

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B. TECH.
(ELECTRONIC COMMUNICATION SYSTEMS ENGINEERING)
(Under Credit Based Continuous Evaluation Grading System)

(SEMESTER: I–VIII)

Session: 2013–14



GURU NANAK DEV UNIVERSITY

AMRITSAR

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(ii) Subject to change in the syllabi at any time.
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B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

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

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

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 – II	2	0	0
	Elective–II	2	0	0
Practical				
CSP194	Fundamental 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 (Compulsory) – II OR	2	0	0
PBL–132	Basic Punjabi (Mudhli Punjabi) – II	2	0	0

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

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 will not be included in SGPA.

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

S–Satisfactory

US–Unsatisfactory

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

Semester – IV

Course Code	Course Title	L	T	P
	Interdisciplinary Course – I	4	0	0
	Interdisciplinary Course – II	3	0	0
ECL–231	Guided Wave Propagation	3	1	0
ECL–232	Theory of Communication Signal & Systems	3	1	0
ECL–234	Fiber Optics Communications	3	1	0
	Elective – III	3	1	0
Practicals				
ECP–234	Lab. Fiber Optics Communications	0	0	1
ECP–236*	Electronic Circuits Simulation & Implementation	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 application Electronic Circuits.*

List of Elective – III

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

List of Lab Elective – 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. (ECSE) 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.

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

Semester – V

Course Code	Course Title	L	T	P
	Interdisciplinary Course – III	4	0	0
ECL331	Analog Communication Systems	3	1	0
ECL332	Microprocessor and Its Interfacing	3	1	0
ECL333	Basic of Radiating Systems	3	1	0
MGL301	Entrepreneurship Skills for Engineers	3	0	0
	Elective – IV	3	1	0
Practicals				
ECP331	Lab Analog Communication Systems	0	0	1
ECP332	Lab Microprocessor and its Interfacing	0	0	1
	Lab Elective – 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

List of Lab Elective – IV

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

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

Semester – VI

Course Code	Course Title	L	T	P
	Interdisciplinary Course – IV	4	0	0
ECL341	Microwave Devices & Measurements	3	1	0
ECL342	Advance Communication Systems	3	1	0
	Elective – V	3	0	0
	Elective – VI	3	0	0
ENL351	Communication Skill for Engineers	2	1	0
Practicals				
ECP341	Lab Microwave Devices & Measurements	0	0	1
ECP342	Lab Advance Communication Systems	0	0	1
ECP324	Project	0	0	4
Sub Total:		18	3	6
Grand Total:		27		

List of 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

List of Elective – VI

ECL–365	Microcontrollers	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

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

Semester – VII

Course Code	Course Title	L	T	P
ECL431	Neural Network and Fuzzy Logic Design	3	1	0
ECL432	Signal Processing	3	1	0
	Elective – VII	3	1	0
	Elective – VIII	4	0	0
	Elective – IX	4	0	0
Practicals:				
ECP432	Lab 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

B.Tech. (Electronic Communication Systems Engineering)
(Under Credit Based Continuous Evaluation Grading System)

Semester – VIII

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

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

PHL-193

PHYSICS-I

L T P
2 1 0

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 electromagnetics 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, Schroedinger 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 Feynman Lectures on Physics Vol. I, II, III, RP Feynman, RB Llleighton, M Sands, Narosa Publishing House, New Delhi (1995).
4. Concepts of Modern Physics, Arthur Besier, Tata McGraw Hill, 2007.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

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^+ , H_2 , O_2) and heteronuclear diatomic molecules (CO, NO, HF). Introduction to hybridization and molecular structure of H_2O , NH_3 , CH_4 and ethylene. Valence bond approach (qualitative) of bonding of H_2^+ , H_2 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, Arrhenius theory of ionization, molar conductance, transport numbers, electric potential difference for a galvanic cell, types of half cells, standard electrode potential, concentration cells.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

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

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

CYP-196

CHEMISTRY LAB

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

1. Find the strength of KMnO_4 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 Ca^{2+} and Mg^{2+} 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 I_2 between CCl_4 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.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

MTL-101

MATHEMATICS – I

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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.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL113

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.*

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-113

LAB BASIC ELECTRONICS

L	T	P
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

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

Subject Code: **ENL-101**
Course Title: **Communicative English-I**

Duration of Examination: 3 Hrs
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.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 *Selection 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.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.

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

ECL-115

ELECTRICAL ENGINEERING

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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 analyse 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.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 Gesellschaft Fur Technische Zusammenabelt (GTZ) GMBH.
8. Basic Electrical Engineering by T.K. Naggarakar & Ms. Sakhija Seventh Edition 2008, Oxford University Press.

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

PHL-195 MATERIAL SCIENCE AND ENGINEERING

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3 0 0

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, piezoelectric 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 Viece (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).

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

PBL121: p'lj`bl l`zml - I

p`T-km Eq p`T-psqk-

Credits: 2-0-0

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*B.Tech. (Electronic Communication Systems 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
ਸੂਰ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ
ਵਿਅੰਜਨ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ
3. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ
ਸਾਧਾਰਨ ਸ਼ਬਦ
ਇਕ ਉਚਾਰਕੰਡੀ ਸ਼ਬਦ

ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ: ਨਾਮਕਰਣ ਅਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ, ਗੁਰਮੁਖੀ ਲਿਪੀ : ਨਾਮਕਰਣ, ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ; ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਸੂਰ ਵਾਹਕ (ਉ ਅ ਏ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।
2. ਗੁਰਮੁਖੀ ਆਰਥੋਗ੍ਰਾਫੀ ਅਤੇ ਉਚਾਰਨ; ਸੂਰਾਂ ਦੀ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ (ਲਘੂ-ਦੀਰਘ ਸੂਰ); ਸੂਰ 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, ਞ ਦਾ ਉਚਾਰਨ; ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣਾਂ ਦਾ ਉਚਾਰਨ।
3. ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ : ਸਾਧਾਰਨ ਸ਼ਬਦ; ਇਕੱਲਾ ਸੂਰ (ਜਿਵੇਂ ਆ); ਸੂਰ ਅਤੇ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਆਰ); ਵਿਅੰਜਨ ਅਤੇ ਸੂਰ (ਜਿਵੇਂ ਪਾ); ਵਿਅੰਜਨ ਸੂਰ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਪਾਰ); ਕੋਸ਼ਗਤ ਸ਼ਬਦ (ਜਿਵੇਂ ਘਰ, ਪੀ); ਵਿਆਕਰਣਕ ਸ਼ਬਦ (ਜਿਵੇਂ ਨੂੰ, ਨੇ); ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ-1; ਲਿੰਗ-ਪੁਲਿੰਗ, ਇਕ ਵਚਨ-ਬਹੁ ਵਚਨ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ-1: ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ ਆਦਿ ਨਾਲ ਸੰਬੰਧਿਤ।

*B.Tech. (Electronic Communication Systems Engineering) 1st Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-117

MANUFACTURING PRACTICES

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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. (Electronic Communication Systems 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, Cross–section, 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. (Electronic Communication Systems 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.

*B.Tech. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 AutoCAD or 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 and Company Ltd.

*B.Tech. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

MTL102: MATHEMATICS–II

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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. (Electronic Communication Systems 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 practising 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.)

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.)

*B.Tech. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 Orented 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. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 and 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. (Electronic Communication Systems 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. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 M W 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. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

PHP-194

PHYSICS LAB

L T P

0 0 1

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

*B.Tech. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

Subject Code: **ENL-151**

Duration of Examination : 3 Hrs

Course Title: **Communicative English-II**

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.Tech. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 Writing
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. (Electronic Communication Systems Engineering) 2nd Semester
(Under Credit Based Continuous Evaluation Grading System)*

PBL-131: ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ-II

ਪ੍ਰੋ-ਕਮ ਏਕ ਪ੍ਰੋ ਪਸਕ-

Credits: 2-0-0

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- (II) 8. ਏਕ ਏਕ (sp. virE`m isG sD Eq f`. sihdrblr isG ! r n`nk dv "nlvris#l Eimqsr\$iv%hT il) kvl +
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*B.Tech. (Electronic Communication Systems 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
ਪੈਰਾ 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/ਦੁਹਰਰੁਕਤੀ (ਜਿਵੇਂ ਧੂੜ ਧਾੜੁ/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, ਸ਼ੋਪਿੰਗ ਮਾਲ/ਸਿਨੇਮੇ ਵਿਚ, ਵਿਆਹ ਵਿਚ, ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਵਿਚ, ਦੋਸਤਾਂ ਨਾਲ ਆਦਿ।
3. ਇਸ ਯੂਨਿਟ ਵਿਚ ਚਿੱਠੀ ਪੱਤਰ (ਨਿੱਜੀ/ਦਫ਼ਤਰੀ/ਵਪਾਰਕ), ਪੈਰਾ ਰਚਨਾ, ਸੰਖੇਪ ਰਚਨਾ ਅਤੇ ਅਖਾਣ ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਦੀ ਭਾਸ਼ਾਈ ਯੋਗਤਾ ਨੂੰ ਪਰਖਿਆ ਜਾਵੇਗਾ।

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

MTL201

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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL – 211

DIGITAL ELECTRONICS

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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, de–multiplexer, encoders, decoders, adders, subtracters 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 | (TAIM) |
| 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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL – 212 ANALYSIS AND SYNTHESIS OF NETWORKS

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3 1 0

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 behaviours 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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 Theorem

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-derived and

composite filters

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 multivibrator, 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.

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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, dequeues.

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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 of 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 Resources:** 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).

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. 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 of environmental legislation
- * Public awareness

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.

*B.Tech. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP– 215

LAB PSPICE

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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. (Electronic Communication Systems Engineering) 3rd Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECE-216

SUMMER TRAINING

L T P

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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. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

Interdisciplinary Course – I

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*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

Interdisciplinary Course – II

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*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL– 231

GUIDED WAVE PROPAGATION

L T P
3 1 0

PART – I

Introduction:

Review of Electrostatics and Magnetostatics.

Maxwell's Equation:

Maxwell's equations in differential and integral forms concept of displacement current. Boundary conditions.

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, Poynting theorem and Poynting vector.

PART – II

Guided Wave Propagation:

Waves between parallel planes, TE and TM waves and their characteristics. TEM wave, velocities of waves 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, Velocities of propagation, Attenuation in parallel plane guides, wave impedance

PART – III

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.

References:

1. Electromagnetic Kraus TMH, 2006.
2. Electro Magnetic Wave and Jordon and Balmain PHI, 2007.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-232 THEORY OF COMMUNICATION SIGNAL AND SYSTEMS

L T P
3 1 0

PART – I

1. 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

2. 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.

3. 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.

PART – III

4. 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.

References:

1. Comm. System B.P. Lathi Wiley Eastern, 4th Reprint, 2006.
2. Comm. System Haykins Wiley Eastern, 2005.
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 B.P. Lathi, 4th Edition, 2008 Comm. Systems Oxford University Press.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL–234

FIBER OPTICS COMMUNICATIONS**L T P****3 1 0****PART – I****Introduction:**

Evolution of optical fiber communication, basic elements of fiber optic communications, optical Transmission Windows, comparison with other modes of guided communication.

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**Ray Theory & Mode Theory of Optical Wave Propagation:**

Wave equation in step index fiber, model equation, modes in step index fiber, power flow in step index fiber, modes in graded index fiber, Ray Theory explanation of optical wave propagation, Basic fiber parameters such as Numerical aperture acceptance angle & V–number.

Optical Sources & Detectors: 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, Optical Detectors: Pin and APD, their working principle. Noise in Optical receiver.

PART – III**Fiber Materials and Fabrication**

Fiber materials–Doping of fiber material, Glass fibers, plastic clad glass fibers, plastic fibers, fiber fabrication, drawing and coating.

Optical Fiber Sensors:

Physical phenomena for optical fiber sensor, temperature sensor, pressure sensor, liquid level sensor.

References:

1. Keiser – Optical Fiber Communication, McGraw Hill, 4th Edition, 2008.
2. Myanbaev and Scheiner– Fiber Optics Communication Technology, Pearson Education Asia, 2006.
3. Chai Yeh – Hand Book of Fiber Optics, Academic Press.
4. Ghatak & Thyagarajan–Optical Electronics, Cambridge University Press, 2007.
5. John Gower– Prentice Hall of India Pvt. Ltd., Optical Communication System, 2007.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-234

LAB FIBER OPTICS COMMUNICATIONS

L T P
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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.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-261

LINEAR CONTROL SYSTEM**L T P****3 1 0****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-efficients. Pole-zero location and stability. Routh – Hurwitz criterion, stability of discrete data systems, steady state error analysis of discrete data systems.

PART – II

4. **Root Locus Techniques:**– The extreme points of the root loci for positive gain. Asymptotes to the locii breakaway points, intersection with imaginary axis, 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. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-261**LAB LINEAR CONTROL SYSTEM**

L	T	P
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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.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-262 ELECTRICAL AND ELECTRONIC MEASUREMENTS

L T P
3 1 0

PART – I

Electronic Instruments:

Electronic voltmeter, VTVM Transistor voltmeter, Electronic Multimeter, CRO's study of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope measurement of inductance, capacitance effective resistance at high frequency, Q meters, LCD meter.

Instruments for Generation and Analysis of Waveforms:

Signal generators function generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, and spectrum analysis.

PART – II

Transducers:

Principles of operation, qualitative treatment of strain gauge, LVDT, thermocouple piezoelectric crystal and photoelectric transducers.

Data Acquisition System:

Necessity of recorders, recording requirements, graphic recorders, strip chart recorders, magnetic tape recorder, digital tape recorders.

PART – III

Display Devices:

Electronic indicating instruments, seven segment display, fourteen segmental display, Nixie tube.

Telemetry:

Introduction, method of data transmission, types of telemetry systems and applications.

Computer Controlled Test System:

References:

1. A.K. Sawhney – Electrical and Electronic Measurements and Instrumentation, PHI, 2007.
2. B. Stout – Basic Electrical Measurements, PHI, 2007.
3. D. Cooper – Electronic Instrumentation and Measurement Techniques, PHI, 2006.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-262 LAB ELECTRICAL & ELECTRONIC MEASUREMENTS

L T P
0 0 1

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 circuit 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. circuit 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 circuit parameters.
13. To verify voltage current relationship in a linear circuit 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.

*B.Tech. (Electronic Communication Systems Engineering) 4th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-236: ELECTRONIC CIRCUITS SIMULATION & IMPLEMENTATION

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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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

5. 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 Stabilizer. 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, Trans-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

6. 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 Tone 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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP 331 LAB ANALOG COMMUNICATION SYSTEMS

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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 super-heterodyne 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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP – 332 LAB MICROPROCESSOR AND ITS INTERFACING

L T P
0 0 1

List of Experiments:

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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-333

BASIC OF RADIATING SYSTEMS

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PART – I**1. Radiation:**

Physical concept of radiation, retarded potential radiation from a hertzian, 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, tropospheric 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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

MGL301 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: 1 hour

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.
- Clifton, 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.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

INTERDISCIPLINARY COURSE – III

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*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL – 351

WAVE GENERATION AND SHAPING

L T P

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PART – I

1. 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.

PART – II

2. 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 – III

3. Oscillators:

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

Recommended Books:

1. Pulse Digital and Switching Wave Forms by Millman Taub McGraw Hill, 2008.
2. Wave Generation and Shaping by Strauss McGraw Hill, 2007.
3. Microelectronics by Millman and Grabel McGraw Hill, 2007.

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-351 LAB. WAVE GENERATION AND SHAPING

**L T P
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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

*B.Tech. (Electronic Communication Systems Engineering) 5th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-352

LAB INDUSTRIAL ELECTRONICS

L T P
0 0 1

List of Experiments:

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-341 MICROWAVE DEVICES & MEASUREMENTS

L T P
3 1 0

PART – I

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 traveling Wave Magnetron, Performance charts of Magnetron tubes, Principle of operation of Traveling Wave Tube.

PART – II

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.

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.

PART – III

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.

Suggested Text Books & References:

1. Fundamentals of Microwave Engg. – R.E. Collin, McGraw Hill, 2006.
2. Microwave Devices and Circuits – S.Y. Liao, Prentice Hall of India, 2004.
3. Microwave Circuits – R.N. Ghose, McGraw Hill, 2007.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP – 341 LAB MICROWAVE DEVICES & MEASUREMENTS

L T P

0 0 1

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL – 342 ADVANCE COMMUNICATION SYSTEMS

L T P
3 1 0

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 (DSSS) Spread Spectrum, Frequency hopping 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).

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.

References:

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP – 342 LAB ADVANCE COMMUNICATION SYSTEMS

L T P
0 0 1

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

INTERDISCIPLINARY COURSE – IV

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*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.
2. **Electrodes**
Half–cell potential electrode impedance, equivalent circuits, micro electrode and micro pipette – their equivalent circuits, – polarisable and non–polarisable electrodes.

PART – II

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

PART – III

5. **X–Rays**
Soft and hard X–rays general black diagram of X–ray generator for diagnosis, radiography, angiography, fluoroscopy , CAT.
6. **Isotopes**
Properties, GM Counter, Scintillation counter, Scanners.
7. **Ultrasonics**
Principles–modes of displays–application of ultrasonic’s 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 John Wiley	L.E. Baker
3.	Engineering and Practice of Medicine	Segal and Kilpatric	William and William Co.
4.	X–Ray Techniques for Students	M.O. Chesney	Blazewell

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-363

VLSI TECHNOLOGY AND DESIGN

L T P
3 0 0

PART – I

IC Fabrication: Unit process for integrated circuit fabrication, crystal growth, substrate preparation, oxidation, diffusion, photolithography, ion – implantation, epitaxial for Si, chemical vapor 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.).

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-364

VIRTUAL INSTRUMENTATION

L T P
3 0 0

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 & 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 shearing force.

Recommended Text Books:

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

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL – 369

COMPUTER NETWORK

L T P
3 0 0

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.

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-365

MICRO CONTROLLERS

L T P
3 0 0

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-366

MICROWAVE SOLID STATE DEVICES

L T P

3 0 0

PART – I

Microwave Transistors:

Microwave BIT, HBT, JFET, MESEFT, HEMT, MOSFET, NMOS, PMOS, 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, SYLiao, Prentice Hall.
- Microwave Circuits, RN Chose, McGraw Hill.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-367

SOFTWARE ENGINEERING

L T P

3 0 0

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 – Wlутten, Bentley and Barlow; Galgotia Publications, 1996.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-368

OPERATING SYSTEM

L T P
3 0 0

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ENL351 COMMUNICATION SKILLS FOR ENGINEERS

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.

*B.Tech. (Electronics Communication System Engineering) 6th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-324

PROJECT

L T P
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Students either individually or in a group have to undertake a project of their interest or related to their degree of specialization in the beginning of 6th Semester.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-431 NEURAL NETWORK & FUZZY LOGIC DESIGN

L T P

3 1 0

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.

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).

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL 432**SIGNAL PROCESSING****L T P****3 1 0****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,

PART – III

- Frequency transformation.
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	

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-432

LAB SIGNAL PROCESSING

L T P
0 0 1

Design the implementation of various types of digital filters on DSP 2100 – TM

320 C 10 & TM 320 C 25.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-451

OPTICAL COMMUNICATION

L T P
3 1 0

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. *Fiber Optic Communication Technology*, Djafar K. Mynbaev, Lowell L. Scheiner 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*.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECP-451

LAB OPTICAL COMMUNICATION

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0 0 1

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 in 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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 modelling, Digital signalling 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 Handyphone 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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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, Serial vs Parallel processing, Parallelism vs Pipeline. Array Processor, Multi processor systems. Loosely coupled Multiprocessor & tightly coupled Multi processor.

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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

ECL-456

Bio-sensors and MEMS

L	T	P
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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 dynamics 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)– “Bio-sensors 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.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 Primer": 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).ECP 412.

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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 –

*B.Tech. (Electronic Communication Systems Engineering) 7th Semester
(Under Credit Based Continuous Evaluation Grading System)*

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

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

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- 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

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.