

PONDICHERRY UNIVERSITY
BACHELOR OF TECHNOLOGY PROGRAMMES
(EIGHT SEMESTERS)

REGULATIONS

Approved by 17th Board of Studies (Engineering) meeting
(Operated from the Academic Year 2003-2004)

1. Conditions for Admission :

- (A)** Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed.

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu / or any other examination equivalent there to with minimum of 40% marks (a mere pass for SC/ST candidates) in aggregate of subjects – Mathematics, Physics and Chemistry.

OR

An Examination of any University or Authority recognised by the Executive Council of the Pondicherry University as equivalent thereto.

- (B)** Lateral Entry for Diploma passed candidates for admission to third semester of the eight semester B.Tech programme should be required to have passed three year diploma or four year sandwich diploma course in engineering/technology with a minimum of 60% marks in aggregate in the subjects covered in 3rd to 6th semester (a mere pass for SC/ST candidates). A list of diploma programmes approved for admission for each of the degree programme is given in **Annexure – A**.

2. Age Limit :

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme candidates, should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. Duration of Programme :

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

4. Eligibility for the award of Degree :

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. Branches of Study :

- Branch I - Civil Engineering
- Branch II - Mechanical Engineering
- Branch III - Electronics & Communication Engineering
- Branch IV - Computer Science & Engineering
- Branch V - Electrical & Electronics Engineering
- Branch VI - Chemical Engineering
- Branch VII - Electronics & Instrumentation Engineering
- Branch VIII - Information Technology**
- Branch IX - Instrumentation & Control Engineering
- Branch X - Mechatronics

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. Subjects of Study :

The subjects of study shall include theory and practicals as given in the scheme of examination and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. Examinations :

The theory and practical examinations shall comprise continuous assessment throughout the semesters in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

- 5 marks for 95% and above
- 4 marks for 90% and above but below 95%
- 3 marks for 85% and above but below 90%
- 2 marks for 80% and above but below 85%
- 1 mark for 75% and above but below 80%

In total three tests are to be conducted and the better two are to be considered for assessment.

(b) Practicals for which there is a university practical examination of 50 marks:

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

- 10 marks for 95% and above
- 8 marks for 90% and above but below 95%
- 6 marks for 85% and above but below 90%
- 4 marks for 80% and above but below 85%
- 2 marks for 75% and above but below 80%

8. Requirement for appearing for University Examination :

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution. A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

(iv) In addition, the candidate shall satisfy the following conditions.

(a) To be permitted to register for courses in 5th semester, the candidate should have earned a minimum of 30 credits for the I & II semesters put together.

(b) To be permitted to register for the courses in 7th semester, the candidate should have completed all credit requirements for the I and II semester and 30 credits for the 3rd and 4th semesters put together.

9. Procedure for completing the course :

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters.

10. Passing Minimum and Classification of Successful Candidates :

(i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

(ii) A candidate who has been declared "Failed" in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

- (a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.
- (b) The candidate should have attended all the college examinations as well as university examination.
- (c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.
- (d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made upto the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

(iii) AWARD OF LETTER GRADES

The assessments of a course will be done on absolute marks basis, however, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

Range of Total Marks	Letter Grade	Grade Points
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	F	0
Incomplete	FA	

F Denotes failure in the course.

FA denotes absent / detained as per clause 8. After results are declared, Grade Sheets will be issued to the students. The grade sheets will contain the following details:

- (a) The college in which the candidate has studied.
- (b) The list of courses enrolled during the semester and the grades scored.
- (c) The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.
- (d) GPA is the ratio of sum of the products of the number of credits of courses registered and the corresponding grades points scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$\text{GPA} = \frac{\text{Sum of [c x GP]}}{\text{Sum of C}}$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester, 'F' FA grades are to be excluded for calculating GPA and CGPA.

- (iv) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters within a **MAXIMUM PERIOD OF 7 YEARS** reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.
- (v) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.
- (vi) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 3rd to 8th semester alone should be considered. Rank certificates would be issued to the first ten candidates in each branch of study
- (vii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of 8

semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall be declared to have passed the examination in **FIRST CLASS**.

(viii) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

11. Provision for withdrawal :

A candidate may, for valid reasons, and on the recommendations of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded. **DISTINCTION** whereas they are not eligible to be awarded a rank.

12. Discontinuation of Course :

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

13. Revision of Regulations and Curriculum :

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

ANNEXURE – A

B.Tech courses in which admission is sought	Diploma courses eligible for admission
Civil Engineering	Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Civil Engineering (Sandwich)
Mechanical Engineering	Mechanical Engineering Automobile Engineering Agricultural Engineering Mechanical and Rural Engineering Refrigeration and Air-conditioning Agricultural Engineering & Farm – Equipment – Technology Metallurgy Production Engineering Machine Design & Drafting Mechanical Engineering (Sandwich) Machine tool maintenance and Repairs (Sandwich) Printing Technology / Engineering Textile Engineering / Technology Tool Engineering
Electrical and Electronics Engineering	Electrical Engineering Electrical and Electronics Engineering Electronics and Instrumentation Instrumentation Technology
Electronics & Communication Engineering	Electronics and Communication Engg., Electronics Engineering Electrical Engineering Electrical and Electronics Engineering Medical Electronics
Computer Science & Engineering	Computer Science & Engineering Computer Technology
Electronic and Instrumentation Engineering, Instrumentation and Control Engineering	Instrumentation and Control Instrumentation Engineering Electronics and Instrumentation Electronics Engineering Applied Electronics Medical Electronics Electrical & Electronics Electronics and Communication Engineering
Chemical Engineering	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper & Pulp Technology (Sandwich) Polymer Technology (Sandwich)
Information Technology	Computer Science and Engineering Computer Technology Electrical and Electronics Engineering Electronics & Communication Engineering Electronics and Instrumentation Engineering Instrumentation Engineering

PONDICHERY UNIVERSITY
B.Tech - CURRICULUM

I B.TECH – ELECTRICAL & ELECTRONICS ENGINEERING

I Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
UCC 0231	Technical English	3	-	-	3	25	75	100
UCC 1202	Mathematics – I	3	1	-	4	25	75	100
UCC 1213	Physics	3	-	-	3	25	75	100
UCC 1224	Chemistry	3	-	-	3	25	75	100
UCC 0125	Basic Engineering.	4	-	-	4	25	75	100
UCC 0016	Engineering Mechanics	2	1	-	3	25	75	100
	Practicals							
UCC 0217	Physics Lab	0	0	3	1	50	50	100
UCC 0228	Chemistry Lab	0	0	3	1	50	50	100
UCC 0029	Work Shop Practice	0	0	3	1	50	50	100
	Total	18	2	9	23	300	600	900

II Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
UCC 0041	Computer Programming	3	-	-	3	25	75	100
UCC 2202	Mathematics – II	3	1	-	4	25	75	100
UCC 2213	Material Science	3	-	-	3	25	75	100
UCC 2224	Environmental Science	3	-	-	3	25	75	100
UCC 0135	Elements of Electrical and Electronics Engineering	3	1	-	4	25	75	100
UCC 0026	Thermodynamics	2	1	-	3	25	75	100
	Practicals							
UCC 0047	Computer Lab	0	0	3	1	50	50	100
UCC 0028	Engineering Graphics	2	0	3	2	50	50	100
UCC 0059	Basic Electrical and Electronics lab	0	0	3	1	50	50	100
	Total	19	3	9	24	300	600	900

PONDICHERRY UNIVERSITY
B. TECH (ELECTRICAL AND ELECTRONICS ENGINEERING)
CURRICULUM

III SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 3201	MATHEMATICS - III	3	1	0	4	25	75	100	3
UEE 3052	ELECTRIC CIRCUIT ANALYSIS	3	1	0	4	25	75	100	3
UEE 3053	ELECTRICAL MACHINERY – I	3	1	0	4	25	75	100	3
UEE 3054	ELECTRONIC DEVICE AND CIRCUITS	3	0	0	3	25	75	100	3
UEE 3055	ELECTROMAGNETIC THEORY	3	1	0	4	25	75	100	3
UEE 3015	FLUID MECHANICS AND HYDRAULIC MACHINERY	3	0	0	3	25	75	100	3

PRACTICALS

UEE 3056	ELECTRONICS LAB – I	0	0	3	1	50	50	100	3
UEE 3057	ELECTRICAL MACHINE LAB - I	0	0	3	2	50	50	100	3
UEE 3018	FLUID FLOW & HYDRAULIC MECHANICS LAB	0	0	3	1	50	50	100	3
UEE 3239	GENERAL PROFICIENCY -I	0	0	2	1	50	-	50	-
					27				

IV-SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 4201	MATHEMATICS -IV	3	1	0	4	25	75	100	3
UEE 4052	ELECTRICAL MACHINES – II	3	1	0	4	25	75	100	3
UEE 4053	ELECTRONIC CIRCUITS	3	0	0	3	25	75	100	3
UEE 4054	LINEAR CONTROL SYSTEM	3	1	0	4	25	75	100	3
UEE 4055	PULSE AND DIGITAL CIRCUITS	3	0	0	3	25	75	100	3
UEE 4046	OBJECT ORIENTED PROGRAMMING IN C ++	3	0	0	3	25	75	100	3

PRACTICALS

UEE 4057	ELECTRONICS LAB – II	0	0	3	2	50	50	100	3
UEE 4058	ELECTRICAL MACHINE LAB - II	0	0	3	1	50	50	100	3
UEE 4049	PROGRAMMING LAB IN C ++	0	0	3	2	50	50	100	3
UEE 4230	GENERAL PROFICIENCY - II	0	0	2	1	50	-	50	-
					27				

V-SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 5201	MATHEMATICS - V	3	1	0	4	25	75	100	3

Curriculum & Syllabi (B.Tech. EEE)

UEE 5052	ANALOG AND DIGITAL INTEGRATED CIRCUITS	3	1	0	4	25	75	100	3
UEE 5053	TRANSMISSION AND DISTRIBUTION	3	1	0	4	25	75	100	3
UEE 5054	ELECTRICAL AND ELECTRONICS MEASUREMENT	3	1	0	4	25	75	100	3
UDE 5005	I.D.E.-I	3	0	0	3	25	75	100	3

PRACTICALS

UEE 5056	DIGITAL ELECTRONICS LAB	0	0	3	1	50	50	100	3
UEE 5057	MEASUREMENT AND CONTROL LAB	0	0	3	1	50	50	100	3
UEE 5238	GENERAL PROFICIENCY -III	0	0	2	1	50	-	100	3
					22				

VI -SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 6051	POWER SYSTEM ANALYSIS	3	1	0	4	25	75	100	3
UEE 6052	POWER ELECTRONICS	3	1	0	4	25	75	100	3
UEE 6053	MICROPROCESSORS	3	1	0	4	25	75	100	3
UEE 6054	ELECTRICAL MACHINE DESIGN	3	1	0	4	25	75	100	3
UDE 6005	I.D.E. - II	3	0	0	3	25	75	100	3

PRACTICALS

UEE 6056	MICRO PROCESSORS LAB	0	0	3	1	50	50	100	3
UEE 6057	POWER SYSTEM LAB	0	0	3	1	50	50	100	3
UEE 6238	GENERAL PROFICIENCY - IV	0	0	2	1	50	-	50	3
					22				

VII -SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 7231	INDUSTRIAL MANAGEMENT	3	0	0	3	25	75	100	3
UEE 7052	SOLID STATE DRIVES	3	1	0	4	25	75	100	3
UEE 7053	ELECTRICAL SAFETY AND QUALITY	3	0	0	3	25	75	100	3

Curriculum & Syllabi (B.Tech. EEE)

	MANAGEMENT								
UEE 7054	ELECTIVE - I	3	0	0	3	25	75	100	3
UEE 7055	ELECTIVE - II	3	0	0	3	25	75	100	3

PRACTICALS

UEE 7056	POWER ELECTRONICS LAB	0	0	3	2	50	50	100	3
UEE 7057	PROJECT PHASE - I	0	0	3	2	50	-	50	-
UEE 7058	SEMINAR	0	0	2	1	50	-	50	-
UEE 7059	TRAINING /INDUSTRIAL VISIT	0	0	3	1				
					22				

VIII-SEMESTER

CODE	SUBJECTS	L	T	P	C	IA	UE	T	DE
UEE 8051	UTILIZATION OF ELECTRIC ENERGY	3	1	0	4	25	75	100	3
UEE 8052	PROTECTION AND SWITCHGEAR	3	0	0	3	25	75	100	3
UEE 8053	ENERGY ENGINEERING	3	0	0	3	25	75	100	3
UEE 8054	ELECTIVE – III	3	0	0	3	25	75	100	3
UEE 8055	ELECTIVE – IV	3	0	0	3	25	75	100	3

PRACTICALS

UEE 8056	PROJECT PHASE - II	0	0	8	6	50	100	150	-
UEE 8057	COMPREHENSIVE VIVA	0	0	2	1	50	50	100	-
					23				

LIST OF ELECTIVES

GROUP – A (Elective I and II to be chosen from this group)

1. High Voltage Engineering
2. Digital Signal Processing
3. Special Electric Machines
4. Embedded Systems
5. Power System Economics
6. Data Structure
7. Power System Operation and Control
8. Network Analysis and Synthesis
9. Bio-Medical Instrumentation
10. Advanced Instrumentation

GROUP – B (Elective III and IV to be chosen from this group)

1. Digital Control System
2. Solid State Relays
3. Digital Logic with VHDL Design
4. Micro Controllers and Applications
5. Renewable Energy Sources
6. Personnel Computer System
7. Power System Stability
8. Power System Restructuring and Deregulation
9. High Voltage Direct Current Transmission
10. Principles of Robotics

LIST OF INTERDEPARTMENTAL ELECTIVES (UID 5005 & UID 6005)

Code	Subject Title	Department offering the Subject
011	Experimental Stress Analysis	Civil Engineering
012	Computer Aided Planning and Drafting	
021	Mechatronics	Mechanical Engineering
022	Total Quality Management	
031	Communication Engineering	Electronics and Communication Engineering
032	Computer Networks	
041	Relational Database Management Systems	Computer Science and Engineering
042	Visual Programming	
051	Introduction to Soft Computing	Electrical and Electronics Engineering
052	Industrial Electronics	
061	Elements of Biotechnology	Chemical Engineering
062	Industrial Pollution Abatement	
071	Industrial Control Systems	Electronics and Instrumentation Engineering
072	Transducers and Instrumentation	
081	IT for Engineers	Information Technology
082	Bio Informatics	
201	Finite Element Methods	Mathematics
202	Computational Fluid Dynamics	
211	Introduction to Nano Technology	Physics
212	Novel and Intelligent Materials	
221	Instrumental Methods of Analysis	Chemistry
222	Ceramic Technology	

UCC 0041 COMPUTER PROGRAMMING

UNIT – I

Introduction to basic concepts of Hardware/Software – System Software – Application Software – Low level and High level Languages – CAD/CAM – Graphics – AutoCAD – LAN-MAN-WAN – Internet and Intranet.

UNIT – II

Fundamentals of C Programming:– Sample 'C' Program. Introduction to Data types: – Identifier, keyword, data type, ASCII, variables, constants. Input/output:– Printf, Scanf, format string - escape sequences. Operators and constructs: – Relational, logical, conditional operators, expression, statements, if, else if, shorthand operators.

UNIT III

Loops - Functions –Recursion – String handling – Programming examples -Type conversion.

UNIT IV

Storage class specifiers – User defined data types – Enumerated data types, typedef – Structures – Union.

UNIT V

C Preprocessor – Pointers – File handling - problems using these concepts

Text Books:

1. Subburaj. R, Programming in C, Vikas Publishing House Pvt Ltd., First Edition, 2000.
2. Balagurusamy. E, Programming in ANSI C, Tata McGraw Hill, Second Edition, 2002.

UCC 1202 MATHEMATICS - I

UNIT-I

APPLICATION OF DIFFERENTIATION: Sub tangent and subnormal – Curvature, evolutes and involutes.

INTEGRAL CALCULUS: Properties of definite integrals – Reduction formulae for $x^n e^{ax}$, $\sin^n(x)$, $\cos^n(x)$, $\tan^n(x)$, $\sin^m(x) \cos^n(x)$, $x^n \sin(ax)$, and $x^n \cos(ax)$.

UNIT –II

MULTIPLE INTEGRALS AND APPLICATIONS: Multiple integrals – change of order of integration. Applications: Areas and volumes (Cartesian and polar) – mass and center of mass (constant and variable densities).

UNIT-III

ANALYTICAL SOLID GEOMETRY: Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

UNIT-IV

DIFFERENTIAL EQUATIONS: Exact equations, First order linear equations, Bernoulli's equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-V

DIFFERENTIAL EQUATIONS(Higher order): Linear differential equations of higher order – with constant coefficients, the operator D - Euler's linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Book:

Dr.M.K.Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, July 2001.

Reference Book:

P. Kandasamy, K. Thilagavathy and K. Gunavathy, Engineering Mathematics, Volume-I, Second Edition, S. Chand and Company Ltd., New Delhi 1996.

UCC 1213 PHYSICS – I

Unit I – Optics

Interference: Newton's rings – Michelson's interferometer – wavelength determination – interference filter – antireflection coatings. *Diffraction:* diffraction grating – resolving power of grating & prism. *Polarization:* Fresnel's theory of double refraction – quarter and half wave plates – Optical Rotation.

Unit II – Acoustics

Ultrasonics: ultrasonic waves productions and detections – piezoelectric – magnetostriction – NDT applications. *Acoustics of auditoria:* – Sabine's formula – Reverberation time.

Unit III – Wave mechanics

Matter waves – de Broglie wavelength – uncertainty principle – Schroedinger wave equation – time dependent – time independent – application to particle in a box – barrier penetration – tunneling effect – tunnel diode.

Unit IV – Nuclear energy source

Binding energy – mass defect – packing fraction – mass and binding energy – disintegration in fission – fission and fusion – nuclear reactor – PHWR – FBTR – materials used in nuclear reactors.

Unit V – Lasers

Principles of Laser – Einstein's Coefficients – Threshold Conditions – Optical resonators – *Solid State laser:* NdYAG – *Gas Laser:* CO₂ laser – Dye laser, *Semiconductor Laser:* GaAs Laser – *Laser in NTD:* Holographic Interferometry, Single and Double exposure

Text Books:

1. **Engineering Physics R K Gaur and S L Gupta, Dhantath Rai and Sons (1996)**
2. Optics – 2nd Edition Ajay Ghatak TMH (1995)

Reference Books:

1. Introduction to Modern Physics – Richtwmeier, Kennard and cooper TMH (1998).
2. Laser and Application – Thiagarajan and Ghatak
3. Corept of Modern Physics Beiser – Mc graw Hill (1998).

UCC 1224 CHEMISTRY

UNIT I WATER

Hardness of water – units and calcium carbonate equivalent.
Determination of hardness of water – O – Hehner's method.
Disadvantages of hardwater – boiler scale and sludge, caustic embrittlement, priming & foaming and boiler corrosion.
Water softening method – lime-soda process, zeolite process and Ion exchange process

UNITII HIGH POLYMERS

Monomers – functionality, degree of polymerization -Tacticity -
Addition & Condensation Polymerization – Molecular weight distribution.
Polymerization techniques - Thermoplastics and Thermosets -
Preparation, properties and uses of Polyester, Teflon, nylon 6,6, PVC, Bakelite.
Polymer composites - Fibre reinforced plastics.

UNIT-III ELECTROCHEMICAL CELLS

Galvanic cells, Single electrode potential, Standard electrode potential. Elctromotive series. EMF of a cell and its measurement.
Nernst equation. Electrolyte Concentration cell. Reference electrodes - Hydrogen, Calomel & Glass electrodes.
Batteries - Primary and secondary cells, laclanche cell, lead acid storage cell & Ni-Cd battery.
10 hrs

UNIT-IV CORROSION AND ITS CONTROL

Chemical and Electrochemical corrosion. Types of corrosion-Galvanic, pitting, concentration cell corrosion. Passivity. Corrosion control
Methods - Cathodic protection and corrosion inhibitors.
Protective coatings: Types of protective coatings-Metallic coating, - cladding, electroplating and anodizing.

UNIT-V PHASE RULE

Phase rule-definition and explanation of terms in phase rule.
Water, lead -silver alloy system, copper – nickel alloy system and iron-carbon alloy system

TEXT BOOKS

1. P C Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai and Sons, New Delhi, 2000
2. S S Data, "A Textbook of Engineering Chemistry" S Chand & Co., Ltd., New Delhi.

REFERENCES :

J C Kuriacose and Raja Ram J, "Chemistry in Engineering and Technology Vol.-I & II, Tata McGraw-Hill Co-Ltd., New Delhi.

UCC 0135 – ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRICAL:

PART – A

UNIT – I

Active and passive elements - review of Kirchoff's laws – star/delta conversion – equivalent resistance – Node and mesh methods of analysis of DC circuits.

UNIT – II

Concepts of AC circuits – rms value, average value, form and peak factors – real and reactive power – power factor – Node and mesh analysis of AC circuits.

UNIT – III

Introduction to three phase balanced circuits – two watt meter method of power measurement – Principle of DC generator, DC motor, Transformer and single phase motor.

ELECTRONICS:

PART - B

UNIT – I

Solid state devices - characteristic of diode, BJT, FET,UJT and SCR – RC coupled amplifier- Principle of Hartley oscillator and RC phase – shift oscillator – Introduction to IC.

Transducers – Linear variable differential transformer (LVDT, Strain gauge, Tachogenerator, Resistance Temperature Detector (RTD), Thermocouple, Thermistor, Piezoelectric transducer.

UNIT – II

Boolean algebra – reduction of Boolean expressions – De-Morgan's theorem logic gates – Implementation of Boolean expressions – flip - flops RS, JK, T and D – combinational logic - Half adder, Full adder and subtractors – Principle of counters and registers

UNIT – III

Model of a communication system – Types of electrical communication channel- wire and wireless channel – wire, Coaxial cable and optical fiber – Microwave radio link and satellite link. Advantage of Digital Communication – Overview of ISDN.

TEXT BOOKS:

1. R. Muthusubramanian, S Salivahanan, and K A Muraleedharan, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, New Delhi, 2000.

Reference Books:

1. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering" Prentice Hall of India Ltd. New Delhi.
2. Allen Mottershead , "Electronic Devices and Circuits: An Introduction", Prentice Hall of India Ltd. New Delhi.
3. George Kennedy and Bernard Davis, "Electronic Communication Systems", Tata McGraw-Hill Ltd. New Delhi. Year 2001.

UCC 0026 THERMODYNAMICS

UNIT I : BASIC CONCEPTS AND DEFINITIONS

Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

UNIT II : FIRST LAW OF THERMODYNAMICS

The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

UNIT III : SECOND LAW OF THERMODYNAMICS

Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

UNIT IV : GAS POWER CYCLES

Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

UNIT V : REFRIGERATION CYCLES AND SYSTEMS

Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems - Gas refrigeration cycle - Absorption refrigeration system - Liquifaction and solidification of gases

Text Books :

1. **Nag,P.K., "Engineering Thermodynamics", 2nd edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi,1995**
2. Wark, K., "Thermodynamics", 4th edition ,Mc Graw Hill, N.Y.,1985

Reference Books :

1. Arora, C.P., "Thermodynamics" , Tata Mc Graw Hill Publishing Co. Ltd., New Delhi,1998.
2. Burghardt, M.D., "Engineering Thermodynamics with Applications", 4th edition, Harper & Row, N.Y., 1986.
3. Huang, F.F., "Engineering Thermodynamics" 2nd edition , Macmillan Publishing Co. Ltd., N.Y.,1989.
4. Van Wylen, G.J and R.E Sonntag., "Fundamental of Classical Thermodynamics", 4th edition, John Wiley & Sons , 1994.
5. Cengel, Y.A. and Boles, M.A., 1989, "Thermodynamics - An Engineering Approach", Mc-Graw Hill.

UCC 0047 COMPUTER PROGRAMMING LAB (0 0 3 2)

There are three cycles of experiments. Write C programs to solve the problems wherever required.

CYCLE I - BASIC CONCEPTS

1. Study of Turbo C IDE – Compilation and execution using simple C Programs
– Simple OS Interface/ commands.
2. Solve quadratic equation for various possible inputs.
3. Generation of all prime numbers in a given range. (Using iteration construct).
4. Sort given array of numbers and names.
5. Matrix operations (addition, subtraction, transpose)

CYCLE II - STRUCTURES AND FILES

6. Create an array of structures for student information with the following details:
 - Name -
 - DOB -
 - Age
 - Marks - percentage or CGPA
 - Roll No. -
 - Gender -
 - i. Compute the overall pass percentage of the class.
 - ii. List of the students roll numbers who failed in the current semester.
 - iii. Compute the average
 - 1v. Given a name, print the marks and other details.
7. Using files implement the above problem and print the mark sheet of each student after storing structure information in an input file. Also read the input file and create two output files containing male student information and female student information separately.
8. Develop the following functions to perform matrix multiplication:
 - i. Read any given general matrix
 - ii. Print a given matrix
 - iii. Identify the compatibility
 - iv. Multiplication of two matrices
9. Recursive program to
 - i. Find Factorial of a number

- ii. Generate Fibonacci Series.

CYCLE III - APPLICATIONS

10. Using AutoCAD,
a) Draw a National flag/house/car/layout of a street using basic objects.
b) Create a village layout and manipulate it with different edit commands.
11. Using MS WORD,
a) Prepare a practical experiment report for any one of Physics experiments. (report should include diagrams, tables, formulae, using mathematical symbols.)
b) Prepare a letter containing the facilities available in a department addressed to N companies (using mail merge).
12. The placement data from the year 1996 to 2001 of Pondicherry Engineering College is given in the following table.

Year	Number of Students placed
1996	168
1997	179
1998	272
1999	245
2000	292
2001	192

- Using extrapolation method, find the expected number of students to be placed in the year 2005.
13. To identify the position of a pendulum at a given time instant after formulating equation for simple pendulum.
14. Accept a chemical equation and check whether it is balanced or not.
15. To Count the number of words and sentences in a given paragraph.

UCC 0231 – TECHNICAL ENGLISH

UNIT – I - BASIC COMMUNICATION THEORY

Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.

UNIT – II READING

Comprehension of technical and non-technical material, skimming, scanning, Inferring, Guessing, the meaning of words from contexts, Note making and extension of vocabulary, predicting and responding to context.

Include Intensive Reading.

UNIT – III WRITING

Effective sentences, Cohesive writing, Clarity and Conciseness in writing, Introduction to technical writing, Better paragraphs, Definition, Description, Practice in summary writing.

Include I. Four modes of writing – Description, Narration, Exposition and Argument.

II. Use of dictionaries, Library references, Use of indices. Making bibliographical entries with regard to sources from books, journals, internet, etc. Developing reference skills relating to note taking, collating information and organizing it.

UNIT IV WRITTEN COMMUNICATION

Report writing – informal and formal reports, Memoranda, Notice, Instruction.

Include: Business Letters, Resumes, Job Applications.

UNIT V - SPEAKING

Features of effective speech, practice in speaking fluently, Dialogue practice, Simple social exchanges, short extempore.

Include : Basics in Phonetics, Group Discussions and Presentations.

Importance of Listening Skills.

Text Books :

1. Boove, Courtland R, et al. Business Communication Today. Delhi: Pearson Education, 2002.
2. Lakshminarayanan, K.R. English for Technical Communication, Chennai: Scitech Publication, 2001.

Reference Books:

1. Davis, Llyod and Susan McKay, Structures and Strategies. Hyderabad; Universities

Press, 1999.

2. Jones, Daniel, Everyman's English Pronunciation Dictionary, New Delhi; Universal Book Stall, 2001.

UCC 0028 ENGINEERING GRAPHICS

Unit 0

Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit I

Conic sections, Involutives, Spirals, Helix. Projection of Points, Lines and Planes

Unit II

Projection of Solids and Sections of Solids.

Unit III

Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit IV

Isometric projections and Orthographic projections

Unit V

Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

TEXT BOOKS:

1. K.R. Gopalakrishna, A Text Book of Engineering Drawing, Vol. I & II
2. K.V. Natarajan, A Text Book of Engineering Drawing.
3. BIS, Engineering Drawing practice for Schools & College.

REFERENCES:

1. N.D. Bhatt, Engineering Drawing.
2. K. Venugopal, Engineering Drawing.
3. Warren. T. Luzadder, Fundamentals of Engineering Drawing.
4. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with

5. computer applications, Holt – Sounders Int. Edn. 1985.
James D Bethune and et al., Modern Drafting, Prentice Hall Int., 1989.

UCC 0059 - BASIC ELECTRICAL AND ELECTRONICS LAB

List of Experiments

Electrical:

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor's room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places-wiring

Electronics:

1. Study of Analog and digital instruments
2. Study of CRO
3. Calibration of Voltmeter and Ammeter
4. Calibration of Energy meter and Wattmeter
5. Verification of Kirchoff's laws
6. Characteristics study of transducers (LVDT, Straingauge, thermocouple)
7. Digital Logic Gates

UCC 2202 MATHEMATICS - II

Unit I

ALGEBRA: Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

Unit II

MATRICES: Inverse of matrix by row transformation – Eigen values and Eigen vectors - Cayley-Hamilton theorem (without proof) – Diagonalisation – rank of matrix – solution of a general system of m linear algebraic equations in n unknown ($m \leq n$).

Unit III

TRIGONOMETRY: Expansions for $\sin(n\theta)$, $\cos(n\theta)$, $\tan(n\theta)$, $\sin^n(\theta)$, $\cos^n(\theta)$. Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts. (Sec.6.1 to 6.3, 6.5 in Chapter 6 and Chapter 7 in the Text Book given below)

Unit IV

VECTOR ANALYSIS: Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

Unit V

STATISTICS: Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Book:

Dr.M.K.Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, July 2001.

Reference Book:

P. Kandasamy, K. Thilagavathy and K. Gunavathy, Engineering Mathematics, Volume-I, Second Edition, S. Chand and Company Ltd., New Delhi, 1996.

UCC 2213 Material Science

Unit I - Crystal structure and x – ray diffraction

Miller indices – Bravais lattices – unit cell – reciprocal lattice vector – Atomic packing fraction – Debye–Scherrer X– ray Diffraction method – co-ordination number – radius of atom and size of cell.

Unit II – Defects

Point defects – Qualitative ideas of point, line and volume defects - Lattice vibration – Specific heat of solids – Einstein’s-Debye’s Theory – Thermal conductivity in metals

Unit III – Dielectric properties

Dielectric Polarization and Mechanism – Clausius-Mossotti relation – Dielectric constant measurements – Temperature and frequency dependence of dielectric constant – Dielectric loss – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, ferroelectrics and pyroelectric materials and its applications

Unit IV – Magnetic Properties

Classification of Magnetic Materials – Quantum Theory of Ferro and Anti-ferromagnetism – hysteresis curves and parameters – Curie temperature – domain theory – magnetic anisotropy – soft and hard magnetic materials – magnetic bubble – memory devices - Magnetic circuits

Unit V – Semiconductors and superconductors

Compound semiconductors – Hall effect – origin of energy band and energy gap – Kronig penny model – Basic concepts superconductivity – transition temperature – Meissener effect – Type I and II superconductors – high temperature superconducting materials – 123 superconductor.

Text books

1. Materials Science – M Arumugam, Anuratha Printers, 1994.
2. Solid State Physics – S.O Pillai – Wiley Easton, 1994.

Reference

- 1 Solid State Physics – C Kittel 7th Edition – Wiley Eastern Ltd., 1987
- 2 Science of Engg. Materials – C M Srivastava – Wiley Eastern Ltd., 1987
- 3 Elementary Physics – M Ali Omar – Addison Sesley Publishing Co.India,1990.

UCC 2224 ENVIRONMENTAL SCIENCE

Unit I

Environmental segments – brief outline. Pollution – Definition – classification. Pollutants – classification of pollutants.

Air pollution-I - Reactions in atmosphere – Sources of air pollution – Gaseous pollutants – oxides of nitrogen, oxides of sulfur, oxides of carbon, hydrocarbons and particulates.

Unit II

Air pollution II – Greenhouse effect – Sources - Effect on Global climate-consequences. Chlorofluoro carbons- (CFC). Ozone depletion – Cause -Mechanism-Effects on environment. Smog-Sulfurous or London Smog – Photochemical Smog or Los Angeles Smog –Effects on environment.

Acid rain – Theory of acid rain – Effects.

Unit III

Water pollution – Types of water pollution–Sources-Classification of water pollutants cause and effect of :- (i) Inorganic pollutants and toxic metals, (ii) Organic pollutants, (iii) Radioactive pollutants and (iv) Pesticides.

Unit IV

Pollution monitoring and control methods - Air pollution - Analysis of CO_x, NO_x, SO_x, H₂S, Hydrocarbons, particulate matter.

Water pollution. Monitoring pH, Dissolved oxygen –Winkler's method - BOD, COD, TOC.

Unit V

Noise pollution – Sound levels – Sources of Noise – Effects of Noise – Noise Limits – Some control measures

Basic concept of Environmental impact assessment – Types of impact – Quantifying specific impact – Elementary aspects of impact identification and evaluation.

TEXT BOOKS:

1. Anil Kumar De, "Environmental Chemistry", 3rd Edition, New Age International (P) Ltd., Publishers, New Delhi (1996)
2. B K Sharma, "Environmental Chemistry" GOEL Publishing House, Meerut, (2000).

REFERENCE BOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd., New Delhi, (1994).
2. S A Abbasi, "Environmental Pollution and its control", Cogent International, Pondicherry, (1998). (For Unit V)..
3. A textbook in Environmental Science, V Subramanian, Narosa Publishing House, New Delhi.

UCC0125 Basic Engineering

Part-A CIVIL ENGINEERING.

Unit I

Buildings, Building Materials

Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

UNIT II

Buildings and their components:

Buildings-Variou Components and their functions.

Soils- classification and methods of improving bearing capacity of soils.

Foundations-Functions and classification.

Masonry-Types of stone and brick masonry.

Flooring-functions and types-cement, concrete, mosaic, granolithic-marble, timber and granite flooring.

Roofs-Flat roofs - steel trusses - roof covering.

Unit III

Utilities and Services:

Surveying-classification, general principles of surveying – Basic terms and definitions in chain, compass, leveling surveying and uses of surveying – definition, characteristics and uses of contours.

Roads-types, Water bound macadam road, cement concrete road, bituminous road.

Bridges-types, T-beam, steel, arch, culvert and causeway.

Dams-Purpose, selection of site, types of dams - gravity and earthen dams..

Water supply-sources-surface and ground water quality and quantity requirements.

Rainwater harvesting.

Text Book:

- 1.Purushothama Raj.P., Basic civil engineering,3rd Edn., Dhanam Publications, Chennai, 2001.
2. Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications, Chennai, 2001.

Reference Books:

1. Rajpat, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2002
2. Punmia, B.C. etal, Surveying , Vol-I, Laxmi Publishers, New Delhi, 2002
3. Arora, S P and Bevidra, S P., Building Construction, Dhanpat rai & Sons, New Delhi, 2002.

UCC 0125 BASIC ENGINEERING

**PART-B
MECHANICAL ENGINEERING**

Unit IV

INTERNAL AND EXTERNAL COMBUSTION SYSTEMS:

Working principles of IC engines – Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.

CONVENTIONAL POWER GENERATION SYSTEMS:

Hydraulic, steam and gas turbines power plants – Schemes and layouts – Selection criteria of above power plants.

Unit -V

NON-CONVENTIONAL ENERGY SYSTEMS (Description only)

Solar thermal systems – Solar photovoltaic – Solar pond – wind, wave, tidal, geothermal and ocean thermal energy conversion systems.

CASTING:

Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

Unit – VI.

METAL JOINING:

Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications.

SHEET METAL PROCESSING:

Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications

TEXT BOOKS:

1. Lindberg, R.A.Process and Materials of Manufacture, PHI.
2. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi.

REFERENCES:

1. E1.Wakil, M.M.Power Plant Technology, Mc Graw Hill Book Co.
2. Campbell, J.S.Principles of Manufacturing Materials and processes, TMH.
3. Hajra Choudhry, et. A1, Workshop Technology, Media Promoters Publishers Pvt. Ltd., Bombay.
4. Chapman, A.J.Production Technolgoy.

UCC 0016 ENGINEERING MECHANICS

Unit – I

Fundamental of Mechanics – Basic Concepts Force System and Equilibrium

Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, definition of rigid body and degrees of freedom, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

Unit – II

Plane Trusses

Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses-method of joints, method of sections

Friction

Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction, introduction to virtual work principle

Unit – III

Properties of Surfaces

Properties of sections – area, centroids of lines, areas and volumes, moment of inertia-first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

Unit – IV

Kinematics and Kinetics of Particles

Rectilinear motion, curvilinear motion, Relative motion, equations of motion, D'Alembert's principle, work, power, energy and efficiency – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.

Unit - V

Kinematics and Kinetics of Rigid bodies

Plane motion, Absolute motion, Relative motion, Translating axes and rotating axes, work and energy, impulse and momentum

Text Books

1. Rajesekaran.,S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2002
2. Natesan, S C., Engineering Mechanics, Umesh Publications, New Delhi, 2002

Reference Books

1. Meriam, J.L., "Statics", John Wiley, 2002
2. Meriam, J.L., "Dynamics", John Wiley, 2002
3. Natarajan, K V., Engineering Mechanics, Dhanalakshmi Publishers, Chennai, 2003.

PHYSICS LABORATORY: UCC 0217

(ANY 10 EXPERIMENTS)

- 1 THERMAL CONDUCTIVITY – LEE'S DISC
- 2 THERMAL CONDUCTIVITY RADIAL FLOW
- 3 SPECTROMETER – PRISM AND HOLLOW PRISM
- 4 SPECTROMETER – GRATING
- 5 SPECTROMETER - ORDINARY & EXTRAORDINARY RAYS
- 6 NEWTON'S RINGS
- 7 AIR – WEDGE
- 8 POLARIMETER
- 9 I – H CURVE
- 10 FIELD ALONG THE AXIS OF COIL CARRYING CURRENT
- 11 MELDE'S STRING
- 12 KUNDT'S TUBE
- 13 LASER EXPERIMENT: Wavelength Determination Using Grating and Vernier Calipers.
- 14 JOLLY'S EXPERIMENT FOR α
- 15 VIBRATION MAGNETOMETER – CALCULATION OF MAGNETIC MOMENT AND POLE STRENGTH

UCC 0029 WORKSHOP PRACTICE

Sl.No.	Trade	List of Exercises
1.	Fitting	Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.
2.	Welding	Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding
3	Sheet metal work	Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.
4.	Carpentry	Study of tools and Machineries – Exercises on Lap joints and Mortise joints

LIST OF EXERCISES

I.Fitting

- 1.Study of tools and Machineries
- 2.Symmetric fitting
- 3.Acute angle fitting

II.Welding

- 1.Study of arc and gas welding equipment and tools
- 2.Simple lap welding (Arc)
- 3.Single V butt welding (Arc)

III.Sheet metal work

- 1.Study of tools and machineries
- 2.Funnel
- 3.Waste collection tray

IV.Carpentry

- 1.Study of tools and machineries
- 2.Half lap joint
- 3.Corner mortise joint.

UCC 0228 CHEMISTRY PRACTICALS

(Any 10 Experiments)

1. Determination of total hardness of water by EDTA method.
2. Determination of alkali by Flame photometer.
3. Estimation of iron by colorimetry.
4. Molecular weight determination of a polymer by viscometry.
5. Percentage composition of sugar solution by viscometry.
6. Determination of dissolved oxygen content in water.
7. Estimation of mixture of alkali ($\text{HCO}_3 + \text{CO}_3$)
8. Determination of Pb in polluted water by conductometry.
9. Estimation of Fe^{2+} by Potentiometry.
10. Determination of COD of a waste water sample.
11. Determination of chloride content in water.
12. Determination of copper in brass.
13. Determination of available chlorine in bleaching powder.

UEE 3201 MATHEMATICS - III

UNIT I: LAPLACE TRANSFORM

Definitions - Laplace transform of unit impulse and step functions - Laplace transform of periodic functions - Exponential shift formula - Initial and final value theorems - Laplace transform of derivatives and integrals - Convolutions theorems - Inverse Laplace transform - methods of determining inverse Laplace transform - Solutions of linear differential equations using Laplace transforms.

UNIT II: FUNCTION OF A COMPLEX VARIABLE

Functions of a complex variable - continuity, derivatives and analytic function - Cauchy - Riemann equations – Necessary and sufficient conditions for analyticity - Harmonic and orthogonal properties of the real and imaginary parts - Conformal mapping - Bilinear transformations.

UNIT III: COMPLEX INTEGRATION

Cauchy's theorem - Cauchy's integral formula - Taylor's and Laurent series - Residue theorem – Contour integration round the unit circle and semi-circular Contour.

UNIT IV: FOURIER SERIES

Dirichlet's conditions - Expansion of periodic functions into Fourier series - Change of interval - Half-range Fourier series. Complex form of Fourier series - Root mean square value - Parseval's theorem on Fourier coefficients - Harmonic analysis.

UNIT V: FOURIER TRANSFORM

Definition and properties - Fourier Integral theorem - statement - Fourier sine transform and cosine transforms - Inverse Fourier transforms.

TEXT BOOKS:

1. M.K. Venkataraman, Engineering Mathematics, Third Year Part A & B, The National Publishing Company, Madras (1995).
2. S.Narayanan, T.K. Manicavachagam Pillai, and C. Ramanaiyah, Advanced Mathematics for Engineering students, C.Viswanathan & CoPvt.,Ltd., Madras (1985)

REFERENCES:

- 1 Erwin Kreyszig, Advance Engineering Mathematics, Wiley Eastern Ltd., 1985.
- 2 B.S.Grewal Higher Engineering Mathematics", Khanna Publishing, Delhi, 2000.

UEE 3052 ELECTRIC CIRCUIT ANALYSIS

UNIT I: NETWORK THEOREMS

Review-Loop and Nodal method for DC circuits. Theorems-Thevenin's, Norton's, superposition, compensation, Tellegan's, Reciprocity, maximum power transfer theorems, Millman theorem – Applications to DC circuits.

UNIT II: AC CIRCUITS

Steady state analysis of a.c circuits using loop and nodal methods. Network theorems-Thevenin's, Norton's, superposition, maximum power transfer theorems, Millman theorem- Application to AC circuits.

UNIT III: TRANSIENTS

Transient response of RL and RC and RLC circuits to DC excitation-Natural and forced oscillations. Application of Laplace transform for transient solution.

UNIT IV: RESONANCE AND APPLICATIONS

Resonant circuits-series, parallel, series-parallel circuits-effect of variation of Q on resonance. Relations between circuit parameters, Q, resonant frequency and bandwidth. Inductively coupled circuits-single tuned and double tuned circuits - bandwidth and frequency response.

UNIT V: ANALYSIS OF 3 PHASE CIRCUITS AND NETWORK TOPOLOGY

Solution of 3 phase balanced circuits by node and mesh method and by using single-phase equivalents; power measurement by two-wattmeter method; solution of 3 phase unbalance circuits by node and mesh methods.

Basic concepts of graph theory-tree, branch, chord, incidence and reduced incidence matrices-application to network solutions. Link current and tie set, tree branch voltage and cut set, duality and dual networks.

TEXT BOOKS:

1. Hayt and Kemmerly, "Engineering circuit analysis", McGraw Hill, 1986.
2. A. Sudhakar and S.P.Shyammohan "Circuits and Networks Analysis and Synthesis", TMH, 1997.

REFERENCES:

1. M.Arumugam and Premkumar, "Circuit theory", Khanna publishers, 1987.
2. Schaum series, "Circuit theory", McGraw Hill, New Delhi, 1989.

3. F.F.Kuo, "Network analysis and synthesis", 1966.
4. K.V.V.Moorthy and N.S.Mamath, "Basic circuit analysis", McGraw publishing co., Delhi, 1989.
5. S.N.Sivanantham, "Electric Circuit Analysis", Vikas Publishing House Pvt. Ltd., New Delhi, 2002.

UEE 3053 ELECTRICAL MACHINERY – I

UNIT I

Simple magnetic circuit calculations – Fringing – B-H Loop – Induced emf and force – Hysteresis and eddy current losses – Single phase transformers – Principle Construction – No load operation – Ideal transformer – Equivalent circuit – Losses – Testing – Efficiency and voltage regulation.

UNIT II

Auto transformer - Three phase transformers – Principle - Construction - Poly phase connections – Testing – Parallel operation – Three winding transformers – Phase conversion – On load tap changing – Excitation phenomena – Variable frequency transformer.

UNIT III

Principles of electro mechanical energy conversion – Energy, Co-energy – Forces of electromagnetic origin – Single and multiply excited magnetic field system – Elementary concepts of rotating machines – mmf of distributed winding - Rotating magnetic field – Torque – Magnetic Leakage.

UNIT IV

DC Machines - Construction – DC Machine Windings – Lap and wave winding – emf and torque equation – Armature reaction – Compensating winding – Commutation - Methods of excitation - Characteristics of DC motor and generator.

UNIT V

Starting methods and speed control and Breaking – Introduction to solid state power control of DC machines – Efficiency and Testing – Applications.

TEXT BOOK:

1. I.J. Nagrath and D.P. Kothari, "Electric machines" T.M.H. publishing Co.Ltd., New Delhi, 2nd Edition, 1990.
2. A.E. Fitzgerald, Charles Kingsley, Jr. and Stephen D.Umans, "Electric Machinery" 5th Edition, McGraw Hill Book Co., New Delhi, 1992.

REFERENCES:

1. B.L. Theraja, "Electrical Technology Vol.II AC/DC Machines", Niraja Constructions and development Co.Ltd., New Delhi, 2002.
2. Stephen J. Chairman, "Electric Machinery Fundamentals", McGraw Hill Book Co., New Delhi, 1985.
3. M.G. Say "Alterating current Machines" ELBS 5th Edition, 1986, Singapore.

UEE 3054 ELECTRONIC DEVICES AND CIRCUITS

UNIT I: PN JUNCTION

Energy bands in solids - charge carriers in semiconductors – carrier concentration – carrier lifetime – drift and diffusion currents – continuity equation – forward and reverse biased PN junction Avalanche and zener breakdown of PN junctions

DIODES

Theory of operation, characteristics and applications of diodes, zener diodes –light emitting diodes and photo diodes introduction to tunnel diodes, varactors schottky barrier diodes

UNIT II: TRANSISTORS

PNP and NPN transistors-current flow-characteristics-transistor parameters-ebbers moll equations

BIASING AND STABILIZATION OF TRANSISTOR

Operating point – bias stability- different types of bias, fixed bias, collector to base bias and self-bias – stabilization against variation in V_{BB} and I_{CO} – bias compensation. Thermistor and sensistor compensation – thermal runaway and thermal stability

UNIT III: FIELD EFFECT TRANSISTORS

Theory of JFET, characteristics, small signal characteristics and parameters – small signal equivalent circuit – pinch off voltage – MOSFET structure – depletion and enhancement modes of operation – characteristics – biasing of FET

UNIT IV: SPECIAL DEVICES

Theory of operation and characteristics of UJT, SCR, TRIAC, DIAC, Power diodes, SCS, GTO, PUJT and IGBT with simple applications

UNIT V: RECTIFIERS AND POWER SUPPLIES

Half wave and full wave rectifiers – bridge rectifiers – filter using Inductors and capacitors – multiple LC filters-regulation- regulated power supplies – shunt and series voltage regulators – SMPS

TEXT BOOKS:

1. Millman & Halkias, “Electronic devices and circuits”, McGraw Hill Electrical and electronic series, 1985
2. Ben G Streetman, “Solid-state electronic devices”, Prentice Hall of India, 2001

REFERENCE BOOKS:

1. David A Bell, “Electronic devices and circuits”, Prentice Hall of India, 2000

UEE 3055 ELECTROMAGNETIC THEORY

UNIT I

Introduction - Coulomb’s law – Electric field intensity – electric fields due to point, line, surface and volume charge distributions – Electric flux density – Gauss law – Electric potential – potential gradient – Divergence and divergence theorem – Poisson’s and Laplace equations.

UNIT II

Field due to dipoles – dipole moment – Current and current density – Conductors and Dielectrics - Boundary conditions – capacitance – Dielectric interface – Capacitance of system of conductors – Dielectric constant and Dielectric strength - Energy stored in capacitor – Energy density.

UNIT III

Introduction – Biot - Savart Law – Ampere’s Circuital Law – Applications – Curl – Stoke’s theorem – Magnetic flux – Magnetic flux density – The Scalar and Vector magnetic potentials – Force on a moving charge and current elements – Force and Torque on closed circuit.

UNIT IV

Introduction to magnetic materials – Magnetization and Permeability – Magnetic boundary conditions – Magnetic circuit – Potential energy and forces on Magnetic materials – Faraday’s Law – Inductance and mutual inductance – Inductance of solenoids, toroids, and transmission lines.

UNIT V

Conduction current and Displacement current – Maxwell’s equation in point and integral forms – Wave propagation in free space – Wave propagation in Dielectrics – Power and the Poynting Vector – Propagation in good conductors – Wave polarization.

TEXT BOOKS:

1. William Hayt, "Engineering Electromagnetics", McGraw Hill, New York, 1989.

REFERENCES:

1. John D. Kraus, "Electromagnetics" McGraw Hill, 4th Edition
2. N. Narayana Rao, "Elements of Engg. Electro Magnetics", Prentice Hall of India, 3rd Edition.
3. K.A.Gangadhar, "Field theory", Khanna publishers, New Delhi, 1980.
4. S.Seely, "Introduction to Electromagnetic Fields", Mc Graw Hill, 1958.
5. Simon Ramo, "Fields and waves in communication Electronics", Willey & Sons, 1990.

UEE 3015 FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT -I

Physical properties of fluids, mass density, specific weight, specific volume, specific gravity viscosity - Newton's law of viscosity, compressibility, surface tension and capillarity Pressure and its measurement: absolute and gauge, atmospheric pressures, simple manometers.

UNIT -II

Dynamics of fluid flow -equation of motion, Bernoulli's equation- practical application - venturi meter, orifice meter and pitot tube-Flow through pipes - loss of energy due to friction - minor energy losses - hydraulic gradient and total energy line - flow through pipes-pipes in series pipes in parallel -power transmission through pipes

UNIT -III

Turbines: General layout of a hydro-electric power plant - definitions of heads and efficiencies of a turbine - classification of turbines - pelton wheel - velocity triangles - work done efficiency -radial flow -reaction turbines- Francis turbine-velocity triangles - work done efficiency -draft tube theory-governing of turbines: Specific speed and its significance - unit quantities.

UNIT -IV

Centrifugal pumps - main parts, work done, definitions of heads and efficiencies-nummum starting speed - multistage pumps specific speed - priming - cavitation.-

Reciprocating pumps main parts -working principle - slip indicator diagrams - effects of acceleration and friction on indicator diagram - maximum speed of a reciprocating pump - Air vessels.

UNIT -V

Hydraulic devices - hydraulic press, hydraulic accumulator and hydraulic intensifier - Hydro power development - Types, layout and components of typical plant - Load factor, utilization factor and capacity factor- small, mini and micro power plants.

TEXT BOOKS:

1. Modi & Seth, "Fluid Mechanics, Hydraulic and hydraulic Machines", Standard Publishing House, New Delhi, 2002.
2. Rajput, RK. "Fluid Mechanics and Hydraulic Machines", S. Chand & Company, New Delhi, 2002.

UEE 3056 ELECTRONICS LAB - I

1. Characteristics of a PN Junction diode and a Zener diode.
2. Characteristics of a BJT in common base configuration.
3. Characteristics of a BJT in common Emitter configuration.
4. Characteristics of a Junction Field Effect Transistor.
5. Characteristics of a Uni Junction Transistor and IGBT.
6. Characteristics of an SCR and a Triac.
7. Rectifiers and Filters.
8. Biasing Techniques for transistors-Fixed biasing, collector to base biasing and voltage divider biasing
9. Diode clippers and clamping circuits.
10. Biasing of FET circuits.

UEE 3057 ELECTRICAL MACHINES LAB-I

AC MACHINES

1. Load test on single-phase transformer
2. O.C and S.C test on single-phase transformer
3. Parallel operation of single-phase transformer
4. Sumpner's test.
5. Scott connection.

6. Load test on 3 phase transformer
7. O.C and S.C test on 3 phase transformer
8. Parallel operation of 3 phase transformer
9. Study of 3 phase transformer connection

DC MACHINES

10. Load test on D.C shunt, series and Compound Motors
11. Load test on D.C shunt, series and Compound Generators
12. O.C.C of D.C shunt Generator
13. Swimburne's test
14. Hopkinsen's test on DC Motor
15. Retardation test
16. Field test of DC series Motor.

- - - - -

UEE 3018 FLUID FLOW & HYDRAULIC MECHANICS LAB

FLUID FLOW LAB

- 1) Determination of co-efficient of discharge of orifices and mouth pieces
- 2) Determination of coefficient of discharge of the venturimeter and orifice, meter
- 3) Determination of friction factor for a pipe
- 4) Determination of minor losses due to pipe implements
- 5) Determination of Metacentric heights for ship models
- 6) Determination of force due to Impact of jet on vanes.

HYDRAULIC MACHINERY LAB

- 1) Performance characteristics of Centrifugal Pump
- 2) Performance characteristics of Reciprocating Pump
- 3) Performance characteristics of Submersible Pump
- 4) Performance characteristics of Gear Pump
- 5) Performance characteristics of Pelton Wheel
- 6) Performance characteristics of Francis Turbine

UEE 3239 GENERAL PROFICIENCY I

UNIT I: BASICS OF COMMUNICATION

Essential Communication Skills; Elements of Communication; Basic Models of communication; Frames of Reference; Purposeful Communication; Channels of Communication; Developing Good Communication Style

UNIT II: LANGUAGE DEVELOPMENT THROUGH READING

TOEFL based Reading Comprehension; Current Affairs; Vocabulary Building; Idioms and Phrases; Basic Phonetics.

UNIT III: SPEAKING PRACTICE

Dialogue/Conversation; Types of Conversations; Listening Skills; Telephone Etiquette; Public Speaking; Debate.

UNIT IV: QUANTITATIVE ANALYSIS

Aptitude Tests.

REFERENCES:

1. Bovee, Courtland L and John V Thill. Business Communication Today. Pearson Education, 2003.
2. Rymniak, Marilyn J and Janet A Shanks. TOEFL CBT Exam. Simon and Schuster, 2002.
3. Lewis, Norman. Word Power Made Easy. Bloomsbury, 2003.
4. Nicholls, Anne. Mastering Public Speaking. Jaico Publishing House, 2003.
5. Jones, Daniel. Cambridge English Pronouncing Dictionary. CUP, 2003.
6. Aggarwal, R.S. Quantitative Aptitude. S. Chand & Co., 2004.

UEE 4201 MATHEMATICS - IV

UNIT I: PARTIAL DIFFERENTIAL EQUATIONS

Formation by elimination of arbitrary constants and arbitrary functions - General, singular, particular and complete integrals - Lagrange's linear first order equation - Higher order differential equations with constant coefficients.

UNIT II

Solution of partial differential equation by the method of separation of variables - Boundary value problems - Fourier series solutions - Transverse vibration of an elastic string.

UNIT III

Fourier series solution for one dimensional heat flow equation - Fourier series solutions for two-dimensional heat flow equations under steady state conditions (Cartesian and polar forms)

UNIT IV: APPLIED STATISTICS

Curve fitting method of least squares - fitting of straight lines, second-degree parabolas and more general curves. Test of significance; Large samples test for single proportions, differences of proportions, single mean, difference of means, difference of standard deviations.

UNIT V

Small samples: Test for single mean, difference of means and correlations coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. M.K. Venkataraman, Engineering Mathematics, Third Year Part A & B, The National Publishing Company, Madras (1995). (For Units I, II, III)
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematics for Engineering students, Sultan Chand and Sons (1975). (For Units IV and V).

REFERENCES:

- 1 Erwin Kreyszig, Advance Engineering Mathematics, Wiley Eastern Ltd., 1985.
- 2 B.S. Grewal Higher Engineering Mathematics", Khanna Publishing, Delhi, 2000.

UEE 4052 ELECTRICAL MACHINERY - II

UNIT I

AC windings – Three phase induction machines – Construction and operation – Flux and mmf waves – Equivalent circuit – Torque-Power relationships – Performance characteristics – Tests - Circle diagram.

UNIT II

Starting methods– Cogging and crawling – Speed control – Slip energy recovery scheme - Double cage rotor – Induction generator – Induction machine dynamics – Synchronous induction Motor.

UNIT III

Three phase Synchronous machines – Construction and operation – Cylindrical and Salient pole rotor – Modeling – Flux and mmf waves – Synchronous reactance – Armature reaction – Voltage regulation – EMF, MMF and Potier methods– Synchronization – Operating characteristics – Power flow equations.

UNIT IV

Capability curves – Two reaction model of salient pole machines – Slip test – Parallel operation – Hunting and suppression methods – Starting – Transient analysis of three phase synchronous machines – Single phase synchronous generators.

UNIT V

Single phase induction motors – Double revolving field theory – Torque-speed characteristics - Equivalent circuit – Performance analysis – Starting - Comparison of single phase and three phase induction motors – Single phase synchronous motor – reluctance motor – Hysteresis motor – Two phase Servo motor – AC tachometer – Stepper motors – Universal motor.

TEXT BOOK:

1. I.J. Nagrath and D.P. Kothari, “Electric machines” T.M.H. publishing Co.Ltd., New Delhi, 2nd Edition, 1990.
2. A.E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, “Electric Machinery” 5th Edition, McGraw Hill Book Co., New Delhi, 1992.

REFERENCES:

1. B.L. Theraja, “Electrical Technology Vol.II AC/DC Machines”, Niraja Constructions and development Co.Ltd., New Delhi.
2. Stephen J. Chairman, “Electric Machinery Fundamentals”, McGraw Hill Book Co., New Delhi, 1985.
3. M.G. Say “Alternating current Machines” ELBS 5th Edition, 1986, Singapore.

UEE 4053 ELECTRONIC CIRCUITS

UNIT I: SMALL SIGNAL AMPLIFIERS

Two port device and the hybrid model – Determination of h- parameter from the characteristic – Analysis of a transistor amplifier using h-parameter. General amplifier characteristics – Gain, input and output impedances – Small signal analysis of transistor amplifiers – Frequency response.

LARGE SIGNAL AMPLIFIERS

Class-A amplifier – Harmonic distortion – Transformer coupled Audio power amplifier – Efficiency – Push-pull amplifier – Class B amplifier – Class AB operation.

UNIT II: FET AMPLIFIER

Equivalent circuit – Common source and common drain amplifiers – FET as voltage variable resistor.

MULTISTAGE AMPLIFIER

R.C. coupled amplifiers – Transformer coupled and direct coupled amplifier – Frequency response – Effect of cascading on gain and bandwidth – Darlington pair and cascade connection.

UNIT III: DIFFERENTIAL AMPLIFIERS

Gain calculation – Frequency response and impedance levels – CMRR and its significance in design.

OPERATIONAL AMPLIFIERS

Basic operational amplifier – Characteristics of OP Amp – Comparator – Inverting and Non-inverting amplifier – Differentiator – Integrator – Phase shifter – Frequency response of operational amplifiers.

UNIT IV: FEED BACK AMPLIFIERS

Feedback concept – Barkhausen criterion – Gain with feedback – General characteristics of negative feedback amplifiers – Four basic types of feedback and effect on gain – Input and output resistances – Multistage feedback amplifiers – Frequency response and stability.

UNIT V: OSCILLATORS

Conditions for oscillations – LC oscillators – Analysis of Hartley, colpitt and tuned oscillators – R.C. oscillators – Phase shift and wein bridge types and analysis of these circuits – Crystal oscillators and frequency stability – UJT relaxation oscillators

TEXT BOOK:

1. Millman and Halkias, “Integrated Electronics”, McGraw Hill, 1985.

REFERENCES:

1. Mathur et.al., “Electronics Devices Applications and Integrated Circuits”, Umesh Publications, New Delhi.
2. A.P. Malvino, “Electronic Circuits”, Tata McGraw Hill, 1987.
3. David Bell, “Electronic Devices and Circuits”, PHI, 1986.

UEE 4054 LINEAR CONTROL SYSTEM

UNIT I: INTRODUCTION

Introduction to control systems – Control theory concepts - Open loop and feedback control systems – Mathematics modeling of control systems – Analysis of control systems using Laplace transforms – Block diagram reduction techniques – Signal flow graphs.

UNIT II: CONTROL SYSTEM COMPONENTS

Introduction – Controller components Time Response Analysis - Analysis of transient and steady state behavior of control systems – Standard test signals – Time response of first order and higher order systems – Steady state errors – Error criterion.

UNIT III: ROOT – LOCUS AND FREQUENCY RESPONSE ANALYSIS

Root locus concepts - Construction of root loci – Root contours

Time and frequency response correlation – Polar plot – Bode plot – All pass and minimum phase systems.–

UNIT IV: SYSTEM STABILITY

Stability concepts – Conditions for stability – Routh, Hurwitz stability criteria – Relative stability analysis - Stability in frequency domain – Nyquist stability criterion – Relative stability analysis – Gain margin – Phase margin – Frequency response specification – Constant M circles – Constant N circles – Nichol's chart.

UNIT V: STATE SPACE ANALYSIS OF LINEAR CONTINUOUS SYSTEMS

Introduction - State space representation using physical variables – Phase variables and canonical variables – Derivation of transfer function from state model – Solving the time invariant state equation – State transition Matrix – Its properties and computation

Introduction to controllability and observability

TEXT BOOK

1. R.M.Shinners, 'Modern control system theory and application', Addison - Wiley, reading, 1982.
2. Naresh K. Shinha," Control Systems", New Age Publications, 1996.

REFERENCES

1. K. Ogata, "Modern control engineering", prentice Hall Englewood chiffs, N.J., 1970.
2. D.K.Cheng, "Analysis of linear systems" Addison-Wesley, 1959.
3. B.C.Kuo "Automatic control systems", 4th edition, prentice Hall, Engle wood chiff, N.J., 1984.
4. I.J.Nagrath and M.Gopal, " Control systems Engineering", 2nd edition, Wiley eastern, New Delhi, 1982.

UEE 4055 PULSE AND DIGITAL CIRCUITS

UNIT I: COMBINATIONAL CIRCUITS

Binary arithmetic – BCD addition and subtraction – Code converters - Parity generator – Binary to BCD and BCD to binary conversions – Design of combination circuits using NAND and NOR gates – Design of encoders, decoders, multiplexers, demultiplexer – Serial adders – Binary multiplier – Simplification of k-map.

UNIT II: SEQUENTIAL CIRCUITS

Design of counters using Flip-flops– Synchronous, asynchronous, Up/Down counters, decade counter, ring counter, BCD counter – Shift registers and bi-directional shift registers. Parallel/serial converters

UNIT III: MEMORIES

Role of memory in computers – Memory types and terminology – ROM – RAMs –Non-volatile RAMS – Sequential memories – Programmable logic devices – Magnetic memories – Charge – Coupled devices.

UNIT IV: LINEAR WAVE SHAPING CIRCUITS:

Linear wave shaping circuits: RC, RL and RLC circuits – Pulse transformer – Steady state switching characteristics of devices – Clipping and clamping circuits – Switching circuits.

UNIT V: MULTI-VIBRATORS AND TIME BASE CIRCUITS:

Bistable, monostable and astable multi-vibrators – Schmitt trigger – Voltage and current sawtooth sweeps – Fixed amplitude sweep – Constant current sweep – UJT – Sawtooth Miller and bootstrap time base – Multivibrators using negative resistance devices (UJT and tunnel diodes).

TEXT BOOKS:

1. Millman & Taub, “Pulse, Digital and Switching Waveforms”, McGraw Hill Book Co., 1984.
2. A. Anand Kumar, “Fundamentals of Digital Circuits”, - PHI-2001.

REFERENCE BOOKS:

1. A.P. Malvino and D.P. Leach, “Digital Principles and Applications”, TMH, 2002.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill-1987.

UEE 4046 OBJECT ORIENTED PROGRAMMING IN C++

UNIT I

Data types: - fundamental types – Booleans – characters-integers- floating point types- enumerations- declarations – names –scope – initialization- Pointers- references- pointers and constants- arrays –structures- type conversions -explicit type conversions.

UNIT II

Types of statements: - declaration statements - selection statements – expressions- iteration statements-for statements- go to statements.

Functions:- function declarations- argument passing- Overloaded function names-default arguments- unspecified number of arguments- pointer to function- Macros- inline functions.

UNIT III

Classes – member functions – access control – constructors and destructors - objects – copying objects-Operator overloading – binary and unary operators – conversions- friend functions.

Derived classes- virtual functions- abstract classes. Class hierarchies: - Multiple inheritances – virtual base class- access control.

UNIT IV

Files streams - Input/ Output Streams – manipulators-standard manipulators- user defined manipulators - templates - Exception handling

UNIT V

The evaluation of object model – Element of object model – applying object model- Nature of an object – Relationship among objects -Nature of the classes- Relationship among classes.

TEXTBOOKS:

1. Bjarne Stroustrup – “ The C++ Programming Language”, Third Edition, Addison Wesley.
2. Grady Booch – “Object Oriented Analysis and Design”, Addison Wesley.

REFERENCE BOOKS:

1. Robert Lafore – “Object Oriented Programming in Turbo C++”, Galgotia Publication Ltd.
2. Stanley b. Lippman, Jove Lajoie, C++ Primer, Third Edition, Addison Wesley.

UEE 4057 ELECTRONICS LAB - II

1. Frequency response characteristics of a single stage RC Coupled Amplifier
2. RC phase shift Oscillator.
3. UJT Relaxation Oscillator
4. Astable Multivibrator
5. Schmitt Trigger
6. Series and shunt voltage regulators. IC 723 voltage Regulator
7. Inverting, Non-Inverting Amplifiers and voltage follower circuits using IC 741.
8. Differentiator and Integrator using IC 741..
9. Summing Amplifier, Error Amplifier (Difference amplifier) circuits using IC 741 and Comparator operation using 741 – Regulator PWM and SPWM Techniques.
10. Frequency Response of Active first order and second order filters.
11. Wein-Bridge oscillator using IC 741.
12. IC 555 – Monostable and Astable operation.

UEE 4058 ELECTRICAL MACHINES LAB – II

1. Load test on 3 phase squirrel cage Induction Motor
2. Load test on 3 phase slip ring Induction Motor
3. No load & Blacked rotor test on 3-phase squirrel cage Induction Motor
4. Load test on 1 phase Induction Motor
5. Load test on 3 phase Induction Generator
6. Study of speed control of Induction Motor
7. Load test on 1 phase Alternator
8. Load test on 3 phase Alternator
9. Predetermination of voltage Regulation of 3 phase Alternator by EMF & MMF Method.
10. Predetermination of voltage Regulation of 3 phase Alternator by ZPF method.
11. Parallel operation of Alternators
12. Determination Direct axis reactance and quadrature axis reactance of a salient pole Alternator by slip test.
13. V and inverted V curve of an auto synchronous motor.

UEE 4049 OBJECT ORIENTED PROGRAMMING IN C++ LABORATORY

- 1) Experiments involved the following concepts
- 2) Classes and objects
- 3) Function overloading
- 4) Inheritance
- 5) Operator overloading
- 6) Virtual function
- 7) Virtual class
- 8) Friend function
- 9) File handling

- 10) Template
- 11) Exception handling
- 12) Mini Project related to Electrical Engineering Problem.

UEE 4230 GENERAL PROFICIENCY II

UNIT 1: IMPORTANCE OF COMMUNICATION

Introduction; Verbal and Non-verbal Codes of Communication; Barriers to Communication; Self-Assessment; SWOT Analysis; Identifying Strengths and Weaknesses.

UNIT 2: PERSONALITY DEVELOPMENT

Body Language; Non-verbal Skills; Leadership Qualities; Emotional Quotient; Effective Time Management; Surviving Stress; Overcoming Failure; Professional Ethics

UNIT 3: VERBAL COMMUNICATION

Social Exchanges; Planned Speech; Extempore; Basics of Attending & Organizing Meetings; Informal Discussions

UNIT 4: QUANTITATIVE ANALYSIS

Aptitude Tests

REFERENCES:

1. Mohan, Krishna and Meera Banerji. Developing Communication Skills. Macmillan, 2002.
2. Leigh, Andrew and Michael Maynard. The Perfect Leader. Random House Business Books, 1999.
3. _____ . Perfect Communications. Random House Business Books, 1999.
4. Minchinton, Jerry. Maximizing Self-confidence. Jaico Publishing House, 2003.
5. Thorpe, Edgar. Course in Mental Ability and Quantitative Aptitude. Tata McGraw-Hill, 2003.

UEE 5201 MATHEMATICS - V

UNIT I: THEORY OF EQUATIONS

Relation between the roots and the coefficient of an equation - Calculation of symmetric functions of the root of an equation - Transformation of equations - Reciprocals of the roots - Reciprocal equation - Roots of given equation multiplied by a constant m - Equations whose roots are diminished by the same quantity - Horner's method.

GAMMA AND BETA FUNCTIONS

Series solutions to second order linear equations with ordinary points and regular singular points. (Erogenous method).

UNIT III

Bessels functions and Legendre polynomials - series solutions - Generating functions - Recurrence relations at orthogonal property.

UNIT IV: PROBABILITY

Axiomatic approach to probability, Random experiment, event - Algebra of events, probability - Mathematical Notion - Probability function - Law of addition of probabilities. Extensions of general law of addition of probabilities - Multiplication law of probability and conditional probability - Extension of multiplication law of probability - Independent events - Bayes theorem (4.5, 4.6, 4.7 and 4.9 of the text Book No. 3)

UNIT V

Random variable - Distribution function - properties of distribution function - Discrete Random variable - probability mass function - Discrete distribution function - continuous random variable, probability density function, continuous distribution function, joint probability law, joint probability mass function - Joint probability distribution function - Marginal distribution function - Joint density function. (Sections 5.1, 5.2, 5.3, 5.4, 5.4.1, 5.4.3, 5.5, 5.5.1, 5.5.2, 5.5.3, 5.5.4 of the Text Book No. 3)

TEXT BOOKS:

1. "Numerical methods in Science & Engineering "- Dr.M.K.Venkataraman (1986)
2. "Higher Mathematics for Engineering and Science" - Dr.M.K.Venkataraman.
3. "Fundamentals of Mathematical Statistics" - S.C.Gupta and V.K.Kapoor.

- - - - -

UEE 5052 ANALOG AND DIGITAL INTEGRATED CIRCUITS

UNIT I: IC FABRICATION:

Monolithic IC technology – planar process – Bipolar junction transistor – FET fabrication – CMOS technology – IC packing – Surface mounting devices.

DIGITAL IC's. Logic families; DTL, HTL, RTL, TTL, ECL, PMOS, CMOS, I^2L performance criteria - Comparison, applications, advantages.

UNIT II: OPERATIONAL AMPLIFIERS:

Comparator – Window detector- Precision rectifier - Current to voltage converter - Current converter - Log and antilog amplifiers - Analog multiplier - Differential amplifiers - Instrumentation amplifiers - Waveform generators.

UNIT – III

Series op-amp regulator – IC voltage regulator – Switching regulator – Digital to analog converters – Analog to digital converter – Voltage to frequency converter – Frequency to voltage converter – Active filters – State variable filter.

UNIT IV: PHASE LOCKED LOOP

Phase comparator - PLL block diagram - lock range and capture range - PLL applications.

I.C TIMER

IC timer - design of Astable, monostable Schmitt trigger, missing pulse detector using 555 timer - dual timer - Applications.

UNIT V: SYSTEM DESIGN

Design of Sample and Hold circuits – data loggers - frequency synthesizer - function generator - noise generator - examples of display systems - line driver/receiver - programmable counter/timer. 7 seg LED/LCD display – Digital Voltmeter – Digital Phase Meter.

TEXT BOOKS:

1. B.S.Sonde, "Introduction to system design using IC's Wiley eastern, 1985.
2. D. Roy Choudhuy, Shail Jain, "Linear Integrated Circuits", New Age International (P) Ltd, 2001.

REFERENCES:

1. R.A. Gayakwad, "Op-Amps and Linear integrated circuits", PHI, 2001.
2. Millman & Taub, "Digital Integrated Electronics" Mc Graw Hill Company, 1984.

UEE 5053 TRANSMISSION AND DISTRIBUTION

UNT I: DISTRIBUTION SYSTEMS

Structure of electric power systems - one Line Diagram - generation, transmission and distribution systems, comparison of distribution systems – radial and ring – two wire dc, ac single phase and three phase systems – current and voltage calculations in distributors with concentrated and distributed loads – Kelvin’s law for the design of feeders and its limitations.

UNIT II: TRANSMISSION LINE PARAMETERS

Resistance, inductance and capacitance of single and three phase transmission lines - symmetrical and unsymmetrical spacing – transposition - single and double circuits - stranded and bundled conductors - application of self and mutual GMD – Skin and Proximity effect - inductive interference - Corona - characteristics.

UNIT III: PERFORMANCE OF TRANSMISSION LINES

Development of equivalent circuits for short, medium and long lines – efficiency and regulation - attenuation constant and phase constant - surge impedance loading - power circle diagrams for sending and receiving ends - transmission capacity, steady state stability limit – voltage control of lines - shunt and series compensation.

UNIT IV: INSULATORS AND CABLES

Insulators – types and comparison – voltage distribution in string insulator – string efficiency – methods of improving string efficiency – Stress and sag calculations – effect of wind and ice – supports at different levels – stringing chart - cables – types – capacitance of cables – insulation resistance - dielectric stress and grading - dielectric loss - thermal characteristics - capacitance of three core cables.

UNIT V: RECENT TRENDS IN TRANSMISSION

Design of rural distribution, planning and design of town electrification schemes – comparison of EHVAC & HVDC system – economic distance for HVDC – terminal equipment for HVDC systems – description of DC transmission system – planning-advantages-interconnection of HVDC & AC systems – Introduction to FACTS technology.

TEXT BOOK:

1. C.L.Wadhwa, 'Electrical Power Systems' Wiley Eastern Ltd., India, 1985.

REFERENCES:

1. S.L.Uppal, Electrical Power, Khanna Publishers, New Delhi, 1981.
2. Soni, Bhatnagar and Gupta, Electrical Power, Dhanpat Rai & Sons, New Delhi, 1976.
3. S.L.Uppal, "Electrical Power", Khanna Publishers, New Delhi, 1981.
4. S.N.Singh, "Electric Power Generation, Transmission & Distribution, Prentice Hall of India, New Delhi, 2003.

UEE 5054 ELECTRICAL & ELECTRONICS MEASUREMENT

UNIT I: TERMS AND DEFINITIONS

Accuracy, precision, resolution, sensitivity error's types. Circuits For Resistance Measurement: Measurement of resistance- Kelvin's double bridge - Wheat stones bridge- Mega ohm bridge - Loss of charge method - Direct deflection method Megger- Measurement of earth resistance – Fall of potential method – Localization of cable fault - Murray loop and varley loop test.

UNIT II: ELECTRICAL MEASURING INSTRUMENT

Basic effects of electromechanical instruments – Ammeter and voltmeter – Moving coil – Moving Iron – Electrodynamometer and induction type – Extension of range. Wattmeter – Dynamometer and induction type energy meter – induction type – Instrument transformers.

Electronic Instruments – Amplified DC meter, True RMS responding meter, Digital Instruments.

UNIT III: AC MEASUREMENT & MAGNETIC MEASUREMENTS

AC bridges - Maxwell's, Hay's Anderson's for measurement of L Desauty's bridge and Scherring bridge for measurement of C and Wien's bridge for measurement of frequency. B-H curve and hysteresis loop using ballistic galvanometer, permeameters, and Loss measurement using wattmeter method.

UNIT IV: SPECIAL INSTRUMENTS

Maximum demand indicator – Trivector meter – Power factor meter – Synchroscope – Frequency meter – Phase sequence indicator

UNIT V: TRANSDUCERS

Temperature transducers- RTD, thermister, Thermocouple - Displacement transducer - Inductive, capacitive, LVDT, Pressure transducer – Bourdon tube, Bellows – Flow transducer – Electromagnetic flow meter – Strain gauges – Piezo electric and Hall effect transducer.

TEXT BOOK:

1. A.K.Sawhney, "A course of in Electrical & Electronics measurement & instrumentation", Dhanpat Rai & sons, 2001.
2. Ernest.O.Doeblin, "Measurement System", McGraw Hill, 1990.

REFERENCES:

1. John P.Bentley, "Principles of measurement system", Addison Wesley Longman (pvt.) Ltd., 2000.
2. G.S.Rangan, G.R.Sharma and V.S.V.Mani, "Instrumentation devices and systems", Tata McGraw Hill, 2000.
3. James W. Dally, William F.Riley, Kennath G. McCornell, "Instrumentation for engg. Measurements", John Wiely & Sons (p) Ltd., 2003.
4. D.V.S.Moorthy, "Transducers & Instrumentation", Prentice Hall of India, 1995.

UEE 5056 DIGITAL ELECTRONICS LAB

1. Study of logic gates; verification of Boolean laws and De’Morgans laws; Implementation of basic gates using universal.
2. Study of Flip Flops – RS, clocked RS, D Flip-Flops, T Flip Flop and JK, JK Master slave flip flops using logic gates. IC 7476 operation.
3. Arithmetic circuits – Adders and sub tractors – Implementation of a Logical. Functioning Karnaugh’s map simplification
4. Up and Down counters; Decade counters.
5. Multiplexer and De-Multiplexer.
6. Digital comparator and parity generator/checker circuits.
7. Code converters.
8. Encoders and Decoders.
9. Monostable and Astable Multivibrators using gates and ICs.
10. Digital to Analog converters.

UEE 5057 MEASUREMENT & CONTROL LAB

1. Measurement of resistance – medium & low using bridge
2. Instrumentation amplifier – characteristics
3. Signal converter with grounded and floating loads
4. Calibration of meters – energy meter using wattmeter
5. Extension of range of voltmeter and ammeter
6. Frequency measurement
7. Magnetic measurement
8. Verification of network theorems using practical/PSPICE/Computer simulation package
9. Determination of transfer function of machines using practical set up/simulation package
10. Study of time response of different types of systems – using computer simulation package
11. Study of frequency response of different types of systems using computer simulation
12. Study of system stability

UEE 5238 GENERAL PROFICIENCY III

UNIT 1: COMPOSITION ANALYSIS

Technical and Non-technical Passages (GRE Based); Differences in American and British English; Analyzing Contemporary Issues; Expanding Terminology

UNIT 2: DEXTERITY IN WRITING

Importance of Writing; Written vs. Spoken Language; Formal and Informal Styles of Writing; Resources for Improving Writing; Grammar and Usage; Letter-writing; Application Essays; Project Proposals

UNIT 3: PRESENTATION SKILLS

Collecting and Organizing Materials; Audience; Content; Rehearsing; Delivering Matter; Questions; Controlling Anxiety; Seminar Presentations (Subject Oriented/ General Topics); Language lab Practice

UNIT 4: QUANTITATIVE ANALYSIS

Aptitude Tests

REFERENCES:

1. Bhatnagar, R.P and Rajul Bhargava. English for Competitive Examinations. Macmillan, 1999.
2. Thorpe, Edgar and Showick Thorpe. Objective English. Pearson Education, 2004.
3. Staff of Kaplan. GRE Exam 2004. Simon and Schuster, 2003.
4. Leigh, Andrew and Michael Maynard. The Perfect Presentation. Random House Business Books, 1999.
5. Thorpe, Edgar. Test of Reasoning. Tata McGraw-Hill, 2003.

UEE 6051POWER SYSTEM ANALYSIS

UNIT I: POWER SYSTEM MODEL

Representation of Power system components like synchronous machines, induction machines, transformers, transmission lines, loads etc, for steady state analysis - Per unit Quantities, Impedance and reactance diagram - Formulation of network matrices for the power systems - Bus impedance and bus admittance matrices, reduction techniques on network matrices for network changes.

UNIT II: LOAD FLOW ANALYSIS

Formulation of load flow equations - Bus impedance and bus admittance matrix methods - Solution of simple problems, consideration of voltage controlled buses, tap changing transformers, phase shift control, line flow calculations - Effect due to new lines, loads and voltages - Gauss, Gauss-Seidel method and Newton-Raphson method for calculating line voltages.

UNIT III: SEQUENCE NETWORKS

Review of symmetrical components - Introduction to components and allied components - transformation matrices used in resolution of unbalanced voltages and currents - positive, negative and zero sequence networks of power system components, sequence impedance matrices of power systems - representation of various types of faults in sequence networks.

UNIT IV: SHORT CIRCUIT ANALYSIS

Formulation of a mathematical model to analyses faults on power system - Bus impedance method of solution for various common faults using symmetrical components - solution of simple problems by bus impedance method and sequence network method. Effect of fault impedance - Use of short circuit study data for relaying and breaking studies - study of simultaneous faults on the system.

UNIT V: STABILITY ANALYSIS

Stability problems - Swing equation - Equal Area Criterion - Critical Clearing Angle - Solution of Swing equation by Step by step method and Modified Euler's method - Distinction between steady state, transient state and dynamic stabilities.

TEXT BOOKS:

1. John.J.Grainger and Stevenson Jr.W.D., "Power System Analysis", Mc. Graw Hill International Edition, 1994.
2. I.J.Nagrath and D.P.Kothari," Modern Power System Analysis ", Tata McGraw Hill Publishing Company, 1990.

3. C.L. Wadhwa," Electrical Power System", New Age International (P) Ltd., Publishers, Second Edition, 1985.

REFERENCES:

1. W.D.Stevenson Jr. "Elements of Power System Analysis" Mc Graw Hill International Editions, Fourth Edition, 1982.
2. G.W.Stagg and A.H.EL - Abiad "Computer methods in power systems" Mc Graw Hill, 1968.
3. B.M.Weedy "Electrical power system" John Wiley & sons seas, New York, 1967.
4. M.A.Pai, "Computer Techniques in Power System Analysis", Tata Mc Graw Hill, New Delhi, 1979.
5. Vadhera, "Power System Analysis and Stability", Khanna Publishers, New Delhi, 1981.

UEE 6052 POWER ELECTRONICS

UNIT I: POWER SEMI CONDUCTOR DEVICES

Power switching devices overview: ideal & real switching characteristics - power diode, BJT, SCR, TRIAC, MOSFET, GTO, IGBT- VI characteristics, Turn-on, Turn-off methods; protection - di/dt, dv/dt, over current, over voltage, specifications, losses, thermal characteristics, series and parallel operation, triggering circuits.

UNIT II: CONTROLLED RECTIFIERS

Operation and analysis of single and three phase rectifiers – half and fully controlled converters with R, RL and RLE loads with and without free wheeling diodes; converter and inverter operation – wave forms, gate time control, output voltage, input current, power factor, effect of load and source inductance.

Power factor and harmonic improvement methods – multi-phase width controlled, symmetrical angle controlled; series converter, twelve pulse converters; dual converter modes – four-quadrant operation with and without circulating current modes; firing circuits.

UNIT III: CHOPPERS

Principles of high power chopper circuits – voltage commutated, current commutated chopper, multi-phase chopper, multi-quadrant operation, switch mode regulators – principle of operation of buck, boost and buck boost regulators; time ratio control, variable frequency control, duty cycle.

UNIT IV: INVERTERS

Principles of high power VSI and CSI inverters, Modified McMurray, auto sequential inverter, – waveforms at load and commutating elements, inverter; analysis of three phase inverter circuits with star and delta loads; control and modulation techniques; unipolar, bipolar inverters – voltage and frequency control; harmonics study.

UNIT V: AC CHOPPER AND CYCLO CONVERTERS

Principle of single phase and three-phase AC voltage controller – ON/OFF and phase angle control; principle of single phase and three phase cyclo converters circuits, different control techniques and firing pulse generation.

Applications – regulated power supply, UPS, solid-state motor starters, static circuit breakers, HVDC systems, reactive power compensation.

TEXT BOOK:

1. M.H.Rashid, "Power Electronics", PHI, New Delhi, 2001.
2. P.S.Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2001.

REFERENCES:

1. Net Mohan, M.Underland, William P.Robbins, "Power Electronics Converters, applications and design", John Wiley & sons, Singapore, 2001.
2. M.D.Singh, K.B.Khanchandani, "Power Electronics", Tata McGraw Hill, New Delhi, 2001.
3. Cyril W.Lander, "Power Electronics", McGraw-Hill, International edition, New Delhi, 1993.
4. Williams B.W., "Power Electronics Devices, drivers, applications and passive components", McMillan Press Ltd., London, 1992.

UEE 6053 MICROPROCESSORS

UNIT I: ARCHITECTURE AND OPERATION OF MICROPROCESSORS

Basic Microprocessor – Architecture, Registers, Arithmetic and logic section, Control Section and Interface section – 8085 microprocessor – Architecture, timing and sequencing, State transition sequence – Memory and I/O synchronization – Wait states.

UNIT II: 8085 PROGRAMMING

Instruction set – Programming techniques – Counter and time delay programs – Stack and subroutines – Code conversion – Arithmetic and logic operations on 8/16 bit binary/BCD numbers.

UNIT III: MEMORY AND PERIPHERAL INTERFACING

Compatibility between memory and microprocessor unit – System bus – Address space – Partitioning of the address space – Dynamic RAM interfacing. Review of data techniques – I/O ports – Programmable I/O ports of 8155 – 8255A Programmable peripheral interface.

UNIT IV

8085 interrupt structure – 8259A programmable interrupt controller – 8254 Programmable interval timer – DMA controller. Serial mode of data transfer – 8215A US ART – Standard interfaces. Interfacing keyboard – Interfacing displays – 8279 Programmable keyboard display interface.

UNIT V: OTHER MICROPROCESSORS

Brief description and functioning of Z80, MC 6800 and 6502. Applications: Temperature monitoring and control – Traffic light control – Frequency Measurement – Waveform generation – Stepper motor control – Analog to digital conversion – Digital to analog conversion.

TEXT BOOKS:

1. Gaonkar, “Microprocessor Architecture, Programming and Applications”,

REFERENCES:

1. Kenneth L. Short, “Microprocessor and Programme Logic”, PHI, 1988.
2. Ajit Pal, “Microprocessors Principles and Applications”, Tata McGraw Hill, 1990.

UEE 6054 ELECTRICAL MACHINE DESIGN

UNIT I: FUNDAMENTALS OF DESIGN

Standard specification for frame size, conductors and insulation of electrical apparatus - M.M.F and leakage reactance calculations - Thermal rating of electrical apparatus – Performance prediction from thermal rating - magnetization and loss curves.

UNIT II: D.C MACHINES

Constructional details - Armature windings - Output equation - Choice of specific loadings - Choice of poles and speed - Design of conductors, winding, slot, air gap, field poles and field coils - Commutator and brush design calculations, efficiency - Temperature rise.

UNIT III: TRANSFORMERS

Constructional features - Output equation - Design of core, coils, tank and cooling tubes - Calculation of circuit parameters - No load current – losses – efficiency - temperature rise and regulation from design data.

UNIT IV: 3 ϕ INDUCTION MOTOR

Constructional details - Output equation - Choice of specific loadings - Design of stator, squirrel cage rotor, windings and slots - Calculation of circuit parameters - No load current - efficiency and temperature rise from design data.

UNIT V: DESIGN OF 1 ϕ INDUCTION MOTOR AND INTRODUCTION OF CAD

Constructional details – Output equation – Design of running and starting windings for capacitor start induction motor - Computers in design - Flow chart - Analysis method – Synthesis method – Hybrid method – Optimization – CAD of transformers - magnetic field calculations using finite difference and finite element methods - Determination of equi potential lines.

TEXT BOOKS:

1. A.K.Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and sons, New Delhi, 1984.
2. S.K.Sen, "Principles of Electrical Machine Design with Computer Programmes", Oxford and IBM publishing co., pvt. Ltd., New Delhi, 1987.

REFERENCES:

1. H.M.Rai, "Principles of Electrical Machine Design", Sathya prakashan, Delhi., 1988.

2. A.E.Clayton, "Performance and design of Direct Current Machines", The English Language Book Society and Sir Isaac Pitman and Sons Ltd., London, 1962.
3. M.G.Say, "The performance and design of Alternating current Machines", Sir Isaac Pitman and Sons Ltd., London, 1958.

UEE 6056 MICROPROCESSOR LAB

1. 8/16 bit Binary Operations
2. 8/16 bit BCD Operation
3. Block Operations
4. Code Conversions
5. Generation of Series (Fibonacci series & Prime series)
6. Sorting of an Array
7. Message Display (Moving & Flashing)
8. Digital clock Simulation
9. Digital Calculation Simulation
10. Traffic light inter face
11. Stepper motor inter face
12. Seven Segment Display Inter face
13. ADC inter face
14. DAC inter face.

UEE 6057 POWER SYSTEMS LAB

1. Per unit computation
2. Formulation of the admittance matrix by direct inspection and singular transformation methods
3. Formation of bus impedance matrix
4. Inverse matrix by pivotal condensation method
5. Symmetrical components for no lines open, one line open and two lines open
6. Short circuit studies for LL, LG, LLG and three phase faults
7. Swing equation by step by step method
8. Determination of average load, peak load, load factor and diversity factor
9. Perform the frequency duration response for automatic generation control
10. Determine the critical clearing angle of the given system using equal area criterion
11. Economic load dispatch neglecting losses with and without generation limits
12. Economic load dispatch including losses
13. Study of ETAP
14. Load flow analysis using N-R method in ETAP

UEE 6238 GENERAL PROFICIENCY IV

UNIT 1: RESUMES

Introduction to Resumes; Types of Resumes; Organization of Resume Formats; Presenting Information and Content

UNIT 2: GROUP DISCUSSIONS/ ACTIVITIES

Introduction; Defining Group Discussions; Types of Group Discussions; Preparation; Participation; Group Dynamics; Intra/Inter Dept. Group Discussions; Team-work; Negotiation Skills; Introduction to Organizational Behaviour; Language lab Practice

UNIT 3: INTERVIEWS

Introduction; Honing Verbal and Non-verbal Skills; Rehearsing; Listening Skills; Taking the Interview; Facing Questions; Mock Interviews

UNIT 4: QUANTITATIVE ANALYSIS

Aptitude Tests; Psychometric Tests; Puzzles

REFERENCES:

1. Prasad, H.M. How to Prepare for Group Discussion and Interview. Tata McGraw-Hill, 2001.
2. Kenendy, Gavin. The Perfect Negotiation. Random House Business Books, 1999.
3. Career Press Editors. 101 Great Resumes. Jaico Publishing House, 2003.
4. Robins, Stephen. Organizational Behaviour. Prentice-Hall, 2003
5. Aggarwal, R.S. A Modern Approach to Verbal & Non-verbal Reasoning. S. Chand & Co., 2004.

UEE 7231 INDUSTRIAL MANAGEMENT

UNIT – I

Management concept-Types and principles of management - scientific management types and functions of organization - merits and demerits- elements of management planning, organizing, staffing, directing, and control.
Types of ownership-sole proprietorships- partnership, private and public limited companies- Advantages and disadvantages.

UNIT II: FINANCIAL MANAGEMENT

Source of finance - internal and external - types of investment- Evaluation of Investments- preparation of balance sheet and profit and loss statement - managing working capital-types of accounting and significance of each type.

UNIT III: PRODUCTION AND MATERIALS MANAGEMENT

Types of production - Forecasting of sales - Absorbing in demand - process planning scheduling, Routing- Functions and objects of materials management - stores and material management - stores and material control- Inventory planning and control - functions of inventories.

UNIT IV: SALES AND MARKETING

Core concepts of marketing needs, wants and demand-marketing Vs selling-products and markets- pricing and its related factor basic concepts in channels of distribution - sales promotion -Advertising-Market research - sales forecasting.

UNIT V: INDUSTRIAL PSYCHOLOGY AND PERSONAL MANAGEMENT

Definition, scope of Industrial psychology - Individual and group-motive and morale. Fatigue, causes and remedy-accidents causes and prevention manpower planning, job analysis and merit rating- wage and salary administration - causes of Industrial unrest - collective bargaining - (MBO) management by objectives - concepts, advantages and limitations of MBO.

REFERENCES

1. J.S.Chandan," Management - Theory and practice", Vikas publications.
2. Joseph Massie," Essential of Management ", 3rd Edition prentice Hall.
3. Hoonkz C.O. Donnel," MANAGEMENT "8th Ed Mc Graw Hill.
4. Pandey I'M.," Financial Management ", Vikas publishing House pvt.
5. Monappa Arun and Saiyadi," Personnel Management", - Tata Mc Graw Hill New Delhi.

UEE 7052 SOLID STATE DRIVES

UNIT I: DRIVE CHARACTERISTICS

Characteristics of mechanical system; requirement of drive characteristics; selecting the drive elements; modeling of dc motor; selection of motor rating; P, PI and PID controllers; constant HP and constant torque operations.

UNIT II: DC DRIVES

Single phase and three phase drives - half controlled and fully controlled; Chopper drives - class A, B, C, D and E chopper drives; braking of dc drives.

UNIT III: STATOR VOLTAGE CONTROLLED INDUCTION MOTOR DRIVE

Stator voltage controlled induction motor drive - slip torque characteristics; different configuration of controller's input current; closed loop operation.

UNIT IV: INVERTER CONTROLLED INDUCTION MOTOR DRIVE

Slip-torque characteristics; harmonic equivalent circuit; Rotating magnetic fields; harmonic current; efficiency; torque; stability.

UNIT V: ROTOR RESISTANCE CONTROLLED INDUCTION MOTOR DRIVE

Rotor resistance control; slip-torque characteristics; equivalent chopper resistance; chopper circuit filter; constant current operation.

SLIP POWER RECOVERY SCHEME: Slip power recovery scheme; sub synchronous operation; performance prediction; input power factor.

TEXT BOOKS:

1. P.C.Sen, "Thyristor Drives", John Wiley and sons, 1981.
2. S.S.Dewan, G.R.Sleman and A.Straughen "Power Semiconductor Drives", John Wiley sons, 1984.
3. J.M.D.Murphy and F.G. Turnbull, "Power Electronic Control of AC Motors", Pergamon press, 1988.

REFERENCES:

1. M.H.Rashid, "Power Electronic Circuits, Devices and Applications", Prentice Hall International, 1988.
2. Bimal K. Bose, "Power Electronics and AC Drives", Prentice Hall International, 1986. James T. Humphries and Leslie P. Sheets, "Industrial Electronic", Third Edition, Delmar publishers, Inc., 1989.

UEE 7053 ELECTRICAL SAFETY AND QUALITY MANAGEMENT

UNIT I: REVIEW OF IE RULES AND ACTS AND THEIR SIGNIFICANCE

Objective and scope – ground clearances and section clearances – standards on electrical safety - safe limits of current, voltage – earthing of system neutral – Rules regarding first aid and fire fighting facility.

UNIT II: ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS

Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT III: SAFETY DURING INSTALLATION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE

Preliminary preparations – safe sequence – risk of plant and equipment – safety documentation – field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safeguards for operators – safety.

UNIT IV: ELECTRICAL SAFETY IN HAZARDOUS AREAS

Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT V: QUALITY MANAGEMENT

Total quality control and management – Importance of high load factor – Disadvantages of low power factor – Causes of low P.F. – power factor improvement – equipments – Importance of P.F. improvement.

REFERENCES:

1. S. Rao, Prof. H.L. Saluja, "Electrical safety, fire safety Engg And safety management", Khanna Publishers. New Delhi, 1988.
2. Pradeep Chaturvedi, "Energy management policy, planning and utilization", Concept Publishing company, New Delhi, 1997.
3. Nagrath. I.J. and Kothari. D.P. "Power System Engineering", Tata Mc Graw Hill publishing company Ltd. New Delhi, 1998.

UEE 7056 POWER ELECTRONICS LAB.

Experimental study of the following through Simulation / Educational modules:

1. SCR Trigger circuits (using RC, UJT, Counters)
2. Study on DC choppers and forced commutation techniques
3. Study on single phase controlled rectifiers with R, RL & RILE loads
4. Study on three phase controlled rectifiers
5. Study on AC Choppers
6. Study on Inverters
7. Study on Cycloconverters
8. Speed control of AC/DC motors using solid-state devices
9. SCR based motor soft starting circuits (starters) & static circuit breakers
10. Regulated power supply

UEE 7057 PROJECT WORK PHASE – I

The objective of the projects is to enable the students to work in convenient group of not more than four members in a group on a project involving analytical, experimental, design combination of these related to one or more areas of Electrical & Electronics Engineering. Each project shall have a guide who is member of faculty of Electrical & Electronics Engineering.

Four periods per week is allotted for the project work Phase-I. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on continues internal assessment comprising one seminar and one internal viva voce. The guide and departmental committee for 50 marks shall examine the students.

UEE 7058 SEMINAR

The objective of seminar is to enable the students to work in convenient groups (not more than four members in a group) and present a seminar on any chosen topic connected with Electrical & Electronics Engineering. The topic shall be chosen in consultation with a Faculty member who would be the guide. Each group is expected to make a critical review of literature and prepare a report. The students are expected to

present a seminar. A committee comprising of the guide and the departmental committee for 50 marks shall evaluate the performance of the students in the seminar.

UEE 7059 INDUSTRIAL VISITS/TRAINING REPORT

During the course of study from 3rd to 6th semester each student is expected to undertake a minimum of six industrial visits or undertake a minimum of for weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by a Departmental Committee at the end of seventh semester for 50 marks.

EEE 8051 UTILIZATION OF ELECTRICAL ENERGY

UNIT I: ILLUMINATION

Production of light – Determination of MHCP and MSCP – Polar curves of different types of sources – Rousseau's construction – Lighting schemes and calculations – Factory lighting – Flood lighting – Electric lamps – Gaseous discharge – High pressure and low pressure.

UNIT II: ELECTRIC HEATING AND WELDING

Resistance, Inductance and Arc furnaces – Construction and fields of application – Losses in oven and efficiency - High frequency - Dielectric heating – Characteristics of carbon and metallic arc welding – butt welding – spot welding.

UNIT III: ELECTRIC DRIVES AND CONTROL

Group drive – Individual drive – selection of motors – starting and running characteristics – Running characteristics - Mechanical features of electric motors – Drives for different industrial applications - Choice of drives – power requirement calculation – power factor improvement.

UNIT IV: ELECTRIC TRACTION

Traction system – Speed time characteristics – Series and parallel control of D.C motors - Open circuited, shunt and bridge transitions – Ttractive effort calculation – Electric braking – Tramways and trolley bus – A.C traction and recent trend.

UNIT V: ELECTROLYTIC PROCESSES

Electrolysis – polarization factor – preparation work for Electro plating – Tanks and other equipments – Calculation of energy requirements – Methods of charging and

maintenance – Ni-iron and Ni- cadmium batteries -Components and materials – Chemical reactions – Capacity rating of batteries – Battery charges.

TEXT BOOK:

- 1.Uppal S.L, "Electric Power", Khanna Publishers, 1988
- 2.Open Shaw Taylor, "Utilization of Electrical Energy", Oriented Longmans Limited (Revised in SI Units), 1971.
3. Soni A. Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, “ A text book on Power System Engineering”, Khanna Publishers, 2000.
4. A.I.Starr, “Generation, Transmission and Utilization of Electric Power”, ELBS, 1978.

REFERENCES:

1. Soni Bhatnagar & Gupta A, "Course in Electric Power", Dhanpat Rai Sons, 1979.
2. N.V.Suryanarayanan, “Utilization of Electric Power”, Wiely Eastern Ltd., 2001.
3. G.C.Garg, “Utilization of Electric Power and Electric Traction”, Khanna Publishers, 2001.

UEE 8052 PROTECTION AND SWITCHGEAR

UNIT – I

Basic ideas of short circuit currents and relay protection; basic terminology; essential qualities of a protective relay; operating principles of relays; The universal relay; torque equation, RX diagram.

UNIT – II

Over current relays; directional over current relays; distance relays; differential relays; under frequency and negative sequence relays; Electromagnetic and solid state relays. Time –distance relay, mho relay

UNIT – III

Generator protection; transformer protection; bus zone protection; feeder protection; carrier current protection of transmission lines; Relay coordination of a sample system. Industrial power system protection, A.C.motor protection, rectifier protection, testing & commissioning.

UNIT – IV

Arcing phenomena and arc quenching; circuit breaker rating RRRV; current chopping and capacitive current breaking characteristics of HRC fuses; DC circuit breaking, surge protection, impulse levels.

UNIT – V

Oil minimum circuit breakers; air blast circuit breakers; vacuum and SF6 circuit breakers; testing of circuit breakers, oil switches and ring main units, high voltage load breaking switches.

TEXT BOOK:

1. B.Ravindranath and N.Chander, "Power Systems protection and switchgear", Wiley Eastern Ltd, 1977.

REFERENCES:

1. C.L.Wadhwa, " Electric power systems", New Age International (P) Ltd publishers, 1983.
2. S.P.Patra, S.K.Babu and S.Choudhuri, "Power systems protection", Oxford and IBM Publishing Co., 1983.
3. Sunil S. Rao, "Switchgear and protection", Khanna publishers, New Delhi, 1986.
4. Lewis Blackburn "Protective Relaying – Principles and applications", Second Edition, Dekker Inc., 1998.
5. T.S.Madhava Rao, "Solid State Relays", Tata McGraw Hill

UEE 8053 ENERGY ENGINEERING

UNIT I: CONVENTIONAL ENERGY SOURCES:

Energy sources – Coal, Oil, natural gas, nuclear fuels, hydro power, nature, formation, resources, energy situation, National and international.

UNIT II: NEW AND RENEWABLE ENERGY SOURCES:

Design and operation of power plants and other systems using new and renewable energy sources, solar, wind, geothermal, ocean, thermal, tidal wave, Bio-gas plants, Bio-mass energy, Wood gas, Alternate fuels for automotive engines.

UNIT III: DIRECT AND NEW ENERGY CONVERSION:

Solar Cells, Fuel Cells, Magneto hydro dynamic generator, prospects of large, medium and small-scale power generation, new energy transformations, coal gasification, synthetic fuels, Hydrogen.

UNIT IV: CO-GENERATION AND FLUIDIZED BED COMBUSTION:

Cogeneration, cogeneration in process industries, power plants, Topping cycles – steam turbine with flue gas treatment, gas turbine with heat exchanger, combined cycle, diesel

engine, Bottoming cycles – steam turbine, organic rankine turbine, Cogeneration – applications.

UNIT V: ENERGY CONSERVATION AND MANAGEMENT:

Waste heat recovery-Heat pump – Economics of energy conservation, principles of electrical energy conservation, Principles of Energy Management, Demand forecasting, Energy auditing, Energy Economics

TEXT:

1. Panner, S.S., and ICE man, Energy, Addison Wesley Publishing Co., 1974.

REFERENCE:

1. David Hu. Hand Book of Industrial Energy Conservation, Van Nostrand Co., 1983.
2. Christopher, and Armsted.H, Geothermal Energy, John Wiley and Sons, 1978.
3. Pulfrey, D.L., Photovoltaic Power Generation, Van Nostrand Co., 1983.

UEE 8056 PROJECT WORK PHASE –II

The objective of the projects is to enable the students to work in convenient group of not more than four members in a group on a project involving analytical, experimental, design combination of these related to one or more areas of Electrical & Electronics Engineering. Each project shall have a guide who is member of faculty of Electrical & Electronics Engineering.

Twelve periods per week is allotted for the phase-II of the project work.. Each group of students should complete the project and prepare a report covering literature survey, problem statement methodology, results and conclusions. The guide and departmental committee shall evaluate the student's work for 50 marks based on one seminar and one internal viva-voce.. The student shall take up the viva-voce before a committee comprising of an external and an internal examiner, which evaluates the students work for 100 marks.

UEE 8057 COMPREHENSIVE VIVA VOICE

A departmental committee for 50 marks for internal assessment evaluates the students on all areas of Electrical & Electronics Engineering. They also shall be examined by a panel of examiners (An internal examiner and an external) on all areas of Electrical & Electronics Engineering at the end of 8th semester.

LIST OF ELECTIVES

GROUP A (Elective – I Subjects)

UEE 01 HIGH VOLTAGE ENGINEERING

UNIT – I : OVER VOLTAGES AND INSULATION CO ORDINATIONS

Introduction – Historical sketch – Comparison between AC and DC transmission – Kinds of DC links – Planning and modern trends. Causes of over voltages in transmission lines; lightning and switching over voltages; effects of over - voltages on power system equipment; protection against over voltages; surge absorbers and surge diverters; shielding; insulation coordination.

UNIT – II: GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of high AC voltages; cascaded transformers; generation of high DC voltages; Cockroft Walton circuit and its qualitative analysis; generation of impulse and switching surges; Marx circuit; generation of high impulse current. Tripping and control of impulse generators.

UNIT – III: MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of AC, DC impulse and switching surges using sphere gaps, peak voltmeters, potential dividers and high speed CRO, opto Electronics method; Fiber optic method; RIV and corona measurements; partial discharge; dielectric loss measurement using bridges.

UNIT – IV: ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS

Ionization processes - Townsend & Streamer theory - the sparking voltage - Paschen's law - Time lag for breakdown - Breakdown in non-uniform fields and corona discharges. Conduction and breakdown in pure and commercial liquids and solids dielectrics.

UNIT – V: HIGH VOLTAGE TESTING PRACTICE

BS/IEC/VDE specification for testing; correction factor; high voltage testing of power apparatus; corona and RIV testing measurement; Non destructive insulation tests; sources and hazards of EMI and EMC; EMI/EMC testing practice; corona and ESD testing techniques.

TEXT BOOK:

1. E.Kuffel and W.S.Zaengel, "High voltage Engineering Fundamentals", Pergamon Press, Oxford, London, 1986.

REFERENCES:

1. Allan Greenwood "Electrical Transients in power systems " Wiley Interscience, a division of John Wiley and Sons Inc., New York, 1971.
2. Dieter Kind, "An Introduction to High voltage Experimental Techniques", Wiley Eastern Limited, New Delhi.
3. T.J.Gallagher and A.J.Pearmain, "High voltage Measurement Testing and Design ", John Wiley and Sons, New York, 1982
4. M.S.Naidu and N.Kamaraju, "High voltage Engineering" Tata Mc Graw Hill publishing company, New Delhi, 1983.
5. Rakosh Das Begamudre, "Extra High voltage A.C Transmission Engineering", Wiley Eastern Limited, New Delhi, 1986.

UEE 02 DIGITAL SIGNAL PROCESSING

UNIT-I: INTRODUCTION

Discrete time signals and systems-Impulse function-Z transform-properties-Inverse Z-transform-Convolution-Applications-Stability and causality- ROC- Simple problems.

UNIT-II: DISCRETE SPECTRAL ANALYSIS

Introduction-The Fourier transform-sampling theorem and reconstruction of signals -Spectra of continuous time signals and its sampled sequence-DFT-properties-Fast Fourier Transform (FFT) – Radix –2, DIT & DIF Algorithms.

UNIT-III: DESIGN OF FIR DIGITAL FILTERS

Introduction-Windowing-frequency domain design- approximation Method-Design examples.

UNIT-IV: DESIGN OF IIR DIGITAL FILTERS

Introduction-review of design of analog filters-frequency transformation-Design of low pass filters-Impulse invariant Design-Bilinear Transform-Matched Z transform design method-design examples.

UNIT-V: IMPLEMENTATION AND APPLICATIONS

Realization block diagram-cascade and parallel realization-effect of finite word Length-practical implementation using hardware and Software.

TEXT BOOK

1.Alan V.Oppenheim and W.schafer,"Discrete time signal processing", Prentice Hall Pvt.,Ltd.,1989.

REFERENCES:

- 1.A.Antoniou,"Digital filters: Analysis and design", Tata Mc Graw Hill.1990.
2. P.Rameshbabu, "Digital Signal Processing", SciTech Publications Pvt. Ltd., 2001.

UEE 03 SPECIAL ELECTRIC MACHINES

UNIT I: SYNCHRONOUS RELUCTANCE MOTORS

Constructional features; axial and radial air gap motors; operating principle; reluctance torque; phasor diagram; motor characteristics; vernier motors.

UNIT II: STEPPER MOTORS

Constructional features; principle of operation; variable reluctance, permanent magnet, hybrid stepper motors; Modes of operation, single and multi stack stepper motors; Static and dynamics speed characteristics - theory of torque prediction; linear and nonlinear analysis; motor characteristics; Concepts of lead angles – Open loop and close loop control by Microprocessor - drives circuits – Applications.

UNIT III: SWITCHED RELUCTANCE MOTORS

Constructional details - principles of operation; - Selection of poles and pole arcs – Static and dynamics Torque production – Power flow – effects of saturation – Performance - drive circuits – Current regulation – Torque speed characteristics – Speed and torque control – Static observers for rotor position sensing – volt-ampere requirements – Applications.

UNIT IV: PERMANENT MAGNET BRUSH LESS DC MOTORS

Principle of operation; types; magnetic circuit analysis; EMF and torque equations; Drive circuits ; Torque speed characteristics – Motors with 120° and 180° magnet arcs - Winding inductances and armature reaction - power controllers;- Computer simulation – Applications.

UNIT V: PERMANENT MAGNET SYNCHRONOUS MOTORS

Principles of operation; EMF and torque equation; reactance; phasor diagram; power controllers; converter volt-ampere requirement; torque speed characteristics – Microprocessor based control.

TEXT BOOKS:

1. T.J.E. Miller, "Brush less Permanent Magnet and reluctance Motor Drives", Clarendon Press, Oxford, 1989.
2. P.P. Acarnley, "Stepping Motors, A Guide to Modern theory and practice", Peter Peregrines, London, 1982.

REFERENCE:

1. A. Hughes, "Electric Motors and Drives", Affiliated East - West Press Pvt., Ltd., Madras, 1990.

UEE 04 EMBEDDED SYSTEMS

UNIT-I: INTRODUCTION TO HARDWARE

Terminologies – timing diagram – memory – microprocessors – buses – DMA – Interrupts - shared data problem - Interrupt Latency.

UNIT-II: REAL TIME OPERATING SYSTEM

Software Architecture – Round Robin with interrupts. Real time operating systems – Tasks and Data – Semaphores and shared Data. Message Queues. Mailboxes pipes, timer functions – Events, Memory Management Basic design of RTO system.

UNIT-III: SOFTWARE DEVELOPMENT AND DEBUGGING TOOLS

Development tools – Host and target machine Links / Locators for embedded software – software in to target system Debugging techniques – testing host machine – simulators – Laboratory tools.

UNIT-IV

Embedded microcomputer system. Motorola MC 68H11 family – architecture Addressing modes – programming – Interrupts Memory interfacing and High-speed I/O interfacing.

UNIT V: APPLICATION

Data acquisition systems – Transducer – DAS design – Analysis of noise – DAS case studies open loop control systems – closed loop controllers – Digital PTD controller.

TEXT BOOK / REFERENCE BOOKS

1. David E. Simon, “An Embedded Software Primer”, Pearson Education, 2003.
2. Jonathan W. Valvano, “Embedded microcomputer system – Real time interfacing”, Thomson, Brooks / Cole, 2002.

UEE 05 POWER SYSTEM ECONOMICS

UNIT-I: ECONOMIC CONSIDERATIONS

Cost of electrical energy-expressions for cost of electrical energy-capital-interest-depreciation-different methods-factors affecting cost of operation-number and size of generating units-importance of high load factor-importance of power factor improvement-most economical power factor-meeting the KW demand on power stations-power system tariffs.

UNIT-II: ECONOMIC DISPATCH

Economic scheduling of generators in a plant-economic coordination of generation among a number of plants-losses neglected, with generator limits, losses included-losses of economy in incremental cost data- automatic load dispatch in power systems-analog and digital computers for application to load dispatch.

UNIT-III: ECONOMIC OPERATION

General loss formula-evolution of incremental transmission loss rate-method of calculation of loss coefficients-systematic development of transmission loss formula-Transmission loss as a function of plant generation, voltage and phase angle-economic dispatch computers.

UNIT- IV: ECONOMIC CONTROL

Interconnected operation-economic operation of hydro thermal power plants- λ - γ iteration scheme-gradient approach-modeling and solution approach to short term and long term hydro-thermal scheduling problem using dynamic programming.

UNIT-V: OPTIMAL POWER FLOWS

Problem formulation-cost minimization-loss minimization-solution using NLP and successive LP methods.

TEXT BOOKS:

1. Kirchmayer. L.K,"Economic operation of power system", John Wiley & Sons, 1953.
2. Kirchmayer. L.K."Economic control of Interconnected Systems", John Wiley & Sons, 1959.

REFERENCES:

1. Allen J Wood and B F Wollenberg, "Power Generation, Operation and Control", John Wiley & Sons, New York, 1984.
2. I J Nagrath and D P Kothari,"Modern Power System Analysis", Tata McGraw Hill, New Delhi.

UEE 06 DATA STRUCTURE

UNIT I

Overview; SPARKS; How to create programs; ARRAYS, STACKS AND QUEUES, Fundamentals, evaluation of expressions, multiple stacks and queues.

UNIT II: LINKED LISTS

Singly linked lists; Linked stacks and queues; polynomial addition; more on linked lists, sparse matrices; doubly linked lists and dynamic storage management; garbage collection and compaction; strings, a case study data representation for strings, pattern matching in strings.

UNIT III: TREES

Basic terminology; Binary trees, binary tree representation, binary tree traversal more on binary trees, binary tree representation of trees; application of trees, set representation, Decision trees, game trees, counting binary trees.

INTERNAL SORTING

Searching; insertion sort; quick sort; how fast can we sort; 2- way merge sort; heap sort; sorting on several keys; practical considerations for internal sorting.

UNIT IV: EXTERNAL SORTING

Storage devices, magnetic tapes, disk storage; sorting with disks, K- way merging, buffer handling for parallel operation, run generation; sorting with tapes, balanced merge sorts, polyphase merge, sorting with fewer than 3 tapes

UNIT V: FILE STRUCTURES

Definitions and Concepts; record organization; sequential files; the structure of sequential files, processing sequential files; indexed sequential files, the structure of indexed sequential files, processing indexed sequential files; direct files, the structure of direct files; processing direct files; other methods of files organization, virtual memory, VSAM files; multiple – key access, multilist organization, inverted list organization the controlled list length multilist organization.

TEXT BOOK:

1. Robert L.Kruse, “Data structures and program design “, PHI.

REFERENCES:

1. Mary E.S. Loomis, ”Data Management And File Processing “, PHI.
2. Bhagat Singh and Thomas L. Naps, “ Introduction to data structures “.

UEE 07 POWER SYSTEM OPERATION AND CONTROL

UNIT – I

Approach adopted in utilities for providing reliable, quality and economic electric power supply; Necessity for regulation of system frequency and voltage; P - F and Q - V control structure; recent trends in real time control of power systems.

UNIT – II

Load forecasting, components of system load, classification of base load, forecasting of the base load by method of least square fit; Introduction to unit commitments constraints on unit commitment, unit commitment using priority ordering load dispatching.

UNIT – III

LOCAL CONTROL: Power control mechanism of individual machine, mathematical model of speed governing mechanism, speed load characteristics of governing mechanism; Regulation of two generators in parallel.

SYSTEM CONTROL: Division of power system into control areas, LFC control of a single area; static and dynamic analysis of uncontrolled system; proportional plus integral control of a single area; LFC control, of two area system - uncontrolled case, static and dynamic response; Tie line with frequency bias control of two area.

UNIT – IV

Incremental cost curve, co-ordination equations with losses neglected - solution by iteration; co-ordination equations with loss included (No derivation of Bmn co-efficient); solution of co-ordination equations using Bmn co-efficient by iteration method., Base point and participation factors; Economic dispatch controller added to LFC.

UNIT – V

LOCAL CONTROL: Fundamental characteristics of excitation system; Block diagram model of exciter system

SYSTEM CONTROL: Generation and absorption of reactive power, method of voltage control, injection of reactive power, static shunt capacitor/inductor VAR compensator, tap changing transformer.

TEXT BOOKS:

1. Olle I. Elgerad, “Electric Energy System Theory and Introduction”, Tata Mc Graw Hill publishing company, New Delhi, 1983.

REFERENCES:

1. Allen J.Wood, Bruce F. Wollenbarg, “Power Generation, operation and control”, John Wiley and sons, 1984.

2. B.M.Weedy, "Electric Power System", John Wiley & sons, Elsevier publishing company, Amsterdam, 1972.
3. A.K.Mahalanbias, D.P.Kothari & S.I.Ahson, "Computer Aided Power System Analysis and Control" Tata Mc Graw Hill publishing company, New Delhi, 1990.
4. I.J.Nagrath, D.P.Kothari, "Power System Engineering", Tata Mc Graw Hill publishing company Ltd., 1998.

UEE 08 NETWORK ANALYSIS AND SYNTHESIS

UNIT –I NETWORK FUNCTIONS

Poles and zeros of network functions –Location of poles and zeros in the complex plane – Transfer functions and transfer functions properties of all network functions – Time domain response – Stability – Routh’s criterion.

UNIT –II: TWO PORT PARAMETER

Short circuit admittance parameters, open circuit Impedance parameters, and transmission parameters –Hybrid parameters and Image and Iterative parameters – parameters conversion. Insertion loss and reflection factor, attenuators, Equalizers.

T section and section – T to and to T transformation – Twin T networks, Bridged T, Parallel – T and Lattice networks.

UNIT –III: FOURIER SERIES

Fourier series representations for periodic signals – Parseval’s Theorem, Line spectra – Energy spectral density.

UNIT-IV: TRANSFORMATION

Laplace transformation – Applications to linear network systems – Fourier transformations.

UNIT-V: SYNTHESIS

Positive real function –Properties -Brune’s positive real functions – Reactive networks – Separation property – Forms of reactance functions – Foster’s reactance theorem – Synthesis by ladder and lattice network.

TEXT BOOK:

- 1.Frankline F.Kuo, "Network Analysis and Synthesis", Wiley International Edition, 1966.

REFERENCES:

1. Van Valkenburg, "Introduction to Modern Network Synthesis", 1984.
2. Gobind Darayanani, "Principles of active network synthesis & design", 1976.
3. G.K.Mithal, "Network Analysis", 1983.

UEE 09 BIO – MEDICAL INSTRUMENTATION

UNIT – I: TRANSDUSERS

Resistive, Capacitive, Inductive, Photo – electric, Piezo – electric, Thermo – electric, Mechanic – electric transducers – The pick up circuits for each of the transducers.

UNIT – II: ELECTRODES

Half – cell potential, Electrode impedance, equivalent circuits, and Microelectrode and Micro pipett – Their equivalent circuits – polarisable and non-polarisable electrodes.

UNIT – III: NON-ELECTRICAL PARAMETERS

Flow meters, respiration gas volumes and rate measurements, pressure measurements and force measurements, temperature measurements.

UNIT – IV: BIO – CHEMICAL MEASUREMENTS

PH, PCO₂, PO₂, PHCO₃, electro – phoresis, photoelectric calorimeter, spectro – Photometer.

X – RAYS

Soft and Hard X-Ray - general block diagram of x-ray generator for diagnosis, Radiography, Angiography, fluoroscopy, CAT.

UNIT – V: ISOTOPES

Properties, GM counter, Scintillation counter, Scanners.

ULTRASONICS

Principles – Models of Display – Application of Ultrasonic for Diagnosis.

TEXT BOOKS:

1. Geddes and L.E.Baker, “Principles of Applied Bio – Medical Instrumentation”, John Wiley and Sons, New York, 1975
2. Jacobson and Webster, “Clinical Engineering ”, PHI, New Delhi, 1979

REFERENCES:

1. Peter strong,” Bio physical Measurement and Measurement concepts”, Tetranic Inc., 1970
2. Segal and Kilpatric, “Engineering and Practice of Medicine ”, The William and Eilliams company, Baltimore, 1967
3. M.O.Chensey,”X Ray techniques for student Radiographers”, Blazwell Scientific publications, Oxford, 1971.

UEE 10 ADVANCED INSTRUMENTATION

UNIT I

Introduction; Functional elements of a measurement system – Classification of instruments- performance characteristics; Static and dynamic errors in measurements

UNIT II

Sensors and transducers- resistive, inductive and capacitive transducers-pots, strain gauges, LVDT, variable capacitance pickups, piezo-electric, electromagnetic, thermoelectric, photoelectric, optical encoders, resistive digital encoders, shaft encoder.

UNIT III

Signal conditioning; DC&AC signal conditioning systems-Instrumentation amplifiers; OP. Amp-Buffer amplifier, Differential amplifiers, charge amplifier, Filters-A/D & D/A Converters

UNIT IV

TELEMETRY & DATA PRESENTATION

DC Telemetry: Current, voltage and position tele metering systems. AC

Telemetry: Modulation-F.M., A.M., P.M. Pulse Telemetry: PAM, PDM, PPM, PCM-channels multiplexing: TDM, FDM.

Data Presentation: Visual display: Seven segment, LED, Nixie tubes, LCD. Recorders: Strip chart recorder, x-y recorder, magnetic tape recorders.

UNIT V

Process instrumentation: Measurement of pressure, temperature, speed, acceleration, flow, liquid level, sound and pH. A general outline of instrumentation system in thermal & nuclear power plants.

TEXT BOOKS:

1. Sawhney A.K, A course in Electrical and Electronics measurements and instrumentation, Dhanpat Rai & Sons.
2. Liptak B.C, Instrumentation in process Industry.

REFERENCES:

1. Nakre B.C and Choudhry K.K, Instrumentation Measurements and Analysis, Tata Mc Graw Hill publishing company Ltd., New Delhi, 1988.
2. Ernest O Doebelin, Measurement systems Application and Design, IV edition, Tata Mc Graw Hill Ltd.

GROUP B (Elective II, Elective III Subjects)

UEE 01 DIGITAL CONTROL SYSTEM

UNIT - I:

Review of sampled data control system – sample and hold operation – review of z transform - pulse transfer function – z – domain equivalents to s-domain–stability analysis -correlation between time response and root location in the z plane –effect of pole zero configuration in z plane – transient response of sampled data system – steady state error.

UNIT – II

Discrete time state equations–state diagram – realization of pulse transfer function-Direct realization – cascade realization –parallel realization sampled data model of Continuous time system-concepts of controllability and observability–systems with Dead time.

UNIT – III

Transform of digital control systems–design specifications–design on the w-plane - Digital PID controller – Introduction to design on the z plane.

UNIT – IV

Implementation of control algorithm using microprocessor – general description of Micro controllers – digital quantization – signal quantization – microprocessor based Position control system. System model – control algorithm – micro controller.

UNIT – V

Microprocessor based temperature control: The processor model – the control Algorithm – hardware mechanization – system software – stepping motors and their Interface to microprocessors. Operational features of stepping motors – stepping motor device circuits – LP drive – Chopper drive – interfacing of stepping motors to microprocessor.

TEXT BOOK:

1. Gopal M , “Digital Control Engineering ”, Wiley Eastern publishers.

REFERENCES:

1. Nazareth I J and Gopal M, “Control System Engineering ”, 2nd edition, Wiley Eastern, NewDelhi, 1982.
2. Kuo B C, “Digital Control System”, Prentice Hall.
3. M.Gopal, “Digital Control & State Variable Methods, 2nd edition, TMH, 2003.

UEE 02 SOLID STATE RELAYS

UNIT – I

Philosophy of power system protection and its requirements – conventional Vs static relays – generalized characteristics and operational equations of relays - steady state and transient performance of signal deriving elements – signal mixing techniques and measuring techniques CTs and PTs in relaying schemes – saturation effects – stabilizing resistors

UNIT – II

Static relay circuits using analog and digital Ics for over current, differential and directional relays.

UNIT – III

Static relay circuits for generator loss of field, under frequency, distance, impedance, reactance, mho and reverse power relays.

UNIT – IV

Static relay circuits for carrier current protection – steady state and transient behavior of static relays – testing and maintenance of relays – tripping circuits using – thyristors.

UNIT – V

Microprocessor based relays – hardware and software for the measurement of voltage, current, and frequency and phase angle – microprocessor based implementation of over current, directional, impedance and mho relays.

TEXT BOOKS:

1. Van C Warrington, “Protective Relays – Their Theory and Practice”, vol. II, Champman & Hall Ltd., London, 1969 & I.
2. T.S.Madhava Rao, “Power System Protection – Static Relays”, Tata McGraw Hill, New Delhi, 1984.

REFERENCE:

1. Ram B., ”Fundamentals of Microprocessors and Microcomputers ”, Dhanpat Rai & Sons, New Delhi, 1992.

UEE 03 DIGITAL LOGIC WITH VHDL DESIGN

UNIT-I

Introduction to CAD tools-Design Entry-Synthesis is – Functional simulation-Introduction to VHDL – Writing simple. VHDL code-using CAD tools to complement circuits in CPLDs and FPGAS.

UNIT-II

Implementation Technology-NMOS Logic Gates – CMOS Logic gates-Negative logic system. Standard chips – programmable logic derives. PLA, PAL, CPLDs, FPGAS. Using Cad tool to implement circuits in CPLD and FPGA practical aspects – transfer gates- implementer details of SPLDs CPLDs and FPGAs

UNIT-III

Optimized implementation of logic further – strategies for minimization – multi level synthesis – CAD tool subtrator Arithmetic circuits – Adder – signed/unsigned. Design of arithmetic circuits using CAD tools.

UNIT-IV

Combinational circuit-multiphase, decoder encoder VHDL for combinational circuits. Flip flops, register, counter and simple processor.

Synchronous sequential circuits-Design of finite state using CAD tool.

UNIT-V

Asynchronous sequential circuits – Design examples. Digital system design Building blocks – design – clock synchronization. Logic circuits – Faucet models path sensitizing – Random tests – testing sequential test- built in self-test. Testing of pales.

TEXT BOOK:

1. Stephen Brown, Zvonko Vransri, “ Fundamental of digital logic with VHDL design”, Tata Mc Grow Hill, 2002.

REFERENCES:

1. Charles H. Roth, Jr, “Digital systems Design using VHDL”, Thomson learning 2001.
2. Bhasker. J.A., “Guide to VHDL syntax upper saddle River”, NJ. Prentice Hall, 1995.

UEE 04 MICRO CONTROLLERS AND APPLICATIONS

UNIT - I

Role of micro controllers - 8 bit micro controllers - architecture of Intel 8031/8051/8751 - hardware description - memory organisation - addressing modes - Boolean processing - instruction set - simple programs.

UNIT - II

Peripheral interface - interrupt - applications; Automobile turn indicator - small dc motor control.

UNIT - III

16-bit micro controllers - Intel 8096 - architecture - modes of operation-addressing addressing modes - Instruction set - simple programs.

UNIT - IV

Peripheral function of 8096 - Interrupt structure - Timers - High speed inputs and outputs - analog interface - PWM output - serial port - I/O ports - status and control registers - watch dog timer.

UNIT - V

Hardware design - hardware connections - drive and interface levels - analog inputs and outputs - I/O and serial port timings - bus timing and memory interface - noise protection - EPROM programming - Expansion methods - I/O port expansion - memory expansion - serial port expansion. Application; stepper motor control - AC power control - introduction to Motorola ACCII

TEXT BOOKS:

- 1.Intel, "Micro controller Hand Book", Intel Corporation, USA, 1984.
- 2.Intel, "16 bit Embedded Controller Hand Book", Intel Corporation, USA, 1989.

REFERENCE:

- 1.John S Peatman, "Design with Micro controllers", McGraw Hill Book Company, Singapore, 1988.

UEE 05 RENEWABLE ENERGY SOURCES

UNIT I

General: Primary and commercial energy, sources - study of availability energy consumption pattern and growth rate in India.

Non-commercial energy sources - Availability, Economics, and efficiency.

UNIT II

Solar Energy and Applications: Solar radiation - Principles of solar energy collection -

Types of collector – Characteristics and Principles of different types of collectors and their efficiencies,

Solar Energy applications - water heaters, air heaters, solar cooling; solar drying and power generation - solar tower concept (solar plant) - solar pump,

UNIT III

Wind energy: Energy from the wind - General theory of wind mills - Types of wind mills - performance of wind machines - wind power - efficiency.

UNIT IV

Tidal energy: Energy from tides and waves - working Principles of tidal plants - tidal power generations Geothermal energy - principle of working geothermal power plants.

UNIT V

Bio-energy: Energy from Bio-mass - Biogas plants various types _ Industrial wastes - Municipal waste Burning plants - Energy from the Agricultural wastes Applications.

REFERENCES

1. S.P. Sukhatme, solar. Energy; (Principles of thermal collection and storage), Tata McGraw Hill Publishers, Fourth Print - February 1989.
2. G.D. Rai, Solar Energy Utilization, Khanna Publishers. Second revised edition, 1984.
3. Ronald Shaw, Wave Energy; (A Design challenge), Ellis Horwood Limited Publishers, First edition, 1982.

UEE 06 PERSONAL COMPUTER SYSTEMS

UNIT – I: 8088 MICROPROCESSOR

Architecture of 8088 processor - minimum and maximum modes - Addressing modes and Instruction set - introduction to 80386.

UNIT – II: PC SYSTEM UNITS

IBM PC system units - system memory map - I/O address map - PC bus (I/O channel) specifications - PC classification - PC/XT/AT/SUPER AT.

PROGRAM CREATION

Creation of programs in Assembly language - Assembler - Linker and Debugger.

UNIT – III

Structure of MS - DOS BIOS - DOS Kernel - Command processor - specifying files in MS - DOS (version - 2) Layout of Boot record, File allocation - Table and file Directory - MS - DOS booting process - program segment prefix - COM and EXE files.

UNIT – IV: ADAPTER CARDS

BIOS and DOS interrupts - Keyboard Adapter - Printer Adapter - Monochrome and Color Graphics Adapters - Speaker interface.

UNIT - V

Diskette format - Diskette drive - Adapter card using UPD 765880 - Asynchronous communication adapter card using INS8290 -DART - other PC bus adapter cards such as analog and digital I/O card.

TEXT BOOKS:

1. Charles A Holf, "Micro computer Organisation, Hardware and Software", Macmillan Pub Co., New York, 1985.
2. Steven Simon, "MS - DOS Bible", Howard Sams Co., USA 1986.

REFERENCES:

1. Avatar Singh and Walser A Triebel, "IBM PC/8088 Assembly Language Programming", Prentice Hall Inc., USA, 1985.
2. PC/XT Technical Reference Manual.

UEE 07 POWER SYSTEM STABILITY

UNIT-I

Concept and importance of stability in power system operation and design. Steady state, transient and dynamic stability. The swing equation of machines connected to infinite bus bar and machines connected together

UNIT -II

Swing curves-Solution by point by point and Euler's method. Qualitative treatment of stability studies on Network analyzers and digital computers..

UNIT -III

Equal area criterion, calculation of critical clearing angle by equal area criterion of various fault conditions. Effect of reclosure. Factors affecting transient stability and its improvement.

UNIT-IV

Types of excitation systems, AVR, calculation of exciter response by graphical integration and step-by-step methods. Effect of speed governing system inertia and damping on steady state and transient stability.

UNIT-V

Significance of steady state stability, power limit of transmission systems. Clarke's diagram of two machine systems with and without losses. Steady stability of one machine connected to an infinite bus bar.

TEXT BOOK:

1. K.A. Gangadhar, "Analysis and stability of Electrical power system", Khanna Publishers, 2001.

REFERENCES:

1. E.W.Kimbark, "Power System Stability", Vol-I and II, Wiley Eastern Ltd.,
2. Olle.I.Elgerd, "Electric Energy Systems Theory-An Introduction", TataMcGraw-Hill Pub.co.Ltd.,New Delhi.
3. S.S.Vadhera, "Power System Analysis and Stability", Hanna Publishers, New Delhi.

UEE 08 POWER SYSTEM RESTRUCTURING AND DEREGULATION

UNIT I:

Deregulation of Electric utilities: Introduction-Unbundling-Wheeling-Traditional Central utility model-Reform motivations-Separation of Ownership and operation- competition and direct access in the Electricity market –ISO-components of ISO-types of ISO-role of ISO-Electric utility market in different countries.

UNIT II:

Transmission expansion in the New Environment – Introduction – role of transmission planning – vertically integrated utility – three models of electricity market – Profit transmission planning – pool – bilateral trades – multilateral trades.

UNIT III:

Transmission pricing in open access system – Introduction – rolled in pricing methods – marginal pricing method – embedded cost recovery – pricing models in different countries.

UNITIV:

Total transfer capability – CBM and TRM – Available transfer capability (ATC) – methods to compute ATC – concept of congestion management – inter and inter zone congestion – congestion pricing management – Transmission congestion contracts – Ancillary services.

UNIT V:

Salient features of Indian Electricity Act 2003 – TSO – Availability based tariff – Electric supply industry structure under deregulation in India – regulatory and policy development in Indian power Sector – Opportunities for IPPs and CPPs under electricity Act 2003.

TEXT BOOKS:

1. Wood and Wollenberg, “Power system operation control”, second edition, John Wiley sons, 1996.
2. Loi Lei Lai, “Power system Restructuring and Regulation”, John Wiley sons, 2001.

REFERENCES:

1. Michael Einhorn and Riaz Siddiqi, “electricity transmission pricing and technology”, Kluwer Academic publishers, 1996.
2. M.Ilic and F.Galiana and L.Fink, “Power systems restructuring: Engineering and Economics”, Kluwer Academic publishers, 1998.
3. M.Shahidehpour and M.Alomoush, “Restructuring Electrical Power Systems”, Marcel Decker Inc., 2001.

UEE 09 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION

UNIT-I: GENERAL ASPECTS OF HVDC AND HVAC TRANSMISSION

Introduction - Historical sketch - Comparison between AC and DC transmission - kinds of DC links – Planning and modern.

UNIT-II: CONVERTER CIRCUITS AND ANALYSIS

Three phase bridge converter - Simplified analysis, waveforms with and without overlap - Current and voltage relations - Input power factor – Principles of control – Control

characteristics – Constant ignition angle control – Constant current and extinction angle control.

UNIT-III: PROTECTION

Converter faults, commutation failure, axis fire – Disturbance caused by over current and over voltage – Protection against over current and over voltage – Surge arrestors smoothing reactors – Corona effects of DC line – Transient over voltages for DC line – Protection of DC links.

UNIT-IV

Sources of reactive power static VAR system – Reactive power control during transients – Generation of harmonics – Types and design of various AC filters, DC filters – Career if mg and RI noise.

UNIT-V

Types of MTDC system – Comparison of series and parallel MTDC system – HVDC insulation – DC line insulators – DC breakers – Characteristics and types of DC breakers.

TEXT BOOK:

1. Edward Wilson Kimbark, “Direct current Transmission”, Wiley Interscience, Vol. I, New York, 1971.

REFERENCES:

1. C. Adamson and N.G. Hingorani, “High voltage DC power Transmission”, Garraway Limited, England.
2. J. Arrialga, “HVDC Transmission”, Peter Peregrinus Ltd., London, 1983.
3. Kosko, “Neural Networks and Fuzzy Sets Applications”, PHI, 1970.

UEE 10 PRINCIPLES OF ROBOTICS

UNIT-I: TYPES OF ROBOTS

Automation and robotics; Robot Anatomy; Classifications of Robots by DOF motion, platform, power source, intelligence and application area.

BASIC COMPONENTS OF ROBOTS

a) Manipulators; Wrists; End effectors; Control units; Power units; Robot sensors; b) Robot sensors; Proximity sensors; Ranger sensors, Tactile sensors; Visual sensors; Sensors for mobile Robots.

UNIT-II: ROBOT MOTION ANALYSIS AND CONTROL

Introduction to manipulator kinematics; Homogeneous transformations and Robot kinematics; Manipulator path control; Robot dynamics; configuration of a Robot controller; Obstacle avoidance.

UNIT-III: ARTIFICIAL INTELLIGENCE

AI –techniques; LISP programming; AI and Robotics; LIPS in the factory; Sensing and digitizing function machine vision; Image processing and analysis; training and vision system; natural language processing; speech recognition; legged locomotion; collision avoidance; natural networks computing.

UNIT-IV: ROBOT PROGRAMMING

Methods of Robot programming; lead through programming methods; a robot program as a path in space; motion interpolation; weight, signal and delay commands; Branching, capabilities and limitations of lead through methods.

UNI T – V: APPLICAIONS OF ROBOT

Material handling; Processing operations; Assembly and inspection; Future application.

TEXT BOOKS:

1. Mikell P.Groover, Michell wein,Roger N. Nagal and Nicholas G.Ordey, "Industrial Robotics, technology, Programming and applications" Mc Graw Hill, Last print, 1987
2. Harry H. Poole, "Fundamentals of Robotics Engineering", Van Nostrand Reinhold, New York, 1989.

REFERENCES:

1. V.Damel Hunt, "Smart Robots", Chappan and Hall, 1985
2. P.G.Ranky, C.Y.Ho, "Robot Modeling", IFS (publication) Ltd., UK., 1985.
3. Wenwar L. Hall, Bethe C. Hall, "Robotics – A user friendly introducion", Holt – Saunders International Edition, Japan, 1985.

**LIST OF INTERDEPARTMENTAL ELECTIVES
(UID 5005 & UID 6005)**

UID : 011 - EXPERIMENT STRESS ANALYSIS
(Offered by Civil Engineering)

Unit –I

Experimental stress analysis – its scope and importance characteristics of ideal strain gauge – Mechanical- optical – acoustical – inductance – capacitance strain gauges.

UNIT –II

Electrical resistance strain gauges – gauge characteristic and types – selection of gauges – gauge factor – gauge materials – transverse sensitivity - rosettes – analysis of stress and strain using rosettes – circuiting – equipment for recording static and dynamic strains - load , pressure and displacement transducers.

UNIT –III

Model analysis – direct and indirect models – law of structural similitude – choice of scales – model materials – limitations of model studies – Buckingham Pi theorem - design of direct and indirect models – begg’s deformer and its application

UNIT –IV

Two dimensional photo- elasticity - optical principles stress optical law – methods of producing isoclinics and isochromatics – methods measuring fractional fringe orders model materials – methods for separating principle stresses.

UNIT –V

Photo elastic coatings
Moire fringe and brittle lacquer techniques
Introduction to stress freezing techniques

Test Books

1. V.M. Vazirani, S.P Chandola, “Experimental stress Analysis”,Khanna publishers,1988
2. L.S Srinath “Experimental stress Analysis” Tata McGrand Hill, New Delhi , 1984
3. Experimental stress Analysis, Dr. Sadhu Singh, Khanna Publishers ,1982

Reference

James W Dalley and William F Riley “ Experimental Stress Analysis” Tata McGrand Hill, 1965.

**UID 012 - COMPUTER AIDED PLANNING AND DRAFTING
(Offered by Civil Engineering)**

UNIT –I

Introduction - Creating New drawing – Opening existing drawings – working with tool bars – using short cut menus – pointing devices- setting drawing units- modifying AutoCAD environment – viewing and updating drawing properties – modifying tool bars

UNIT –II

Using commands and systems variables – creating objects – Hatching drawing with previsions – controlling the drawing display – Editing method - using layers and object properties – auditing text to drawing – creating dimensions .

UNIT –III

Using blocks and external reference – management content with auto cad design centre – creating a layout to plot – plotting drawings batch plotting – using scripts files – working three – dimensional space – interactive veering in 3D – creating three – dimensional object

UNIT –IV

Rendering and imaging – using 3D images- drawing 3D models creating hidden –line images – using render with related applications. Working with raster image –managing raster images- accessing raster image using internet- modifying images and image boundaries

UNIT –V

Creating compound documents with OLD – linking and embedding information –using information from other application in AutoCAD. Accessory external database-working with table data- creating labels – accessing the internet visual Lisp and auto Lisp – VBA and active X automation

Text Books

1. Introduction to AutoCAD 2002 by J.T Roberts
2. Introduction to AutoCAD 2002 by George Omura
3. Introduction to AutoCAD 2002 by A. Yarwood

Reference

1. 3D Modelling in AutoCad by John EL Wilson Arnie Willians - 2002

UID 021 – MECHATRONICS
(Offered by Mechanical Engineering)

Unit – I : Introduction

Introduction to Mechatronics – Mechatronics in Products – Mechatronics in Engineering Design – Measurement Systems – Electronics for Mechanical – Mechanical System for Electronics. System Response – Dynamic Characteristics of Systems – zero order - First order – Second order – System Modeling and analogies.

(9 hours)

Unit – II : Amplifying and Digital Circuits

Amplifier – Operational amplifier – Instrumentation amplifier – comparator. Digital Representations – Boolean algebra – Design of logic Network – Flip flops – Application of flip flops – Special purpose Digital integrated circuits.

(9 hours)

Unit – III : Microprocessor and Data Acquisition

Microprocessors and micro Computers – Micro Controllers – Numeric key board – LCD Display – Method to Design a Micro controller based system. Data acquisition – quantizing theory – Analog to Digital conversion – Digital to Analog conversion.

(9 hours)

Unit – IV : Sensors and PLC

Performance Terminology – Semi conductor Sensors and micro electro mechanical Devices - Actuators – Hydraulics Actuators – pneumatic Actuators. Programmable Logic Controllers (PLC) – basic structure – input / output processing – programming – Mnemonics Timers – relays and counters – data handling – selection of PLC.

(9 hours)

Unit – V : Control Architecture and Mechatronic Systems

Control architecture – Analog – Digital – Micro Controller – Single Board Computer – personal Computer designing. Case studies of Mechatronic system. Introduction to design of Mechatronic systems - Coin counter - Robotics - Magnetic Bearings etc..

(9 hours)

Text Books :

1. David G. Alciatore and McGraw Mecheal.B.Histand - Introduction of Mechatronics and Measurement Systems, Hill International Editio, 1999.
2. HMT - Mechatronics, Tata McGraw Hill Publishing Company Ltd., 1998.
3. Lawrence J.Kamm - Understanding Electro – Mechanical Engineering, An Introduction to Mechatronics”, Prentice Hall, 2000.

UID 022 - TOTAL QUALITY MANAGEMENT
(Offered by Mechanical Engineering)

Unit – I

Introduction to TWM – Strategies concepts and objectives – Total quality model – TQM as applied to Indian Industries – Quality circle concepts – concepts, objectives and functions of quality circles – Benefits of the organization – Training of quality Circle members – Implementation. (9 hours)

Unit – II

Tools and Techniques – The seven management tools =- Technique for analyzing a quality process – Statistical process Control – Introduction to S-S concepts (9 hours)

Unit – III

Cost of quality – Taguchi's quality loss function – House keeping concepts for industries, tool room, production shop – processing industries. (9 hours)

Unit – IV

Quality based product and process Design – Design for reliability – Design for maintainability – Quality Function Deployment (QFD) – QFD and Quality Assurance – QFD Principles, Concepts and applications – case studies. (9 hours)

Unit – V

KAIZEN Concepts – Kaizen by TQC – POKA YOKE ISO 9000 certification system – 9001 to 9004 systems – procedures, audits and reviews – case studies. (9 hours)

TEXT / REFERENCE BOOKS

1. S.M.Sundara Raja : Total Quality Management Tata Mc Graw Hill, 1998.
2. Patrick.J.Sweeney(editor) : TQM for Engineering, Quality Resources, Newyork, 1993.
3. John Bank : The Essence of Total Quality Management, Prentice Hall of India, 1998.
4. James I Bossert, : Quality Function Deployment, ASQC quality press, Wisconsin, 1994.

UID 031 - COMMUNICATION ENGINEERING
(Offered by Electronics & Communication Engineering)

UNIT – I

Modulation – Need for modulation – Amplitude modulation – frequency spectrum – Power relation – different types of modulators – SSB and VSB generation. AM transmitters – Block diagram – functions of each block – high level transmitters.

UNIT – II

Angle modulation – principle of Frequency and Phase modulation – Relation between FM and PM waves – Bandwidth of FM – Narrow band wide band FM – Generation of FM wave – Direct and Indirect methods – FM transmitters – Block diagram – functions of each block.

UNIT – III

Detection and Receivers – Detection – Diode detectors – Synchronous detection – FM detectors – slope detectors – Phase discriminators – Ratio detectors.

Receiver – different types – super-heterodyne receivers – Block diagram – Choice of IF and Oscillator frequencies – Tracking – alignment – AVC, AFC – Receiver characteristics.

UNIT – IV

Pulse modulation systems – Sampling theorem – Pulse amplitude modulation – Channel bandwidth for PAM – detection of PAM signals – Pulse time modulation – generation of PDM and PPM – conversion of PDM and PPM – conversion of PDM to PPM – detection of PTM signals – Pulse code modulation – quantization – PCM systems – Encoder – decoder – Time division multiplexing – Frequency division multiplexing.

UNIT – V

Broadband communication system (Block Diagram Approach) – Telegraph system – Tele printer and Facsimile system – Telephone system – crossbar and electronic exchanges – Television system – microwave communication and optical communication systems – Principle of satellite communication – computer communication – Electronic Mail.

Text Books:

1. G. Kennedy, “Electronic Communication Systems”, McGraw Hill, 1984.
2. Wayne Tomasi, “Electronic Communications Systems – Fundamentals Through advanced”, 4th Edition, Pearson Education, 2001.

References:

1. Taub and Schilling, “Principles of Communication Systems”, McGraw Hill, 1989.
2. Bruce Carlson, “Communication Systems”, McGraw Hill, 1985.

UID 032 - COMPUTER NETWORKS
(Offered by Electronics & Communication Engineering)

UNIT I

Data Communication Concepts: Transmission media – Data encoding – Interface and modems – Multiplexing – Error detection and correction – Digital subscriber line – Circuit switching – Packet switching – Message switching.

UNIT II

Wide Area Networks: ISO-OSI layered architecture – Function of the layers – Data link protocols – HDLC, LAPB, LAPD, Inter networking devices – Repeaters, bridges, routers, routing algorithms – Distance vector routing, link state routing, X.25 protocol, congestion control.

UNIT III

Frame Relay and ATM Networks: Frame relay operation – Layers and traffic control; ATM networks – Architecture switching, Layers service classes.

UNIT IV

Local Area Networks: LAN topology – Ethernet – Token bus – Token ring – FDDI – Wireless LAN, ATM LAN – IEEE 802 Medium access control layer standard – Random access protocols – ALOHA – Slotted ALOHA.

UNIT V

OSI Layers: Transport layer issues – Session layer – Synchronization – Presentation layer – Encryption, decryption, Application layer – Message handling system, file transfer, virtual terminal – E-mail.

Text Book:

Achyut S. Godbole, Atul Kahate, “Computer Communication Networks”, Tata McGraw Hill, New Delhi, 2004.

References:

1. Andrew. S. Tanenbaum, “Computer Networks”, PHI, 1956.
2. W. Stallings, “Data and Computer Communication”, Second Edition, New York, Mc Millan, 1988.

UID 041 - RELATIONAL DATABASE MANAGEMENT SYSTEMS
(Offered by Computer Science & Engineering)

UNIT I

Introduction to Database Systems-applications-Comparison with file systems-Data models-View of data-database languages-database users and administrators -Transaction management system structure-application architecture-constraints-keys-Design issues.

UNIT II

Entity_Relationship Diagrams-Relational model-structure of relational database: basic structure-Schema-Fundamentals of Normalization-1NF, 2NF, 3NF-Introduction to Query languages.

UNIT III

Introduction to Oracle-Introduction to PL/SQL: Why PLSQL-Features of PL/SQL-PL/SQL Block-lexical units-variable declaration-PL/SQL types-PL/SQL Control Structures-PL/SQL records and tables-SQL statement-DML-pseudo columns –grant and revoke privileges -transaction control. Built in SQL functions: character functions, numeric-date-conversions-group and other functions.

UNIT IV

Cursors: Introduction-fetch loops-variables-subprograms : creating procedures and functions, subprogram locations and dependencies-privileges-packages-Triggers-error handling.

UNIT V

Introduction to Microsoft SQL Server-MY SQL-MS ACCESS. Case Studies: Material Management-Library Information System.

TEXT BOOKS

1. "Database System Concepts" – Silberschatz And Korth, McGraw Hill-Fourth Edition,2002.
2. "Oracle 8: PL/SQL Programming" – Scott Urman, Oracle Press, Tata McGraw Hill, 1999.

UID 042 - VISUAL PROGRAMMING

(Offered by Computer Science & Engineering)

UNIT I

INTRODUCTION: Operating System fundamentals: DOS-WINDOWS. Features of Object Oriented Programming: Abstraction-Encapsulation-Inheritance-Classes-Derived classes-Virtual functions-Streams.

UNIT II

VB INTRODUCTION: Datatypes and Variables-Keywods-Statements-Controls and forms: types-properties-events-methods. Built-in: functions-procedures. User-defined: functions-procedures-properties.

UNIT III

DATA OBJECTS: Open Data Base Connectivity (ODBC)-Active Data Objects (ADO)-Data Access Objects (DAO)- Active X Data Objects and Data Connection (ADODC)-Data environment-Data report-ADODC based controls.

UNIT IV

APPLICATION DEVELOPMENT AND AUTOMATION: MDI-Menu-Toolbar-Active X-Mouse events- OLE based Automation-Class-Modules-DLL.

UNIT V

VC++ INTRODUCTION: Windows console application-AppWizard-MFC introduction-Windows MFC application.

TEXT BOOKS:

- 1.Gary Cornell, '*Visual Basic 6.0*', Tata McGraw Hill, 1998.
- 2.C.H. Pappas, W.H. Murray, III '*Visual C++: The Complete Reference*', Tata McGraw Hill, 1999.

**UID 051 - INTRODUCTION TO SOFT COMPUTING
(Offered by Electrical & Electronics Engineering)**

UNIT-I

Fuzzy systems: Crisp sets – Fuzzy sets – Operation and properties. Fuzzy relations – Equivalence and tolerance relations. Fuzzy membership function- types and definitions. Membership value assignments – Rule based systems. Type of fuzzy inference. Structure and parameters of a Fuzzy system- computer assignment.

UNIT-II

Neural Networks: Biological inspiration – Neuron model and Network architectures perception – architecture, learning rule. Limitations of multilayer perception- Back propagation algorithm – learning rule – computer assignments.

UNIT-III

Genetic Algorithm: Goals of optimization – Introduction to GA – terminologies. Simple GA- Data structure. Genetic operation – crossover, mutation, fitness scaling, Inversion- A Multi parameter mapped fixed point coding – computer assignments.

UNIT-IV

Evolutionary programming: Single and multi objective optimization-general algorithm-Binary GA, Real parameter GA, constraint handling in GA Evolution strategies general programming – computer assignments.

UNIT-V

Applications to various branches of Engineering and science- Application of fuzzy, neural, GA and EP in computer science, electrical, communication, instrumentation and control, mechanical and civil engineering.

TEXT BOOKS

1. Timothy J. Ross 'Fuzzy logic with Engineer application' McGraw Hill.
2. Martin T. Hagan Howard B.Deruth, Mark Beale 'Neural Network Design' Thompson Learning 1996
3. David E. Gold Berg 'Genetic Algorithm' Pearson Education 2002.
Multi objective optimization using Evolutionary Algorithm – by Kalyanmoy Deb.
John Wiley and sons 2002

UID 052 - INDUSTRIAL ELECTRONICS
(Offered by Electrical & Electronics Engineering)

UNIT – I: THYRISTERS

SCR – SCR behaviour and rating – phase control of SCR – turn-off of SCR – SCR with resistive load and inductive load – rectifiers with back emf load – TRIAC – TRIAC circuits – phase control of SCR

UNIT – II: REGULATORS OF VOLTAGE AND MOTOR SPEED

Voltage compensator – solid state DC voltage regulation – DC shunt motor – armature control and field control of motor speed – electronic control of DC motor – speed regulator action – full wave motor speed regulation by one SCR

UNIT – III: INDUSTRIAL HEATING

Induction heating – principles- theory – merits – applications – high frequency power source for induction heating

Dielectric heating – theory – electrodes used in dielectric heating – method of coupling of electrodes to RF generator – thermal losses in dielectric heating

UNIT – IV: INDUSTRIAL TIMING CIRCUITS

Constituents of industrial timing circuits – timers – classification of timers – thermal timers – electromechanical timers – electronic timers – classification of electronic timers – digital timing element – digital counters – SCR delay timer – IC electronic timer

UNIT – V: PROGRAMMABLE LOGIC CONTROLLERS

Number system and codes – basics of PLC programming – timer and counter instructions – data manipulation instructions – shaft register and sequence instructions

TEXT BOOKS

1. Frank D. Petruzella, Industrial Electronics, McGraw Hill International Editions, 1996
2. G.K. Mithal, Ravi Mithal, Industrial Electronics, Khanna Publishers, Delhi, 1995
3. George M. Chute, Robert D Chute, Electronics in Industry, McGraw Hill International Editions

**UID 061 - ELEMENTS OF BIOTECHNOLOGY
(Offered by Chemical Engineering)**

UNIT-I

What is Biotechnology, Biotechnology -an interdisciplinary pursuit, public perception of Biotechnology, Biotechnology and the developing world? Classification of micro-organisms, The cell, its organelles and their respective functions, Basic metabolism of cells, DNA – Structure and function, RNA-Structure and function.

UNIT-II

Enzyme Technology: Proteins, Protein Structure & Function, Protein –Protein interactions, The nature of enzymes, application of enzymes, Technology of enzyme production, immobilized enzymes.

UNIT-III

Biotechnology and Medicine: Introduction, Pharmaceuticals and bio-pharmaceuticals, Antibiotics, vaccines and monoclonal antibodies, gene therapy. Biotechnology and Environment: Introduction, Microbial ecology / environmental biotechnology, waste water and sewage treatment, landfill technologies, composting, bioremediation, microbes and the geological environment, sustainability.

UNIT – IV

Genetics And Biotechnology: Introduction, industrial genetics, protoplast and cell fusion technologies, genetic engineering, Introduction to Bio-informatics, potential lab biohazards of genetic engineering, Bioethics.

UNIT V

Biotechnology in Agricultural, food and Beverage industries: Introduction, plant biotechnology, diagnostics in agriculture, food and beverage fermentation, speciality fermentation products e.g.: biopolymers, bio-pesticides, miscellaneous microbial derived food products.

Text Books/ Reference Books:

1. Shuler, M.L. and F. Kargi. 1992. *Bioprocess Engineering*, Prentice-Hall, Englewood Cliffs, NJ.
2. Bailey, J.E. and D.F. Ollis. 1986. *Biochemical Engineering Fundamentals*, 2nd Ed. McGraw-Hill, New York.
3. Biotechnology by Smith, Cambridge Press.
4. Modern Concepts of Biotechnology by H.D. Kumar, Vikas Publishing House Pvt. Ltd.
5. Elements of Biotechnology by P.K. Gupta, Rastogi Publications.

UID 062 - INDUSTRIAL POLLUTION ABATEMENT

(Offered by Chemical Engineering)

UNIT I

Man and environment, types of pollution, pollution controls aspects, industrial pollution, pollution monitoring and analysis of pollutants, Indian pollution regulations.

UNIT II

Water pollution- source of water pollution- measurement of quality- BOD- COD- colour and odor-PH- heavy metals-treatments etc (qualitatively). Industrial waste water treatment (qualitatively) and recycle.

UNIT III

Solid wastes- quantities and characterizations – industrial –hazardous waste- radio active waste-simple treatments and disposal techniques (qualitatively treatment).

UNIT IV

Air pollution-types and sources of gaseous pollutants-particulate matter-hazardous air pollutants-global and atmospheric climatic change (Green house effect)-acid rain. Industrial exhaust – characterization and Methods of decreasing the pollutants content in exhaust gasses (qualitatively)

UNIT V

Noise pollution –sound level-measuring transient noise-acoustic environment-health effects of noise –noise control.

Text books / Reference books:

- 1.'Environmental pollution and control' J.Jeffrey peirce etl, Butterworth-Heinemann; 4th edition , 1997.
- 2.'Pollution control in Process Industries', S.P.Mahajan, Tata Mc.Graw Hill, 1990.
- 3.'Environmental Pollution Control Engineering', C.S.Rao, New Age International Ltd., 1992.
- 4.'Industrial Air Pollution Engineering', V.Cavaseno, Mc.Graw Hill, 1980.
- 5.'Pollution Control Theory', Martin Crawford, Mc.Graw Hill, 1976.
- 6.'Solid Wastes', Martell, John Wiley, 1975.

UID 071 - INDUSTRIAL CONTROL SYSTEMS
(Offered by Electronics & Instrumentation Engineering)

UNIT – I

INTRODUCTION: Need for control – block diagram representation of a Control System- mathematical modelling-transfer function and state space modelling-examples in mechanical, electrical, level, pressure and thermal processes –time response analysis of first order and second order processes- stability-self-regulation – servo and regulator operation.

UNIT – II

CONTROL ACTIONS AND CONTROLLERS: Basic control actions characteristics of on-off, proportional, integral and derivative control modes – P+I, P+D and P+I+D control modes – Tuning of controllers-Finite control elements-valves and actuators-characteristics of control valves – inherent and installed characteristics.

UNIT-III

COMPUTER CONTROL: Basic building blocks of computer control system – SCADA – Direct Digital Control – AI and expert control systems – Case studies on computer control for Industrial process.

UNIT-IV

PROGRAMMABLE LOGIC CONTROLLERS: Evolution of PLC's – Sequential and programmable controllers – Programming of PLC – Relay logic – Ladder logic – Functional blocks connecting PLC to computer – Case study of bottle filling system.

UNIT-V

DISTRIBUTED CONTROL SYSTEMS: Evolution – Different architecture – local control unit – Operator interface – Displays – Engineering interface-DCS applications.

References:

1. Stephanopoulos, G., Chemical Process Control, Prentice Hall of India, New Delhi, 1990.
2. Michal P.Lucas, Distributed control systems, Van nostrand Reinhold Co.,1986.
3. Petrezeulla, Programmable Controllers, McGraw Hill, 1989.

UID 072 - TRANSDUCERS AND INSTRUMENTATION

(Offered by Electronics & Instrumentation Engineering)

UNIT – I

Generalised scheme of measurement-Statistical analysis of measurement data- Mean, Standard deviation-Probability of errors-Gaussian Distribution- Probable error and limiting error Static characteristics of instruments – Accuracy, Precision, Sensitivity, Linearity, Resolution. Hysteresis, Threshold, Input impedance, Loading effects- generalised mathematical model of measurement systems-Dynamic characteristics.

UNIT-II

Electronic analog meters-DC and AC Voltmeters, AC and DC bridges- Digital method of measuring frequency, period, velocity. Displacement and speed Display Devices- CRO's - LED'S ,LCD's.

UNIT – III

Transducers-Characteristics-Strain gauges-LVDT, Eddy current transducers, Hall effect transducers, Magnetostrictive transducers, capacitive Transducers –Piezoelectric transducers- photoelectric Transducers-Thermo electric transducers.

UNIT – IV

Measurement of temperature and Pressure: Manometers ,Bourdon Gauges -Diaphragm, Bellows-Vacuum Gauges- Mcloid Gauge-Knudsen Gauge, Pirani gauge

Temperature scales –resistance thermometers-Thermistors-Thermocouples-Radiation Pyrometer- Types and characteristics

UNIT-V

Flow measurement: Differential Flow meters-Operating principle-Different types-Orifice-Rotameter-Mass flow meter-positive displacement meter-Electromagnetic and Ultrasonic Flow meters

Level Measurements: Slight glass flow gauge, Displacer torque tubes ,Bubbler tube, Diaphragm box, D/p methods, resistance <capacitance and Ultrasonic level Gauging Measurement of PH, humidity ,Moisture and Viscosity

Textbooks:

1. A course in Electronic measurements and Instrumentation , A.K.Sawhney, Dhanpat Rai & sons,1998
2. Measurement Systems , Application and design, E.O.Doeblin, McGraw Hill,1990.
Mechanical and Industrial Measurement, R.K.Jain, Khanna Publishers,1996

UID 081 : INFORMATION TECHNOLOGY FOR ENGINEERS

(Offered by Information Technology)

UNIT I

INTRODUCTION:Information Age; Responses – Information system; Infrastructure and Architecture – IT support for organizations; Types of information systems – Managing IT – Basic of computer hardware and software for IT infrastructure- input devices, output devices, memory devices.

UNIT II

COMMUNICATION NETWORKS FOR IT:Telecommunication system: Networks: LAN, WAN, ETHERNET, Network server, Network software; Network processing strategy; Telecom applications; Network OS; Operation and services provided; ftp, Usenet, Remote login, Telnet.

UNIT III

INTERNET : Evolution - WWW, Websites, Homepages, Search Engines, URL, Name server, Proxy server, Gateways, Routers, Modem, Switches, Email server, Inter Service Providers, Internet connectivity (VSAT, Leased line, Dial-up line, Radio link) .

UNIT IV

E-COMMERCE AND IT SYSTEMS : E-commerce: Business applications: Market research and customer support Infrastructure, payments and other support - Planning and Management: Principles for IS planning: Role of IS and user departments; Resources; IT architecture; Centralized and no centralized; Client/server; End user computing architecture; Managing IS; Organizational structure; IS vulnerability; protection; Security; Network Protection and Firewalls Risk management and cost-Benefit analysis.

UNIT V

APPLICATIONS: Information system; GIS EDI and EFT; Extranets; Implementation; Data, Knowledge and decision support; Decision making- and support systems; Data visualization technologies; Knowledge Management- and Discovery and analysis - AI and Expert systems; Intelligent agents; Virtual reality; Ethical and global issues;

REFERENCE BOOKS :

1. E. Turban et al, *'Introduction to IF'* , John Wiley and sons, IC, 2000.
2. Turban et al, *'IT for management: Making connection for strategic Advantage'*, 2nd Edition, John Wiley and sons, Inc., 2001.
3. Dennis, P., Curtin et al, *'IT the breaking wave'* Tata McGraw-Hill, 1999.
4. Steven Alter, *IS, A management perspective*, 1999.
5. Gralla Preston, *'How the internet works'*, Techmedia Publication, 4th Edition, 2000.

UID 082 - BIO INFORMATICS
(Offered by Information Technology)

UNIT I

Coding -Common health care language - coding techniques – coded and quasi coded data Medical vocabulary – industry wide communication standards HL7 – unified medical language system – quality of care paradigms, risk management bioethics.

UNIT II

Information networks - Internet – facilities used in the internet web browsers STTP 5, HTTP, HTML, URL – European molecular biology network – national centre for bio-technology information.

UNIT III

Patient record maintenance - Electronic patient record – models or ERP – environmental services – metrics – telemedicine – community networks – telemedicine peripherals and equipment selection – anatomy of video conferencing technology.

UNIT IV

Basic Genetic Science : Study of cell, nucleus, chromosomes and their components Evaluation of chromosomes, Impact of chromosomes on genes, gene study. Protein information resources - Biological data basics – primary secondary data basics – Protein pattern data basics – DNA sequences data basics - DNA analysis - Genes structure and DNA sequences – interpretation of EST structures – different approach to EST analysis.

UNIT V

Alignment techniques - Data base searching - comparison of two sequences– identity and similarity – global and global similarity – global and local alignment- multiple sequence alignment – data basis of multiple alignment – secondary data base. Expert system-Principles of expert system – statistical decision trees – integration of decision support in clinical processors.

TEXT BOOK

1. T.K. Attwood , D.J. Parry-Smith, "*Introduction to Bioinformatics*", Pearson Education, 1999

REFERENCE BOOKS

1. Coiera E, "*Guide to medical informatics, The internet and telemedicine, Chajzman & Hall medical*", London 1997.
2. Bernser, E.S., "*Clinical decision support systems, Theory and practice, Springer-Verlag*", New York, 1999.
3. Dan E. Krane , Michael L., Raymer, "*Fundamental Concepts of Bioinformatics*", Pearson Education, 2002.

UID 201 - FINITE ELEMENT METHOD
(Offered by Mathematics)

UNIT – I (Weighted residual and Variational methods)

Introduction, Weighted residual methods: Least square, Partition, Galerkin, Moment and Collocation methods. Variational method: Ritz method. (10 Hours)

UNIT - II (Finite Element method)

Finite elements: Different types and their functions. Numerical integration over finite elements. Finite Element method: Ritz method, Least square method and Galerkin method. (10 Hours)

UNIT - III

Solution of initial value problems for ordinary differential equations and initial boundary value problems for partial differential equations by finite element method. (9 Hours)

UNIT - IV

Solution of boundary value problems for ordinary differential equations and partial differential equations by finite element method. (9 Hours)

UNIT - V

Solution of some nonlinear differential equations by finite element method. Solution of some practical application problems arising in various branches of engineering. (7 Hours)

Text Book:

1. M.K. Jain, Numerical solution of differential equations, Wiley Eastern Limited, New Delhi, 1987.
2. J. N. Reddy, An introduction to the Finite Element Method, McGraw Hill, Singapore, 1985.

Reference Book:

1. O.C. Zienkiewicz, The Finite Element Method, 3rd Edition, McGraw Hill, 1977.
2. C.S. Desai and J. F Abel, Introduction to the Finite Element Method, CBS Publishers and Distributors, New Delhi, 1987.
3. R. Wait and A.R. Mitchell, Finite Element Analysis and Applications, John Wiley & Sons, New York, 1986.
4. A. J. Davies, The Finite Element Method: A first approach, Clarendon Press, Oxford, 1980.
5. H. Grandin Jr., Fundamentals of the Finite Element Method, Mcmillan, New York, 1986.
6. K.W. Morton, Numerical solution of convection-diffusion problems, Chapman and Hall, 1996.

UIE 202 - COMPUTATIONAL FLUID DYNAMICS

(Offered by Mathematics)

1. Classification and finite difference formulations :

Classification: Elliptic, Parabolic, Hyperbolic, System of first order p.d.e and System of second order p.d.e. Initial and boundary conditions, Lax's equivalence theorem,

Finite difference formulations: central, forward, backward differences.

Uniform and non-uniform grids, numerical errors, grid independence test.

2. Numerical Solution of Ordinary and Partial differential equations

Runge-Kutta methods, Finite difference methods for O.D.E,

Elliptic: Laplace and Poisson equations. Parabolic: One- dimensional and Two-dimensional heat conduction equations. Hyperbolic: One- dimensional wave equation.

3. Incompressible flows:

Governing equations: Primitive variables formulation, Vorticity-Stream function formulation in Cartesian, spherical and cylindrical polar coordinates.

Determination of pressure-by-pressure Poisson equation,

Flow inside a lid-driven cavity, axis symmetric flow past a sphere and cylinder, application of upwind difference scheme.

4. Compressible flows:

Governing equations: Euler equations and Burgers equation

Lax-Friedrichs and Lax-Wendroff methods.

Flux splitting method, Riemann solvers, Kinetic schemes, Relaxation schemes.

FTCS, FTBCS, DUFORT-FRANKEL, Mac Cormack (explicit methods)

Mac Cormack, BTCS, BTBCS (implicit methods) for solving inviscid and viscous Burgers equation.

5. Heat flows:

Steady heat conduction in rectangular, spherical and cylindrical geometries, Transient heat conduction, steady one-dimensional convection-diffusion equation, Heat transfer in the boundary layer over a flat plate.

TEXTBOOKS

Muralidhar, K and Sundararajan, T., "Computational Fluid Flow and Heat Transfer"(2nd edition). Narosa Publishing house, New Delhi.
(units 3, 4 and 5)

Klaus A. Hoffmann and Steve T. Chiang, "Computational Fluid Dynamics for Engineers" Vol.1.A publication of Engineering Education system, Wichita, Kansas, 67208-1078, USA. ASIN: 0685272257

(units 1, 3 and 4)

Grewal, B. S., “ Numerical methods in Engineering and Science”, Khanna Publishers
(unit 2)

REFERENCES

Langtangen, Hans P.
Computational Partial Differential Equations
Numerical Methods and Diffpack Programming
Publisher: Springer verlag
Series: [Texts in Computational Science and Engineering](#), Vol. 1
2nd ed., 2003, XXVI, 855 p., Hardcover
ISBN: 3-540-43416-X (\$ 62.99)

Langtangen, Hans P.; Tveito, Aslak (Eds.)
Advanced Topics in Computational Partial Differential Equations
Publisher: Springer verlag
Series: [Lecture Notes in Computational Science and Engineering](#), Vol. 33
2003, XIX, 658 p., Softcover
ISBN: 3-540-01438-1 (\$99.00)

[M.O. Deville](#), [P.F. Fischer](#) and [E.H. Mund](#)
High-Order Methods for Incompressible Fluid Flow
ISBN: 0521453097, Publisher: Cambridge University Press 2002 (\$ 85.00)

[Pieter Wesseling](#) [Principles of Computational Fluid Dynamics](#)
Publisher: Springer-Verlag ISBN:3540678530 (\$ 135.59)

[John D., Jr. Anderson](#). Computational Fluid Dynamics
Publisher: Mc-Graw Hill Science/Engineering/Math,
ISBN:0070016852, (\$82.50)

[Joel H. Ferziger](#), [Milovan Peric](#). Computational Methods for Fluid Dynamics
Publisher: springer verlag, ISBN: 3540420746, (\$59.95)

Suhas V Patankar “Numerical Heat Transfer Fluid Flow”,
Publisher: Hemisphere Publishing Corporation, 1980.
ISBN:0891165223 (\$94.95)

Anderson, D.A., Tannehill, I.I., and Pletcher, R.H., “Computational Fluid Mechanics and Heat
Transfer (2nd edition)
Publisher: Taylor and Francis
ISBN:156032046X. (\$92.97)

Bose, T. K., “Numerical Fluid Dynamics”
Publisher: Narosa Publishing house Pvt.Ltd
ISBN: 8173191662 .(\$69.99)

UID 211 -INTRODUCTION TO NANO TECHNOLOGY

(offered by Department of Physics)

Unit-1: Introduction to Physics of Solid State

Intermolecular forces: thermodynamic aspects - Quantum Mechanical Treatment of the Many-Particle Problem - Potential Energy Surface - Pair Potential Approximation - Advantages and Limitations of the Pair Potential Approximation - Phenomenological Potentials - Pseudo-Potentials - Many-Body Potentials.

Unit - 2: Fundamentals of nanoscience

Size dependence of properties - Particle size determination - Bulk to nano transition - Semiconducting nanoparticles - Carbon nanostructures - Mechanical properties (hardness, ductility, elasticity) - Optical properties of nanotubes - Electrical properties of nanotubes.

Unit - 3: Preparation of nanosystems.

Introduction to nanolithography - Carbon nanotubes: preparation - Synthesis and preparation of nanomaterials (crystalline and thinfilm) - Physical and chemical methods - Control and stability (size, shape, composition).

Unit - 4: Characterization of nanosystems.

Thermal Stability - Basic Material Properties - Mean Values and Correlation Functions - X-ray diffraction - Scanning Electron Microscopy - Scanning Tunneling Microscopy - Electron Microscopy - X-ray absorption spectroscopy - Photoelectron emission spectroscopy.

Unit - 5 : Nano-Engineering: Applications

Nanotubes, nanowires, and nanodevices-introduction - Functional Nanostructures - Introduction to molecular electronics - Field emission and Shielding - Applications in Computers - Applications in fuel cells - Applications in chemical sensors - Applications in mechanical reinforcement - Microelectromechanical systems (MEMs) - Nanoelectromechanical systems (NEMs) - Molecular and Supramolecular Switches.

Text Books:

Unit-1 and 2:

- (a) **Charles P. Poole and Frank J Owens.** *Introduction to nanotechnology.* Wiley Interscience, 2003. (US \$ 80.00).
- (b) **Crandall, B. C. and Lewis, James (Eds.)** “*Nanotechnology: Research and Perspectives*” MIT Press, 1992.

Unit-3 and 4:

- (a) **P E J Flewitt, R K Wild.** *Physical Methods for Materials Characterization. 2nd Edition,* Institute of Physics Publishing, UK. 2004.
- (b) **Gottstein, Günter.** (2004) *Physical Foundations of Material Science.* Springer Verlag.

Unit-5:

- Cleland, Andrew N.** (2003). *Foundations of Nanomechanics: From Solid-State Theory to Device Applications.* Springer Verlag.

References for further study:

1. **J M Vail, Winnipeg.** *Topics in the Theory of Solid Materials.* Institute of Physics Publishing, UK. 2004.
2. **M W Barsoum.** *Fundamentals of Ceramics.* Institute of Physics Publishing, UK. 2004.
3. **A S Edelstein, R C Cammarata,** *Nanomaterials: Synthesis, Properties and Applications.* IOP Publishing, UK, 1998. (\$70.00)
4. **Bhushan, Bharat** (Ed.) (2004) *Springer Handbook of Nanotechnology* (With CD-ROM) ISBN: 3-540-01218-4 (EURO 200.00)
5. **Awschalom, D.D.; Loss, D.; Samarth, N.** (Eds.) (2002) *Semiconductor Spintronics and Quantum Computation.* Springer Verlag. ISBN: 3-540-42176-9 (EURO 70.00)
6. **Vincenzo Balzani.** *Molecular Devices and Machines : A Journey into the Nanoworld* Wiley VCH, 2003, (\$92.00).
7. **Peidong Yang.** *Chemistry of Nanostructured Materials.* World Scientific, 2004. (\$84.00)
8. **Andrzej W. Miziolek et. al.,** *Defense Applications of Nanomaterials* American Chemical Society, 2004. (\$150.00)
9. **Liming Dai.** *Intelligent Macromolecules for Smart Devices: From Materials Synthesis to Device Applications (Engineering Materials and Processes).* Springer Verlag 2004. (\$150.00)
10. **Michael Rieth.** *Nano-engineering in Science and Technology: An Introduction to the World of Nano-Design,* World Scientific, 2003. (\$26.00).
11. **Hari Singh Nalwa.** *Handbook of nanostructured materials and nanotechnology.* 5 volume set, 3583 pages; (US \$ 1500.00). Academic Press, 2000.

UID 212 - Novel and Intelligent Materials

(offered by Department of Physics)

Unit – 1: Introduction to functional materials.

10 hours

Introduction to functional materials - Phase transition and anomalies - Microscopic, mesoscopic, macroscopic phenomena and symmetry - Energy conversion - Examples of functional materials - Thermally responsive materials - Materials responsive to electric, magnetic and stress fields - Increased functionality through (i) Morphotropic phase boundary and (ii) Domain engineering.

Unit-2 Actuators and adaptronics

10 hours

Definition. of an actuator - Actuator as part of system - Intelligent actuators - Smart actuators - Piezoelectric actuators – Theory -Technical transducers - Comparison with other actuator types - Example applications - Magnetostrictive actuators - Theory of magnetostriction in magnetostrictive actuators - Properties of shape memory alloys - Electrical shape memory – actuators - Innovative applications.

Unit-3: Rheological fluid and Chemical actuators.

10 hours

Electrorheological fluid actuators - Limitations to the concept of electrorheological fluids - Summary of advantages of ER fluids - Magnetorheological (MR) fluid actuators - Description of MR fluids - Basic MR device design consideration - Linear MR fluid dampers.- Electrochemical actuators: fundamentals - Construction of reversible actuators.

Unit-4: Nanomaterials

10 hours

Size dependence of properties - Particle size determination - Bulk to nano transition - Semiconducting nanoparticles - Carbon nanostructures - Mechanical properties (hardness, ductility, elasticity) - Optical properties of nanotubes - Electrical properties of nanotubes.

Unit-5: Fiber optic sensors and Magnetoresistance

10 hours

Physical principle of fiber optic techniques - Types of fiber sensors and sensor selection - Integrating and Quasi-Distributed Long-Gauge-Length sensors-Short-Gauge-Length sensors. – Introduction to magneto-resistance – Giant magnetoresistance – Colossal magnetoresistance – Materials – Perovskite oxides – Applications in spintronics like spin transistor and spin valve.

Textbooks:

Unit-1 [Hartmut Janocha](#) (Editor), [Daniel J. Jendritza](#), [Hartmut Hanocha](#).

Adaptronics and Smart Structures: Basics, Materials, Designs and Applications.

Springer Verlag, 1999.

Unit-2: V. Srinivasan. *Smart Structures: Analysis and Design*. Cambridge university press,

2000. **Unit-3:** [Mukesh V. Gandhi](#), [Brian S. Thompson](#). *Smart Materials and Structures*. Kluwer Academic Publishers, 1992.

Unit-4: Charles P. Poole and Frank J Owens. *Introduction to nanotechnology*. Wiley Interscience, 2003.

Unit-5: [Tapan Chatterji](#). *Colossal Magneto-resistive Manganites*. Kluwer Academic Publishers. 2004.

References for further study:

1. [Mel Schwartz](#). *Encyclopedia of Smart Materials Set. (1200 pages)* John Wiley & Sons 2001.
2. [Zhong Lin Wang](#), [Z. C. Kang](#). *Functional and Smart Materials: Structural Evolution and Structure Analysis* Plenum press. 1998.
3. [Ahsan Hariz](#) , [Vijay K. Varadan](#), [Olaf Reinhold](#). *Smart Materials, Structures, & Integrated Systems*. The International Society for Optical Engineering, 1997.
4. [Alan R. Wilson](#), [Hiroshi Asanuma](#). *Smart Materials*. The International Society for Optical Engineering, 2001.
5. [Janet M. Sater](#), [Manfred Wuttig](#). *Smart Materials Technologies*. The International Society for Optical Engineering; 1998.
6. [Malcolm E. Lines](#), [Alastair M. Glass](#). *Principles and Applications of Ferroelectrics and Related Materials*. Oxford university press; 2001.
7. [Elbio Dagotto](#), [G. Alvarez](#), [S. L. Cooper](#), [A. L. Cornelius](#), [A. Feiguin](#), [J. Fernandez-Baca](#), [D. Gibbs](#), [J. P. Hill](#), [T. Hotta](#). *Nanoscale Phase Separation and Colossal Magnetoresistance*. Springer Verlag. 2003.
8. G Manson; N Parkes; G R Tomlinson; K Worden; W A Bullough; W J Staszewski, (2002) *Smart Technology Demonstrators and Devices*. IOP Publishing.
9. Inoue, A., Hashimoto, K. (Eds.) (2001). *Amorphous and Nanocrystalline Materials: Preparation, Properties, and Applications* Springer Verlag.
10. *Sensors and Their Applications XII* (2003). IOP Publishing, U.K.
11. C. M. Friend (Editor). *Smart Materials and Structures*. Chapman and Hall, 1998.

UID 221 - INSTRUMENTAL METHODS OF ANALYSIS
(Offered by Department of Chemistry)

UNIT I

Electromagnetic radiation – different regions, their wavelengths, frequencies and energies. interaction of electromagnetic radiations with matter – atomic, molecular, electronic interaction. Basic principles of spectroscopy – emission and absorption of radiation. Radiation sources, detectors.

UNIT II

Molecular spectra – UV-visible spectroscopy - principle – UV-visible spectrophotometers – instrumentation techniques. IR spectroscopy – principle, single and double beam IR spectrophotometers – instrumentation techniques.

UNIT III

Nuclear magnetic resonance spectroscopy – basic principles and instrumentation techniques. Principles of ion optics – ion sources, single focusing and double focusing mass spectrometers – principles and instrumentation techniques.

UNIT IV

X-ray fluorescence spectrometry - basic principles and instrumentation techniques. Flame emission and atomic absorption spectroscopy - basic principles and instrumentation techniques.

UNIT V

Electrochemical methods – conductometry, potentiometry, pH meter - principles and instrumentation. Principles of gas and liquid chromatography – gas chromatograph and HPLC - instrumentation.

Text book

1. H.H. Willard, L.L. Merit, J.A. Dean and F.A. Settle, Instrumental methods of analysis, 7 th edition, CBS Publishers and Distributers, New Delhi, 1986.

Reference books

1. D.A. Skoog and D.M. West, Principles of Instrumental Analysis, 2 nd edition, Holt-Saunders, 1980.
2. Brain S. Furniss, Antony J. Hannaford, Peter W.G. Smith and Austin R. Tatchel, Vogel's Text book of Practical Organic Chemistry, 5 th edition, ELBS-Longman, 1996.

UID 222 - CERAMIC TECHNOLOGY

(Offered by Department of Chemistry)

Unit I

Nature of ceramic materials-crystalline ceramic materials-silicates and clay minerals and spinal structures-polymorphic transformations-glass and non-crystalline phases-structure and composition of glass-surface and interface-wetting and phase distribution.

Unit II

Ceramic raw materials-clay materials-silicate and silicate minerals-synthetic raw materials-oxide (like Al_2O_3 , ZrO_2 , TiO_2 , MgO) and non-oxide (like Si_3N_4 , AlN , BN , SiC) raw materials. Synthetic techniques-sol-gel processing, liquid-phase reaction and hydrothermal synthesis.

Unit III

Processing of ceramics-powder pressing, extrusion, slip casting, firing-thermal treatment procedure-drying, sintering, annealing-viscosity based transition points in glass-glass forming methods, glass-ceramics.

Unit IV

An outline of ceramic equilibrium diagrams-one component (SiO_2) two component (Al_2O_3 , Cr_2O_3 , MgO-CaO , $\text{MgO-Al}_2\text{O}_3$, Al_2O_3 , SiO_2 , $\text{Al}_2\text{O}_3\text{-BeO}$) and qualitative ideas of methods of representation of three component diagrams-Nucleation-grain growth.

Unit V

Mechanical properties of ceramic materials-elastic properties and strength-Griffith's theory-plastic and viscous deformations-strengthening of glass. Thermal properties-thermal expansion, heat capacity and thermal conductivity-thermal stresses.

Text Books:

14. L.H. Van Vlack, Physical Ceramics for Engineers, Addison Wesley, 1964.
15. F.H. Norton, Elements of Ceramics, Addison Wesley, 1974.

Reference Books:

1. W.D. Kingery, H.K. Bowen, D.R. Uhlmann, Introduction to Ceramics, 2nd edition, John Wiley & Sons, 1991.
2. D. Ganguli and M. Chatterjee, Ceramic powder preparation: A handbook, Kluwer Academic Publishers, 1997.
3. David Segal, Chemical Synthesis of advanced ceramic materials, Cambridge University Press, 1989.
4. W. D. Kingery, Ceramic Fabrication Process, John Wiley 1960.