SYSTEM

Feed forward control – Ratio control – Cascade control – Split range – Multivariable control and examples from distillation column and Boiler system.

REFERENCES:

1. Process control – by Pollard A., Heinemann Educational Books, London, 1971.
2. Process Control – Harriott P. , TMH, 1991.
3. Automatic Process Control – by Eckman D.P. , Wiley Eastern Ltd., New Delhi, 1993.
4. G-Chemical Process Control – by Stephanopoulos, Prentice Hall, New Delhi.
5. Process Control – by Patranabis.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.Tech (ICE) I -SEMESTER 0-3-2 IC3127
PROCESS CONTROL LAB

1. Flow level control unit.
2. Temperature level control unit.
3. Servo and regulator operation.
4. Realization of control actions: Pneumatic controllers.
Hydraulic controllers. Electronic controllers.
5. Process tuning – Process reaction curve method.
6. Process tuning – continuous and damped oscillation method.
7. Operation of flow loop in plant.
8. Input convertor – Pneumatic actuator.
9. Input convertor – Hydraulic actuator.
10. Control valve characteristics (Different types).
11. Multi loop control systems – Ratio Control.
12. Multi loop control systems – Cascade Control.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.Tech (ICE) I -SEMESTER 0-3-2 IC3128

INSTRUMENTATION LAB – II

(Minimum 10 experiments should be conducted)

1. Design and simulation of Analog Circuits using CAD Package.
2. Design of PCBs using Packages and Fabrication of PCB.
3. Linearization of Thermistor using Microprocessor.
4. Study of Level monitoring Instruments using PLC.
5. pH measurements.
6. Measurement of Blood Pressure.
7. Calibration of P to I and I to P converters.
8. RPM indicator using Strobostrom/Gyroscope.
9. Measurement of Humidity.
10. Measurement of velocity of liquid using Ultrasonic (Doppler effect) method and also flow measurement.
11. Measurement of Level using Capacitance method/Transducer.
12. Displacement measurement using inductive pickup and capacitive pickup.
13. PID Controller setup (Flow/Temp. Level).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**HYDERABAD****III B.Tech (ICE) II -SEMESTER****4-0-4 IC3221****POWER PLANT INSTRUMENTATION****UNIT – I: AN OVERVIEW OF POWER GENERATION**

Brief survey of methods of power generation – Hydrothermal, Nuclear, Solar, Wind etc. Importance of instrumentation for power generation – Thermal power plants – Building blocks – Details of the Boiler Processes – PI diagram of Boiler – Cogeneration.

UNIT – II: PARAMETERS AND MEASUREMENTS

Electrical measurements – current, Voltage, Power, Frequency power factor, Trivector meter – Non electrical parameters, flow of feed water, fuel, air and steam with correction factors for temperature – Pressure – temperature – level radiation detectors – smoke density measurements – dust monitor.

UNIT – III: CONTROL LOOPS AND INTERLOCKS IN BOILERS

Combustion control – control of Main header Pressure, airfuel ratio control – furnace draft and excessive air control, drum level (three element control) main and reheat steam temperature control, burner tilting up, bypass damper, superheater, spray and gas recirculation controls – BFP recirculation control – Hot well and deaerator level control – pulverizer control, Computers in Power Plants.

UNIT – IV: TURBINE MONITORING AND CONTROL

Condenser vacuum control – gland steam exhaust pressure control – Speed, vibration, Shell temperature monitoring and control – Lubricating oil temperature control – Hydrogen – generator cooling system.

UNIT – V: ANALYZERS IN POWER PLANTS

Thermal conductive type – paramagnetic type, Oxygen analyzer, infrared type and trim analyzer – Spectrum analyzer – hydrogen purity meter – Chromatography – pH meter – Conductivity cell – fuel analyzer, brief survey of pollution monitoring and control equipment.

REFERENCES:

1. Modern Power Stations Practice, vol. 6, Instrumentation, Controls and Testing - Pergamon Press, Oxford, 1971.
2. Power Plant Technology – by Wakil M.M., McGraw Hill.
3. Standard Boiler Operations - Questions and Answers – by Elonka S.M., and Kohal A.L., TMH, New Delhi, 1994.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

III B.Tech (ICE) II -SEMESTER 4-0-4 IC3222

DIGITAL SIGNAL PROCESSING

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 B.Tech (ICE) II-SEMESTER 4-0-4 IC3223

ROBOTICS AND EMBEDDED SYSTEMS

UNIT-I

INTRODUCTION : Classification of robots, Degrees of freedom of Robots, Workspace, Application of Robots in industry. Robots in material handling, loading, unloading, processing, inspection and assembling robots used in welding, painting and in hazardous places, specification of requirement of degree of freedom for different applications.

UNIT-II

Mechanical, Hydraulic, Pneumatic Manipulators, Actuators and grippers, DC and AC servometers, linear position measuring transducers, optical encoders, range proximity sensing, Techniques used in robot vision, usage acquisition and processing, introduction to programming of robots.

UNIT-III

Introduction to Embedded Systems, embedding computers. Introduction to instruction sets, different types of processor ARM processor and share processor. Introduction to CPUs, I/O devices, Primitives, Busy wait and intercepts.

UNIT-IV

Introduction to Co-processors – Memory Managements units – CPU performance power consumption – Data compressor Design example – Introduction to Computer platform – CPU Bus, Memory devices – I/O devices – Designing with microprocessor design example – Alarm clock.

UNIT-V

Introduction to program design, models of programs – Assembling and linking – Introduction to processes and

operating systems – Switching, operating systems scheduling – Interprocess conversion – Design example.

REFERENCE BOOKS:

1. Richard D. Clafter, Thomas A. Chemielwski and Michalneghi "Robotic Engineering" Prentice Hall of India, New Delhi.
2. Wayne Wolf – 'Computers as Components Principles of Embedded Computer System Design', Morgan Karmen Publishers & Harcourt India Pvt Ltd. Publishers.

2002-2003

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

III B.Tech (ICE) II -SEMESTER 4-0-4 IC3224

MICROPROCESSORS AND MICROCONTROLLERS

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.

UNIT – II:

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.

UNIT – III:

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 – IV:

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 – V:

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 – VI:

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 Ram Singh and B.P. Singh, New Age Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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UNIVERSITY, HYDERABAD
III B.Tech (ICE) II-SEMESTER 4-0-4 IC3225

DIGITAL & OPTIMAL CONTROL SYSTEMS

UNIT-I

Introduction to digital Control Systems, Z-transform technique, initial and final value theorem, solution of difference equations using Z-transform, pulse transfer function.

UNIT-II

State space representation of digital systems, solution of discrete time state space equation. Controllability and observability, stability tests of digital systems: Jury's stability test and Liapunov stability theorem for linear digital systems.

UNIT -III

Design of digital control systems with digital controllers through bilinear transformation. Digital PID controller, Design for dead beat response, pole placement design by state feedback for single input and multi-input systems, pole placement design by incomplete feedback or output feedback.

UNIT-IV

Optimal Control: Formulation of optimal control problem. Minimum time, Minimum energy, Minimum fuel problems. State regulator problem, Output regulator problem. Tracking problem. Calculus of variations approach: Minimisation of functionals of single function. Constrained minimisation. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints.

UNIT-V

Multivariable theory: Transfer between transfer matrix and static space representation - Minimal realization - Controllable realization - Observable realization - Algorithms - Minimal derivative operation (DO) realization - Dynamic feedback compensation in frequency derivative - Design algorithm - Order of the Compensator - Equivalence to linear state variable feedback - Model making compensation - Elementary feedback.

TEXT BOOKS:

1. Modern Control Theory by M. Gopal, M/s. TMH Publications.
2. Linear Multivariable control theory by Y.S.Apte.

REFERENCE:

1. B.C.KUO HOLT, RINEHART; Digital control systems. WIONSTON INC.
2. K.OGATA : Discrete time control systems. PRENTICE HALL

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III B.Tech (ICE) II SEMESTER

4-0-4 IC 3226

COMMUNICATION SYSTEMS

NOTE : CONCEPTS & QUALITATIVE TREATMENT ONLY

UNIT-1 RANDOM VARIABLES AND PROCESSES

Probability, Random variables, cumulative distribution function, probability density function, gaussian and rayleigh density functions, central limit theorem, random processes.

UNIT II PRINCIPLES OF TELEMETRY & TELECONTROL:

Fundamental concepts, significance, functional blocks of Telemetry and Telecontrol systems, Methods of telemetry-Electrical, Pneumatic, Hydraulic and Optical Telemetry, State of the art-Telemetry standards. Telecontrol methods, Guidance and Regulation.

UNIT III ANALOG MODULATION TECHNIQUES:

Concept of Modulation, Need of Modulation, Frequency translation, Amplitude modulation, spectrum of A.M, Power content, DSB, SSB and VSB. Demodulation techniques for AM, DSB, SSB & VSB. Frequency and Phase modulation, spectrum of NBFM and WBFM, Generation of WBFM-Armstrong Method, Carson rule for estimation of bandwidth, Demodulation techniques for FM-Center tuned discriminator and Ratio detectors, Frequency Division Multiplexing (FDM).

UNIT IV PULSE & DIGITAL MODULATION TECHNIQUES:

PAM, Natural and Flat top sampling, pulse time modulation, Channel bandwidth for PAM signal, Pulse code Modulation, Quantization of signals, quantization error, μ -Law and A-Law Companders, Delta modulation (DM), DPCM, Adaptive DM, Time Division Multiplexing (TDM).

UNIT V DIGITAL CARRIER MODULATION & LINE CODING TECHNIQUES:

Introduction, Optimum Binary Receiver, Binary Digital modulation schemes: ASK, FSK, PSK, DPSK, introduction to M-ary schemes - QPSK, MSK, QAM. Line coding techniques - elementary treatment and comparison study of on-off (NRZ, RZ), Polar, Bipolar, Duo-binary, high density bipolar and Manchester signaling schemes.

TEXT BOOKS:

1. B.P.Lathi, "Modern Digital & Analog Communication Systems", Oxford University Press.
2. K.Sam Shanmugham, "Digital & Analog Communication Systems"

REFERENCES:

1. Simon Haykin, "Analog & Digital Communications".
2. Taub & Schilling, "Principles of Communication Systems".

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III.B.Tech (ICE) II -SEMESTER 0-3-2 IC3227

MICROPROCESSORS LAB

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III.B.Tech (ICE) II -SEMESTER 0-3-2 IC3228

CONTROL SYSTEMS LAB – II

1. Determination of the control characteristics of A.C. servomotor.
2. Transfer function of armature controlled D.C. servomotor with inertia and viscous friction load.
3. Control characteristics of a magnetic amplifier with and without feedback.
4. D.C. Motor speed control with regenerative and degenerative feedback and with tach generator in the feed back path.
5. D.C. position control system – Output control with variation of control loop gain.
6. System identification for the frequency response of a filter (band pass –bad elimination filter).
7. Shaft angle encoder, decoder, output characteristics.
8. Amplitude modulation low frequency, signal and recovery after demodulation (effect of modulating frequency on the signal to noise ratio).
9. Robot manipulator motion control using feed pendent.
10. Pick and plan assignment of robot manipulator with microcontroller.
11. 4-1 line multiplexer with digital logic gates.
12. Elementary fact programming on a robot manipulator (describing a trajectory, which is predefined).

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

IV B.Tech (ICE) I SEMESTER 4-0-4 IC 4121

NEURAL NETWORKS AND FUZZY LOGIC CONTROL

**UNIT-I INTRODUCTION AND DIFFERENT ARCHITECTURES
OF NEURAL NETWORKS**

Artificial Neuron – MLP – Backpropagation – Hopfield Networks
– Kohonen self organizing maps – Adaptive Resonance.

UNIT-II NEURAL NETWORKS FOR CONTROL

Schemes of Neuro-control – Identification & control of Dynamical systems – Case study.

UNIT-III INTRODUCTION TO FUZZY LOGIC

Fuzzy sets : Fuzzy Relations – Fuzzy conditional statements –
Fuzzy rules Fuzzy algorithm – Functional diagram.

UNIT-IV FUZZY LOGIC CONTROL SYSTEMS

Fuzzy logic controller – Fuzzification interface – Knowledge base
– Decision making logic – Defuzzification interface – Design of
Fuzzy logic controller – Case study.

UNIT-V NEURO – FUZZY LOGIC CONTROL

Adaptive fuzzy systems – Optimization of membership function
and rule base of fuzzy logic controller using Neural Networks –
fuzzy neuron – Case study.

REFERENCE BOOKS :

1. Khr G.J., and Folger T.A., Fuzzy sets, uncertainty and Information Prentice Hall of India, New Delhi, 1994.
2. Simon Hayking, Neural Network, ISA, Research Tringle Parke, 1995.

2002-2003

3. Kosco B., Neural Networks and Fuzzy systems : A Dynamical approach to machine intelligence, Prentice Hall, USA, 1992.
4. Hertz J., Korgh A., and Palmer R.G., Introduction to the Theory of Neural Computation Addison – Wesley Publishing Co., California, 1991.
5. Nie & Linkers : Fuzzy Neural Control : Principles, Algorithms and Applications; PHI, 1998.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.Tech (ICE) I SEMESTER

4-0-4 IC 4122

ADAPTIVE CONTROL SYSTEMS

UNIT-I

Concept of Adaptive Control. Definition. Types of adaptivity, essential components of adaptive control. Essential ratio of adaptive control. General adaptive system, learning in adaptive system.

UNIT-II

Adjustment of system parameter to maintain specified closed loop pole-zero configuration-Matrix system, Osden's system, the system of Anderson, Buland and Cooper. Adjustment of system parameters to satisfy selected error criteria.

UNIT-III

Computer controller adaptive control system; Karlman's method, Corbins method, staffin's method, Merrians methods, Braun's method, method of Mishkin and Hadded.

UNIT-IV

Adaptive control with the gradient method, Adaptive control using Lyaphnov design. Model reference adaptive control – hyper stability design.

UNIT-V

Self tuning regulators : Regulation and tracking with Minimum Variance control, pole placement of self tuning regulators.

REFERENCE BOOKS:

2. Adaptive control systems – Mishkin and Braun – Mc Graw Hill
3. Digital control systems – P.N. Paraskevopoulos Prentice Hall

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.Tech (ICE) I SEMESTER

4-0-4 IC 4123

COMPUTER AIDED DESIGN OF CONTROL SYSTEMS

UNIT-I

Introduction and mathematical background, system models, Generation of system matrices – Least order. Decoupling zeros, mode of system transformation – Mcmillan form – Reduction to least order – Controllability and absorbability – Decomposition of the state space – stability.

UNIT-II

SISO System : System Specification, Stability – Decoupling zeros, Nyquist Diagram. Inverse Nyquist diagram – Design of phase lead compensators from inverse Nyquist diagram – Design of phase lag compensators from inverse Nyquist diagram.

UNIT-III

Root loci method of design, Comparison with inverse Nyquist diagram technique – Sensitivity. Design criteria, step response – frequency response – pole location – selection of criteris. Irrational transfer functions, Non minimum phase response. The circle criteria – connection with the describing function.

UNIT-IV

Multivariable Systems : Notation, Gain space, stability, frequency response criteria for stability, Diagonal dominance, Ostrowski's theorem, Achieving dominance, Sensitivity, Direct Nyquist array, Design procedure – Multi variable circle criterion.

UNIT-V

Design with MATLAB : Basics of MATLAB : Entering simple matrices, statements, variables, arithmetic expressions, complex numbers and matrix expressions, output format, quitting and saving the work space, logical operators, Vectors and Subscripts.

UNIT-VI

FOR loops, M files and functions, menu interface to PC-MATLAB, Tool Boxes for control system design, menu driven options, plotting facilities.

REFERENCE BOOKS :

1. Computer Aided Design of Control Systems – by Resenbrock (Academic Press)
2. Multivariable Control Theory by Y.S. Apte MATLAB Control System Tool Box.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.Tech (ICE) I SEMESTER **4-0-4 IC 4124**

PC BASED INSTRUMENTATION**UNIT - I:****INTRODUCTION:**

PCs in Automated Measurement and control systems, Advantages and disadvantages.

HARDWARE OVERVIEW:

Evolution of PC family, subsystems of PC, self test and initialization of various subsystems.

UNIT - II:**OPERATING SYSTEMS :**

Essential features of OS for PC based Instrumentation, Overview of the features of additional software modules, booting process and command processor.

MOTHER BOARD:

Functional units of mother board and their intercommunication, "CPU Nucleus" logic, DMA, Interrupt Handling Data, Address and Control Bus, Logic, I/O slot signals, New generation mother boards.

UNIT - III:**BUS STANDARDS:**

Introduction to buses, Bus design considerations, Bus communication protocols, Bus topology, control signals.

CASE STUDIES: VME and ISA buses.

UNIT - IV:**STUDY OF STANDARD I/O CONTROLLER CARDS:**

I/O ports, serial and parallel ports, Bus slots, Study of 8255 add-on card, Keyboard, Mouse and VDU Controller Cards.

UNIT – V:**ADD-ON CARD DESIGN :**

Design considerations, Use of portstand, use of IRQ for additional hardware, Power requirements and physical dimensions of Add-on Cards, Device Drivers. Installable and executable device drivers, device driver development – A case study.

REFERENCES:

1. The Microcomputer Bus Structure and Interface Design – by Dexter A.L (Marcel Dekker).
2. IBM PC AT Reference Manual.
3. Peter Norton's Assembly Language Book for IBM PC – by Peter Norton, PHI.
4. PC Trouble Shooting – PHI.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**
IV B.Tech (ICE) I SEMESTER 4-0-4 IC 4125
**CHEMICAL AND PHARMACEUTICAL INDUSTRIAL
INSTRUMENTATION
(ELECTIVE I)**
**UNIT – I : INTRODUCTION TO CHEMICAL PROCESS
INDUSTRY**

Petroleum Processing and Petrochemicals
Manufacturing of Bulk Chemicals, Plastics and Polymers
Pharmaceutical Industry
Cement, Sugar, Paper, Pesticide Industries etc.

**UNIT – II : BRIEF INTRODUCTION TO PROCESS
EQUIPMENT**

Heat Exchangers
Distillation columns
Chemical Reactors
Transmission lines
Evaporators, Rotary Kilns, Crystallizers
Level, Pressure, flow control valves

**UNIT III : DYNAMICS AND CONTROLS OF HEAT
EXCHANGERS**

Heat Transfer – Dynamics of counter current exchangers – Lags and Resonance of distributed systems – control schemes – Response to load changes in steam heat exchangers.
Temperature control instruments.

**UNIT IV: DYNAMIC AND CONTROL OF DISTILLATION
COLUMNS**

Survey of Control Schemes – Basic features of Composition Control (overhead, bottom and product) – analytical Instruments Internal Reflux Control – different Types of Lags (Liquid flow,

concentration lags) – Frequency response of distillation columns.

UNIT V: STABILITY AND CONTROL OF CHEMICAL REACTORS

Stirred – Tank reactors – Effect of lags in control loop – Stability of Tubular Reactors – Batch Reactors – Packed Bed Reactors – SPECIAL STABILITY PROBLEMS – Composition Control – Control of PH and Blending Processes – Response to Agitated tanks. PH control characteristics – Examples of PH Controls Systems and Instruments.

REFERENCES:

1. Shreve's Chemical Process Industries, 5th Edition, Mc.Graw Hill.
2. Outlines of Chemical Technology by C.E.Dryden.
3. Harriott P., Process Control, Mc. Graw Hill.
4. Stephanopolis, G-Chemical Process Control, Prentice Hal
5. The Petroleum Chemicals Industry by R.F. goldstein, E&FN London.
6. Principles of Industrial Instrumentation by Patra Nabis, TMH.
7. Instruments for measurement and control by Holbrook W.C., Van Nostrand; East West.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV/IV B.Tech (ICE) I Semester 0-3-2 IC 4126

BIO-MEDICAL INSTRUMENTATION (ELECTIVE I)

UNIT – I: PHYSIOLOGY

Electrophysiology of muscle, Transmission of action potentials in muscles. Basic charge on cell. Depolarization, Types of muscles, Their electrophysical properties, Source and theories of bio-electric potentials. Electro-physiology of nerve and neuromuscular function, Transmission of impulse from nerve to muscle, Evoked Potentials. Physiology of Heart, Heart as a pump, Heart-Lung machine.

UNIT-II:BIO-MEDICAL TRANSDUCERS / ELECTRODES / RECORDERS

Various types of electrodes, their construction, performance and applications. Errors caused by electrodes in measurement of body potential.

Signal conditioning and processing circuits for medical recording systems.

UNIT – III: STIMULATION – ELECTROMYOGRAPHY (EMG)

Introduction to EMG, Stimulation, Strength duration curves, Myography, Electromyography with voluntary muscular action, Electromyography during electrical stimulation.

ELECTROCARDIOGRAPHY (ECG)

Origin of ECG, Electrocardiographic plane, different types of lead systems, electrode positions, ECG Instrumentation requirements, Interpretation of Electrocardiogram.

UNIT – IV: ELECTRO ENCEPHALOGRAPHY (EEG)

Introduction to EEG, Electrode locations for normal EEG, EEG Recording methods, Clinical value of EEG, the Characteristics of abnormal EEG.

UNIT – V: THERAPEUTIC INSTRUMENTS

Pacemaker, Defibrillator, Shortwave Diathermy, Blood flow and Blood pressure monitor, Arrhythmia monitor.

APPLICATIONS:

Microprocessor applications in Diagnostics, Ultrasound in Medicine, Computerized Tomography, Biotelemetry, Patient safety.

TEXT BOOKS:

1. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
2. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 1987.
3. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
4. Biomedical Telemetry – by Mackay, Stuart R., John Wiley.

REFERENCES:

1. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.Tech (ICE) I SEMESTER

4-0-4

IC 4127

**INSTRUMENTATION AND CONTROL IN ELECTRICAL SYSTEMS
(ELECTIVE II)**

UNIT - I

Layout of a typical power system - components of a power system - nature of transmission and distribution systems - statistics of systems - line parameters (general idea) - power system representation - single line diagrams - impedance diagrams - per unit system.

UNIT - II

Control of voltage, power and frequency - the turbine governor - control loops - division of loads between generators - optimization of power system operation - Computer control of power system - Automatic generation control of a power system - control centers - Voltage control using automatic voltage regulators and tap changing transformers.

UNIT - III

Types of distribution systems - radial and loop and network systems - distribution system planning - factors affecting planning - planning techniques - planning models - computers in distribution system planning - load growth and rate structure - substation scheme and location.

UNIT - IV

Distribution system automation - role of SCADA systems in distribution system operation - Definition of SCADA - components of SCADA : field instrumentation -remote stations -

2002-2003

communication networks - central monitoring system Telemetry systems used in SCADA for distribution systems - data acquisition and data processing methods.

UNIT - V

Instrumentation in power system and distribution system protection - relay and circuit breaker mechanisms - types of relays - overcurrent, directional, overvoltage relays - distance relays and differential relays. Basic concepts involved in their usage - protection of lines and transformers.

TEXT BOOKS :

B.M.Weedy : Electric Power Systems - Third Edition - Wiley Publications.

Arillaga J and Arnold C P : Computer Modeling of Electric Power Systems - John Wiley, 1983.

Kusic George L : Computer Aided Power System Analysis - Prentice Hall, 1986.

Gonen Turan : Electric Power Distribution Engineering, McGraw Hill 1986.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV B.Tech (ICE) I Semester 4-0-4 IC 4128

HYDRAULIC & PNEUMATIC CONTROL SYSTEMS (ELECTIVE - II)

UNIT – I

Introduction to Fluid Power, merits and utility of Fluid Power in industries. Difference between Hydraulic Systems & Pneumatic Systems. Fluid Power Components: Construction and operation of – Pump, Relief valve, Non-return valve, Pilot operated relief valve, Series and Parallel compensator of flow valve, pressure regulating valve, Pressure compensated pump, motor, actuators, Seals used in the control systems. Symbolic representation of Hydraulic and pneumatic Elements. Compressor and air line installations. Various types of Pumps used in hydraulic systems. Hydraulic Fluid and Effective contamination control. Purpose of Air-filters and types in Pneumatic systems.

UNIT – II

Transmission System: Transmission of Fluid Power through various types of cylinders. Compressibility and inertia loading. Hydraulic stiffness, stiffness of pneumatic system. Component effectiveness, brakeage, constant torque load, constant power load, inertia load, viscous damping.

UNIT – III

Valve controlled Systems: Flow through a single speed control valve, Series Pressure Compensation, combined directional and flow rate control valve, Study reaction and Transient Reaction force. Hydraulic and Pneumatic circuits for different controls like – Sequencing circuit, counter balancing, indexing, linear motion, rotation & Hydro copying circuit. Electro-Pneumatics & Electro-Hydraulic controls, Hydro-Pneumatics, Cartridge valve design.

UNIT – IV

Analysis of Accumulator Systems: Accumulator system dynamics, Thermodynamics consideration. Accumulator as

2002-2003

Absorber of pressure shocks. Construction, operation and applications of Intensifier.

UNIT – V

Feed back Systems: Pressure control, Position control, Pump/motor systems. Control with variable capacity pumps. Pump stroke mechanisms. Position control using metering valve Double acting actuators. Speed control, Inertia Load position control systems. Programmable sequential control using modular elements. Servo control systems. Trouble shooting and remedial measures in Hydraulic & Pneumatic Systems.

BOOKS:

1. Fluid Power Systems, by A.B.Goodinain, McMillan Press Ltd.
2. The Control of Fluid Power, by McCloy & Martin, Longman Publications.
3. Mechatronics, by Prof. C.V. Venkataramana, SBS Publishers and Distributors.
4. Production Drawing Practice, by Dr. P. Narshimha Reddy, T.A.Janardhan Reddy & C.Srinivas Rao, The Hi-Tech Publishers

2002-2003

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.Tech (ICE) I SEMESTER 0-3-2 IC 4129

INSTRUMENTATION LAB – III

1. Gas analyzer.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass spectrometer.
8. Nuclear radiation detector.
9. Interfacing of an analog signal to microcomputer through ADC.
10. Interfacing of a Digital signal to Microcomputer through DAC.
11. Interconnection of two microcomputers through serial interface through serial ports.
12. Data Acquisition System.

CONTROL SYSTEMS LAB-III

1. Frequency domain plots for selected transfer function with MATLAB-Nyquist plot bode plot measurement of gain and phase margins.
2. Plotting root locus for selected transfer function using MATLAB.
3. Step function response of a second order system on MATLAB-Control of transient and steady state parameters.
4. Obtaining state-space model for a classical transfer function using MATLAB.
5. Pole – placement for deadbeat response of the chosen system (from the state-space model), using MATLAB and state feedback.
6. Design of phase lead compensator and phase lag compensator for the Bode plot.
7. Transfer function of a sample and Zero order Hold circuit.
8. Design a dead beat digital controller for step input for a chosen 2nd order system.
9. Model reference adaptor control system, with parameter optimization for a position control system.
10. Design of a full order digital observer for the chosen state-space model using state space approach and compute simulation for a chosen system.
11. Programming a Microprocessor (real time control for a computer controlled temperature control system for a heater bath.)
12. A PC based digital controller for a position control system for prescribed specification.

**INSTRUMENTATION AND CONTROL IN MANUFACTURING SYSTEMS
(ELECTIVE - III)**

UNIT - I MANUFACTURING SYSTEMS

Primary and Secondary manufacturing processes, heat treatment, metal forming and machining operations.

UNIT-II

Numerical control - Basic Principles, NC - Coding and programming, Positional and continuous path systems.

Adaptive control using cutting forces on fibres and acoustic emissions cutting temperatures.

Computer integrated manufacturing systems CNC, DNC and machining centres.

UNIT-III

Automation - Principles of automation, control systems for automation in machine tools and other applications.

Flexible manufacturing systems introduction to Robotics, Robot Anatomy, Geometric configuration manipulators end effectors, applications of industrial robots and flexible automation.

Direct and Inverse kinematics for process configuration.
Automated flow line.

UNIT-IV

Instrumentation and controls in press work operation. Press working operations. Mechanical and hydraulic presses.

2002-2003

Instrumentation required for management of forces and displacement. Setting of displacement and rate of displacement.

Equipment for measurement of forces, temperatures, pressures, fibres, acoustic emission, displacement and rate of displacement.

UNIT-V

Automated inspection and testing : Automated inspection methods, Sensors used, contact and non-contact methods, in-processes gauging, machine vision, optical inspection methods, automatic identification techniques.

REFERENCES:

1. Mikell P.Grover, Automation, Production Systems and Computer Prentice Hall of India Pvt. Ltd. 1995.
2. A.Troitsky Principles of Automation and Automated Production Mir Publ., 1976.
3. C.Ray Astaihe, Robots and Manufacturing automation, John Wile and Sons, New York.

2002-2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

IV B.Tech (ICE) II SEMESTER 4-0-4 IC 4222

DIGITAL IMAGE PROCESSING (ELECTIVE - III)

UNIT – I:

Digital Image fundamentals: Digital Image representation, elements of digital image processing system, elements of visual perception, image model, sampling and quantization, basic relationships between pixels, imaging geometry.

UNIT – II:

Image transforms: Fourier transform, Discrete Fourier transforms, properties of 2-D Fourier transform – Fast Fourier transform, Walsh transform, Hadamard transform, Discrete Cosine transform, Hotelling transform.

UNIT – III:

Image enhancement: Background, Enhancement by point processing, Histogram processing, Spatial filtering and enhancement in frequency domain, Image smoothing, Image sharpening, Colour Image processing.

UNIT – IV:

Image restoration: Degradation model, Algebraic approach to restoration, Inverse filtering, Least Mean Square filters, Constrained Least Squares Restoration – Interactive Restoration .

Image Segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation.

2002-2003

UNIT – V:

Image Coding - Fidelity criteria, Encoding process, Error free encoding, Image coding relative to fidelity criterion – Image compression models, the source encoder and decoder, the channel encoder and decoders, Error- free compression, Lossy compression.

TEXT BOOKS:

1. Digital Image Processing – by R.C. Gonzalez & R.E. Woods, Addison Wesley.

REFERENCES:

1. Digital Image Processing – by R.C. Gonzalez & P. Wintz , Addison Wesley.
2. Fundamentals of Digital Image Processing – by A.K. Jain, PHI.

2002-2003

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

IV B.TECH (ICE) – II SEMESTER -

4-0-4 – IC4223

**ELECTRONIC WARFARE
(ELECTIVE - IV)**

UNIT – I: INFORMATION WARFARE:

Introduction – Definition of Intelligence, Command & Control – Description of different Types of Radars – Electronic Attack - Effect on Communication and on different Radar Systems – EA Waveforms & Strategy – Electronic Protection – Its effect on Communication Systems – Introduction to Spread Spectrum techniques.

UNIT – II: ELECTRONIC ATTACK SYSTEMS:

Architecture - On board / Off board systems – Radar Range Equation – Radar Jamming – Plotting of received signal strength of targets using MATLAB.

UNIT – III : ELECTRONIC ATTACK AGAINST MODERN RADAR SYSTEM

Introduction – Techniques of pulse compression – FM Pulse compression – Phase coded Pulse Compression – Auto Correlation function – Use of MATLAB for parameter plotting – Principles of Operation of EA against Modern Radars.

2002-2003

UNIT – IV: DIGITAL RADIO FREQUENCY MEMORYX

Fundamentals of operation of DRFM – Architecture – Characteristics – Block schematic of DRFM – Usage of MATLAB for analysis and plotting.

UNIT – V: ELECTRONIC SUPPORT MEASURES

Introduction to ES Systems – Parameters influencing ES – Description of different Channelized, Compression Receivers used – Digital Receiver – Direction finding systems.

REFERENCE:

1. Curtis D.Schleher: Electronics Warfare in the information Age, Artech House Inc., 1999.

IV B.Tech (ICE) II SEMESTER 4-0-4 IC 4224

**OPTO-ELECTRONIC AND LASER INSTRUMENTATION
(ELECTIVE - IV)**

UNIT – I: OPTICAL FIBERS AND THEIR PROPERTIES

Introduction to optical fibers – Light guidance – Numerical aperture – Dispersion – Different types of fibers – Optical fibers for communication - Optical fibers for instrumentation.

UNIT – II: LASER FUNDAMENTALS

Laser configuration – Q-Switching – Mode locking – Different types of Lasers.

UNIT – III: FIBER OPTIC SENSORS

IR sources and detectors – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications.

UNIT – IV: LASER INSTRUMENTATION

Industrial applications of lasers – Bio-medical application – Laser Doppler velocity meter – Hologram and applications.

UNIT – V: OPTO-ELECTRONIC COMPONENTS

LED, LCD, PIN & APD, Electro-optic, Magneto optic and Acoustic-optic Modulators.

REFERENCES:

1. Lasers : Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press, New York.
2. Lasers and Optical Engineering – by Das P., Springer International Students Edition, 1991.
3. Optical Electronics – by Ghatak A.K. and Thyagarajan K., Foundation Books, 1991.
4. Laser and Applications – by Guimarass W.O.N. and Mooradian A., Springer Verlag, 1981.

UNIT - I: OPTICAL LASERS AND THEIR PROPERTIES

Introduction to optical lasers – basic principles – fundamental
schemas – Diode-lasers – common types of lasers – Optical properties
for communication - Optical lasers for measurement.

REFERENCE

Laser applications – Q-switching – Mode locking – Diode
laser applications – Solid-state lasers – CO₂ lasers –
Applications of lasers

UNIT - II: LASER FUNDAMENTALS

to birefringent wave – interference and diffraction – RI
surfaces and diffraction – Interference and diffraction – RI
surfaces and diffraction – Mode lasers – Mode lasers
beam – Faraday-Lorentz effect – Optical fibers –
Applications of lasers – Polarization maintaining fibers –
Applications

UNIT - III: LASER OPTIC SENSORS

Digital sensor applications to laser – Bi-directional application – Fiber
optic sensor – Hollow fiber and applications

UNIT - IV: LASER INSTRUMENTATION

Applications of lasers – Bi-directional applications – Fiber
optic sensor – Hollow fiber and applications

UNIT - V: OPTO-ELECTRONIC COMPONENTS

LED LCD & APD, Electro-optic Modulator optics using
Acousto-optic modulators