FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B. TECH.
(ELECTRONICS & COMMUNICATION ENGG.)

(Under Credit Based Continuous Evaluation Grading System)

(SEMESTER: I–VIII)

Session: 2013–14

GURU NANAK DEV UNIVERSITY
AMRITSAR

B.Tech. (Electronics & Communication Engineering)
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SEMESTER – I

Course Code	**Course Name**	**L**	**T**	**P**
PHL193	Physics – I	2	1	0
CYL195	General Chemistry	3	1	0
MTL101	Mathematics – I	3	1	0
ECL113	Basic Electronics	2	0	0
ENL101	Communicative English	2	0	0
ECL115	Electrical Engineering	3	1	0
PHL195	Material Science & Engineering	3	0	0
	Elective – I	2	0	0
Practical				
CYP196	Chemistry Lab	0	0	1
ECP113	Lab Basic Electronics	0	0	1
ECP117	Manufacturing Practices	0	0	2
	Sub Total:	**20**	**4**	**4**
	Grand Total:	**28**		

List of Electives–I

PBL–121	Punjabi – I **OR**	2	0	0
PBL–122	Basic Punjabi (Mudhli Punjabi) – I	2	0	0

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SEMESTER – II

Course Code	**Course Name**	**L**	**T**	**P**
PHL199	Engineering Mechanics	3	1	0
ARL196	Engineering Graphics & Drafting	3	1	0
MTL102	Mathematics – II	3	1	0
CSL194	Fundamentals of IT & Computer Programming	2	1	0
ECL125	Electronic Devices & Circuits	3	1	0
PHL198	Physics – II	3	1	0
ENL151	Communicative English	2	0	0
	Elective – II	2	0	0
Practical				
CSP194	Fundamentals of IT & Computer Programming Lab	0	0	1
ECP125	Lab Electronic Devices & Circuits	0	0	1
PHP194	Physics Lab	0	0	1
	Sub Total:	**21**	**6**	**3**
	Grand Total:	**30**		

List of Electives–II:–

PBL–131	Punjabi – II **OR**	2	0	0
PBL–132	Basic Punjabi (Mudhli Punjabi) – II	2	0	0

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SEMESTER – III

Course Code	**Course Name**	**L**	**T**	**P**
MTL–201	Mathematics – III	3	1	0
ECL–211	Digital Electronics	3	1	0
ECL–212	Analysis and Synthesis of Networks	3	1	0
ECL–214	Analog Integrated Circuits	3	1	0
CSL–297	Programming Languages	3	1	0
ESL–220	Environmental Studies (Compulsory)	3*	0	0
Practicals				
ECP–211	Lab. Digital Electronics	0	0	1
ECP–212	Lab. Analysis and Synthesis of Networks	0	0	1
ECP–214	Lab. Analog Integrated Circuits	0	0	1
ECP–215	Lab. PSPICE	0	0	2
ECE–216	Summer Training**	–	S/US	–
	Sub Total:	**15**	**5**	**5**
	Total:	**25**		

* Credits of ESL–220 will not be included in SGPA.

** The student should undergo summer training at the end of 2nd semester. He/ She should clear it satisfactorily.

S–Satisfactory
US–Unsatisfactory

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SEMESTER – IV

Course Code	Course Title	L	T	P
	Interdisciplinary Course – I	4	0	0
	Interdisciplinary Course – II	3	0	0
ECL–221	Electromagnetic Field Theory	3	1	0
ECL–222	Communication Signals and Systems	3	1	0
ECL–224	Fiber Optics	3	1	0
	Elective – III	3	1	0
Practicals				
ECP–224	Lab. Fiber Optics	0	0	1
ECP–226*	Electronic Design & Implementation Lab.	0	0	2
	Lab Elective – III	0	0	1
	Sub Total:	**19**	**4**	**4**
	Grand Total:	**27**		

***Note: The students are expected to design at least five applications Electronic Circuits.**

List of Electives – III

ECL–261	Linear Control System	3	1	0
ECL–262	Electrical & Electronic Measurements	3	1	0

Lab of Electives – III

ECP–261	Lab Linear Control System	0	0	1
ECP–262	Lab Electrical & Electronic Measurements	0	0	1

NOTE: The students of B.Tech. (ECE) 4th Semester are required to undergo Industrial Training four to six weeks after their major examination of 4th Semester in any Industry / Institute of repute. The viva voce will be held along with the viva voce of 5th Semester.

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SEMESTER – V

Course Code	**Course Title**	**L**	**T**	**P**
	Interdisciplinary Course – III	4	0	0
ECL311	Communication System – I	3	1	0
ECL312	Microprocessor and Its Applications	3	1	0
ECL313	Antenna and Wave Propagation	3	1	0
MGL301	Entrepreneurship Skills for Engineers	3	0	0
	Elective – IV	3	1	0
Practicals:				
ECP311	Lab Communication System – I	0	0	1
ECP312	Lab Microprocessor and its Applications	0	0	1
	Elective Lab – IV	0	0	1
ECP315	Industrial Training**	–	S/U S	–
	Sub Total:	**19**	**4**	**3**
	Grand Total:	**26**		

**** The result will be satisfactory or unsatisfactory.**

List of Elective–IV

ECL–351	Wave Generation and Shaping	3	1	0
ECL–352	Industrial Electronics	3	1	0

Lab of Elective – IV

ECP–351	Lab. Wave Generation and Shaping	0	0	1
ECP–352	Lab. Industrial Electronics	0	0	1

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SEMESTER – VI

Course Code	**Course Title**	**L**	**T**	**P**
	Interdisciplinary Course – IV	4	0	0
ECL321	Microwave Engineering	3	1	0
ECL322	Communication Systems – II	3	1	0
	Elective – V	3	0	0
	Elective – VI	3	0	0
ENL351	Communication Skill for Engineers	2	1	0
Practicals				
ECP321	Lab Microwave Engineering	0	0	1
ECP322	Lab Communication Systems – II	0	0	1
ECP324	Project	0	0	4
	Sub Total:	**18**	**3**	**6**
	Grand Total:	**27**		

Elective – V

ECL–361	Digital Communication	3	0	0
ECL–362	Bio–medical Electronics	3	0	0
ECL–363	VLSI Technology and Design	3	0	0
ECL–364	Virtual Instrumentation	3	0	0
ECL–369	Computer Network	3	0	0

Elective – VI

ECL–365	Micro Controllers	3	0	0
ECL–366	Microwave Solid State Devices	3	0	0
ECL–367	Software Engineering	3	0	0
ECL–368	Operating System	3	0	0

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SEMESTER – VII

Course Code	**Course Title**	**L**	**T**	**P**
ECL411	Neural Network and Fuzzy Logic	3	1	0
ECL412	Digital Signal Processing	3	1	0
	Elective – VII	3	1	0
	Elective – VIII	4	0	0
	Elective – IX	4	0	0
Practicals				
ECP412	Lab Digital Signal Processing	0	0	1
	Lab Elective – VII	0	0	1
ECP413	Seminar	0	0	2
	Sub Total:	**17**	**3**	**4**
	Grand Total:	**24**		

List of Elective – VII

ECL–451	Optical communication	3	1	0
ECL–452	Wireless Communication	3	1	0

List of Elective – VIII

ECL–453	Computer Architecture and Organization	4	0	0
ECL–454	Image Processing	4	0	0

List of Elective – IX

ECL–455	Cellular and Mobile Communication	4	0	0
ECL–456	Bio–sensors and MEMS	4	0	0
ECL–457	Digital System Design (Verilog VHDL)	4	0	0
ECL–458	Radar System Engineering	4	0	0
ECL–459	Fundamental of Nano Electronics	4	0	0

List of Lab Elective – VII

ECP–451	Lab Optical Communication	0	0	1
ECP–452	Lab Wireless Communication	0	0	1

Semester – VIII

Course Code	Course Title	L	T	P
ECE421	Industrial Training	–	–	20

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PHL–193 **PHYSICS – I**

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PART – I

Gauss law and its applications in electrostatics in vector form, electric polarization, permittivity, energy density in an electric field, Ampere's law, Charged particle motion in E and B fields, magnetization.

PART – II

Faraday's law of electromagnetic induction; Equation of continuity, generalized Ampere's law, Maxwell's equations, wave equation, plane wave solutions, electromagnetic wave propagation in different media.

PART – III

Origin of quantum hypothesis, de Broglie's hypothesis of matter waves, Uncertainty principle, wave function and wave machines, Schrodinger equation, Expectation value, one–dimensional solution: zero potential, step potential, potential barrier and potential well.

Books Recommended:

1. Introduction to Electrodynamics, David J. Griffiths, Prentice Hall.
2. Electrodynamics, JD Kraus, McGraw Hill, New York (1991).
3. The Feyman Lectures on Physics Vol. I, II, III, RP Feyman, RB Lllleighton, M Sands, Narosa Publishing House, New Delhi (1995).
4. Concepts of Modern Physics, Arthur Besier, Tata McGraw Hill, 2007.

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CYL–195 GENERAL CHEMISTRY

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3 1 0

The course has been divided into three nearly equally distributed sections. Unit–I to be completed before Minor–I, Unit–II before Minor II and Unit III should be completed before the final exams. Final exam will be from all the three units.

UNIT–I

1.Chemical Bonding: (8Hrs.)

Qualitative treatment of bonding by molecular orbital theory of homonuclear diatomic (H_2^+H2,O2) and heteronuclear diatomic molecules (CO, NO, HF). Introduction to hybridization and molecular structure of H2o, NH3,CH4 and ethylene. Valence bond approach (qualitative) of bonding of H_2^+, H2 and benzene, Bond model of solids, Dipole moments and polarizability, Intermolecular forces–dipole–dipole interactions, dipole–induced dipole, induced dipole–induced dipole, Intermolecular forces in ionic lattices, magnetic moments. Bonding in metals and transition metal complexes. (Covalent, coordinate and back bonding).

(2Hrs.)

2. Chemical Equilibrium: (5 Hrs.)

Conditions of Chemical Equilibrium, Free enthalpy and equilibrium in reactions of ideal gasses, Temperature dependence of equilibrium constant. Equilibrium in non ideal systems. Use of fugacity in equilibrium calculations, standard states for components in solutions, equilibrium constant in solution.

UNIT–II

3.Electrochemistry: (5 Hrs.)

Faraday's Laws, conductance, Arhemnium theory of ionization, molar conductance, transport numbers, electric potential difference for a galvanic cell, types of half cells, standard electrode potential, concentration cells.

4.Chemical Kinetics: (5 Hrs.)

Rate, order, molecularity, first, second and third order rate equations, Temperature dependence of reactions explosion reaction and photochemical reaction.

5. Polymers: (5 Hrs.)

Chemistry of polymers, addition, condensation and copolymerization, molecular weight distribution, types of polymers–plastics, elastomers and fibers, biopolymers.

UNIT–III

6. Molecular Spectroscopy: (15Hrs.)

General features of spectroscopy–experimental techniques, intensities and line width, Rotational spectroscopy–molecular rotation and determination of length by rotational spectra. Vibrational spectroscopy–normal modes of vibrations, selection rules for IR and raman determination of force constant and identification of common functional groups UV and visible spectroscopy Beer Lambert's Law, electronic transitions and their significance, photo electron spectroscopy, nuclear magnetic Resonance spectroscopy–principles of magnetic resonance, NMR of simple molecules and their significance of magnetic and electric properties of materials.

Books Recommended:

1. Physical Chemistry by PW Atkins.

2. Physical Chemistry by Maron and Pruttton.

3. Molecular Spectroscopy – Williams and Fleming

4. Polymers by Billmeyer

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CYP–196 LAB CHEMISTRY

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Chemistry practical course for undergraduate students of electronics and computer science departments.

1. Find the strength of KMnO4 solution.
2. Determine number of water molecules in Mohr salt by titration method.
3. Determine percentage of sodium carbonate in given sample of washing soda.
4. Determine percentage of sodium carbonate and sodium hydroxide in given sample of caustic soda.
5. Determination of total Hardness of Water.
6. Determine the percentage of Ca2+ and Mg2+ in the given sample of water.
7. To determine the molecular weight of a compound by Rast's micro method.
8. Determination of coefficient of viscosity of a given liquid by viscometer.
9. To determine the unknown composition of a given mixture of two liquids by viscosity method.
10. To find the mol. wt. of high polymer by using viscosity measurements.
11. Determination of surface tension of a given liquid by drop number method by stalagmometer.
12. To determine the critical micelle concentration of a soap (sodium laurate) by surface tension measurements.
13. To determine the distribution coefficient of I2 between CCl4 and water.
14. To determine refractive index of a liquid by Abbe's refractometer and hence the specific and molar refraction.
15. Determination of Chlorine in bleaching powder.

Books Recommended:

1. Findlay's Practical Physical Chemistry.

2. Advanced Practical Physical Chemistry by J.B. Jadav.

3. Quantitative Organic Analysis by Vogel.

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MTL–101 **MATHEMATICS – I**

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3 1 0

UNIT – I

Calculus: Partial Derivatives, Euler's theorem on homogeneous functions, Maclaurin's and Taylor's expansions of single and two variables, Maxima and minima of functions of several variables, Lagrangian method of multipliers, Multiple integrals and their use in obtaining surface areas and volumes of solids.

UNIT – II

Infinite Series: Sequences and sub sequences and their convergence, Cauchy sequence, Infinite series and their convergence, Standard tests for convergence including p-test, Ratio test, Comparison test, Raabe's test, Cauchy Integral test, Cauchy root test, Gauss's test, Absolute Convergence, Alternating series and its convergence, Power Series.

UNIT – III

Vector Calculus: Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field and their physical interpretations, Line integral of a vector field, Surface integral of vector field, Volume integral of a scalar field, Green's theorem, stokes theorem, Gauss divergence theorem (without proofs) and their applications.

Books Recommended:

1. Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.
2. Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3. BS Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. Murray & Spiegel, Vector Analysis, Schaum Publication Co.

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ECL–113 **BASIC ELECTRONICS**

L	**T**	**P**
2	**0**	**0**

PART – I

1. **Diode Circuits:** Quantitative analysis of the behavior of pn junction, depletion layer, current components, storage capacitance and transition capacitance, diode equivalent circuit, barrier potential at metal semiconductor interface and ohmic contacts, Junction diode switching times.

PART – II

Types of diodes–zener diode, LED, photo diode, tunnel diode, varactor diode.

2. **Application of Diodes:** Diode Clippers, Diode Clampers, Zener as voltage, regulators, Rectifiers–half wave and full wave, filters.

PART – III

3. **Bipolar Junction Transistors:** Junction Transistor, current components, transistor as an amplifier, CB, CE and EC configurations, analytical expressions for transistor characteristics, transistor at low frequency.

References:

1. *Integrated Electronics, Millman, Jand Halkias, C.C. TMH, 2007.*
2. *Electronics Devices and Circuits, Cheruku D.R. and Battula TK, Pearson Education (2005).*
3. *Electronic Devices and Circuits by Gupta, JB, Kataria and Sons, 2008.*

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ECP–113 LAB BASIC ELECTRONICS

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0	0	1

1. Study of VI characteristics of pn junction
2. Study of Half wave, full wave & Bridge rectifiers.
3. Study of simple capacitive, T & II filters.
4. Study of zener regulator.
5. Study of transistor characteristics in CC, CB and CE configuration

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Subject Code: **ENL–101** Duration of Examination: 3 Hrs
Course Title: **Communicative English** Credits: 02 (L=2,T=0,U=0)

Objectives: To Introduce students in a graded manner to the communication skills of Reading and Writing in English. At the end of semester I, the students should be able to demonstrate adequate competence in comprehending the prescribed text and performing the given writing tasks.

Reading:

a) Developing Habits of Independent and Fast Reading:
Students will be required to read a prescribed prose anthology titled *Selections from Modern English Prose* (Ed. Haladhar Panda published by University Press, Hyderabad). The essays in the anthology will be read by students at home with the help of glossary given in the book. Progressing from one lesson to another, they should learn to read fast.
Students are supposed to keep a record of their reading in the form of notes, difficulties, summaries, outlines and reading time for each essay. Class teacher may use this record for award of internal assessment (if any).

b) Developing Comprehension Skills:
Teacher will provide guided comprehension of the prescribed texts in the class and help students in answering the questions given at the end of each lesson. Teacher can construct more questions of factual and inferential nature to enhance the comprehension skills of the students. The teacher shall also guide students to do the grammar exercises given at the end of each lesson.

Writing:

a) Developing Skills in Personal Writing:
Students will be required to learn short personal write–ups involving skills of description and narration. The types of composition task may include personal letter writing, telegram writing, notice writing, diary writing etc. Teacher shall instruct the students about the appropriate format and usual conventions followed in such writings. The teacher may also prescribe composition/writing book if so required.

b) Developing Writing Skills based on Guided Composition:
The students will be required to write a longish composition on a question from the essays on *Selections from Modern English Prose.* The composition will require presentation of ideas beyond the prescribed essays. Sample composition topics are given at the end of each lesson.

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Question Paper: The following format is suggested for a 3–hour test.
(Appropriate choices may be given where possible)

1. Short–answer comprehension questions (at least 5) based on the lessons included in S*election from Modern English Prose* **App. weighting 30%**
2. Questions on grammar and vocabulary (words, phrases, proverbs) **App. weighting 20%**
3. Two short writing tasks of app. 100 words. One a personal letter involving narration of a personal experience or description of objects, persons, places of events. The second may be a telegram or public notice or a diary entry about a personal or family achievement, loss or celebration. **App. weighting 30%**
4. One long composition of about 300 words on one of the topics discussed in Selections from Modern English Prose. Due consideration be given to the organization of details and coherence in writing. **App. weighting 20%**

Internal Assessment: The teacher may consider the following for award of internal assessment, if any.

1. Evidence of independent reading as given above. Teacher may suggest some special tasks to suit the needs of their students.
2. Students may be asked to keep diary of their daily or specific routines.
3. Students may be asked to write a certain number of compositions on selected topics during the semester.

The division of the syllabus and the paper pattern for Minor and Major tests may be as follows:–

Minor–I

The syllabus to be covered; the essay from Sr. No. 1 to Sr. No. 6 from the prescribed book and personal letter.
Paper pattern: The following format is suggested for a test of 20 marks.
1. Personal letter (1 out of 2)
2. Short answer type question from the essay (2 out of 4).
3. Questions on Grammar and Vocabulary.

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Minor–II

The syllabus to be covered; the essay from Sr. No. 7 to Sr. No. 13 from the prescribed book and personal letter.

Paper pattern: The following format is suggested for a test of 20 marks.

1. Personal letter (1 out of 2)
2. Short answer type question from the essay (2 out of 4).
3. Questions on Grammar and Vocabulary.

Major Test

The syllabus to be covered; the essay from Sr. No. 14 to Sr. No. 20 from the prescribed book telegram and diary entry.

The format for 3 hour major test will be mentioned in the syllabus. This test will also include the syllabus covered in Minor–I and Minor–II.

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ECL–115 ELECTRICAL ENGINEERING

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3	1	0

Purpose:
Engineers today are required to work with multi disciplinary (including electrical, electronics, computer and mechanical) systems. They have to have understanding of the basic knowledge of electrical engineering for appreciating its application in the machinery, power and control circuits and analyze simple problems in consultation with specialists in electrical engineering. The subject imparts basic concepts, principles and skills in electrical engineering.

Instructional Objectives:
- Understanding the basic concepts, principles and theories of electrical sciences relating to application of electrical engineering in industries.
- Explain the distribution of electrical power from power station to consumers after going through transmission and distribution lines.
- Recognize accessories, devices, equipment and protection employed in lines, machines and circuits.
- Understand construction, working principles and application of transformer, induction motor, DC motor and fractional horse power motors.
- Select motors for various applications in Engineering.
- Diagnose simple faults in wiring, installation, motor control circuits, protection systems and earthing.
- Understand requirements of lighting for various industrial applications and select lighting devices.
- Use measuring instruments for measuring current, voltage and power in supply circuit and machines.
- Calculating current, voltage and power in simple single phase and three phase AC circuits.
- Prepare report of experimentation done on an electrical circuit or electrical machines.
- Analyzing motor control circuits and distribution circuits to identify and operate control and protective devices.

Contents:

PART – I

1. **Electricity:** A brief review of various applications of electricity, difference between AC and DC, units of voltage, current and resistance, concept of electromagnetic induction and production of alternating e.m.f. – single phase and poly phase, concept of 3 phase system star and delta connections, voltage and current relations (formula only).

2. **Power Supply:** A brief review of special features of the power supply system, power station, transmission, distribution lines, service main, domestic and industrial wiring installation.
3. **Circuit Analysis:** A brief review of DC and single phase AC circuits. Three phase AC circuits, phaser representation, star–delta transformation, concept of balanced and unbalanced three phase circuits, measurement of power and power factor in three phase balanced circuits, AC circuits (L.R.C.) solution.

4. **Electrical Machinery:** Transformers, its working principle, types of transformers and their applications, performance losses, efficiency and voltage regulation open circuit and short circuit tests on a transformer, auto transformer.

PART – II

5. **DC Motors:** Force and EMF production, methods of excitation in DC machines, various types, characteristic and application of DC shunt and series motors.

6. **3 Phase Induction Motor:** Construction and type of three phase induction motors, equivalent circuits, application of different types of induction motors, starters and protective devices used for motors.

7. **3 Phase Synchronous Machines:** Principle of working and construction of alternators and synchronous motors.

8. **Single Phase Induction Motors:** Types and construction, their working principle, starting of single phase motor, application of single phase motors.

PART – III

9. **Control and Protection:** Control mechanism, principle and application of servo motors, protection devices for wiring installation and motors – fuses MCB, LCB, relays.

10. **Cables:** Types of cables, construction of LT and HT cables, laying of cables, selection of cables.

11. **Earthing and Grounding:** Need, types, Indian Electricity Rules, use of meggar and earth tester for measurement of earth resistance.

Recommended Books:

1. Principles of Electrical Engineering by Gupta BR; S. Chand and Company, New Delhi.
2. Electrical Technology by Hughes Edward; The English Language Book Society and Longmans Group Limited, London.
3. Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.
4. Experiments in Basic Electrical Engineering by Bhattacharya SK and Rastogi KM; New Age International, New Delhi.
5. Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.
6. Advanced Electrical Technology by Cotton H; Isaac Pitmans and Sons Limited, London.
7. Electrical Engineering – Basic Technology by Hubschar; Deutsche Gesllschaft Fur Technische Zusammenabelt (GTZ) GMBH.
8. Basic Electrical Engineering by T.K. Naggarkar & Ms. Sakhija Seventh Edition 2008, Oxford University Press.

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PHL–195 MATERIAL SCIENCE AND ENGINEERING

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PART – I

Classification of Materials on the basis of their physical properties and applications, Structure–property relationship, structure of materials, crystal system, close packing, crystal planes and directions, Miller indices, Determination of crystal structure using X–Ray diffraction.

PART – II

General properties and applications, Phase diagram, Unary and binary, Lever rule, solid solutions, effect of doping and alloying, steel types, non–ferrous materials and alloys. Crystal imperfections, 0, 1, 2 and 3 dimensional defects, deformation in single and polycrystalline materials.

PART – III

Plastic and Plastic deformation, Effect of temperature, impurity and grain size. Conductors, Ferro–electric, dielectric, piezeoelectric and pyro–electric materials and their applications, Electrode, Electrical contact, register and photo–register materials, properties and applications of photo–conducting materials.

Recommended Books:

1. Materials Science and Engineering by WD Callister Jr. (John Wiley).
2. Elements of Materials Engineering by LH Van Vieck (Addison Wesley).
3. Principles of Materials Science and Engineering by W Smith (Tata McGraw Hill).
4. Introduction to Solids by LV Azaroff (TMH).
5. Materials Science and Engineering by V Raghvan (Prentice Hall).
6. Structure and Properties of Materials Vol.1 to 4 by WD Mofflet, GW Pearsall and John Walff (Wiley Eastern).

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PBL–121: pj`bl l`zml – I

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Credits: 2–0–0

(I) 1. **E`qm En`qm** (sp. virE`m isG sD Eq f`. sihdrblr isG **!**r n`nk dv "nlvris#l Eimqsr$ iv&( hT il**)** kh`*lk`r +
(,$ **!**rm**)** isG ms`i-r + **!#`r**
(E$ sj`n isG + **pT`* dl Dl**
(.$ krq`r isG d**!**l + **,&l Elfl v`ll !r!`bl**
(kh`*l–s`r iv/`–vsq| kh`*l–kl` kh`*lk`r$

0. **!**rm**)**l Er**2!**r`-l dl j**!**q (p(ql4 mh`rnl4 ibdl i#pl q EDk$4 ivr`m i&n /bd j**6**
(/D–E/D$

(II) 1. **E`qm En`qm** (sp. virE`m isG sD Eq f`. sihdrblr isG **!**r n`nk dv "nlvris#l Eimqsr$ iv&( hT il**)** kh`*lk`r +
(,$ sq**)** isG Dlr + **s~7l kD**
(E$ klvq isG ivrk + **,lj`6**
(.$ mihdr isG srn` + **j2d`r mkd isG**
(kh`*l–s`r iv/`–vsq| kh`*l–kl` kh`*lk`r$

0. l**)** r&n` (jlvnl–prk sm`jk Eq &lq ivi/E~ ,q$+
89 l**)** il**)**v`,* (kl`s iv& Eq Gr l.l Ei:E`s$

(III) 1. **E`qm En`qm** (sp. virE`m isG sD Eq f`. sihdrblr isG **!**r n`nk dv "nlvris#l Eimqsr$ iv&( hT il**)** kh`*lk`r +
(,$ pm pk`/ + **m`6` bd`**
(E$ **!**lz`r isG sD + **kll;*|**
(.$ mhn :f`rl + **G#*`**
(s$ virE`m isG sD + **dldl**
(kh`*l–s`r iv/`–vsq| kh`*l–kl` kh`*lk`r$

0. pr` p**6** k p/n~d ,qr d*`
(**E`qm En`qm** psqk d kh`*l :`**!** iv&(**8**< pirE~d Ei:E`s krv`,*$

B.Tech. (Electronics & Communication Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)
(List of Electives – I)

PBL–122: ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In lieu of Punjabi Compulsory)

2-0-0

ਪਾਠ–ਕ੍ਰਮ

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ,
   ਗੁਰਮੁਖੀ ਲਿਪੀ
   ਗੁਰਮੁਖੀ ਲਿਪੀ : ਬਣਤਰ ਅਤੇ ਤਰਤੀਬ

2. ਗੁਰਮੁਖੀ ਆਰਥੋਗ੍ਰਾਫੀ
   ਸੁਰ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ
   ਵਿਅੰਜਨ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ

3. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ
   ਸਾਧਾਰਨ ਸ਼ਬਦ
   ਇਕ ਉਚਾਰਖੰਡੀ ਸ਼ਬਦ

ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ : ਨਾਮਕਰਣ ਅਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ, ਗੁਰਮੁਖੀ ਲਿਪੀ: ਨਾਮਕਰਣ, ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ; ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਸੁਰ ਵਾਹਕ (ਓ ਅ ਏ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।

2. ਗੁਰਮੁਖੀ ਆਰਥੋਗ੍ਰਾਫੀ ਅਤੇ ਉਚਾਰਨ; ਸੁਰਾਂ ਦੀ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ (ਲਘੂ–ਦੀਰਘ ਸੁਰ); ਸੁਰ ਅਤੇ ਲਗਾਂ ਮਾਤਰਾਂ; ਵਿਅੰਜਨਾਂ ਦੀ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ; ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣਾਂ (ਹ, ਰ, ਵ) ਦਾ ਉਚਾਰਨ ; ਲ ਅਤੇ ਲ਼ ਦਾ ਉਚਾਰਨ; ਭ, ਧ, ਢ, ਝ, ਘ ਦਾ ਉਚਾਰਨ; ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣਾਂ ਦਾ ਉਚਾਰਨ।

3. ਪੰਜਾਬੀ ਸ਼ਬਦ–ਬਣਤਰ: ਸਾਧਾਰਨ ਸ਼ਬਦ; ਇਕੱਲਾ ਸੁਰ (ਜਿਵੇਂ ਆ); ਸੁਰ ਅਤੇ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਆਰ); ਵਿਅੰਜਨ ਅਤੇ ਸੁਰ (ਜਿਵੇਂ ਪਾ); ਵਿਅੰਜਨ ਸੁਰ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਪਾਰ); ਕੌਸ਼ਗਤ ਸ਼ਬਦ (ਜਿਵੇਂ ਘਰ, ਪੀ); ਵਿਆਕਰਣਕ ਸ਼ਬਦ (ਜਿਵੇਂ ਨੂੰ, ਨੇ); ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾਫ਼1; ਲਿੰਗ–ਪੁਲਿੰਗ, ਇਕ ਵਚਨ–ਬਹੁ ਵਚਨ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ–1: ਖਾਣ–ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ ਆਦਿ ਨਾਲ ਸੰਬੰਧਿਤ।

B.Tech. (Electronics & Communication Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)

ECP–117 MANUFACTURING PRACTICES

L	T	P
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Aim of this lab course is to make the students familiar with machine shop, Welding shop and Carpentry shop.

In the Machine shop the students are required to understand the working of Lathe machine, Drilling Machine, Shaper machine and Grinding Machines. Students will be given a job to make using these machines

In the welding shop the students are required to be familiar with arc welding and gas welding. Different types of joints. The students will have hand on practice on the gas and arc welding and will be required to make some job as instructed by the instructor.

In the carpentry shop the students will be made familiar with different types of tools used in carpentry and also some simple jobs will be given to the students to have a hand on practice in this shop.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

PHL–199 ENGINEERING MECHANICS

L T P
3 1 0

PART – I

Internal forces and momentum conservation. Centre of mass. Elastic collisions in laboratory and center of mass systems; velocities, angles, energies in these systems and their relationships. Conservation of angular momentum and examples–shape of the galaxy, angular momentum of solar system. Torques due to internal forces, angular momentum about center of mass, Crosssection, elastic scattering and impact parameter, Rutherford scattering.

PART – II

Equation of motion of a rigid body, rotational motion of a rigid body in general and that of plane lamina. Rotation of angular momentum vector about a fixed axis. Angular momentum and kinetic energy of a rigid body about principal axis, Euler's equations. Precession and elementary gyroscope, Spinning top.

PART – III

Frames of reference, Galilean transformation, Galilean invariance, The Michelson–Morley experiment. Special theory of relativity, the Lorentz transformation, Relativity of length and time, relativistic velocity addition, mass variation formula, mass–energy equivalence.

Reference Books:

1. Mechanics–Berkeley Physics Course, Vol–I (Second Edition): C. Kittel, W. D. Knight, M. A. Ruderman, C. A. Helmholtz and R. J. Moyer–Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
2. Analytical Mechanics: Satish K. Gupta–Modern Publishers.
3. Fundamentals of Physics: D. Halliday, R. Resnick and J. Walker (Sixth Edition) – Wiley India Pvt. Ltd., New Delhi.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

ARL–196 ENGINEERING GRAPHICS AND DRAFTING

L T P
3 1 0

UNIT – I

Drawing Techniques: Various types of lines, principles of dimensioning, size and location of dimensions, symbols, conventions scales (plane and diagonal) and lettering as per IS Code SP–46 of practice for general engineering drawings.

- Practice of drawing various types of lines and dimensioning exercises.
- Drawing exercises pertaining to symbols, conventions.
- Exercise on lettering techniques: Free hand printing and numerals in 3,5,8 and 12 mm sizes vertical and inclined at 75°; instrumental lettering in single stroke.

Projection of Points, Lines and Planes: First angle and third angle projections, concept of horizontal and vertical planes, Projection of points and lines, True length, Horizontal and vertical traces, Projection of Planes, Traces of Planes, Auxiliary planes.

- Practice exercises on projection of points, lines and planes.

Projection and Selection of Solids: Projection of solids such as Prisms, Pyramids, Cylinders, Cones, Spheres, Auxiliary View.
Principles of sectioning, types of sectioning, section lines, cutting plane lines.

- Practice on projection of solids.

UNIT – II

Isometric Projection: Exercises on isometric views.
Orthographic Projections: Orthographic views, Missing views.

- Exercises on identification of missing views.
- Practice on orthographic projections.

Practice of free hand sketching of different types of objects.

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UNIT – III

Intersection and Development of Surfaces: Intersection of cylinders, cones and Prisms, Axis of solids being vertical or horizontal. Development of surfaces of truncated cylinders, cones and prisms.

- Exercises on intersection of solids – cylinder and cylinder, cylinder and cone, prism and prism, prism and cone, sphere with cylinder.
- Exercises involving development of surfaces (Y–Piece, Hopper, Tray and truncated pieces).

Fasteners: Introduction to temporary and permanent fasteners, rivetted and welded joints, types of screw threads, conventional symbols for internal and external threads.

- Exercises involving drawing of bolts, nuts, studs and locking devices.

Symbols and Conventions: Symbol and conventions pertaining to relevant engineering disciplines. Practice in using AatoCAD of similar graphic package for preparing simple drawings.

Recommended Books:

1. Engineering Drawing by PS Gill, SK Kataria and Sons, Ludhiana.
2. Engineering Drawing by NK Bhatt.
3. Engineering and Teaching Drawing by Earl D. Black.
4. Text Book of Engineering Drawing by RK Dhawan, S. Chand & Company Ltd.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

MTL–102 MATHEMATICS–II

L T P
3 1 0

UNIT – I

Differential Equations: Exact differential Equation, Higher order linear Differential equations, ODE's with constant coefficients.

Laplace Transforms: Laplace transforms, Properties of Laplace transforms, Laplace transform of derivatives and differentiation theorem, Integration theorem, Laplace transform of Integrals, Inverse Laplace transform, Formulas for obtaining inverse Laplace transforms, Convolution theorem, The second shifting property.

UNIT – II

Fourier Series and Fourier Transform: Fourier Series expansion, Fourier series for even and odd functions, half range series, harmonic functions, Modulation theorem, Shifting properties, convolution theorems, sine and cosine transforms, Fourier transform of derivatives and integrals, inverse Fourier transform, Applications to PDE's and ODE's.

UNIT – III

Complex Analysis: De Moivre's theorem with applications, Analytic functions, Cauchy-Riemann equations, Laplace equation, Cauchy's integral theorem, Cauchy's integral formula (without proofs), Taylor series and Laurent series (without proofs), Residues and their application in evaluating real improper integrals.

Books Recommended:

1. Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book. Company.
2. Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3. BS Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

CSL–194: FUNDAMENTALS OF I T AND COMPUTER PROGRAMMING

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Purpose:
Computers are being used more and more in engineering, business and information processing field. It is more so, because of the easy availability of high performance computers at a very nominal cost. All the engineering graduates have to use computer inevitably in their professional life. Early exposure to basics of computer languages and information technology helps students to effectively exploit the potential of computers in their course of studies.

Instructional Objectives:
The students after undergoing the course should be able to:
1. Understand the basic structure of computers and its working.
2. Use the computer effectively by practicing DOS and Windows Operating Systems.
3. Solve technical problems by using the modern computer languages such as C and C++.
4. Process the text by using the text processing package MS Word.
5. Appreciate the potential of Information Technology.

CONTENTS:

PART–I

1. Block diagram of Computer, Associated peripherals, Memories – RAM, ROM, Secondary Storage Devices, Introduction to Computers, Languages, Operating Systems, Compilers and Assemblers. (4 hrs.)
2. Introduction to DOS, its features, Basic Internal and External commands. (4 hrs.)

PART–II

3. Introduction to Windows and its features. (4 hrs.)
4. C Language

   Data types, operators, expressions, input, data, output and string functions, control structures

   for, while, if–then, case looping structure.

   Algorithms – solution, development and refinement, flow charting symbol and techniques.

   Functions, Arrays and Structures, Printers, Files. (8 hrs.)

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

PART–III

5. Introduction to MS Word, Purpose and characteristics of documents (text, fonts, size and styles, number diagrams, graphs, charts, labels, paragraph searching and replacing page layout, alignments and justification). Spelling Check, mail merge. (4 hrs.)

6. Introduction to Information technology and its potential. (4 hrs.)

Recommended Books:

1. Computers Today by Sanders.
2. Fundamentals of Computers TTTI Publication.
3. DOS 5 A to Z by Gary Masters.
4. DOS Instant Reference by Harvey and Nelson.
5. Mastering World 6 for Windows – Ron Manfield.
6. Object Oreinted Programming in C++ L Naljyoti Barkakati.
7. Mastering Turbo C by Brottle Stan Kelly.
8. C Programming by Beam JE.
9. Turbo C++ by Greg Perry and Marcus Johnson.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
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CSP–194 FUNDAMENTALS OF IT & COMPUTER PROGRAMMING LAB

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I. a) Looking for directories and files under DOS.

b) Changing drives, searching for files, looking at files extensions and size of files.

c) Deleting and saving files, protecting and unprotecting file.

d) Formatting floppy disks.

II. Familiarising with windows, closing, maximising, shifting icons, ordering icons, changing the size of windows, moving windows.

III. File manager to view the files, transfer files from directories/devices to other placings.

IV. Exercises (at least five) involving assignment, looping, functions, arrays, pointers an files in C.

V. Simple programs (at least three) to demonstrate object oriented concepts in C++.

VI. Familiarisation and hands on experience with MS Word Software under Windows.

Instructional Approach:

Teachers are expected to lay greater emphasis in making use of computers by students. This will enable students to develop desired competencies in making use of computers in their professional activities.

While teaching programming language, focus should be on hand–on experience by providing appropriate tutorial/practical exercises.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

ECL–125 ELECTRONICS DEVICES & CIRCUITS

L T P
3 1 0

PART – I

1. **Bipolar Junction Transistors:** Transistor at low frequency, Transistor hybrid model, H–parameters, conversion formulas, analysis using h–parameters, cascading transistor amplifiers, transistor at high freq. and its hybrid (pi) CE model.

2. **Field Effect Transistors:** The JFET, V/I characteristics, pinch off voltage, MOSFET, Digital MOSFET circuits, low–freq. C.S. and C.D. amplifiers.

PART – II

3. **Transistor Biasing and stabilization:** Operating point, Bias stability, various biasing circuits, stabilization against variation in $1_{co,}$ V_{BE} and beta, Bias compensation, Thermister and Senistor compensation, Thermal Runaway, Thermal stability, biasing the FET, FET as a VVR, CS amp. at high freq., CD amp at high freq.

PART – III

4. **Power Amplifier:** Classification of amplifiers, analysis of class A,B,C and AB amplifiers, push pull amplifier, complementary symmetry and paraphrase amp. distortion in amp., Frequency response of amp., its graphical analysis, Harmonics, power distortion, heat sinks.

5. **Multistage Amplifiers:** Types of Multistage amplifiers like RC, LC, transformer coupled, D.C. amplifiers, their freq. Response curves and analysis, tuned amplifiers and wideband amplifiers and their analysis.

6. **Feedback Amplifiers:** Feedback concepts, transfer gain with feedback, effect of negative feedback on amplifier input and output resistance bandwidth, distortion method of analysis of feedback amplifiers, voltage shunt and current shunt feedback.

References:

1. *Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.*
2. *Integrated Electronics, Millman, J and Halkiias, C.C, TMH, 2007.*
3. *Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.*
4. *Microelectronic Circuits, Sedra & Smith, V Edition, Oxford University Press, 2007.*
5. *Electronic Devices and Circuits by J.J. Cathey, Schaum's Outline Series, TMH, IInd Edition, 2004.*

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

ECP–125 LAB ELECTRONIC DEVICES AND CIRCUITS

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1. Determination of h–parameters of a transistor.
2. Design of transistor biasing circuits.
3. Study of frequency response of RC coupled amplifier.
4. Study of an emitter follower circuit.
5. Study of pulse response (high freq. Characteristics) for an amplifier.
6. Study of frequency response of an Cs–FET amplifier.
7. Study of Class A/B Transformer coupled power amplifier.
8. Study of Class B Complementary symmetry amplifier.
9. Study of positive and negative feedback in amplifiers
10. Design of constant K filters.
11. Design of m–derived filters.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
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PHL–198 **PHYSICS–II**

L T P
3 1 0

PART – I

Classical and quantum statistics: statistics of discrete energy levels, Black body spectral density, Bose condensation :Free electrons, density of states, Kronig–Penney model, effective mass, band structure.

PART – II

Tunnelling of particles and Examples, tunnelling through multiple barriers and superconductor junction: Nanostructure, concept of electrons in low dimensional confinement.

PART – III

Quantum wells & Super–lattices leading to new devices concepts, Laser Einstein coefficients, population inversion, Light amplification ,optical resonators, characteristics of lasers.

Books Recommended:

1. Concepts of Modern Physics, Arthur Besier, Tata McGraw Hill, 2007.
2. Laser Theory and Applications, K Thyagrajan and AK Ghatak, Mac Millan Indian Ltd., New Delhi.
3. Laser and Optical Engineering, P.Dass, Narosa Pub. House, New Delhi, 1991.
4. Basic Engineering Thermodynamics by MW Zemansky and HC Vanees. McGraw Hill Book Co., Tokyo International Student Edition.
5. Applied Thermodynamics for Engineers and Technologists by TD Estop and McConkey; Longman Scientific and Technical.
6. Thermodynamics by JP Helman; McGraw Hill.
7. Engineering Thermodynamics by DB Spalding and EH Cole; ELBS and Adward Arnold Pub. Ltd.
8. Thermodynamics by Alien L. King, WH Freeman and Company, San Francisco.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

PHP–194 **PHYSICS LAB**

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1. To find the capacitance of a capacitor using flashing and quenching of neon lamp.

2. To determine the capacitance of a capacitor by discharging it through a voltmeter.

3. To measure the low resistance using Carey– Foster's bridge.

4. To find the frequency of AC supply using an Electrical vibrator.

5. To find the impedance of an AC Circuit containing R, L and C in series.

6. To study the resonance in series LCR circuit for different R–values and calculate Qvalue.

7. To study the phase relationships using impedance triangle for LCR circuit and calculate impedance.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

Subject Code: **ENL–151** Duration of Examination : 3 Hrs
Course Title: **Communicative English** Credits : 02 (L=2,T=0,U=0)

Objectives: To Introduce students in a graded manner to the communication skills of Reading and Writing in English. At the end of semester II, the students should be able to demonstrate adequate competence in comprehending an unseen passage and performing the prescribed communication/writing tasks.

Prescribed Book: Vandana R. Singh, The Written Word, Oxford University Press, New Delhi (Selected Chapters).

Reading:

a) Developing Comprehension Skills:
Students will be required to read sample comprehension passage as given in Chapter *Critical Reading and Comprehension* of the prescribed book. The teacher will help students in handling text and answering questions given at the end of each passage.
Teacher can bring in more texts and construct questions of factual and inferential nature to enhance the comprehension skills of the students.

b) Developing Habits of Additional Reading:
The students will be required to show evidence of additional independent reading. They will maintain a scrapbook consisting of such readings as clippings from newspapers and magazines, short articles, stories etc. The minimum quantum of such additional reading will be decided by the class teacher, who will also test students individually on their additional reading (and appropriately award internal assessment, if required.

Writing:

a) Developing Vocabulary and using it in the Right Context:
Students will be required to pay special attention to build up their vocabulary. They should master the contents of the chapter on *Vocabulary* in the prescribed book. Teacher will help the students learn the correct and appropriate use of the given set of words/phrases/expressions.

b) Developing Skills in Formal Writing:
Students will be required to do write–ups involving skills of making formal complaints, requests, orders etc., reporting, note taking, summarizing and transcoding. The types of composition task may include business and public interest letters, news/features writing, speeches, minutes, instructions, summary reports etc. Teacher shall instruct the students about the appropriate format and usual conventions followed in such writings. The following chapters in the prescribed book may be consulted for exercise materials on these tasks:

1. Paragraph and essay writing
2. Report Writing
3. Letter Writig
4. Note Making and Summarizing
5. Transcoding

Recommended Books:

1. A Course in Grammar and Composition by Geeta Nagaraj, Foundation Book, 2006.
2. Oxford Guide to Effective Writing and Speaking by Jhon Seely.

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)

PBL–131: ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ–II

p`T–km Eq| p`T psqk~

Credits: 2–0–0

(I) 1. **E`qm En`qm** (sp. virE`m isG sD Eq| f`. sihdrblr isG **!** r n`nk dv "nlvris#l Eimqsr$ iv&(hT~ il**)** kvl+

(,$:`.l vlr isG
(E$ p+ prn isG
(.$ p+ mhn isG
(kivq`–s`r iv/`–vsq k`iv–kl` kvl$

0. pj`bl /bd b*qr + D`q=ml vDqr (E!qr ip;qr iv,(qpq Eq| rp-qrl$ sm`s›

(II) **8**. **E`qm En`qm (**sp. virE`m isG sD Eq| f`. sihdrblr isG **!** r n`nk dv "nlvris#l Eimqsr$ iv&(hT il**)** kvl+

(,$ Eimq` plqm
(E$ f`. hr:jn isG
(.$ i/v km`r b#`l vl
(kivq`–s`r iv/`–vsq k`iv–kl` kvl$

0. **p**lr`l **r&n`** + kl`s iv& **89** ivi/E~ (si:E`&`rk D`rimk Eq| r`jnlqk$ q pr` r&n` d Ei:E`s krv`,* ›

(III) **8**. **E`qm En`qm (**sp. virE`m isG sD Eq| f`. sihdrblr isG **!** r n`nk dv "nlvris#l Eimqsr$ iv&(hT il**)** kvl+

(,$ f`. jsvq isG nkl
(E$ f`. j!q`r
(.$ f`. srjlq p`qr
(s$ p`/
(kivq`–s`r iv/`–vsq k`iv–kl` kvl$

0. mh`vr q E**)`*** (E**)`*** q mh`vr` k/ iv&$ **099** mh`virE~ Eq| **899** E**)`*~** n v`k~ iv& vrq* d Ei:E`s krv`,* (kl`s iv& q Grl .l$ ›

B.Tech. (Electronics & Communication Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)
(List of Electives – II)

PBL–132: ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Punjabi Compulsory)

2–0–0

ਪਾਠ–ਕ੍ਰਮ

1. ਪੰਜਾਬੀ ਸ਼ਬਦ–ਬਣਤਰ
   ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ
   ਬਹੁ–ਉਚਾਰਖੰਡੀ ਸ਼ਬਦ

2. ਪੰਜਾਬੀ ਵਾਕ–ਬਣਤਰ
   ਸਾਧਾਰਨ–ਵਾਕ : ਕਿਸਮਾਂ
   ਸੰਯੁਕਤ–ਵਾਕ : ਕਿਸਮਾਂ
   ਮਿਸ਼ਰਤ–ਵਾਕ : ਕਿਸਮਾਂ

3. ਪ੍ਰਕਾਰਜੀ ਪੰਜਾਬੀ
   ਚਿੱਠੀ ਪੱਤਰ
   ਪੈਰ੍ਹਾ ਰਚਨਾ
   ਸੰਖੇਪ ਰਚਨਾ
   ਅਖਾਣ ਅਤੇ ਮੁਹਾਵਰੇ

ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1. ਪੰਜਾਬੀ ਸ਼ਬਦ–ਬਣਤਰ : ਸੰਯੁਕਤ ਸ਼ਬਦ; ਸਮਾਸੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਲੋਕ ਸਭਾ); ਦੋਜਾਤੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਕਾਲਾ ਸਿਆਹ); ਦੋਹਰੇ ਸ਼ਬਦ/ਦੁਹਰੁਕਤੀ (ਜਿਵੇਂ ਧੂੜ੍ਹ ਧਾੜ੍ਹ/ਭਰ ਭਰ), ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਬਣਤਰ/ਸਿਰਜਨਾ; ਅਗੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਉਪ ਭਾਸ਼ਾ), ਪਿਛੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਰੰਗਲਾ), ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ–2: ਪੜਨਾਵੀਂ ਰੂਪ, ਕਿਰਿਆ/ਸਹਾਇਕ ਕਿਰਿਆ ਦੇ ਰੂਪ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ–2: ਮਾਰਕੀਟ/ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ।

2. ਪੰਜਾਬੀ ਵਾਕ–ਬਣਤਰ : ਕਰਤਾ ਕਰਮ ਕਿਰਿਆ; ਸਾਧਾਰਨ ਵਾਕ, ਬਿਆਨੀਆ, ਪ੍ਰਸ਼ਨਵਾਚਕ, ਆਗਿਆਵਾਚਕ, ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕਾਂ ਦੀਆਂ ਕਿਸਮਾਂ; ਸੁਤੰਤਰ ਅਤੇ ਅਧੀਨ ਉਪਵਾਕ; ਸਮਾਨ (ਤੇ/ਅਤੇ) ਅਤੇ ਅਧੀਨ (ਜੋ/ਕਿ) ਯੋਜਕਾਂ ਦੀ ਵਰਤੋਂ; ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ : ਵਿਭਿੰਨ ਸਮਾਜਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸਥਿਤੀਆਂ ਦੇ ਅੰਤਰਗਤ; ਘਰ ਵਿਚ, ਬਾਜ਼ਾਰ ਵਿਚ, ਮੇਲੇ ਵਿਚ, ਸ਼ੌਪਿੰਗ ਮਾਲ/ਸਿਨਮੇ ਵਿਚ, ਵਿਆਹ ਵਿਚ, ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਵਿਚ, ਦੋਸਤਾਂ ਨਾਲ ਆਦਿ।

3. ਇਸ ਯੂਨਿਟ ਵਿਚ ਚਿੱਠੀ ਪੱਤਰ (ਨਿੱਜੀ/ਦਫ਼ਤਰੀ/ਵਪਾਰਕ), ਪੈਰਾ ਰਚਨਾਂ, ਸੰਖੇਪ ਰਚਨਾ ਅਤੇ ਅਖਾਣ ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਦੀ ਭਾਸ਼ਾਈ ਯੋਗਤਾ ਨੂੰ ਪਰਖਿਆ ਜਾਵੇਗਾ।

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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MTL–201 **MATHEMATICS–III**

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UNIT–I

Probability: Classical and axiomatic approach to the theory of probability, additive and multiplicative law of probability, conditional probability and bayes theorem.

Random Variables: Random Variables, probability mass function, probability density function, cumulative distribution function, function of random variable. Two and higher dimensional random variables, joint distribution, marginal and conditional distributions, Stochastic independence.

UNIT–II

Expectation: Mathematical expectations and moments, moment generating function and its properties.
Probability Distributions: Binomial, Poisson, Uniform, Exponential, Gamma, Normal distribution, t–distribution, chi–square distribution, F–distribution.

UNIT–III

Uniform Pseudo random number generation and random variable generation, Generating random variate from standard statistical distribution (discrete and continuous distribution), Monte– Carlo integration.

Books Recommended:

1. Hogg, RV, Mckean, JW and Craig, AT: Introduction to Mathematical Statistics.
2. Gupta, SC and Kapoor, K: Fundamentals of Mathematical Statistics, Sultan Chand & Co.
3. Rubinstein, R.Y.: Simulation and the Monte Carlo Method, John Wiley.
4. Probability and Statistics with Reliability by KS Trivedi, Prentice Hall.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECL – 211 **DIGITAL ELECTRONICS**

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3 1 0

PART – I

1. **Number System and Binary Code**:
Introduction, Binary, Octal and hexadecimal number system. Signed and unsigned number, binary operations–Addition, Subtraction. Multiplication and division. Subtractions using 1's and 2's compliment; ASCII code. Excess 3 codes and Gray code. (4)

2. **Minimization of logic function**:
OR, AND, NOT, NOR, NAND, Ex–OR gates, Basic theorem of Boolean Algebra sum of products and product of sums canonical form. Minimization using theorems, minimization using K–map and Q–M method. Incompletely Specified functions. (6)

PART – II

3. **Combinational Logic Circuits:**
Introduction, Combinational circuit design, multiplexer, demultiplexer, encoders, decoders, adders, substracters and code converters, parity checker, BCD display drive, magnitude comparators. (5)

4. **Sequential Circuits**:
Introduction, flip flop, SR. JK, D,T. Edge triggered and clocked flip–flop, Registers. Types of Registers, circuit diagram, timing wave form and operations, counter, counter design with state equation state diagram.

PART – III

5. **D/A and A/D Converters:**
Introduction, Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test. D/A accuracy and resolution, parallel A/D converter Counter type A/D converter, Successive approximation A/D converter, Single and dual slope A./D converter, A/D accuracy and resolution, Voltage to Frequency conversion, Voltage to time conversion. (8)

6. **Semiconductor Memories:**
Introduction, Memory organization, Classification and characteristics of memories. Sequential memories, ROMs, RAM memories, Content addressable memories, programmable logic arrays, charged–coupled device memory. (5)

7. **Logic Families:**
RTL, DCTL, DTL, TTL, ECL and its various types, Comparison of logic families. (4)

Recommended Books:

1.	Digital Principle and Applications:	Mulvino and Lelach	(TAIII)
2.	Modern Digital Electronics :	R.P. Jain	(PIII)
3.	Digital Electronics Principles :	Malvino	(TIIM)
4.	Modern Digital Systems Design :	Cheung & Bredeson	(WPC)
5.	An Engg. Approach to Digital Design :	Fletcher	(PRI)

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECP–211 LAB DIGITAL ELECTRONICS

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1. (a) Verification of the truth tables of TTL gates, e.g., 7400, 7402, 7404, 7408, 7432, 7486.
   (b) Design, fabrication and testing of low frequency TTL clocks using NAND gates.
2. (a) Verification of the truth table of the Multiplexer 74150.
   (b) Verification of the truth table of the De–Multiplexer 74154.
3. Design and verification of the truth tables of half adder and full adder circuits using gates 7483.
4. Study and verification of the operations of at ALU 74181 with regards to addition/subtraction/ comparison.
5. Design fabrication and testing of differentiator and integrator circuits using OP AMP.
6. Design fabrication and testing of clipper & clamper circuits using OP AMP.
7. Design fabrication and testing of
   (a) Monostable multivibrator of t_r = 0.1 msec (approx) using 74121/123.Testing for both positive and negative edge triggering, variation in pulse with and retriggering.
   (b) Free running multivibrator at 1 KHz and 1 hz using 555 with 50% dully cycle Verify the timing from theoretical calculations.
8. Design fabricate and test a switch debouncer using 7400.
9. (a) Design and test of an S.R. flip–flop using NOR/Nand gates.
   (b) Verify the truth table of a J–K flip flop (7476).
   (c) Verify the truth table of a D flip–flop (7474) and study its operation in the toggle and asynchronous modes.
10. Operate the counters 7490, 7493 and 74192. Verify the frequency division at each stage. With a low frequency clock (say 1 hz display the count on LEDs).
11. (a) Verify the truth table of decoder driver 7447 and 07448. Hence operate a 7 segment LED display through a counter using a low frequency clock.
    (b) Repeat the above with the BCD to Decimal decoder 7442 and an array of LEDs.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECL – 212 ANALYSIS AND SYNTHESIS OF NETWORKS

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PART – I

1. **Circuit Concepts:** Circuit elements; Independent and dependent sources, signals and wave forms; periodic and singularity voltages.
2. **Mesh & Nodal Analysis:** Loop currents and loop equations, node voltages and node equations, mesh and nodal analysis, duality, graphical method of determining the dual of N/Ws.
3. **Network Theorems:** Superposition, Thevenin's, Norton's, Maximum power Transfer, Tellegen's, Reciprocity theorem.

PART – II

4. **Signal Waveforms:** Introduction, step function, ramp, impulse, doublet functions, shifting or sampling property of impulse function.
5. **Time and Frequency Domain Analysis:** Representation of basic circuits in terms of generalized freq, their response, Laplace transform of shifted functions, transient & steady response. Time domain behaviors from poles and zeros. Convolution Theorem. Convolution integral.
6. **Filters Synthesis:** Classification of filters, characteristic impedance and propagation constant of pure reactive network, Ladder network, T–section, Pi–section, terminating half section. Pass bands and stop bands. Design of constant–K, m–derived filters. Composite filters.

PART – III

7. **Network Synthesis:** Network functions; Impedance & Admittance function, Transfer functions, Relationship between transfer and impulse response, poles and zeros and restrictions, Network functions for two terminal pair network. Sinusoidal network in terms of poles & zeros. Reliability condition for impedance synthesis of RL & RC networks, network synthesis techniques for 2–terminal network, Foster and Causer's forms of synthesis.
8. **State Variable Analysis:** Introduction, state equations, choice of state variables, order of complexity of a N/W, writing state equations using N/W graphs, advantages of state variable analysis.

Books Recommended:

1. Networks and Systems by : Ashfaq Hussain
2. Network Analysis and Synthesis by : Soni–Gupta
3. Network Analysis and Synthesis by : D.R.Chaudhry
4. Network Analysis and Synthesis by : R. Sudhakar

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECP–212 LAB ANALYSIS AND SYNTHESIS OF NETWORKS

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Experiments covering

Implementation and proof of

Superposition Theorem

Thevenin's Theorem

Norton's Therorem

Maximum Power Transfer Theorem

And Reciprocity Theorem.

Study of transfer characteristics of

Low Pass Filters

High Pass Filters

Band Pass Filters

Band Stop Filters

Design and implementation of

Constant–k

m–dirived and

composite filters

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECL–214 ANALOG INTEGRATED CIRCUITS

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PART – I

Differential and Gas–code Amplifiers

Introduction, Differential Amp with circuit configuration, Input, Balanced output, unbalanced output, differential Amp with D.C. and A.C. analysis of inverting and non–inverting inputs, Single as Balanced output and unbalanced output difference amp. With their D.C. and A.C. analysis, FET difference amp. Swamping Resistors const current bias, current mirror, according of difference amp. Stage level translation cascade or CA–CB configuration with its D.C. and A.C. analysis, common wave signals.

Introduction to Op–Amp.

Operational Amp. Block diagram, analysis and its schematic symbol interpretation of data sheet and character practical op–amp. Input offset voltage, input bias current, input offset current, output offset voltage, thermal drift, offset of variation power supply voltages on offset vtg. Temp. and supply vtg. Sensitivity parameters, noise, common mode configurations and common mode reject freq–response of an op–amp compensating networks, slew rate

PART – II

Op–Amp. with Negative Feedback:

Introduction and Block diagram representation of feedback configurations voltage–series feedback amp. with difference parameter voltage shunt feedback with different parameters, differential amp. with one op–amp., two op–amp., three op–amp.

Op–Amp. Applications:

D.C. and A.C. Amplifiers, peaking amp. scaling and averaging amp., signal conditioner, V to I and I to V converter, log and antilog amp., differential Amp. Instrumentation and Isolation amp. etc. integrator and differentiator, active filters, Butterworth. Chebyshev approximatives. Sallon and Key structure, state variable filters. LP. HP, BP, and all pass filters, analog multiplier and its applications, sample and hold circuits, A to D and D to A converters, introduction to data acquisition systems.

PART – III

Oscillators voltage to freq. And freq–to voltage conversions, precision rectifiers, clippers and clampers peak detectors, sample and hold circuit, logarithmic amplifiers.

The 555 Timer

Introduction and block diagram 555 timer as monostable multibrator, astable multivibrator and as bistable multivibrator and timer applications.

Phased Locked Loops and Voltage Regulations:–

Operating principles & applications of PLL, Fixed voltage regulators, Adjustable voltage regulators, switching regulators.

Books:

Sr. No.	Name of Book	Author	Publisher
1.	Integrated Electronics	Millman & Halkias	McGraw Hill
2.	Electronic Fundamental & Applications	I.D. Ryder	PHI
3.	Micro–electronics	Millman	McGraw Hill
4.	Op–Amps & Linear Integrated Circuits	Ramakant & Gayakward	PHI

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECP–214 LAB ANALOG INTEGRATED CIRCUITS

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LIST OF EXPERIMENTS:

1. To use discrete components to build and understand the amplifier circuit similar to those used in linear. ECE and calculate gain of each stage and total gain.

2. To examine the design and operating characteristics of an Op–amp inverting summer.

3. To use the Op–Amp as Schmitt trigger and study its response.

4. To examine the effects of bias currents on Op–Amp operation.

5. To use the CF–Amp as summing amplifier.

6. To study the effect of different noise source upon co–Amp output noise level.

7. To study the operation of a voltage/current boosted amplifier.

8. Design a series regulators with an error amplifier to provide an output voltage of 5 volt at a lead current of 4.5 Amp. Use a 741 pp. Amp, and specify the Zener voltage necessary transistor gain and the maximum power dissipation of the transistor.

9. Design a wein bridge oscillator using 741 with and without adaptive feedback.

10. To investigate the operation of a VCO–type digital voltmeter.

11. Design a delay circuit using 555.

12. To examine the operation of a PLL and to determine the free running frequency, the capture range, and the lock in range of PLL.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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CSL–297 PROGRAMMING LANGUAGES

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Purpose:
The purpose of this course is to enable students to understand the concepts of data structure and the commonly used algorithms.

Instructional Objectives:
The students undergoing this course should be able to
• Understand and explain fundamentals of data structures
• Develop approach towards analyzing and evaluating commonly used algorithms
• Write the algorithm in pseudo code similar to programming language C
• Understand basic concepts of object oriented programming.
• Solve problems using C++

Contents:

PART–I

Advance features of C Programming:
Standard C Data types, Storage Classes, Standard C libraries, Unions, Macro's, Advance preprocessor statements, Dynamic memory allocation.

Data Structures:
Preliminaries– Various Data structures, common operations on data structures.
Arrays– Insertion, deletion, traversal, searching–Linear search and binary search, sorting–insertion sort, selection sort, and merging.

PART–II

Stacks– Introduction, implementation of stack using arrays, Polish notation, Quick sort.
Queues– Introduction, implementation of queue using arrays, deques.
Linked List– representation of linked list in memory, operations on linked list– creation, traversal, search, insertion and deletion.
Trees – terminology, binary tree, binary search tree – traversal, search, insertion and deletion.

PART–III

Object Oriented Programming:
Basic concepts of object oriented programming, difference between C and C++, Classes, Objects, operator overloading, Inheritance, polymorphism, Input and output functions.

Recommended Books:

1. Theory and Problems of Data Structures by Seymour Lipschutz, Schaum's Outline Series, McGraw–Hill Book Company.
2. Data Structures using C by Yedidyah Langsam, Tenenbaum, Prentice Hall of India.
3. Programming in C++ by Balagurusamy, Tata McGraw– Hill.
4. The Waite Group's Object Oriented Programming in C++ by Robert Lafore.
5. Programming in C++ by Mark Keegon.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ESL–220: ENVIRONMENTAL STUDIES (COMPULSORY)

Credit 3–0–0

1. **The multidisciplinary nature of environmental studies:** Definition, scope & its importance, Need for public awareness.

2. **Natural resources**: Natural resources and associated problems.

   a) **Forest Resources**: Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
   b) **Water Resources**: Use and over–utilization of surface and ground water, floods, drought, conflicts over water, dams–benefits and problems.
   c) **Mineral Resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
   d) **Food Resources**: World food problems, change caused by agriculture and overgrazing, effects or modern agriculture, fertilizer–pesticide problem, salinity, case studies.
   e) **Energy Resources**: Growing of energy needs, renewable and non–renewable energy resources, use of alternate energy sources, case studies.
   f) **Land Recourses**: Land as a resource, land degradation, soil erosion and desertification.
   g) Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.

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

4. Biodiversity and its Conservation:

Definition: Genetic, species and ecosystem diversity, Biogeographical classification of India.
Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.
Biodiversity of global, National and local levels, India as mega–diversity nation "Hot–spots of biodiversity.
Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts
Endangered and endemic species of India.
Conservation of Biodiversity: In situ and Ex–situ conservation of biodiversity.

5. Environmental Pollution:

Definition, Causes, effects and control measures of:
a) Air Pollution
b) Water Pollution
c) Soil Pollution
d) Marine Pollution
e) Noise Pollution
f) Thermal Pollution
g) Nuclear Hazards
Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies Disaster Management: Floods, Earthquake, Cyclone and Landslides

6. Social Issues and Environment:

* From unsustainable to sustainable development
* Urban problems related to energy
* Water conservation, rain water harvesting, watershed management
* Resettlement and rehabilitation of people; its problems and concerns. Case studies
* Environmental ethics: Issues and possible solutions.
* Climate change, global warning, acid rain, ozone layer depletion, nuclear accidents and holocause. Case studies.
* Wasteland reclamation
* Consumerism and waste products
* Environmental Protection Act
* Air (prevention and Control of Pollution) Act
* Water (prevention and Control of Pollution) Act
* Wildlife Protection Act
* Forest Conservation Act
* Issues involved in enforcement o£. environmental legislation
* Public awareness

7. Human Population and the Environment

* Population growth, variation among nations
* Population explosion–Family welfare programme
* Environment and human health
* Human rights
* Value education
* HIV / AIDS
* Women and child welfare
* Role of information technology in environment :and human health
* Case studies

*** Road Safety Rules & Regulations:** Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs.

*** Accident & First Aid:** First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance.

8. Field Work: Visit to a local area to document environmental assets–river / forest / grassland / hill / mountain. Visit to a local polluted site–Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems–pond, river, hill slopes, etc. (Field work equal to 5 lecture hours).

References:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Bharucha, E. 2004. The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad.
4. Brunner, R. C. 1989. Hazardous Waste Incineration, McGraw Hill Inc. New York.
5. Clark, R. S. 2000. Marine Pollution, Clanderson Press Oxford.
6. Cunningham, W. P., Cooper, T. H., Gorhani, E. & Hepworth, M. T. 2001. Environmental Encyclopedia, Jaico Publications House, Mumbai.
7. De, A. K. 1989. Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment, New Delhi.
9. Hawkins, R. E. 2000. Encyclopedia of Indian Natural History, Bombay Natural History Society.

10. Heywood, V. H & Waston, R. T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
11. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
12. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
13. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
14. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
15. Odum, E. P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.
16. Rajagopalan, R. 2005. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
17. Sharma, B. K. 2001. Environmental Chemistry. Geol Publishing House, Meerut.
18. Sharma, J. P. 2004. Comprehensive Environmental Studies, Laxmi Publications (P) Ltd, New Delhi.
19. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
20. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.
21. Survey of the Environment. 2005. The Hindu.
22. Tiwari, S. C. 2003. Concepts of Modern Ecology, Bishen Singh Mahendra Pal Singh, Dehra Dun.
23. Townsend, C., Harper, J. and Michael, B. 2001. Essentials of Ecology, Blackwell Science.
24. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECP– 215 **LAB PSPICE**

L	T	P
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1. Introduction to pspice, MATLAB and SIMULINK.
2. Verification of network theorem
3. Resonant Circuits: R–L–C series and parallel circuits
4. Amplifiers: Using BJT and OP–amps
5. Oscillators circuits: Using BJT and OP–amps
6. Frequency Response of CE Amplifier
7. Design and Verification of Class–A Power Amplifier
8. Frequency response of Integrated circuits
9. Stability of feedback amplifiers

B.Tech. (Electronics & Communication Engineering) 3rd Semester
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ECE–216 **SUMMER TRAINING**

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Students would showcase their projects and jobs performed in machine shops during their summer training and appear for the viva voce examination for the same.

B.Tech. (Electronics & Communication Engineering) 4th Semester
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INTERDISCIPLINARY COURSE – I

L	T	P
4	0	0

B.Tech. (Electronics & Communication Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)

INTERDISCIPLINARY COURSE – II

L	T	P
3	0	0

B.Tech. (Electronics & Communication Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)

ECL– 221 ELECTROMAGNETIC FIELD THEORY

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PART–I

1. **Time Varying Fields:**
Maxwell's equations in differential and integral forms concept of displacement current. Boundary conditions.

2. **Electromagnetic Waves:**
Wave equation and its solution in different media, plane wave, sinusoidal time variations, polarization, Reflection of waves by perfect dielectrics and by perfect insulators. Surface impedance, Pointing theorem and pointing vector.

PART–II

3. **Guided Waves:**
Waves between parallel planes, TE and TM waves and their characteristics. TEM wave, velocities of waves

4. **Transmission Lines:**
Circuit representation of parallel plane transmission lines. Parallel plane transmission, plane with losses. Low loss RF and UHF transmission lines. Distortion less condition. Transmission line charts. Impedance matching.

PART–III

5. **Introduction:**
Review of Electrostatics and Magnetostatics.

6. **Wave Guides:**
Rectangular and circular wave guides. TE and TM waves in rectangular wave guides. Impossibility of TEM wave in wave guides. Wave impedances and characteristics impedances. Transmission line analogy for wave guides. Attenuation and factor of wave guides. Dielectric slab wave guides.

Books Recommended:

SR.NO.	NAME OF BOOK	AUTHOR	PUBLISHER
1.	Electro Magnetic Wave and Radiating Systems	Jordon and Balmain	PHI
2.	Electromagnetics	Kraus	TMH
3.	Telecommunications	Fraser	

B.Tech. (Electronics & Communication Engineering) 4th Semester
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ECL–222 COMMUNICATION SIGNALS AND SYSTEMS

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PART – I

Signals, Systems and Analysis: Classification of signals and systems, signal representation using fourier series, complex exponential fourier series, representation of periodic signals, a periodic signal representation fourier transform, fourier transform of periodic power signals, power spectral density, system response impulse, step. Time domain response analysis, frequency, Domain analysis

PART – II

Signal Transmission Through Linear Networks: Convolution theorem, its graphical interpretation. Convolution function with a unit impulse function. The sampling theorem low pass and band pass network, matched filter, input output relations with random inputs, envelope detector.

PART – III

Random Signal Theory: Introduction to probabilities, Definition, probability of Random events, joint and conditional probability, probability, probability mass function statistical averages. Probability density functions and statistical averages. Examples of P.D. function, Random processes.

Introduction to Thermal Noise: shot noise partial noise, low frequency or flicker, Gaussian Noise, burst noise, avalanche noise, bipolar transistor noise, F.E.T. noise, noise factor, noise temperature, noise equivalent band width, noise figure. Experimental determination of noise figure.

References:

Sr.No.	Name of Book	Author	Publisher
1.	Comm. System	B.P. Lathi	Wiley Eastern, 4th Reprint 2006
2.	Comm. System	Haykins	Wiley Eastern, 2007
3.	Intro. To Modern Comm. Theory	P.D. Sharma	New Chand Brothers,Roorkee
4.	An Intro. To The Information Theory	Rera F.H.	McGraw Hill, 2007.
5.	Modern & Digital Comm. Systems	B.P. Lathi	4th Edition 2008 Oxford Univ. Press

B.Tech. (Electronics & Communication Engineering) 4th Semester
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ECL–224 **FIBER OPTICS**

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PART – I

1. **A General Introductory Discussion:**
   Elementary discussion of propagation in fibers using a Ray Model Attenuation of Optical fibers.

2. **Signal Degradation in Optical Fibers:**
   Attenuation, absorption, scattering losses and bending losses in optical fibers. Signal distortion in optical wave guide due to material dispersion and wave guide dispersion.

PART – II

3. **Mode Theory of Circular Wave Guide:**
   Wave equation in step index fiber, model equation, modes in step index fiber, power flow in step index fiber , modes in graded index fiber.

4. **Fiber Materials and Fabrication:**
   Fiber materials–Doping of fiber material, Glass fibers, plastic clad glass fibers, plastic fibers, fiber fabrication, drawing and coating.

PART – III

5. **Optical Sources:** Light emitting diode, laser diode, modes and threshold conditions, resonant frequency, laser diode structure, single mode laser, modulation of laser diode light source linearity, reliability considerations.

6. **Optical Fiber Sensors**:
   Physical phenomena for optical fiber sensor, temperature sensor, pressure sensor, liquid level sensor.

Books Recommended:

1. Chai Yeh–Hand Book of Fiber Optics, Academic Press.
2. Ghatak & Thyagarajan–Optical Electronics, Cambridge University Press.
3. Keiser – Optical fiber Communication, McGraw Hill.
4. John Gower– Prentice Hall of India Pvt. Ltd. Optical Communication System.

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ECP–224 **LAB FIBER OPTICS**

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1. To study temperature characteristics of Optical Fiber.
2. To study pressure characteristics of Optical Fiber.
3. To measure numerical aperture of different types of Optical Fiber.
4. To study different losses of Optical Fiber.
5. To determine beat length of Optical Fiber
6. To determine laser beam parameters.
7. To study diffraction experiments using Laser.
8. To study characteristics of Optical Coupler.
9. To study LED and Detector characteristics using integrating sphere.

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ECL–261 LINEAR CONTROL SYSTEM

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PART – I

1. **Introductory Concepts:** Plant, Systems Servomechanism, regulating systems, disturbances, open loop control system, closed loop control systems, linear and non–linear systems, time variant & invariant, continuous and sampled data control systems, block diagrams, some illustrative examples.
2. **Modelling:** Formulation of equation of linear electrical, mechanical, thermal pneumatic and hydraulic system, electrical, mechanical analogies. Use of Laplace transform, transfer function, concepts of state variable modelling. Block diagram representation signal flow graphs and associated algebra, characteristics equation, transfer function of discrete data system, state equation of linear discrete data system, z–transform solution of discrete state equations.
3. **Time Domain Analysis:** Typical test– input signals, transient response of the first and second order systems. Time domain specifications, dominant closed loop poles of higher order systems. Steady state error and co–efficient. Pole–zero location and stability.

PART – II

Routh – Hurwitz criterion, stability of discrete data systems, steady state error analysis of discrete data systems.

4. **Root Locus Techniques:** The extreme points of the root loci for positive gain. Asymptotes to the locii breakaway points, intersection with imaginary exits, location of roots with given gain & sketch of the root locus plot, root loci of discrete data control system.
5. **Frequency Domain Analysis:** Closed loop frequency response, Bode plots , stability and loop transfer function. Frequency response specification relative stability, relation between time and frequency response for second order systems. M and N–circles, Lag magnitude versus Phases angle plot nyquist criterion, frequency domain analysis of discrete data systems.

PART – III

6. **Compensation:** Necessity of compensation series and parallel compensations, compensating network, application of lag and lead compensation.
7. **Control components:** Error detectors – potentiometers and synchronous, servo motor A.C and D.C. techno generators, magnetic amplifiers.

Books Recommended:

1. Modern Control Engineering by K. Ogata, Prentice Hall, New Delhi, 1974.
2. Control System Components by J.F. Gibson, McGraw Hill, 1963.
3. Automatic Control System by B.C. Kuo, Prentice Hall 3rd Ed., 1978.
4. Control System Engineering by I.J. Nagrath & Gopal, Wiley Eastern Ltd., New Delhi., 1975.

B.Tech. (Electronics & Communication Engineering) 4th Semester
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ECP–261 LAB LINEAR CONTROL SYSTEM

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1. To study input–output characteristics of a potentiometer and to use two potentiometers as an error deflector.
2. To study transmitter–receiver characteristics of a synchro set and to use the set as control component.
3. To study the operation of a D–C positional servo system and to investigate the effect of damping and supply voltage on its response.
4. To study the operation of an n.c. position servo–system and to obtain effects of supply voltage and system parameter on its transient response.
5. To design different compensating network for the given cut off frequencies and to plot frequency response of these networks.
6. To use operational amplifiers as multiplier, summer, inverter and integrator.
7. To simulate a servo–system and obtain its characteristics with the use of controllers.
8. To study control action of light control device.
9. To study details of magnetic amplifier and to obtain input–output characterization of this amplifier.
10. To study details of a two winding a–c servo meter and to obtain its T–N characteristics.
11. To study PID – Controller and to obtain the effect of proportional, integral and derivative control action.
12. To study details of an analogue computer and solve a given second order different equation using it.
13. To generate a sine–wave using a given Analog computer with specified amplifier and frequency.
14. To study a stepper motor and control its direction speed and number of steps with the help of a microprocessor.

15. To obtain dynamic characteristics of a given solar cell array and to obtain the point of operation for maximum power transfer to the load.

16. To obtain T.F. of a field controlled d.c. servo meter and to show its pole–zero configuration.

17. To obtain T.F. of an armature controlled d.c. servo meter and to obtain its pole–zero configuration.

18. To design, fabricate and to obtain characteristics of a high pass type filter.

19. To design, fabricate and to obtain the characteristics of a low pass Type filter.

20. To design, fabricate and to obtain the characteristics of a band pass–T Type filter.

21. To design, fabricate and to obtain the characteristics of a composite low pass filter.

22. To design, fabricate and to obtain the characteristics of a composite high pass filter.

23. To design, fabricate and to obtain the characteristics of composite hand pass filter.

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ECL–262 ELECTRICAL AND ELECTRONIC MEASUREMENTS

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PART – I

1. **Units, Dimensions and Standards:**
   SI Units, Determination of absolute units of current and resistance, Standards of EMF, Resistance, Capacitance, Mutual inductance and their construction, Equivalent circuit representation, Figures of Merit, Construction of variable standards and Decade Boxes.

2. **General Theory of Analog Instruments:**
   Primary and secondary instruments, Indicating recording and integrating types, operating torques damping and controlling torques, Torque/ weight ratio, pointers and scales.

PART –II

3. **Analog Measuring Instruments:**
   Principles of operation, Construction, Errors, calibration, areas of application of the following types of instruments for measurement of voltage, current, power, energy, frequency and power factor: (a) PMMC (b) Dynamometer (c) Moving Iron (d) Induction (e) Thermal (f) Electrostatic Extension of Ranges by Shunts. Multipliers: Power and Energy Measurements in Poly phase Circuits.

4. **Potentiometers (Only Principles, Operation & applications of DC & AC potentiometer)**

   (a) Simple concepts of potentiometers.

   (b) Principle of DC potentiometer, applications.

   (c) Principle operation of AC potentiomerter with advantages/ Disadvantages/ applications.

PART – III

5. **Measurement of Resistances;–**

   Low, Medium & High Resistance their measurement.

6. **Bridges:**

   Measurement of R,L,C,M,O by wheatstone, Kelvin, Maxwell Hay, Anderson, Owen, Heaviside, Campbell, Schering, Wien bridges, Bridge sensitivity, Errors, Detectors, Shielding and screening, Wanger ,Earthing.

7. **Instrument Transformers**

   Theory and construction of current and potential transformer, ratio and phase angle error and their minimization, testing of CTS & PTS.

8. **Cathodes Ray Oscilloscopes:**

   Principles and working of CRO, CRO– probes, Measurement of voltage, frequency and phase angle with CRO.

Recommended Books:

1. Electrical & electronic Measurement and Instrumentation by A.K. Sawhney.
2. Basic Electrical Measurement by B. Shout.
3. Electronic Instrumentation and Measurement techniques by W.D. Cooper.

B.Tech. (Electronics & Communication Engineering) 4th Semester
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ECP–262 LAB ELECTRICAL & ELECTRONIC MEASUREMENTS

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LIST OF EXPERIMENTS:

1. Measurement of inductance by Maxwell's Bridge.
2. Measurement of small resistance by the Kelvin's Bridge.
3. Measurement capacitance of the Schering bridge.
4. Measurement of frequency by main bridge.
5. Drawing of the B–H loop of a toroidal specimen by using a flux meter.
6. Calibration adjustment of single phase energy meter.
7. Measurement of displacement with the help of potentiometer.
8. Determination of frequency & phase angle using CRO's.
9. Measurement of medium resistances with the help of Wheatstone bridge.
10. Measurement of leakage factor with flux meter.
11. To use low pass RC ckt. As an integrator for square pulses. To verify the time constant and observe its effect on the output wave form so as to chose its optimum value. Also to calculate the time constant graphically.
12. To observe the response of an R.L.C. ckt. to A.C. input. Determine the phase shift between the applied voltage and current making use of lissajous figures. Compare the result with theoretical one calculated from the ckt. parameters.
13. To verify voltage current relationship in a linear ckt. with non sinusoidal A.C. supply.
14. To find the Q. of a coil by a series resonance method and verify it by using Q. meter.
15. To convert a four terminal network to a three terminal network i.e. equivalent T network.

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ECP–226 ELECTRONIC DESIGN AND IMPLEMENTATION LAB

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Students are required to design simple electronic circuits (Digital, Analog or mixed) as directed by the class teacher. Students should be made aware of the requirement and function of all the components used in the circuit from circuit designing point of view. An introduction about the different designing techniques used nowadays should also be given to the students of this subject.

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ECL–311 COMMUNICATION SYSTEM – I

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PART – I

1. **Base Band Signals and Systems**
   Introduction, Definition of Communication, Communication system, Block Diagram, Need for Wireless Communication, Need of Modulation, General Definition of Modulation. Types of various Signals, Basic Transmission Signals.

2. Analog Modulation Techniques
   Introduction, Theory of Amplitude Modulation, AM Power Calculation AM Current Calculations, AM Modulation with a Complex wave, Theory of Frequency Modulation: Mathematical analysis of FM Spectra of FM Signals, Narrow band FM, Wide band FM, Theory of Phase Modulation, Phase Modulation obtained from Frequency Modulation, Comparison of AM and FM, Comparison of PM and FM.

3. AM Transmission and Reception :
   AM Transmission:

   Introduction, Generation of Amplitude, Modulation, Low Level and High Level Modulation, Basic Principle of AM Generation; Square Law Diode Modulation, Amplitude Modulation in Amplifier Circuits, Vander Bijl Modulation, Suppressed Carrier AM Generation (Balanced Modulator): Ring Modulator, Product Modulator/Balanced Modulator, High Power Linear Modulators.

PART – II

AM Reception:

Tuned Radio Frequency (TRF) Receiver, Super heterodyne Receiver, Basic Elements of AM Super–heterodyne Receiver, Basic elements of AM Super–Heterodyne Receiver, RF Amplifiers, Neutralization of RF Amplifiers, Class of Operation of RF Amplifiers, High power RF Amplifiers, Image Frequency Rejection, Cascade RF Amplifier, Methods of increasing Bandwidth. Frequency Conversion and Mixers: Additive Mixing, Bipolar Transistor Additive Mixer, Self Excited Additive Mixers, Multiplicative Mixing, Multiplicative Mixer Using Dual Gate MOSFET, Tracking and Alignment, IF Amplifier, AM Detector, Square law Detector, Envelope or Diode Detectors, AM Detector, Square law Detector, Envelope or Diode Detector. AM Detector with AGC, Distorted in Diode Detectors, AM Detector. Circuit Using Transistor, Double hetro–dyne Receiver, AM Receiver Using a phase locked loop (PLL), AM Receiver Characteristics.

4. FM Transmission and Reception

FM Transmission

FM Allocation Standards, Generation of FM by Direct Method, Varactor Diode Modulation, Indirect Generation of FM; The Armstrong Method, PC Phase Shift Method, Frequency Stabilised. Reactance FM Transmitter FM Stereo Transmitter.

FM Receptions

Direct Methods of Frequency Demodulation, Travis Detector/Frequency Discrimination (Balanced Slope Detector), Foster Seely or Phase: Discrimination, Radio Detector, Indirect Method of FM Demodulation, FM Detector Using PI Zero Crossing, Detector as a Frequency Demodulator, Pre–emphasis and de–emphasis, Limiters, The FM Receiver, RF Amplifier, FM Stereo Receiver, Tran receiver.

SSB Reception:

SSB Product Demodulator, Balanced Modulator as SSB Demodulator, Pilot Carrier SSB Receiver, SSB Double Super–Heterodyne Receiver, Compatible SSB (CSSB) Receiver, ISB/Suppressed Carrier Receiver.

PART – III

5. Pulse Modulation Transmission and Reception
Introduction, pulse Amplitude Modulation (PAM), Natural PAM Frequency Spectra for PAM, PAM Time Multiplexing Flat–top PAM, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Tune Modulation (PTM); Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PPM Demodulator.

Books Recommended:

1. *Communication Systems by J.Dass Wiley Eastern, 2007.*

2. *Digital and Analog Communication Systems by K Sham Shanmugam (John Wiely & Sons), 2007.*

3. *Electronic Communication Systems by Wayne Tomasi Pearson Education Fifth Edition, 2007.*

4. *Communication System (Analog & Digital) by Sanjay Sharma (KATSON), 2006.*

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ECP–311 LAB COMMUNICATION SYSTEM – I

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LIST OF EXPERIMENTS:

1. To study the amplitude modulation and demodulation experimental boards.
2. To study the frequency modulation & demodulation experiment boards.
3. To Study the function of a superhetrodyne receiver.
4. To study the operation of a phased lock loop.
5. To study the operation of a single sideband transmission system.
6. To study the operation of balance modulator.
7. To study the vestigial sideband transmission system.
8. To study the PAM, PWM, PPM techniques.

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ECL–312 MICROPROCESSOR AND ITS APPLICATIONS

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PART – I

Introduction to Microprocessors: Need for Flexible Logic and Evolution of Microprocessors, Applications, Generic Architecture of a Microprocessor.

INTEL 8085 Microprocessor: Pin Functions, Architecture, Addressing Modes, Instruction Set, Timing Diagrams, Interrupts, Programming Examples.

Basic Input/Output Techniques: Serial I/O, Parallel I/O, Programmed I/O, Interrupt Driven I/O, Direct Memory Access.

PART – II

INTEL 8086 Microprocessor: Pin Functions, Architecture, Characteristics and Basic Features of Family, Segmented Memory, Addressing Modes, Instruction Set, Data Transfer Instructions, Arithmetic, Logical, Shift & Rotate Instructions, Flag Control Instructions, Transfer of Control Instructions, Processor Control Instructions, Programming Examples, Interrupt Structures,

INTEL 8086 System Configuration: Clock Generator (8284), Bus Controller (8288), MIN/MAX Modes of 8086 and System Configurations.

PART – III

Peripheral Controllers: USART (8251), Programmable Peripheral Interface (8255), Programmable Interrupt Controller (8259), Programmable Keyboard and Display Interface. Co–processors 8087.

Advanced Microprocessors: Main features, comparison of 80186, 80286, 80386, 80486 and Pentium processors.

Books :

1. Microprocessor architecture Programming and application with 8085 : R.S.Gaonkar PRI
2. Microprocessor and Interfacing : D.V.Hall TMH
3. The 8088 and 8086 Microprocessors : W. A. Triebel, Avtar Singh, Pearson Edu Asia
4. An Introduction to the INTEL family of Microprocessor. : J.L.Antonakos, Pearson Edu Asia

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ECP–312 LAB MICROPROCESSOR AND ITS APPLICATIONS

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1. Simple programs for sorting a list of number in ascending and descending order.
2. Sorting a list without destroying the original list.
3. Code conversion – Binary to Gray/Gray to Binary.
4. Program for addition of BCD numbers.
5. Program for multiplication of 8 bit numbers using Booth's algorithm.
6. Interface an LED array and 7–segment display through 8255 and display a specified bit pattern/character sequence at an interval of 2 seconds.
7. Generate the given waveform using a DAC after interfacing it with a microprocessor kit, Use any PPI port.
8. Interface an ADC chip with microprocessor kit and verify its operation with d.c. and low frequency inputs. Use of PPI port and sample and holds is required.
9. Interface an external 8253 to the micro processor kit at the address given.
   Hence,
   i) Generate a pulse train of specified duty cycle at the given output line, operate as a N counter
   ii) Count a train of pulses for a given duration.
10. Interface the given microprocessor kit to a personal computer through R.S.–232C. The band rate is specified. Verify data transfer in both directions (P–PC and PC–P).
11. Interface a given printer to the micro processor kit using on board 8255.
12. Interface an external keyboard to a microprocessor kit through on board 8255.
13. Write a program to demonstrate rolling display from left–to–right using 8279. Do not use any built in routines, instead program the 8279.
14. Use the SOD line to generate a square wave of the specified duty cycle at a given frequency.

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ECL–313 ANTENNA AND WAVE PROPAGATION

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PART – I

1. **Radiation:**
   Physical concept of radiation, retarded potential radiation from a hertizian , mono pole and a half wave dipole, field in the vicinity and antenna, for field approximation.
2. **Antenna Parameters:**
   Radiation pattern, directivity, gain; radiation resistance effective aperture, terminal impedance, noise temperature, reciprocal properties, elementary ideas about self and mutual impedance.

PART – II

3. **Aperture Antennas:**
   Radiation through an aperture in a conduction screen, solo horn and reflector antennas.
4. **Antenna Arrays:**
   Arrays of point sources, array factor, directivity and beam width, ordinary and fire array super directive and fire array pattern multiplication, non uniform excitation, electronic scanning.

PART – III

5. **Wave Propagation:**
   Basic idea of ground wave surface wave and space wave propagation, troposphere propagation and duct propagation. Structure of ionosphere, reflection and infraction of waves by ionosphere, regular and irregular variations of the ionosphere qualitative discussion of propagation through ionosphere, vertical height, maximum usable frequency, skip distance, propagation characteristics of medium, high frequencies and microwaves.
6. Concept of Electromagnetic interference, EMC, advantages of EMC.

Books Recommended:

1. Antenna, Krous, J.D., McGraw Hill
2. Electromagnetic and radiating system, Jordan E.C.P., H.I
3. Antennas Theory and Design, C.A. balanis Row and Harper
4. Antenna Theory and Practice, R. Chatterjee, Wiley Eastern
5. Antennas and Radio wave Propagation, Collins, R.E. McGraw Hill

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MGL–301 ENTREPRENEURSHIP SKILLS FOR ENGINEERS

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PART–I

- Entrepreneurship: Concepts, Traits, types, characteristics, nature and functions.
- Classification and types of Entrepreneurs.
- Social Responsibility of an Entrepreneur.
- Role of Entrepreneurship in Economics Development.

First Terminal Test: 1hour

PART–II

- Entrepreneurship motivation.
- Developing Creativity and Understanding Innovation.
- Entrepreneurial Decision Process.
- Setting Up a Small Business Enterprise

Second Terminal test: 1 hour

PART–III

- Brief introduction to concept of Marketing and conduction market survey.
- Plant location and plant layout decisions
- Managing relations with staff, customers and suppliers
- Identifying various sources of finance

Suggested readings:

- Hisrich, Robert D and Peters, Michael P, Entrepreneurship, Delhi, Tata McGraw Hill, 2002.
- Holt, David H, Entrepreneurship: New Venture Creation, Delhi, Prentice Hall of India, 2001.
- Cliffton, Davis S and Syflie, David E, “Project feasibility analysis”, 1977 John Wiley, New York.
- Chandra, Prasana, Projects: Preparation, Appraisal, Budgeting and Implementation, New Delhi, Tata McGraw Hill.
- Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himala Publishing House, Mumbai.
- Parsad L.M>, Principles and Practice of Management, Sultan Chanda & Sons, New Delhi.
- M Charatimath, Poornima, Entrepreneurship Development & Small Business Enterprises, Pearson Education , Delhi

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INTERDISCIPLINARY COURSE – III

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B.Tech. (Electronics & Communication Engineering) 5th Semester
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ECL – 351 WAVE GENERATION AND SHAPING

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PART–I

1. **Wave Shaping:**
Linear Wave shaping: Response of RC, RL, RLC circuits to step, pulse, ramp and exponential wave forms, Integrators & differentiators circuits, Attenuators and Pulse transformers.
Non–Linear Wave Shaping: Clipping circuits; diode clipper, op–amp clipper, transistors clipper and compensation. Clamping circuits; diode clamping circuit, clamping operation synchronized clamping, transistors as a switch, Clamping circuit theorem.

PART–II

2. **Oscillators:**
Nyquist conditions for oscillation, Barkhausen Criteria, Tuned collector, Tuned base, Hartley, Collpits, Crystal oscillators, RC Phase shift, Wein bridge oscillators.

PART–III

3. **Wave Generation:**
Multivibrators: Monostable, bistable, astable, smith trigger
Time base generators and their general features, UJT, millers sweep circuits, Bootstrap sweep circuit.
Blocking oscillators and their applications.

Recommended Books:

1. Pulse digital and switching wave forms by Millman Taub McGraw Hill.
2. Wave Generation and Shaping by Strauss McGraw Hill.
3. Microelectronics by Millman and Grabel McGraw Hill.

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ECP–351 LAB. WAVE GENERATION AND SHAPING

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LIST OF EXPERIMENTS

1. To construct the astable multivibrator circuit and determine its performance
2. To construct the monostable multivibrator circuit and determine its performance characteristics
3. To construct habitable multivibrator circuit and determine its performance characteristics
4. To construct the Schmitt trigger circuit and determine its performance
5. To study the performance characteristics of phase shift oscillator and to determine the frequency of oscillation
6. To study the performance characteristics of Hartley /colpitts oscillator and to determine the frequency of oscillation
7. To study the performance characteristic of high pass RC circuit
8. To study the performance characteristic of low pass RC circuit
9. To study the performance characteristic of clipper circuit
10. To study the performance characteristic of clamper circuit
11. To study the performance characteristic of voltage time base generator circuit

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ECL–352 INDUSTRIAL ELECTRONICS

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PART – I

1. **Characteristics of selected devices**

Fast Recovery diodes, Schottky diode, SCR, gate trigger and communication circuits, series and parallel connection of SCRs, Diac, Triac, UJT, Power MOSFETS.

2. **Controlled Rectifier**

Half wave and full wave with resistive and R–L–E and resistive, Inductive loads, Free–wheeling diode, three phase rectifier. Bridge rectifiers–half controlled and fully controlled.

PART – II

3. **Inverter, Chopper and Cycle Converters**

Voltage driven, current driven, bridge, parallel, SCR version, control of output voltage–PWM scheme, harmonic reduction.

4. Induction Heating, effect of frequencies and power requirements, Dielectric heating and applications.

PART – III

5. **Switched Mode Power Suppliers**

Basic principle, step up and step–down circuits, integrated circuits for switched mode regulators.

6. **Motor Control**

D.C. and A.C. motor control, reversible drives, closed loop control, commutatorless d.c. motor control.

References:

- *Power Electronics – P.C. Sen, Tata McGraw Hill Publishing Co. Ltd., 2007.*
- *Power Electronics and Control– S.K. Dutta, Prentice Hall of India Pvt. Ltd., 2006.*
- *Industrial Electronics SN Biswas Dhanpat Rai & Sons, 2005*
- *Thyristor Engineering, MS Berde, Khanna Publication, 2005*
- *Power Electronics, PS Bimbra, Khanna Publication, 2004*

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ECP–352 LAB INDUSTRIAL ELECTRONICS

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1. To draw the characteristics of various thyristor families.
2. To determine frequency of a relaxation oscillator for various values of C.
3. To obtain the average current of an SCR as a function of resistance.
4. To vary the frequency of an inverter circuit.
5. To vary the firing angle of an SCR using a phase shift circuit and a peaking transformer.
6. To control the firing angle of thyristor by varying
   i) dc bias alone
   ii) dc bias with superimposed ac.
7. To vary the speed of a dc motor with the help of an SCR.
8. To determine the ripple factor of a full wave rectifier using SCR for various firing angles.

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ECL–321 MICROWAVE ENGINEERING

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PART – I

1. Microwave Semiconductor Devices:
Classification of Microwave Devices, Tunnel diode, Point Contact diode, Gunn diode, two valley structures, mode of operation, circuit realization, IMPATT diode, Read Diode, circuit realization, PIN diode, basic principle of operation, equivalent circuit, application as switch, modulator and phase shifter; Microwave Bi–polar and Field Effect Transistors – characteristics and performance.

PART – II

2. Microwave Circuits:
Voltage and current definitions, uniqueness of definitions, Impedance representation of one port, two port and n port junctions; Scattering matrix and its properties, Tee's and directional coupler; Transmission matrix representations.

3. Microwave Measurements and Components
Measurement of VSWR & Reflection coefficient, impedance using slotted line, Measurement of Power, use of SMITH CHART, Theory and use of attenuators, Directional Couplers Magic TEE, Probes and Loops. Microwave circulators and Isolators, bends and twists, Resonant cavities, Rat–Race circuits, wave guide, corners, Impedance Matching, Single, Double and Triple stub Tuners, Quarter wave Transformer.

PART – III

4. Microwave Tubes:
UHF limitations in conventional tubes, Analysis and operation of multi–cavity and reflex, Klystron, Admittance diagram of Klystron;

Analysis and operation of a travelling Wave Magnetron, Performance charts of Magnetron tubes, Principle of operation of Travelling Wave Tube.

References:

1. Microwave Principles – A.J. Reich, Van Nostrand.
2. Fundamentals of Microwave Engg. – R.E. Collin, McGraw Hill.
3. Microwave Semiconductor Devices and Their Circuit Applications – H.A. Watson, McGraw Hill, 1969.
4. Microwave Devices and Circuits – S.Y. Liao, Prentice Hall of India, 1990.
5. Microwave Circuits – R.N. Ghose, McGraw Hill.

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ECP–321 LAB MICROWAVE ENGINEERING

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1. Study of microwave components and instruments.
2. Measurement of crystal characteristics and proof of the square law characteristics of the diode.
3. Measurement of Klystron characteristics.
4. Measurement of VSWR and standing wave ratio.
5. Measurement of Dielectric constants.
6. Measurement of Directivity and coupling coefficient of a directional coupler.
7. Measurement of Q of a cavity.
8. Calculation of the attenuation constant of an attenuator.
9. Determination of the radiation characteristics and gain of an antenna.
10. Determination of the Phase–shift of a phase shifter.
11. Determination of the standing wave pattern on a transmission line and finding the length and position of the short circuit stub.

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ECL – 322 COMMUNICATION SYSTEMS – II

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PART – I

1. Digital Modulation Transmission and Reception
Introduction, Comparison of Analog and Digital Signals; Advantages and disadvantages of Digital Communications, Elements of Digital Communication Systems. Pulse Code Modulation (PCM); Quantization Noise, Companding Sampling Theorem, PCM bandwidth, Differential PCM, Delta Modulation (DM), Continuously Variable Slope Delta Modulator (CVSDM) or Adaptive Delta Modulation.

2. Digital Carrier Modulation Transmission and Reception
Introduction, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), coherent, non–coherent FSK detection, Continuous–Phase Frequency–Shift Keying (CP–FSK). Binary Phase Shift Keying (BPSK) ; Bandwidth consideration, transmitter and receiver. Quaternary Phase–Shift Keying (QPSK) ; Bandwidth consideration, transmitter and receiver, Offset QPSK. 8–PSK ; Transmitter and Receiver. Quadrature Amplitude Modulation (QAM); 8–QAM transmitter and receiver. Differential Phase Shift Keying (DPSK).

PART – II

3. Spread Spectrum Communication Systems
Introduction, Principles of Spread Spectrum; Direct sequence Pseudo–noise (DSPN) Spread Spectrum, Frequency hoping Spread Spectrum. Spread spectrum Modulation Systems; Generation of Pseudo–Noise Sequences ; Maximal Length Sequences. Gold Sequences, Correlation properties, Code Division Multiple Access (CDMA) : Principles of operation, Near–Far Interference in Direct Sequence CDMA systems. Adaptive power control in CDMA Spread–Spectrum Systems.

4. Cellular and Mobile Communication Systems
Evolution of Cellular phones; cell phone generations. Cellular system Concepts; cellular system topology, Frequency reuse, cell repeat patterns, cell splitting, sectorization, co–channel interference, Adjacent channel interference, Roaming and Handoffs. GSM Standard for cellular systems ; GSM architecture, Features of GSM, security features, Call processing in GSM. Introduction to new data services like High Speed Circuit Switched Data (HSCSD), General Packet Radio Service (GPRS), Digital Enhanced Cordless Telecommunications (DECT) and Enhanced Data Rate for Global Evolution (EDGE).

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PART – III

5. Space Communications
   History of Satellites, Kepler's Laws, Satellite Elevation Categories, Satellite Orbital Patterns, Geosynchronous satellites ; station keeping, satellite attitude control, satellite spacing and frequency allocation, satellite foot prints, Satellite system link models and equations.

Books:

1. Advanced Electronic Communication Systems 6th by Wayne Tomasi Pearson Education.
2. Wireless Communications Principles and Practices by Rappaport PHI.
3. Mobile Communication by J.Schiller Pearson Education.
4. Wireless Digital Communications Modulation and Spread Spectrum by Dr. Kamilo PHI.
5. Communication Systems (Analog and Digital) by Sanjay Sharma (KATSONS), 2006.
6. Satellite Communication by DC Aggarwal Dhanpat Rai Publication, 2006.
7. Wireless Communication by Mark Ciampa, Cengage Learning India Edition, 2008.

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ECP–322 LAB COMMUNICATION SYSTEMS – II

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1. IF amplifier using Transistors
2. Amplitude Modulator using transistors and demodulation by envelope detection.
3. IC based Balanced Modulator and Demodulator
4. Frequency Modulators using 8038 and 566.
5. Capture range & Lock range measurement of a PLL.
6. Frequency demodulation using PLL.
7. IC based sample and hold.
8. Delta Modulator using D–Flip Flop
9. IF Amplifier using IC 3028.

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INTERDISCIPLINARY COURSE – IV

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B.Tech. (Electronics & Communication Engineering) 6th Semester
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ENL351 COMMUNICATION SKILL FOR ENGINEERS

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PART–I

Basic Grammar:
Use of Articles, Prepositions, Degrees of Comparison, Verbs: Kinds and uses, Tenses: Kinds and uses, Subject: Verb Agreement, Active and Passive Voice, Phrases, clauses and sentences, kinds of sentences, Reported speech.

Basic Composition:
Paragraph writing, Essay writing, Business correspondence, Official reports, Note making. Preparing and delivering presentations Resume writing.

PART–II

Basic Phonetics:
The Production of Speech, The Sounds of English, Phonetic Transcription, Syllable and stress, Intonation.

PART–III

Basic Conversation:
English in use, English for routine communicative functions, English in common interactive situations, Speech practice, Group discussion. Preparing for interview, conferences and seminars.

Books Recommended:

1. Written and Spoken Communication in English by Universities Press (India) Private Limited, Hyderabad.
2. Oxford Guide to Effective Writing and Speaking.

Note: For sections 3 and 4, the students will practice in the language lab.

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ECP 324 **PROJECT**

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Students either individually or in a group have to undertake a project of their interest and related to their degree of specialization in the beginning of 6th semester.

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ECL–361 DIGITAL COMMUNICATION

L T P
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PART – I

1. Data Transmission

Time Division Multiplexing; TDM–PCM systems–baseband signal receiver, error probability, Optimum filter, Coherent reception, correlation, Binary ASK,BSK and PSK systems – Coherent and non–coherent, comparison of Digital transmission schemes–band– width and power requirements,

PART – II

M–ary signaling–coherent PSK, differential PSK and wideband FSK Schemes. QPSK scheme. Introduction to data compression techniques.

2. Data Reception
Optimum detection–Matched Filter receiver using maximum SNR criterion. Practical Matched Filter–Detection of signals in digital communication–Parameter estimation.

PART – III

3. Error Correcting Codes
Introduction, Galois fields, vector spaces and matrices, block codes, binary cyclic codes, multiple error correcting codes.

Recommended Books:

	Name of Book	**Author**	**Publisher**
1.	Digital and Analog Communication Systems	Sam K. Ahunmugam	John Wiley
2.	Principle of Digital Communication Systems	J. Das	John Wiley
3.	Communication Systems	Taub.Schilling	T.M.H.

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ECL–362 BIO–MEDICAL ELECTRONICS

L T P
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PART – I

1. TRANSDUCERS
   Resistive, capacitive, inductive, photo–electric, piezo–electric, thermo electric, mechano–electronic transducers – the pick circuits for each of the transducers.
   Electrodes
   Half–cell potential electrode impedance, equivalent circuits, micro electrode and micro pipette – their equivalent circuits, – polarisable and non–polarisable electrodes.

PART – II

2. Non–Electrical Parameters
   Flow meters, respiration gas volume and rate measurements, pressure measurements and force measurements, temperature measurements.
   Bio–Chemical Measurements
   PH, PHCO3, electrophoresis photoelectric calorimeter, spectro–photometer.

PART – III

3. X–Rays
   Soft and hard X–rays general black diagram of X–ray generator for diagnosis, radiography, angiography, fluoroscopy , CAT.
4. Isotopes
   Properties, GM Counter, Scintillation counter, Scanners.
5. Ultrasonics
   Principles–modes of displays–application of ultrasonic for diagnosis.

Books Recommended:

	Name of Book	**Author**	**Publisher**
1.	Bio–Physical Measurement and Measurement Concepts	Peter Strong	Tetronic Inc.
2.	Principles of Applied Bio–Medical Instrumentation	Geddes and L.E. Baker	John Wiley
3.	Engineering and Practice of Medicine	Segal and Kilpatric	William and William Co.
4.	X–Ray Techniques for Students	M.O. Chesney	Blazewell

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ECL–363 VLSI TECHNOLOGY AND DESIGN

L T P
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PART – I

IC Fabrication: Unit process for integrated circuit fabrication, crystal growth, substrate preparation, oxidation, diffusion, photolithography, ion – implantation, epitaxy for Si, chemical vapour deposition techniques and metallization.

PART – II

CMOS: MOS transistor theory (enhancement and depletion). NMOS and CMOS technology, the pass transistor, inverter design in NMOS and CMOS technology.

PART – III

CMOS Design and Realization: E/D logic gates in NMOS and CMOS technology, impurity introduction, layer deposition, etching, design rules, general design methodologies, Stick diagrams, polycell and gate away approach, examples of cell design.

Books Recommended:

1. A.B. Glasser, Ges Sharpe – Integrated Circuit Engineering (Addison Wesley).
2. S.K. Gandhi – VLSI Fabrication Principles (John Wiley).
3. N. Wasle, K. Eshranghian – Principles of CMOS VLSI Design (Addison Wesley).
4. C. Mead, L. Conway – Introduction to VSL VLSI Systems (Addison Wesley).
5. V.L.S.I Technology SZE. S.M. (McGraw Hill Pb.).

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ECL–364 VIRTUAL INSTRUMENTATION

L T P
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PART – I

Review of Virtual Instrumentation: Historic perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.

Programming Techniques: VIS & Sub VIS, loops & charts, arrays, clusters, graphs, case & sequence structures, formula modes, local & global variables, string 7 file input.

PART – II

Data Acquisition Basics: ADC, DAC, DIO, Counters & timers, PC Hardware structure, timing, interrupts, DMA, Software and hardware Installation.

Common Instrument Interfaces: Current loop, RS 232C/RS 485, GPIB, System basics, Interface basics, USB, PCMCIA, VXI, SCXI, PXI etc, networking basics for office & industrial application VISA & IVI, image acquisition & processing, motion control.

Use of Analysis Tools: Fourier transform, Power spectrum, Correlation methods, windowing & filtering.

PART – III

Application of VI: Application in Process Control Projects, Major equipments– Oscilloscope, Digital Multimeter, 120 MHz Pentium computers, Lab view Software, Study of Data acquisition & control using Lab view, Virtual Instrumentation for an Innovative Thermal Conductivity Apparatus to measure the Thermal Conductivity Apparatus– to measure the conductivity of non Newtonian fluids while they are subjected to sharing force.

Recommended Text Books:

1. Gary Johnson, Lab View Graphical Programming, Second Edition, Mc GrawHill, New York, 1997.
2. Lisa K.Wells & Jeffrey Travis, Labview for Everyone, Prentice Hall, New Jersey, 1997.

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ECL – 369 COMPUTER NETWORK

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PART – I

1. **Introduction to Computer Network:** Network – needs & goals, classification: broadcast, point to point, topologies: physical & logical, types: LAN, MAN, WAN & Enterprise.

2. Computer Model: Centralized, Distributed. Network configurations : client / server & peer to peer.

   Security Concepts: Access rights, permissions, authentication, shares, groups & users and user accounts.

3. **The OSI Reference Model:** Layer & peer communications, need for protocols, network architecture, design issues for the layer, functions of different layers.

4. **Layer Interfaces and Services:** Entities, service access points, connection oriented and connectionless services, reliable and unreliable services, layer service primitives, Overview of IEEE 802.3n standards.

PART – II

5. **Physical Layer:** The transmission Media : Coaxial cable, twisted pair, optical fiber and wireless. Media for various types of LAN & MAN standards.

6. **Data Link Layer:** Design Issues: service provided, framing, error control & flow control. Protocols: HDLC, LAP, SLIP, PPP, MAC sub layer protocols, ALOHA, CSMA/CD protocols. IEEE standard 802.3 (CSMA/CD), 802.5 (token ring), 802.6, IEEE standard 802.2 Bridges: their need, basic operation and different types.

7. **Network Layer:** Design issues: Service provided, subnet design approaches. Network routing algorithms: their properties, types, congestion control. Internet working: routers, gateways.

8. **Transport Layer:** Transport layer – TCP/IP, quality of service, transport protocol design issues.

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PART – III

9. **Session Layer :** Remote procedure calls.
10. **Presentation Layer :** Data compression, encryption.
11. **Application Layer :** NFS, X.400. Virtual terminals.
12. **Services :** Brief overview of X.25 protocol, frame delay, ISDN, ATM.
13. **Networking Operating System :** Basic concepts of network operating system. Important features and architecture of Window NT operating system, Window NT file system, important features of Novell Netware and UNIX.
14. **Network Management :** Network management, maintenance and troubleshooting of networks, network security.

Books Recommended:

1. Computer Network by A. Tannenbaum.
2. Computer Networks and distributed processing by James Martin.
3. Communication & Network for IBM PC & compatibler by Jordon LP.
4. Data Communication & Networking by Behrouz A. Forouzan TMH, 2006.
5. Data Networks & Internet Communications Technology by Ata Elahi, Cengage Learning India Edition,2008.

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ECL–365 MICRO CONTROLLERS

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PART – I

Introduction: 8051 Microcontroller; Comparison of Microprocessor and Microcontroller, Microcontroller and embedded processors, overview of 8085 families.
8051 Assembly Language Programming: Introduction to 8051 Assembly programming, Assembling and running an 8051 program, Data types and Directives, 8051 flag bits and PSW register, Register banks and stack.
Jump loop and call instructions, I/O Port Programming: Addressing modes and accessing memory using various addressing modes, Arithmetic instructions and programs, Logic instructions and programs, Single bit instructions and programming.

PART – II

Timer/Counter Programming in 8051.
Serial Communication: 8051 connection to RS 232, 8051 serial communication programming.

PART – III

Real World Interfacing: LCD, ADC and sensors, stepper motor, keyboard, DAC and external memory.
Introduction to an Embedded System and its Design: Introduction to ES & its applications, design parameters of an ES and its significance (with respect to all parameters), present trends in ES, Embedded System design life cycle, product specifications and hardware, software partitioning, Co–design.
Introduction to latest Microcontrollers such as ARM Processors and its applications.

Recommended Text Books:

1. The 8051 Microcontroller and Embedded Systems by Ali Mazidi.
2. An Embedded Software Primer, David E.Simon, Pearson Education.
3. Embedded System Design by Frank Vahid and Tony Givargus.

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ECL–366 MICROWAVE SOLID STATE DEVICES

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PART – I

Microwave Transistors:
Microwave BIT, HBT, JFET, MESEFT, HEMT, MOSFET, NMOS, PMCS, CMOS, MEMORIES, OCD.

PART – II

Tunnel Diode
Parametric Devices
Manley Power relations parametric up converters and Down converters.
Transferred Electron Devices
GUNN diode, LSA diode Inp. Diodes CD Te diodes.

PART – III

Avalanche Transit Time Device
Read diode, IMPATT Diode, TRAPATT Diode, BARITT Diode.

References:

- Fundamental of Microwave Engineering, RE Collin, McGraw Hill.
- Microwave Semiconductor Devices & their Circuits application, HA Watson, McGraw Hill.
- Microwave Devices & Circuits, SY Liao, Prentice Hall.
- Microwave Circuits, RN Chose, McGraw Hill.

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ECL–367 SOFTWARE ENGINEERING

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PART – I

I. **Introduction:** Problems encountered during software development and their causes, Software life cycle.

II. **Software Planning:** Software Planning: Objectives and Scope, Costing Estimation and Scheduling.

III. **Software Requirement Analysis:** Fault finding techniques, information flow, information structure, data base requirements, requirement analysis tools.

PART – II

IV. **Software Design Process:** System design tools and techniques, Top down technique, structural programming; Data oriented design, design documentation and review.

V. **User Interface Design:** Design issues, Features of a modern GUI; Menus, scrolling, windows, icons, panels, error messages, etc.

PART – III

VI. **Software Testing and Reliability:** Purpose of testing, unit testing, component testing, integration testing, system testing, testing tools, debugging and reliability.

VII. **Software Maintenance:** Maintainability, documentation to facilitate maintenance; Regression testing, Reverse engineering.

Suggested Text Book & References:

1. Software Engineering – A Practitioners Approach – R.S. Pressman, MCGraw Hill 1992.
2. Software Testing Techniques – Boris Beizer, Van Nostrand Reinhold, 1990.
3. An Integrated Approach to Software Engineering, Pankaj.
4. System Analysis and Design Methods – Wlutten, Bentley and Barlow; Galgotia Publications, 1996.

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ECL–368 OPERATING SYSTEM

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PART – I

Introduction: Operating System, Role as resource manager, Operating system strategies, Factors in operating system design, Views of an operating system.

Process Management I: The system view of processes, Process descriptor, Process state diagram, Resource abstraction, Process hierarchy, Process scheduling strategies, Process synchronization.

PART – II

Process Management II: Dead handling, Coordinating processes, Semaphores.

Memory Management: Factors in memory design, Memory hierarchies, Memory manager strategy, Memory allocation strategies, Paging, Demand paging and Segmentation techniques.

PART – III

Device Management: Device management approaches, Device allocation considerations, Role of I/O traffic controller, I/O scheduler and device handler.

Information Management: File System, Its layered structure and general model, Allocation methods, Free Space management.

References:

1. Gary Nutt: *Operating System, Modern Perspective* , Addison Wesley.
2. A. Silberschatz, P. Galvin: *Operating System Concepts*, Addison Wesley.
3. A.S. Tanenbaum: *Modern Operating System*, Prentice Hall.
4. Madnick and Donovan: *Operating System*, McGraw Hill.
5. M. Mileenkovic: *Operating Systems*, McGraw Hill.

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ECL–411 NEURAL NETWORK & FUZZY LOGIC

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PART – I

1. Fundamentals of Neural Networks, History, Basic concepts of Neural networks, Model of and Artificial neuron, Basic neural network architectures characteristics of Neural networks, Introduction to various learning methods.
2. Back propagation network– architecture, the perception model, model for multilayer perception, back propagation learning and applications.

PART – II

3. Basic Hop field model, Kehonen feature maps.
4. Associative memory, Auto correlators, heterocorrelators, Wang et al's multiple training encoding strategy, BAM, Associative memory for Real– coded pattern pairs and applications.

PART – III

5. Fuzzy set theory– Introduction, crisp sets, and fuzzy sets, crisp and fuzzy relations.
6. Fuzzy Systems: Crisp logic, Predicate logic, fuzzy logic, fuzzy rule based system, Defuzzilication methods and applications.

Recommended Books:

- Neural networks, fuzzy logic and Genetic Algorithm by S. Rajesekaran, G.A. Vijayalakshmi Pai, PHI
- Neural Networks & Fuzzy Logic by Bart Kosko.
- Neural Computing Theory & Practice by P.D. Wasserman (ANZA PUB)

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ECL : 412 DIGITAL SIGNAL PROCESSING

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PART–I

1. **Classification of signals and systems**
   Introduction, classification, singularity function, amplitude and phase Spectra, manipulation of discrete time signal, representation of signals.

2. **Z–transform**
   Introduction, definition, properties, evaluation of inverse Z– transforms.

3. **Discrete and fast Fourier transform**
   Introduction, discrete convolution and correlation.

PART–II

discrete time fourier transform, fast Fourier transform, computing an inverse DFT by doing a direct DFT, Composite radix FFT, Discrete Hilbert transformation, fast convolution correlation.

4. **Finite Impulse Response (FIR) filters**
   Introduction, magnitude and phase response of digital filters, frequency response of linear phase FIR filters, design techniques, design of optimal linear phase transformation

5. **Infinite Impulse Response (IIR) Filters**
   Introduction, IIR filters design by derivatives, impulse invariant & bilinear transformation method, Frequency transformation.

PART–III

6. Applications and Hardware implementation of digital filters

Books Recommended

	Name of Book/ Author	**Publisher**
1.	Theory and Application of /Lawrence R. Rabinder Digital Signal Processing	PHI
2.	Digital Processing Signals/Gold, Rodeer	McGraw Hill
3.	Digital Signal Processing / Oppenheim Schaffer	Prentice Hall Inc.
4.	Digital Signal Processing /S.Salivahanan and A. Vallavaraj	

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ECP – 412 LAB DIGITAL SIGNAL PROCESSING

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Design the implementation of various types of digital filters on DSP 2100 – TM 320 C 10 & TM 320 C 25.

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ECL–451 OPTICAL COMMUNICATION

L T P
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PART – I

1. **INTRODUCTION**
   Evolution of fiber optic systems, Elements of optical fiber transmission links, Brief review of basic concepts and transmission characteristics of optical fibers.
2. **POWER LAUNCHING AND COUPLING**
   Source of fiber power launching– source output pattern, power coupling calculations, equilibrium numerical aperture, LED coupling to single mode fiber, Lensing schemes for coupling improvement. Fiber to Fiber joints, Fiber splicing, Optical fiber connectors and couplers.

PART – II

3. **PHOTO DETECTOR**
   p–i–n photo detector, avalanche photo detector, photo detector noise, detector response time, photo diode materials.
4. **POINT TO POINT OPTICAL LINK DESIGN**
   System considerations, Link power budget, Rise time budget, Line coding– NRZ, RZ, Optical Manchester and block codes.

PART – III

5. **WDM FIBER OPTIC NETWORKS**
   Overview, Time division and wave length division multiplexing in fiber optic networks, Add/ drop problem. Repeaters and amplifiers, Transmitter and receiver requirements in WDM networks. Semiconductor optical amplifiers and Erbium doped fiber amplifiers (EDFAs).
6. **PASSIVE COMPONENTS, SWITCHES AND FUNCTIONAL MODULES OF FIBER OPTIC NETWORKS**
   Couplers/ Splitters, WDM multiplexers and demultiplexers, Filters: Fixed and tunable. Isolators, Circulators and attenuators, optical switches: Single and multistage switches. Basic principle of wavelength converters. Functional modules of Fiber optic networks like Add/ Drop multiplexers and optical cross connects with and without wavelength conversions.

Books Recommended:

1. *Djafar K. Mynbaev, Lowell L. Scheiner Fiber Optic Communication Technology, Pearson Education Asia*
2. *Keiser– Optical Fiber Communications, McGraw Hill*
3. *John M. Senior– Optical Fiber Communications: Principles and Practices PHI*
4. *Chai Yeh– Hand books of Fiber Optics*
5. *Govind P. Agrawal: Fiber Optic Communication Systems, John Willey Sons Inc. USA*
6. *Bishnu P. Pal: Guided Wave Optical Components & Devices, Elsevier Academic Press*

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ECP–451 LAB OPTICAL COMMUNICATION

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NOTE: At least eight experiments are to be performed.

List of Experiments:

1. Evaluation of power budget of an optical link upto 5 km. length in a step of 1 km. using laser and LED source.
2. Evaluation of Rise Time budget of an Optical link upto 5 km. length in a step of 1 km. using laser and LED source.
3. Investigation of Q– factor & BER as a function of optical link length for laser & LED sources.
4. Investigation of Q– factor & BER as a function of increasing bit rate in a given optical point to point link for LED & LASER sources.
5. Measurement of insertion loss and back reflection/ return loss for coupler, WDM, isolator circulator, DWDM MUX/ DEMUX and optical Add Drop Multiplexers (OADM).
6. Determination of isolation/ extinction ratios for appropriate output ports of an isolator, circulator, DWDM MUX/DEMUX and OADM.
7. Investigation of temperature tuning of Bragg grating.
8. Investigation of two channel WDM system.
9. Measurement of system cross–talk/ channel isolation in WDM system.
10. Examination of temperature effects on system crosstalk/channel isolation.
11. Investigation of temperature/ cross talk effects on eye diagram/ BER is WDM systems.
12. Examination of Four Wave mixing (FWM) effect in long haul fiber optic DWDM systems to study the effect of channel separations & allocation on FWM.
13. Examination of stimulated Raman Scattering (SRS) effect in long haul fiber optic DWDM systems & to study the effect of Optical power and Channel separation on SRS.
14. Examination of the effect of dispersion on FWM in a DWDM fiber optic system.

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ECL–452 WIRELESS COMMUNICATION

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PART – I

Introduction: Mobile radio System around the world, Examples of Wireless Communication system, Paging System, Cordless Telephone Systems, Cellular Telephone System, Comparison of common Wireless Communication System.

Digital Communication Through Fading Multipath Channels: Fading channel and their characteristics, Channel modeling, Digital signaling over a frequency non selective slowly fading channel, Frequency selective slowly fading channel, Calculation of error probabilities, Tapped Delay line model , The RAKE demodulator, Performance, Concept of Diversity branches and signal paths, Combining methods, Selective diversity combining, Pre–detection and post detection combining, Switched combining , Maximal radio combining, Equal Gain combining.

PART – II

Multiple Access techniques for Wireless Communication: Introduction, Frequency division, Multiple Access (FDMA) , Time division multiple Access(TDMA), Spread Spectrum Multiple Access, Space division Multiple Access, Packet radio Protocols, Pure ALOHA, Slotted ALOHA, Capacity of Cellular System.

Wireless Networking: Introduction, Difference between wireless & Fixed Telephone Networks, Development of Wireless Networks, Traffic Routing In Wireless network, Wireless data Services, Common channel Signaling, Broadband ISDN &ATM, Signaling System No. 7(SS–7),Personal communication Services/Networks, Protocols for Network Access, Network Databases.

PART – III

Wireless Systems and Standards: AMPS and ETACS, United States digital cellular (IS–54 & IS 136), Global System for Mobile (GSM); Services, Features, system architecture and channel types, Frame structure for GSM, Speech processing in GSM, CDMA digital standards (IS 95); Frequency and channel specifications, Forward CDMA Channel, Reverse CDMA channel, CT2 standard for cordless Telephones, Personal Access Communication System, Pacific Digital Cellular , Personal Handy phone System, PCS and ISM bands, Wireless Cable Television.

Wireless Local Area Networks(WLAN): Components and working of WLAN, transmission media for WLAN, Modulation Techniques for WLAN (DSSS, FHSS), IEEE 802.11 standards and protocols for WLAN (MACA, MACAW), Mobile Network and Transport Layer, Mobile IP, Mobile TCP, traffic routing in wireless networks, wireless ATM, Wireless Local Loop (WLL), WLL Architecture, WLL Technologies and frequency spectrum.

Future Trends: Bluetooth technology, 4G Mobile techniques, Wi–Fi Technology.

Recommended Text Books:

1. Theodore S. Rappaport, "Wireless Communications, Principles, and practice", Third Indian Reprint Pearson Education Asia, 2003.
2. Raj Pandya, "Mobile and Personal Communication Systems and Services", Prentice Hall of India, 2001.

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ECP–452 LAB WIRELESS COMMUNICATION

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1. Study of GSM & CDMA System.
2. Study of Wi–Fi.
3. Study of soft & hard hand off protocols.
4. To Study and evaluate various parameter of GSM using MATLAB programmes.
5. Other related experiment with cellular communications.
6. Case Study of GSM/CDMA cellular networks.

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ECL–453 COMPUTER ARCHITECTURE & ORGANIZATION

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PART–I

1. **Introduction to Computer Architecture:** Basic Comp. Organization: System Buses, Instruction cycles, Instruction format, Instruction types, Addressing Modes.
2. **CPU Organization:** Design specification of a simple & CPU, Instruction fetching, decoding & executing. Design of a simple ALU.

PART–II

3. **Control Unit:** Design Methods, Hardwired Control & Micro programmed Control approach.
4. **Memory Organization:** Memory subsystem organization & interfacing, Types of memories, cache memory, interleaved, associative, virtual memory.

PART–III

5. **I/O Subsystem:** I/O subsystem organization & interfacing, DMA & Interrupts, I/O Processors.
6. **Parallel Processing:** Trends in parallel processing parallel processing mechanism, Flynn & Taxonomy, Seriel vs Parallel processing, Parallelism vs Pipeling. Array Processor, Multi processor systems. Loosely coupled Multiprocessor & tightly coupled Multi processor.

Recommended Books:

1. Comp. Architecture & Organization by John P. Hynes,Mc Graw Hill International
2. Computer System Architecture by Morin Mano, PHI
3. Computer Architecture & Parallel Processing, Faye A. Briggs, McGraw Hill International
4. Computer System Organization & Architecture, John D. Carpinelli, Addison Wesley
5. Computer Architecture & Organization by B. Govinderajalu (TMH), 2007.

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ECL–454 **IMAGE PROCESSING**

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PART–I

1. **Introduction to Electronic Image Processing:** Historical background, visual perception, image formation, sampling & Quantization & application of image Processing.
2. **Transforms used in Electronic Image Processing:** Review of 1–D & 2–D Fourier Transforms, Discrete Fourier Transforms & other image transforms.
3. **Image Enhancement by Point operation:** An overview of point processing, constants & non–linear operations between image and histogram techniques.

PART–II

4. **Spatial Filtering & Fourier frequency Method**: Noise in image, Spatial & Special Frequency Filtering, image restoration.
5. **Non–linear image processing techniques**: Non–linear Spatial/Mean/Adaptive & Homo–morphic filters.

PART–III

6. **Color Image Processing:** Color models, examples of color image processing, Pseudo–coloring & color displays.
7. **Image segmentation & Representation:** Image Thresh–holding, Edge/Line & point direction, Region based segmentation & Image representation.
8. **Introduction to Morphological filters & Image Compression.**

Recommended Text Books:

1. Digital Image Processing by Rafael C. Gonzale & Richard E. Woods, Pearson Education Asia (2nd Edition 2002).
2. Fundamentals of Digital Image Processing by A.K. Jain, 1989, Prentice Hall, Englewood Cliffs, N.J.

B.Tech. (Electronics & Communication Engineering) 7th Semester
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ECL–455 CELLULAR & MOBILE COMMUNICATION

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PART–I

Introduction to Cellular Mobile Systems: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, analog & digital cellular systems.

Cellular Wireless Communication Systems: Second generation cellular systems: GSM specifications and Air Interface – specifications of various units, 2.5 G systems: GPRS/EDGE specifications and features. 3G Systems : UMTS & CDMA 2000 standards and specifications.

PART–II

Elements of Cellular Radio Systems Design: General description of the problem, concept of frequency reuse channels, co–channel interference reduction factor, desired C/I from a normal case in an Omni directional antenna system, cell splitting, consideration of the components of cellular systems.

Interference : Introduction to co–channel interference, real time co–channel interference, co–channel measurement design of antenna system, antenna parameter and their effects, diversity receiver in co–channel interference – different types.

Cell Coverage for Signal & Traffic: General introduction, obtaining the mobile point to point mode, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model – characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation.

PART–III

Cell Site Antennas and Mobile Antennas: Characteristics, antenna at cell site, mobile antennas, Frequency Management and Channel Assignment, Frequency management, fixed channel assignment, non–fixed channel assignment, traffic & channel assignment.

Hand Off, Dropped Calls: Why hand off, types of handoff and their characteristics, dropped call rates & their evaluation.

Optional Techniques: Parameters, coverage hole filler, leaky feeders, cell splitting and small cells, narrow beam concept.

Recommended Text Books:

1. Mobile Cellular Telecommunications; 2nd Ed., William, C Y Lee McGraw Hill.
2. Wireless and Digital Communications; Dr. Kamilo Feher (PHI).
3. T.S. Rappaport, “Wireless Communication, Principles & Practice”, PHI, 2001.

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ECL–456 Bio–sensors and MEMS

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PART–I

Overview of biosensors and their electrochemistry: Molecular reorganization: enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity Fundamentals of surfaces and interfaces.

Bioinstrumentation and bioelectronics devices: Principles of potentiometry and potentiometric biosensors, principles of amperometry and amperometric biosensors, Optical Biosensors based on Fiber optics.

PART–II

MEMS Technology: Introduction to MEMS, MEMS design and fabrication technology: Lithography, Etching, MEMS material, Metals, Semiconductors, Ceramics and Organic Materials, bulk micromachining, Surface micromachining.

RF MEMS: Introduction to static and dynamic Beam Analysis, Electromagnetic modeling concept, MEMS Switches & Micro relays, Inductor &Capacitors, MEMS phase shifter, Antenna, Applications.

PART–III

BioMEMS: Bio/Nano Technology, Biomass, Mendalian genetics, Genomics and proteomics, biosensor arrays; electronic nose and electronic tongue, DNA Transistor, Applications.

References:

1. Richard P Buck,William E. Hatfield (1990), “Biosensors Technology” Marcel Dekker.
2. Vijay K Varadan, K J .Vinoy and K A Jose (2004), “RF MEMS and Applications” Wiley–Vch UK.
3. Baltes H, Brand (2004), “Enabling Technology for MEMS and Nano Devices” Wiley–Vch.

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ECL–457 DIGITAL SYSTEM DESIGN (Verilog VHDL)

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PART–I

INTRODUCTION
Introduction to Computer aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, Logical operators. Types of delays Entity and Architecture declaration. Introduction to behavioural, data flow and structural models.

VHDL STATEMENTS:
Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.
Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

PART–II

COMBINATION CIRCUIT DESIGN:
VHDL Models and Simulation of combinational circuits such as Multiplexers, De–multiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

SEQUENTIAL CIRCUITS DESIGN:
VHDL Models and Simulation of Sequential circuits, Shift Registers, Counters etc.

PART–III

DESIGN OF MICROCOMPUTER:
Architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL.

DESIGN WITH CPLDs AND FPGAs:
Programmable logic devices: ROM, PLAs, PALs, CPLDs and FPGA. Design implementation using CPLDs and FPGAs.

Reference Books:

1. IEEE Standard VHDL Language Reference Manual (1993).
2. Digital Design and Modelling with VHDL and Synthesis: KC Chang; IEEE Computer Society Press.
3. "A VHDL Primmer": Bhasker; Prentice Hall 1995.
4. "Digital System Design using VHDL". Charles.H.Roth; PWS (1998).
5. "VHDL – Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
6. VHDL – IV Edition: Perry TMH (2002).
7. "Introduction to Digital Systems": Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design: Brown and Vranesic; TMH (2000).
9. Modern Digital Electronics – III Edition: R.P.Jain; TMH (2003).

B.Tech. (Electronics & Communication Engineering) 7th Semester
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ECL – 458 RADAR SYSTEM ENGINEERING

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PART–I

1. **Introduction**
   Radar equation, block diagram, operation and application.
2. **Radar Equation**
   Various parameters of radar equation.
3. **CW and FM CW Radar**
   Doppler effect. CW radar. FM CW radar. Multiple frequency CW Radar.
4. **MTI And Pulse Doppler Radar**
   MTI radar, Delay lines, cancellers, Pulse doppler radar, Non coherent MTI radar, AMTI radar.

PART–II

5. **Tracking Radar**
   Sequential loping, conical scan, Monopulse, Tracking in range and doppler, Acquisition.
6. **Radar Transmitters, Antennas and Receivers**
   Hard tube and pulse modulators. Types of Radar antennas, Duplexers, Displays.
7. **Electronic** Scanning **Radar**
   Principle of phased array for electronic scanning, Advantages and capabilities of electronic scanning, block diagram of a electronic scanning system and its operation.

PART–III

8. **Navigational Aids**
   Loaran, Radio range Aircraft, Landing Systems – instruments landing system and Ground controlled approach, Radio Direction Finding, Satellite based navigation system.
9. **Electronic Warfare**
   Electron Reconnaissance (ER), Electronic Counter Measures (ECM), Electronic Counter Counter Measures (ECCM) – different techniques.

Recommended Books:

	Name of Book	**Author**	**Publisher**
1.	Introduction to Radar System	M.I. Skolnik	McGraw Hill
2.	Electronic and Radio Engg.	F.E. Terman	– do –
3.	Radar Engg. Hand Book	M.I. Skolnik	– do –
4.	Radar Systems and Radio Aids to Navigation.	Sen & Bhattacharya	– do –

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ECL–459 FUNDAMENTAL OF NANO ELECTRONICS

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PART – I

1) **Introduction to the practice and discipline of nanotechnology**
   a. The nanoscale dimension and paradigm,
   b. Definitions, history and current practice
   c. Overview of current industry applications
   d. Nanoscale science and engineering principles
2) **Physical basis and principles of nanotechnology**
   a. Overview of chemistry fundamentals for nanotechnology
   b. Engineering principles for nanotechnology materials and applications
   c. Self–assembly and overview of Complex Adaptive Systems (CAS)
3) **Semiconductors**
   a. Moore's Law, history 1950–2025
   b. Materials requirements for silicon
   c. Quantum effects – desired or not
   d. Beyond Moore
   e. Nanofabrication techniques in semiconductors

PART – II

4) **Quantum computing**
   a. Basic physics and Moore's Law
   b. Quantum devices – e.g. quantum dots
5) **Future requirements for development in nanotechnology**
   a. Electron Transport at nano–meter scale
   b. Molecular manufacturing
   c. Self–assembly and 'bottom–up' manufacturing
   d. Organic molecules and supramolecular chemistry
   e. Current practice – applications in nano–bio
   f. Drexler–Smalley debate – realistic projections

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PART – III

6) **Carbon Nanotube Technologies (CNT)**
   a. From graphite to buckyballs to CNT
   b. Carbon nanotube applications and MWNT
   c. Fabricating carbon nanotubes and nano–wall structures
   d. Key applications of CNT and MWNT
7) **Nanomaterials in consumer market**
   a. Electronics, photonics, nano–opto, NEMS
   b. Thin Film applications
   c. Computing technologies – present and future
   d. Nano medicine
8) **Challenges to nanotechnology**
   a. Skilled and educated workforce
   b. Public and private investment in R&D
   c. Materials risks, e.g., carbon fullerene and CNT waste

Recommended Books:

1. Nanotechnology: A gentle introduction to nxt big idea:Mark Ratner. Daniel Ratner,Prentice Hall.
2. Nano Technology De Mystified– A self teaching guide: Linda Williams , Dr. Wade Adams, McGraw Professional.
3. Fundamentals of Nanotechnology :Gabor L. Hornyak, John J. Moore, H.F.Tibbals, Joydeep Dutta, Taylor and Francis.
4. Nano Technology: Fundamentals And Applications : Manasi Karkare, I. K. International Pvt Ltd.
5. Fundamentals of Nanotechnology: Hanson.
6. Nano Technology: Lynn E. Foster, Pearson India.

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ECP–413 **SEMINAR**

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Students are required to give a seminar/presentation along with report on latest topics related to their degree of specialization.

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ECE–421 INDUSTRIAL TRAINING

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Students are required to undergo an industrial training of minimum 20 weeks duration and at the end he/ she should give a presentation along with report.