FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B. TECH.
(ELECTRONICS & COMMUNICATION ENGG.)

(Credit Based Evaluation and Grading System)

(SEMESTER: I – VIII)

Session: 2019–20

GURU NANAK DEV UNIVERSITY
AMRITSAR

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

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CYL197	Engineering Chemistry	3	0	1	4
2.	MTL101	Mathematics-I	3	1	0	4
3.	ECL119	Basic Electrical &Electronics Engineering	4	0	1	5
4.	CSL126	Fundamentals of IT & Programming using Python	2	1	1	4
5.	ENL101	Communicative English – I	2	0	0	2
6.		Elective-I	2	0	0	2
7.	MEP101	Workshop Practices	0	0	2	2
List of Electives–I:						
1.	PBL121	Punjabi (Compulsory) **OR**	2	0	0	2
2.	* HSL101	Punjab History & Culture (1450-1716) **OR**	2	0	0	
3.	* PBL122	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
4.	** SOA 101	Drug Abuse: Problem, Management and Prevention (Compulsory ID Course)	3	0	0	
		Total Credits:	**16**	**2**	**5**	**23**

Note:

1. *** Special Paper in lieu of Punjabi Compulsory, For those students who are not domicile of Punjab**
2. **** Student can opt this Paper whether in 1st or 2nd Semester.**

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SEMESTER – II

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CEL120	Engineering Mechanics	3	1	0	4
2.	MEL120	Engineering Graphics & Drafting	2	0	2	4
3	MTL102	Mathematics-II	3	1	0	4
4.	PHL183	Physics	3	1	1	5
5.	MEL110	Introduction to Engg. Materials	3	0	0	3
6.		Elective-II	2	0	0	2
List of Electives–II:						
1.	PBL131	Punjabi (Compulsory) **OR**	2	0	0	2
2.	* HSL102	Punjab History & Culture (1717-1947) **OR**	2	0	0	
3.	* PBL132	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
4.	** SOA 101	Drug Abuse: Problem, Management and Prevention (Compulsory ID Course)	3	0	0	
		Total Credits:	**16**	**3**	**3**	**22**

Note:

1. *** Special Paper in lieu of Punjabi Compulsory, For those students who are not domicile of Punjab**
2. **** Student can opt this Paper whether in 1st or 2nd Semester.**
3. **PSL-053 ID Course Human Rights & Constitutional Duties (Compulsory ID Course) Students can opt. in any semester except Semester 1st. This ID Course is one of the total ID courses.**

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SEMESTER – III

COURSE		**CREDITS**		
Code	**Course Name**	**L**	**T**	**P**
MTL–201	Mathematics – III	3	1	0
ECL–211	Digital Electronics	3	1	1
ECL–212	Analysis and Synthesis of Networks	3	1	1
ECL–214	Analog Integrated Circuits	3	1	1
CSL–297	Programming Languages	2	1	1
ESL–220	Environmental Studies (Compulsory ID Course)	4	0	0
ECP–215	Lab. PSPICE	0	0	2
ECE–216	Summer Training**		– S/US –	
	Sub Total:	**14**	**5**	**6**
	Total Credits:		**25**	

**** The student should undergo summer training at the end of 2nd Semester. The result will be satisfactory (S) or unsatisfactory (US).**

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SEMESTER – IV

COURSE		**CREDITS**		
Code	**Course Title**	**L**	**T**	**P**
	Interdisciplinary Course – I	4	0	0
ECL–221	Electromagnetic Field Theory	3	1	0
ECL–222	Communication Signals and Systems	3	1	0
ECL–224	Fiber Optics	3	1	1
	Elective – III	3	0	1
ECP–226*	Electronic Design & Implementation Lab.	0	0	2
	Sub Total:	**16**	**3**	**4**
	Total Credits:		**23**	

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

List of Electives – III

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

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

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SEMESTER – V

Course Code	Course Title	Credits			Marks				
		L	T	P	Minor-I	Minor-II	Quiz	Major	Total
	Interdisciplinary Course – II	4	0	0	20	20	10	50	100
ECL311	Communication System-I	3	1	1	20	20	10	50	100
ECL312	Microprocessor and Its Applications	3	1	1	20	20	10	50	100
ECL313	Antenna and Wave Propagation	3	1	0	20	20	10	50	100
ECL318	Computer Network	4	0	0	20	20	10	50	100
	Elective IV	2	1	1	20	20	10	50	100
ECP315	Industrial Training**	---S/US---							
	Sub Total	19	4	3					
	Total Credits	26							
List of Elective-IV									
ECL352	Industrial Electronics	2	1	1	20	20	10	50	100
ECL353	Instrumentation and Industrial Automation	2	1	1	20	20	10	50	100
CSL344	Object Oriented Programming using Java	2	1	1	20	20	10	50	100

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

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SEMESTER – VI

Course Code	Course Title	Credits			Marks				
		L	T	P	Minor-I	Minor-II	Quiz	Major	Total
	Interdisciplinary Course – III	4	0	0	20	20	10	50	100
ECL321	Microwave Engineering	3	0	1	20	20	10	50	100
ECL322	Communication Systems – II	3	1	1	20	20	10	50	100
ECL325	Micro Controllers	3	0	1	20	20	10	50	100
	Elective – V	3	0	0	20	20	10	50	100
ENL351	Communication Skill for Engineers	2	1	0	20	20	10	50	100
ECP324	Project	0	0	4	-	-	-	100	100
	Sub Total	18	2	7					
	Total Credits	27							
List of Elective – V									
ECL–361	Digital Communication	3	0	0	20	20	10	50	100
ECL–363	VLSI Technology and Design	3	0	0	20	20	10	50	100
ECL–367	Software Engineering	3	0	0	20	20	10	50	100
ECL–368	Operating System	3	0	0	20	20	10	50	100

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SEMESTER – VII

Course Code	Course Title	Credits			Marks				
		L	T	P	Minor-I	Minor-II	Quiz	Major	Total
ECL453	Computer Architecture and Organization	3	1	0	20	20	10	50	100
ECL412	Digital Signal Processing	3	1	1	20	20	10	50	100
	Elective – VI	4	0	0	20	20	10	50	100
	Elective – VII	4	0	0	20	20	10	50	100
	Elective – VIII	4	0	0	20	20	10	50	100
	Interdisciplinary Course–IV	4	0	0	20	20	10	50	100
ECP413	Seminar	0	0	2	-	-	-	100	100
	Sub Total	22	2	3					
	Total Credits	27							
List of Elective – VI									
ECL–451	Optical Communication	4	0	0	20	20	10	50	100
ECL–457	Digital System Design (Verilog/ VHDL)	4	0	0	20	20	10	50	100
ECL-460	Wireless Sensor Networks	4	0	0	20	20	10	50	100
List of Elective – VII									
ECL–411	Neural Network and Fuzzy Logic	4	0	0	20	20	10	50	100
ECL–454	Image Processing	4	0	0	20	20	10	50	100
ECL–459	Fundamental of Nano Electronics	4	0	0	20	20	10	50	100
List of Elective – VIII									
ECL–452	Wireless Communication	4	0	0	20	20	10	50	100
ECL–455	Cellular and Mobile Communication	4	0	0	20	20	10	50	100
ECL–456	Bio–sensors and MEMS	4	0	0	20	20	10	50	100
ECL–458	Radar System Engineering	4	0	0	20	20	10	50	100

Semester – VIII

Course Code	Course Title	Credits			Marks				
		L	T	P	Minor-I	Minor-II	Quiz	Major	Total
ECE421	Industrial Training	0	0	20	-	-	-	100	100

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Course Name	**:**	**Engineering Chemistry**
Course Code	**:**	**CYL-197**
Credits (L-T-P)	**:**	**4 (3-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

At the end of this course, the student should be able to understand the water quality requirement for human consumption, different treatment process for municipal water treatment, application of glass, ceramics, composites, magnetic materials, Role of refractories for synthesis of high performance materials. Polymer, rubber and silicone material uses in daily life. Introduction to electrochemistry. Application of CNT and graphene in electronics industry.

Total No. of Lectures –45

	Lecture wise breakup	**Number of lectures**
	SECTION - A	
1	**Water hardness:** Common impurities of water, Hardness: Introduction, EDTA method for determination of hardness, degree of hardness. Numerical based on hardness and EDTA method.	4
2	**Water hardness related problems:** Boiler troubles, their causes, disadvantages and prevention: Formation of solids (scale and sludge), carry over (priming and foaming), corrosion and caustic embrittlement.	2
3	**Water treatment techniques**: Introduction, water purification techniques, steps involved in purification of water, sedimentation, coagulation, filtration and sterilization, chlorination.	3
4	**Softening of water:** Lime-Soda method, Zeolite method, Deionization/Demin-eralization methods. Numerical problems based on Lime-Soda and Zeolite softening methods.	3

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SECTION - B		
5	**Glasses, Ceramics, Composites** Glassy state, glass formers and modifiers, types of glasses, manufacturing, applications. Ceramic structures, types of ceramics and their properties. Composites; types, properties and applications.	6
6	**Magnetic Materials:** Introduction, types of magnetic material, hard and soft ferrites, magnetic properties and applications.	3
7	**Refractories:** Definition, classification, properties, requisites of good refractory, manufacturing of refractory, silica and fire clay refractory and their uses. Seger's (Pyrometric) Cone Test and RUL Test.	3
SECTION - C		
8	**Polymers:** Introduction, classification and constituents of polymers, polymer structure and properties, glass transition temperature (T_g), melting point (T_m), structure-property relations (general), synthesis, properties and application of commercial polymers (Bakelite, Polyethylene, Polypropylene, Polystyrene, Polycarbonate, Polytetrafluoroethylene, Polyester and Nylon)	6
9	**Polymer processing methods**: Introduction, compounding, moulding (Injection, Compression, Blow film and Extrusion). Application of polymers such as contact lenses, bulletproof vest, etc.	3
10	**Rubber:** Introduction, natural rubber, vulcanization, different types of rubber, synthesis of rubbers viz. Buna-S, Buna-N, Buty1 and neoprene rubbers, properties and application.	3
SECTION - D		
12	**Silicone based compounds:** Introduction, properties, preparation of silicones, cross-linked silicones, silicon fluids or oils, silicon elastomers and their applications.	2
13	**Electrochemistry:** Introduction, Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, Arrhenius theory of ionization, specific conductance, molar conductance, Faraday's Law of electrolysis, Chemical cells, distinguish between electrolytic and galvanic cell, reversible and irreversible cells with examples. Standard electrode (reduction) potential of half-cells. Applications of electrochemistry in daily life.	4
14	**Nanomaterial:** Introduction, properties, general methods of preparation. Applications of fullerenes, CNTs and graphene.	3

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List of Practicals:

1. Determination of total hardness of Water.
2. Determination of temporary and permanent hardness of water.
3. To determine the strength of sodium carbonate in given sample of washing soda.
4. To determine the strength of sodium carbonate and sodium hydroxide in caustic soda solution.
5. To determine the strength of acetic acid in vinegar
6. Find the strength of KMnO4 solution with oxalic acid
7. Find the strength of KMnO4 solution with Mohr's salt.
8. To determine the number of water molecules in Mohr's salt by titration method.
9. Determination of relative viscosity of a given liquid with respect to water by viscometer.
10. Determination of surface tension of a given liquid by drop number method by stalagmometer.
11. To determine the strength of strong and weak acid conductometry
12. To determine the critical micelle concentration of a soap (sodium laurate) by surfacetension measurements.

Course Outcomes:	
1	Develop new methods to produce soft water for industrial use and potable water at low cost.
2	Replace metals with polymer in different application areas.
3	Develop low cost and new methods for synthesis of Nano materials.
4	Apply their knowledge for development of new application of electrochemistry.
5	Demonstrate the knowledge of polymer materials for advance engineering applications.

Suggested / Reference Books:	
1	Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, NewDelhi.2014.
2	Physical Chemistry by A. Peter and J.de. Paula 10th Edition Oxford University Press, 2014.
3	Inorganic Polymers by P.B. Saxena, Discovery Publishing House, 2007.
4	Ferrite materials by V.R.K. Murthy & B. Viswanathan, SpringerVerlag, Berlin, 1990
5	Advanced practical physical chemistry by J.B Yadav by Krishna's educational publishers.

E-learning resource: https://nptel.ac.in/courses.php

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Course Name	**:**	**Mathematics-I**
Course Code	**:**	**MTL-101**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester	**:**	**20% weightage**
End Semester	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

The aim of the course is to introduce the important topics of mathematics to future engineers which they would find useful in their respective engineering branches. This course would act as foundation for the students with basic as well as advanced concepts for familiarizing them with the use of mathematics to the real life and problems associated with their respective disciplines.

Total No. of Lectures –

	Lecture wise breakup	**Number of Lecture**
	SECTION - A	
1	**Matrices:** Introduction to matrices, Inverse and rank of a matrix, rank-nullity theorem; Symmetric, skew-symmetric and orthogonal matrices, Hermitian and skew-Hermitian matrices, Unitary matrix, Determinants; System of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem.	10
	SECTION - B	
2	**Infinite Series:** Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D' Alembert's ratio test, Cauchy's root test, Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence.	10

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SECTION - C		
3	**Differential 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.	12
SECTION – D		
4	**Vector Calculus:** Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field, 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.	12

Course Outcomes:	
1	Students will be able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Caylay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
2	It will equipped the students in determining whether the given function can be approximated with the power series.
3	Students will learn the various applications of mathematics using vector calculus techniques.

Suggested / Reference Books:	
1	Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
2	B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.
3	Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book

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Course Name	**:**	**Basic Electrical & Electronics Engineering**
Course Code	**:**	**ECL-119**
Credits (L-T-P)	**:**	**5 (4-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
This course is aimed to introduce important initial understanding of electrical and electronics engineering to the 1st year students, this will act as the foundation for the advanced electronics courses. The aim of this course is to familiarize the students to the basics of electricity, electrical machines and the basics of electronic devices. so that they can use this knowledge in relevant applications.

Total No. of Lectures –48

Lecture wise breakup		**Number of Lectures**
SECTION – A		
1	**Electricity and power supply**: Features of the power supply system, power station, transmission, distribution lines, difference between AC and DC, voltage, current and resistance, concept of electromagnetic induction and production of alternating e.m.f - single phase and 3 phase, 3-phase star and delta connections, voltage and current relations. **Electrical Machinery:** Transformer, its working principle, types of transformers and their applications, performance losses, efficiency and voltage regulation, open circuit and short circuit tests on transformer, auto transformers.	12
SECTION – B		
2	**Circuit Analysis**: A brief review of DC and single phase AC circuits. , Star-delta load transformation, concept of balanced and unbalanced three phase circuits, measurement of power and power factor in three phase balanced circuits. **Semiconductors:** Introduction to semiconductors, Intrinsic Semiconductor, n-type and p-type semiconductors, Effect of Doping, Fermi levels, Charge flow in semiconductors.	12

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SECTION – C		
3	**PN junction diode**: Theory of PN junction diode, depletion layer, barrier potential, Volt-Ampere Characteristics, Current Components, Storage Capacitance and transition capacitance, Junction diode switching times, Zener diode, LED, Photodiode, Varactor diode, Schottky diode **Bipolar Junction Transistors**: Junction Transistor, Current components, transistor as an amplifier, CB, CE and CC configurations and characteristics.	12
SECTION – D		
4	**Fundamentals of DC & AC Motors:** Working principle, construction, types & characteristics of DC motor, Working principle of Single-Phase & Three-Phase Induction motor, Three phase synchronous motor. **Control and Protection**: Control mechanism, principle and applications of protection devices: Fuses, MCB, LCB, relays. Need& types of earthing and grounding, Cables, Construction of LT & HT cables.	12

Course Outcomes: After study of this subject the student will become	
1	Familiar with the electricity production, distribution and the use of control/protection devices.
2	Able to understand the working and applications of electrical machines.
3	Able to understand the basics of semiconductor devices and their applications.
4	Familiar to the concept of rectification and filtration circuits.
5	Able to analyze the basic DC and AC circuits and to solve related circuit problems.

Suggested / Reference 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.
3	Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.
4	Basic Electrical Engineering by T.K. Naggarkar& Ms. Sakhija Seventh Edition 2008, Oxford University Press.
5	Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.
6	Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.
7	Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.

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PRACTICAL:

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 as a voltage regulator.
5. Study of transistor characteristics in CC, CB and CE configuration
6. To study the performance characteristic of clipper circuit
7. To study the performance characteristic of clamper circuit

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Course Name	**:**	**Fundamentals of Information Technology and Programming using Python**
Course Code	**:**	**CSL 126**
Credits (L-T-P)	**:**	**4 (2-1-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the basics of computer as well as programming. The students are able to write programs. This course introduces computer programming using the Python programming language. Emphasis is placed on common algorithms and programming principles utilizing the standard library with Python.

Total No. of Lectures –

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Block diagram of Computer, Associated peripherals, Memories – RAM, ROM, Secondary Storage Devices, Classification of Computers and Languages, Introduction to Compilers, Interpreter and Assemblers, Introduction of various operating system with their file system.	
	SECTION - B	
2	Algorithm and Flowchart, Introduction to Python and Setting up the Python development environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Random number, Real numbers, immutable variables, Python console Input / Output. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators, Control statements: if-else, Nested If-Else, Loops (for, while)	
	SECTION - C	
3	Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Recursion, lists, Common List operations	

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SECTION - D		
4	String Handling, Unicode strings, Strings Manipulation:-compare strings, concatenation of strings, Slicing strings in python, converting strings to numbers and vice versa. Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).	

Course Outcomes:	
1	Implement a given algorithm as a computer program in python language with the understanding of hardware components and memory utilization.
2	Able to use standard programming constructs: repetition, selection, functions, composition, modules and different data types
3	Adapt and combine standard algorithms to solve a given problem (includes numerical as well as non-numerical algorithms) and to debug the program written in python language

Suggested / Reference Books:	
1	Computers Today by Sanders.
2	Fundamentals of Computers TTTI Publication.
3	Learning Python by Mark Lutz, 5th edition
4	Python cookbook, by David Beazley , 3rd Edition
5	Python Essential Reference, by David Beazley , 4th edition
6	Python in a Nutshell, by Alex Mortelli, 2nd Edition.
7	Python programming: An Introduction to computer science, by John Zelle, 2nd Edition.

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Course Name	**:**	**Workshop Practices**
Course Code	**:**	**MEP-101**
Credits (L-T-P)	**:**	**2 (0-0-2)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Course Objectives:

At the end of this course, the student should be able to understand the

1. Understand applications of hand tools and power tools.
2. Understand the operations of machine tools.
3. Select the appropriate tools required for specific operation.
4. Comprehend the safety measures required to be taken while using the tools.

Total No. of Practicals – 48

	Lecture wise breakup	**Number of Practicals**
	SECTION - A	
1	Carpentry Shop: (a) Study of tools & operations and carpentry joints. (b) Simple exercise using jackplane. (c) To prepare half-lap corner joint, mortise &tennon joints. (d) Simple exercise on wood working lathe.	6
2	Fitting (Bench Working) Shop: (a) Study of tools & operations (b) Simple exercises involving fitting work. (c) Make perfect male-female joint. (d) Simple exercises involving drilling / tapping / dieing.	6
	SECTION - B	
3	Black Smithy Shop: (a) Study of tools & operations (b) Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering& swaging.	6
4	Welding Shop: (a) Study of tools & operations of Gas welding & Arc welding. (b) Simple butt and Lap welded joints. (c) Oxy-acetylene flame cutting.	6

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SECTION – C		
5	Sheet-metal Shop: (a) Study of tools & operations. (b) Making Funnel complete with soldering. (c) Fabrication of tool-box, tray, electric panel box etc.	6
6	Machine Shop: (a) Study of Single point cutting tool, machine tools and operations. (b) Plane turning. (c) Step turning. (d) Taper turning. (e) Threading.	6
SECTION - D		
7	Foundry Shop: (a) Study of tools & operations (b) Pattern making. (c) Mould making with the use of a core. (d) Casting	6
8	Electrical and Electronics Shop: (a) Study of tools & operations	6

Course Outcomes:	
1	To acquire skills in basic engineering practice, measuring skills and practical skills in the trades.
2	To provides the knowledge of job materials in various shops.
3	To identify the hand tools and instruments.
4	To provides the knowledge of core technical subjects for making and working ofany type of project.
5	Understand modern manufacturing operations, including their capabilities,limitations, and how to design economically.
6	Gain insight into how designers influence manufacturing schedule and cost, andcost of different components.
7	Learn how to analyze products and be able to improve their manufacturability andmake the cost effectively.

Suggested / Reference Books:	
1	Lab Manual to be provided by Department of Mechanical Engineering
2	Work shop technology by Hajra and Chaudhary
3	Work shop technology by Chapmen

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

ENL-101: COMMUNICATIVE ENGLISH

Credits: 02 (L= 2, T=0, U=0)
Total Marks-100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Objective: To introduce students to the skills and strategies of reading and writing by identifying organizational patterns, spotting classification systems and understanding associations between ideas. This course will prepare students to read a variety of texts and also to communicate more effectively through writing. The course will also pay special attention to vocabulary building.

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Prescribed Text Books:
- *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.
- *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition.

Section–A

"Word List", "Correct Usage of Commonly used words and Phrases" from the chapter "Vocabulary" given in ***The Written Word*** by Vandana R. Singh.

Section–B

Letter- writing as prescribed in ***The Written Word*** by Vandana R. Singh.
Report writing as prescribed in ***The Written Word*** by Vandana R. Singh.

Section–C

Section 1 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

Section–D

Section 2 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

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

PBL 121: ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ - I

Credit: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਸੈਕਸ਼ਨ-ਏ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
(ੳ) ਭਾਈ ਵੀਰ ਸਿੰਘ
(ਅ) ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ
(ੲ) ਪ੍ਰੋ. ਪੂਰਨ ਸਿੰਘ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਗੁਰਮੁਖੀ ਔਰਥੋਗਰਾਫੀ ਦੀ ਜੁਗਤ (ਪੈਂਤੀ, ਮੁਹਾਰਨੀ, ਬਿੰਦੀ, ਟਿੱਪੀ ਤੇ ਅੱਧਕ); ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹ, ਸ਼ਬਦ ਜੋੜ (ਸ਼ੁਧ-ਅਸ਼ੁਧ)

ਸੈਕਸ਼ਨ-ਬੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
(ੳ) ਫਿਰੋਜ਼ਦੀਨ ਸ਼ਰਫ
(ਅ) ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਲੇਖ ਰਚਨਾ (ਜੀਵਨੀ-ਪਰਕ, ਸਮਾਜਕ ਅਤੇ ਚਲੰਤ ਵਿਸ਼ਿਆਂ ਉੱਤੇ) : 10 ਲੇਖ ਲਿਖਵਾਉਣੇ
(ਕਲਾਸ ਵਿਚ ਅਤੇ ਘਰ ਲਈ ਅਭਿਆਸ)

ਸੈਕਸ਼ਨ-ਸੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
(ੳ) ਨੰਦ ਲਾਲ ਨੂਰਪੁਰੀ
(ਅ) ਅਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ
(ੲ) ਡਾ. ਹਰਿਭਜਨ ਸਿੰਘ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਸ਼ੁੱਧ, ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
(15 ਪੈਰ੍ਹਿਆਂ ਦੇ ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ ਅਭਿਆਸ ਕਰਵਾਉਣੇ)

ਸੈਕਸ਼ਨ-ਡੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
(ੳ) ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ
(ਅ) ਸੁਰਜੀਤ ਪਾਤਰ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਅਖ਼ਬਾਰੀ ਇਸ਼ਤਿਹਾਰ : ਨਿੱਜੀ, ਦਫ਼ਤਰੀ ਤੇ ਸਮਾਜਕ ਗਤੀਵਿਧੀਆਂ ਨਾਲ ਸੰਬੰਧਤ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

HSL–101: Punjab History & Culture (1450-1716)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Credits: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

1. Land and the People.
2. Bhakti Movement

Section-B

3. Life and Teaching of Guru Nanak Dev.
4. Contribution of Guru Angad Dev, Guru Arjun Dev, Guru Amar Das and Guru Ram Das.

Section-C

5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

Section-D

7. Guru Gobind Singh and the Khalsa.
8. Banda Singh Bahadur: Conquests and Execution.

Suggested Reading:

1. Kirpal Singh (Ed.), *History and Culture of the Punjab, Part-ii, Punjabi University,* Patiala, 1990.
2. Fauja Singh (Ed.), *History of Punjab, Vol, III Punjabi University, Patiala, 1987.*
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs,* Vol. I, OUP, New Delhi, 1990.

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

PBL-122: ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Punjabi Compulsory)

Credits: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਪਾਠ-ਕ੍ਰਮ

ਸੈਕਸ਼ਨ-ਏ

ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ,
ਮਾਤ੍ਰਾਵਾਂ (ਮੁਢਲੀ ਜਾਣ-ਪਛਾਣ)
ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਤੇ ਵਰਤੋਂ

ਸੈਕਸ਼ਨ-ਬੀ

ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ
ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ
ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ

ਸੈਕਸ਼ਨ-ਸੀ

ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ।
ਸਮਾਨਾਰਥਕ ਤੇ ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ

ਸੈਕਸ਼ਨ-ਡੀ

ਹਫਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਮ, ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿੱਚ।

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(COMPULSORY ID COURSE)
(Student can opt this Paper in 1st or 2nd Semester)
SOA: 101–PROBLEM OF DRUG ABUSE

Time: 3 Hours **Credit 3-0-0**
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section – A

Meaning of Drug Abuse:

(i) Meaning, Nature and Extent of Drug Abuse in India and Punjab.
(ii) Consequences of Drug Abuse for:
Individual : Education, Employment, Income.
Family : Violence.
Society : Crime.
Nation : Law and Order problem.

Section – B

Management of Drug Abuse:

(i) Medical Management: Medication for treatment and to reduce withdrawal effects.
(ii) Psychiatric Management: Counselling, Behavioural and Cognitive therapy.
(iii) Social Management: Family, Group therapy and Environmental Intervention.

Section – C

Prevention of Drug Abuse:

(i) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
(ii) School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

Section – D

Controlling Drug Abuse:

(i) Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program
(ii) Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

References:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection.* Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Kessel, Neil and Henry Walton. 1982, *Alcohalism. Harmond Worth:* Penguin Books.
6. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
7. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
8. Ross Coomber and Others. 2013, *Key Concept in Drugs and Society.* New Delhi: Sage Publications.
9. Sain, Bhim 1991, *Drug Addiction Alcoholism,* Smoking obscenity New Delhi: Mittal Publications.
10. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab*: A Sociological Study. Amritsar: Guru Nanak Dev University.
11. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
12. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation,* Cambridge University Press.
13. Verma, P.S. 2017, *"Punjab's Drug Problem: Contours and Characterstics",* Economic and Political Weekly, Vol. LII, No. 3, P.P. 40-43.
14. World Drug Report 2016, United Nations office of Drug and Crime.
15. World Drug Report 2017, United Nations office of Drug and Crime.

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

Course Name	**:**	**Engineering Mechanics**
Course Code	**:**	**CEL-120**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

- To understand distributed force systems, centroid/ centre of gravity and method of finding centroids of composite figures and bodies.
- To understand moment of inertia and method of finding moment of inertia of areas and bodies.
- To understand dynamics of a particle.
- To understand the kinetics of rigid bodies and simple problems.

Total No. of Lectures –

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Introduction: Force system, dimensions and units in mechanics, laws of mechanics,vectoralgebra, addition and subtraction of forces, cross and dot products of vectors, moment of aforceabout a point and axis, couple and couple moment, transfer of a force to a parallelposition,resultant of a force system using vector method, Problems involving vectorapplication. Equilibrium: Static and dynamic equilibrium, static in determinacy, general equationsofequilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a forcesystem,Problems.	
	SECTION - B	
2	Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems. Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.	
	SECTION - C	
3	Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis and perpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects. Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.	

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

SECTION - D		
4	Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams Classification of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.	

Course Outcomes:	
1	Basic understanding of laws and principles of mechanics.
2	Ability to analyse and solve simple problems of mechanics.
3	An understanding of assumptions and limitations of approaches used.

Suggested / Reference Books:	
1	Engineering Mechanics – Irving H. Shames, PHI Publication.
2	Engineering Mechanics – U.C. Jindal, Galgotia Publication.
3	Mechanics–Berkeley Physics Course, Vol–I (Second Edition): C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholtz and R.J. Moyer–Tata McGraw Hill Publishing Company Ltd., New Delhi.

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

Course Name	**:**	**Engineering Graphics & Drafting**
Course Code	**:**	**MEL-120**
Credits (L-T-P)	**:**	**4 (2-0-2)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

At the end of this course, the student should be able to understand the

1. Increase ability to communicate with people
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic CAD skills.
5. Learn basic engineering drawing formats
6. Prepare the student for future Engineering positions

Total No. of Lectures – 48

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Introduction: Instruments used, Lettering, Types of Lines used, Scales, Types of Projections in use, Dimensioning of Figures, etc.; Orthographic Projections of Points, Lines & Lamina **Lab Work:** Introduction to AutoCAD, Practice of 2D commands, Exercises related to the theory contents of Unit-I	12
	SECTION - B	
2	Projection of Solids: Section of Solids & its Projections; Interpenetration of Solids & Curve of Interpenetration; Development of Surfaces. **Lab Work:** Familiarity with 3D commands, Exercises related to the theory contents of Unit-II	12
	SECTION - C	
3	Isometric Drawing & Isometric Projection **Lab Work:** Lab Exercises related to the theory contents of Unit-III	12

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

SECTION - D		
4	Free-Hand sketching of Engineering Components, Advance 3D Commands: Solving Problems using AutoCAD. **Lab Work:** Lab Exercises related to the theory contents of Unit-IV	12

Course Outcomes:	
1	Student's ability to hand letter will improve.
2	Student's ability to perform basic sketching techniques will improve.
3	Students will be able to draw orthographic projections and sections.
4	Student's ability to use architectural and engineering scales will increase.
5	Student's ability to produce engineered drawings will improve.
6	Student's ability to convert sketches to engineered drawings will increase.
7	Students will become familiar with office practice and standards.
8	Students will become familiar with two and three dimensional drawings.
9	Students will develop good communication skills and team work.

Suggested / Reference Books:	
1	Engineering Drawing, N. D. Bhatt
2	Engineering Graphics with AutoCAD, James D. Bethune
3	Engineering Drawing & Graphics, K. Venugopal
4	Engineering Drawing PS Gill
5	Engineering Drawing, M. B. Shah & B. C. Rana

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(Credit Based Evaluation and Grading System)

Course Name	**:**	**Mathematics-II**
Course Code	**:**	**MTL-102**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
The aim of the course is to enlighten the students with engineering mathematics which they would need to implement in their respective engineering branches. This course would prepare the students for implementation of these concepts in future applications and help them trouble shoot the problems associated with their respective disciplines.

Total No. of Lectures – 45

Lecture wise breakup		**Number of Lectures**
SECTION - A		
1	**Fourier Series:** Euler's formula, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series	10
SECTION - B		
2	**Ordinary Differential Equations :** Exact equations, Equations reducible to exact equations, Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations).	12
SECTION - C		
3	**Complex Analysis:** De Moivre's theorem with applications, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Cauchy's integral theorem, Cauchy's integral formula (without proofs), Taylor series and Laurent series (without proofs) Residues and Residue theorem.	10

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	SECTION - D	
4	**Integral Transforms:** Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Fourier transforms, Finite Fourier Sine and Cosine Transforms, modulation theorem, shifting properties, Convolution theorem.	13

Course Outcomes:	
1	The students will be able to classify differential equations according to certain features.
2	The tool of Fourier series and Laplace Transforms for learning advanced Engineering Mathematics.
3	The students will learn the mathematical tools needed in evaluating complex analysis and their usage.

Suggested / Reference Books:	
1	Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
2	B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.
3	Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.

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Course Name	**:**	**Physics**
Course Code	**:**	**PHL-183**
Credits (L-T-P)	**:**	**5 (3-1-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:

- To make the students aware about Electromagnetic wave fundamentals.
- To make students aware about quantum physics phenomena.

Total No. of Lectures – 48

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Electric and magnetic fields in a medium, Susceptibility and Conductivity, Maxwell's equations, Boundary conditions; EM wave equation, Plane wave solutions.	12
	SECTION - B	
2	Polarization of the EM waves, Pointing vector and intensity of the EM wave; Wave packet, Phase and Group velocities; Reflection and refraction of EM waves at a dielectric interface; Brewster angle; Total internal reflection at a dielectric interface; EM waves in a conducting medium and plasma.	12
	SECTION - C	
3	Wave-particle duality, de-Broglie waves; Quantum mechanical operators; Schroedinger equation, Wave function, Statistical interpretation, Superposition Principle, Continuity equation for probability density; Stationary states, Bound states.	12
	SECTION - D	
4	Free-particle solution, 1-D infinite potential well, Expectation values and uncertainty relations; 1-D finite potential well, Quantum mechanical tunneling and alpha- decay, Kronig-Penny model and emergence of bands	12

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Course Outcomes:	
1	This will enable the students to learn physical concepts associated with electromagnetic radiation and devices.
2	Student will understand quantum mechanical aspects of physics.

Suggested / Reference Books:	
1	Concepts of Modern Physics. Arthur Beiser, (Tata McGraw-Hill, Sixth Edition 2003).
2	Lasers & Nonlinear optics. B.B. Laud (New Delhi, India: Wiley Eastern 1991).

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(Credit Based Evaluation and Grading System)

Course Name	**:**	**Introduction to Engineering Materials**
Course Code	**:**	**MEL110**
Credits (L-T-P)	**:**	**3 (3-0-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the:

1. To review physics and chemistry in the context of materials science & engineering.
2. To describe the different types of bonding in solids, and the physical outcomes of these differences.
3. Give an introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.
4. Give an introduction to the relation between processing, structure, and physical properties.
5. Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.
6. Give the beginning student practice in basic expository technical writing.

Total No. of Lectures – 47

Lecture wise breakup		**Number of Lectures**
SECTION - A		
1	Introduction**:** Historical perspective, scope of materials science and engineering.Atomicstructure and interatomic bonding. Lattices, basic idea	11
SECTION - B		
2	Lattice structure: Bravais lattices, unit cells, crystal structures, crystal planes and directions,co-ordinationnumber.Singlecrystals,polycrystalline,non-crystalline,nano-crystallinematerials.Imperfections in solids: point defects, line defects, surfacedefects.	12
SECTION - C		
3	Solid solutions: phases, phase diagrams. Diffusion phenomenon, phase transformations. Strengthening mechanisms.	12

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SECTION - D		
4	Classification of materials: properties of materials. Structure, properties and applications of different metals and alloys, ceramics, composites and polymers.	12

Course Outcomes:	
1	Given a type of material, be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications.
2	Given a type of bond, be able to describe its physical origin, as well as strength.
3	Be able to qualitatively derive a material's Young's modulus from a potential energy curve.
4	Given the structure of a metal, be able to describe resultant elastic properties in terms of its 1D and 2D defects.
5	Be able to do simple diffusion problems.

Suggested / Reference Books:	
1	Materials Science and Engineering by W.D. Callister Jr. (John Wiley & Sons Inc., Eighth Edition).
2	Materials Science and Engineering: A First Course by V.Raghvan (Prentice-Hall of India Pvt. Ltd.).

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

PBL 131: ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ–II

Credit: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਸੈਕਸ਼ਨ-ਏ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਹਾਣੀਕਾਰ :
(ੳ) ਨਾਨਕ ਸਿੰਘ : **ਭੂਆ**
(ਅ) ਗੁਰਮੁਖ ਸਿੰਘ ਮੁਸਾਫਿਰ : **ਬਾਗੀ ਦੀ ਧੀ**
(ਇ) ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ : **ਪੋਮੀ ਦੇ ਨਿਆਣੇ**
(ਕਹਾਣੀਕਾਰ ਦਾ ਜੀਵਨ, ਕਹਾਣੀ ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ)

II. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਧਾਤੂ/ਮੂਲ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਵਿਉਂਤਪਤ ਅਤੇ ਰੁਪਾਂਤਰੀ), ਸਮਾਸ।

ਸੈਕਸ਼ਨ-ਬੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਹਾਣੀਕਾਰ :
(ੳ) ਸੁਜਾਨ ਸਿੰਘ : **ਬਾਗਾਂ ਦਾ ਰਾਖਾ**
(ਅ) ਕਰਤਾਰ ਸਿੰਘ ਦੁੱਗਲ : **ਤੈਂ ਕੀ ਦਰਦ ਨਾ ਆਇਆ**
(ਕਹਾਣੀਕਾਰ ਦਾ ਜੀਵਨ, ਕਹਾਣੀ ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ)

II. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਕਲਾਸ ਵਿਚ 10 ਵਿਸ਼ਿਆਂ (ਸਭਿਆਚਾਰ, ਧਾਰਮਕ ਅਤੇ ਰਾਜਨੀਤਕ) 'ਤੇ ਪੈਰ੍ਹਾ ਰਚਨਾ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ।

ਸੈਕਸ਼ਨ-ਸੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਹਾਣੀਕਾਰ :
(ੳ) ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ : **ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ**
(ਅ) ਨਵਤੇਜ ਸਿੰਘ : **ਦੂਜੀ ਵਾਰ ਜੇਬ ਕੱਟੀ ਗਈ**
(ਇ) ਪ੍ਰੇਮ ਪ੍ਰਕਾਸ਼ : **ਲੱਛੀ**
(ਕਹਾਣੀਕਾਰ ਦਾ ਜੀਵਨ, ਕਹਾਣੀ ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ)

II. ਮੁਹਾਵਰੇ ਤੇ ਅਖਾਣ (ਅਖਾਣ ਤੇ ਮੁਹਾਵਰਾ ਕੋਸ਼ ਵਿਚ) 200 ਮੁਹਾਵਰਿਆਂ ਅਤੇ 100 ਅਖਾਣਾਂ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤਣ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ (ਕਲਾਸ ਵਿਚ ਤੇ ਘਰ ਲਈ)।

ਸੈਕਸ਼ਨ-ਡੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿਚੋਂ ਹੇਠ ਲਿਖੇ ਕਹਾਣੀਕਾਰ :
(ੳ) ਅਜੀਤ ਕੌਰ : **ਬੁੱਤ ਸ਼ਿਕਨ**
(ਅ) ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ : **ਬੱਸ ਕੰਡਕਟਰ**
(ਕਹਾਣੀਕਾਰ ਦਾ ਜੀਵਨ, ਕਹਾਣੀ ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ)

II. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸੰਬੰਧਕ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

HSL–102: Punjab History & Culture (1717-1947)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Credits: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

1. Sikh Struggle for Sovereignty.
2. Ranjit Singh: Conquests, Administration and the Anglo-Sikh Relations.

Section-B

3. Anglo-Sikh Wars and the Annexation.
4. The Punjab under the British: New Administration, Education and social Change.

Section-C

5. Economic Changes: Agricultural
6. Socio-Religious Reform Movements.

Section-D

7. Role of Punjab in the Freedom Struggle.
8. Fairs and Festivals.

Suggested Readings:

1. Kirpal Singh (Ed.), *History and Culture of the Punjab*, Part-II, Punjabi University, Patiala, 1990.
2. Fauja Singh (Ed.), *History of Punjab*, Vol, III, Punjabi University, Patiala, 1987.
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991*.
4. Khushwant Singh, *A History of the Sikhs*, Vol. I, OUP, New Delhi, 1990.

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

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

Credits: 2-0-0
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਪਾਠ–ਕ੍ਰਮ

ਸੈਕਸ਼ਨ–ਏ

ਸਬਦ ਸ਼੍ਰੇਣੀਆ : ਪਛਾਣ ਅਤ ਵਰਤ

(ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਆ ਵਿਸ਼ਸ਼ਣ)

ਸੈਕਸ਼ਨ–ਬੀ

ਨਤ ਵਰਤ ਦਾ ਪਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤ-ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਨਾਲ ਸਬੰਧਤ ।

ਸੈਕਸ਼ਨ–ਸੀ

ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ

ਸਾਧਾਰਨ-ਵਾਕ (ਪਛਾਣ ਅਤ ਵਰਤ)

ਸੰਯੁਕਤ-ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਮਿਸ਼ਰਤ-ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਸੈਕਸ਼ਨ–ਡੀ

ਪਰ੍ਹਾ ਰਚਨਾ

ਸੰਖੇਪ ਰਚਨਾ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ।ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(COMPULSORY ID COURSE)
(Student can opt this Paper in 1st or 2nd Semester)
SOA–101: PROBLEM OF DRUG ABUSE

Time: 3 Hours **Credit 3-0-0**
Total Marks: 100

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section – A

Meaning of Drug Abuse:

i. Meaning, Nature and Extent of Drug Abuse in India and Punjab.
ii. Consequences of Drug Abuse for:
Individual : Education, Employment, Income.
Family : Violence.
Society : Crime.
Nation : Law and Order problem.

Section – B

Management of Drug Abuse:

i. Medical Management: Medication for treatment and to reduce withdrawal effects.
ii. Psychiatric Management: Counselling, Behavioural and Cognitive therapy.
iii. Social Management: Family, Group therapy and Environmental Intervention.

Section – C

Prevention of Drug Abuse:

i. Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
ii. School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

Section – D

Controlling Drug Abuse:

i. Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program
ii. Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

References:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection.* Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Kessel, Neil and Henry Walton. 1982, *Alcohalism. Harmond Worth:* Penguin Books.
6. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
7. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
8. Ross Coomber and Others. 2013, *Key Concept in Drugs and Society.* New Delhi: Sage Publications.
9. Sain, Bhim 1991, *Drug Addiction Alcoholism,* Smoking obscenity New Delhi: Mittal Publications.
10. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab*: A Sociological Study. Amritsar: Guru Nanak Dev University.
11. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
12. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation,* Cambridge University Press.
13. Verma, P.S. 2017, *"Punjab's Drug Problem: Contours and Characterstics",* Economic and Political Weekly, Vol. LII, No. 3, P.P. 40-43.
14. World Drug Report 2016, United Nations office of Drug and Crime.
15. World Drug Report 2017, United Nations office of Drug and Crime.

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Course Name	**:**	**Mathematics-III**
Course Code	**:**	**MTL-201**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
The aim of this course is to take lead from the earlier mathematics courses offered to students. The course will discuss all the important aspects of higher mathematics for their implementation in numerous modern applications.

Total No. of Lectures –

Lecture wise breakup		**Number of Lectures**
SECTION - A		
1	**Partial Differential Equations**: Formation and solutions of partial differential equations, Lagrange's linear equation of the first order, Non-linear equations, Charpit's method, Homogeneous linear equations with constant co-efficients, Non-homogeneous linear equations, Method of separation of variables, Solution of wave equations, Heat flow equations, Laplace's equations and transmission line equations and their applications to engineering problems.	10
SECTION - B		
2	**Integral Transforms:** Dirac-delta Function, Heaviside's Unit Function, Application of Laplace transform to differential equations, IVP and BVP; Applications of Fourier Transform to ODE and PDE, Z- Transforms, Hankel Transforms and its applications	12
SECTION - C		
3	**Fundamental concept of Probability:** Classical and axiomatic approach to the theory of probability, additive and multiplicative law of probability, conditional probability and Bayes theorem.	10

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SECTION - D		
4	**Probability distributions:** Introduction to discrete and continuous Random variables, probability functions, probability density function, cumulative distribution function and their properties, two dimensional random variables, joint distribution of several random variables, cumulative marginal and conditional distribution functions, Expected value. Bernoulli Trials, Binomial Distribution, Poisson and Normal Distribution, Expected value and variance of continuous and discrete random variables	12

Course Outcomes:	
1	To deal with functions of several variables that are essential in most branches of engineering.
2	The students will learn the mathematical tools needed in using applications of Laplace and Fourier Transforms.
3	The students will learn the essential tool of probability distributions in a comprehensive manner.

Suggested / Reference Books:	
1	Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
2	B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.
3	Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

ECL – 211: DIGITAL ELECTRONICS

Credits:
L T P
3 1 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–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.
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.

SECTION–II

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

SECTION–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.

SECTION–IV

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

Recommended Books:

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

PRACTICALS:

1. To verify truth tables of Basic Gates and Universal Gates.
2. Design and verify truth tables of formation of Basic Gates from Universal Gates.
3. To design and verify truth tables of half adder and full adder circuits.
4. To design and verify truth tables of half-sub tractor and full subtractor circuits.
5. To design and verify truth tables of Encoder and Decoder circuits.
6. Design of Multiplexer and De-Multiplexer Circuits.
7. To design and verify truth table of S-R and D Flip –Flop using NOR/NAND gates.
8. To design and verify truth table of J-K Flip-Flop using NOR/ NAND gates.
9. Designing and Implementation of Synchronous counter.
10. Designing and implementation of Asynchronous Counters.
11. Design and implementation of code convertors.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

ECL – 212: ANALYSIS AND SYNTHESIS OF NETWORKS

Credits:
L T P
3 1 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

Circuit Concepts: Circuit elements, independent and dependent sources, signals and wave forms, periodic and singularity functions, Mesh & Nodal Analysis: Loop currents and loop equations, node voltages and node equations, mesh and supermesh analysis, nodal and supernodal analysis, duality, graphical method of determining the dual of Networks. Network Theorems: Superposition, Thevenin, Norton, Maximum power Transfer, Tellegen, Reciprocity theorem, Millman theorem for DC and AC sources.

SECTION–II

Signal Waveforms: input signals, step, ramp, impulse and doublet function with Laplace transform, sampling property of impulse function, shifting functions, Applications of Laplace transform in electrical circuits, Time and Frequency Domain Analysis: Representation of basic circuits in terms of generalized frequency, transient & steady response, DC and sinusoidal response of RL, RC and RLC circuits.

SECTION–III

Time domain behaviors from poles and zeros, Filters Synthesis: Classification of filters, characteristic impedance and propagation constant of pure reactive network, ladder network, T–section, Pi–section, design of constant–K, m–derived filters, terminating half section, composite filters, 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.

SECTION–IV

Network Synthesis: Two port parameters, Z parameters, Y parameters, ABCD parameters, h parameters, effect of location of poles and zeros on stability, driving and transfer functions, Hurwitz polynomial, positive real function, network synthesis techniques for 2–terminal network by Foster and Causer's forms.

Books Recommended:

1. Circuit and Network Analysis & Synthesis by R. Sudhakar, Tata McGraw-Hill Education.
2. Circuit Theory: Analysis and Synthesis by A. Chakrabarti, Dhanpat Rai Publications.
3. Network and Systems by D.R.Choudhury, New Age International Publishers.

PRACTICALS:

Experiments covering

Implementation and proof of

Superposition Theorem

Thevenin's Theorem

Norton's Therorem

Maximum Power Transfer Theorem

And Reciprocity Theorem.

Study of transfer characteristics of

Low Pass Filters

High Pass Filters

Band Pass Filters

Band Stop Filters

Design and implementation of

Constant–k

m–dirived and

composite filters

B.Tech. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

ECL–214: ANALOG INTEGRATED CIRCUITS

Credits:
L T P
3 1 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

Differential and Cascode Amplifiers: Introduction to differential amplifier and its configurations: Dual Input Balanced output, Dual Input Unbalanced Output, Single Input Balanced output, Single Input Unbalanced Output, Swamping Resistors, Constant Current Bias, Current Mirror, Cascaded Differential Amplifier, Cascode or CE–CB configuration

Introduction to Op–Amp: Operational Amplifier: Block diagram, characteristics and linear applications, Interpretation of data sheets: characteristics, important electrical parameters and their values.

SECTION–II

Concept of Feedback: Introduction and Block diagram representation of negative feedback configurations: Voltage Series and Voltage Shunt feedback and derivation of important electrical parameters. Positive feedback in Oscillators: Phase Shift and Wien Bridge Oscillators.

Filters: Introduction and Design of Low Pass, High Pass, Band Pass, Band Reject, Butterworth and all pass filters.

SECTION–III

Operational Amplifier Applications: Peaking amplifier, scaling and averaging amplifier, V to I and I to V converter, log and antilog amplifier, Instrumentation and Isolation amplifier, Analog multiplier, Integrator, Differentiator, Sample and Hold circuit, Schmitt Trigger, Function Generator, Spectrum Analyzer, Precision rectifiers, Clippers and clampers, Peak detectors.

SECTION–IV

Specialized IC Applications: Introduction, block diagram and applications of 555 timer as Monostable, Astable and Bistable Multivibrator, Phased Locked Loops: Operating principles, characteristics and applications, Voltage Regulators: Fixed, Adjustable and Switching.

Recommended Books:

1. Op–Amps & Linear Integrated Circuits: Ramakant A. Gayakward, 3rd Edition, Pearson Education.
2. Linear Integrated Circuits: S.P. Bali, Tata Mc-Graw Hill
3. Operational Amplifiers with Linear Integrated Circuits: 4th Edition, William D. Stanley

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(Credit Based Evaluation and Grading System)

PRACTICAL:

1. To study the op-amp as an inverting and non-inverting amplifier.
2. To examine the design and operating characteristics of an Op–amp inverting summer.
3. To measure the input offset voltage of an op-amp.
4. To determine the input and output offset voltages of an op-amp.
5. To measure the gain of an op-amp.
6. To use the Op–Amp as Schmitt trigger and study its response.
7. To study IC 555 as an astable multivibrator and verify the frequency using CRO.
8. To use IC 555 as a mono-stable multivibrator.
9. Design a Wein bridge oscillator using 741 with and without adaptive feedback.
10. To investigate the operation of a VCO–type digital voltmeter.
11. To examine the operation of a PLL and to determine the free running frequency, the capture range, and the lock in range of PLL.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

CSL–297 PROGRAMMING LANGUAGES

Credits:
L T P
2 1 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

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:

SECTION–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.

SECTION-II

Arrays– Insertion, deletion, traversal, searching–Linear search and binary search, sorting–insertion sort, selection sort, and merging.
Stacks– Introduction, implementation of stack using arrays, Polish notation, Quick sort.

SECTION-III

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

SECTION–IV

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.

PRACTICAL

SECTION 1

1. Program to search element in linear array using
(a) LInear search (b) Binary search
2. Program to merge two sorted arrays in one sorted array
3. Program to sort elements of array using
(a) Insertion sort (b) Selection sort
4. Program to perform following operations on matrix
(a) Additon (b) Subtraction (c) Multiplication (d) transpose
5. Program to perform following operations on string
(a) Addtion (b) copying (c) reverse (d) length of sting
Program to remove all duplicates from string
7. Program to implement Quicksort on elements of array.
8. Program to implement following operations on linked list
(a) Tranversing (b) Insertion (c) deletion
9. Program to perform push and pop operations on stack.
10. Program to implement following operations on queue
(a) Tranversing (b) Insertion (c) deletion
11. Program to perform Preorder, postorder, inoder tranversing of tree

SECTION 2

1. C++ program to create a class for student to get and print details of N students.
2. C++ program to read sum of two numbers and then print sum
3. C++ program to create a class to read and add two distance
4. C++ program to demonstrate example of array of objects.
5. C++ program to read house details alongwith room details.
6. C++ program to overload unary pre-decrement operator.
7. C++ program to overload unary pre-increment operator.
8. C++ program for constructor, destructor variable decalaration, Definition.
9. C++ program to initialize array of objects with constructors.
10. C++ programs to read class, student details using two classes.
11. C++ program for flight booking system.
12. C++ program to read and print students’s information using two classes and simple inheritance.
13. C++ program to demonstrate example of hierarchial inheritance to get square and cube of a number.
14. Read and print employee information with deSECTIONment and of information using hierarchical inheritance program in C++.

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

L T P
0 0 2

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

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

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. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

ESL–220: ENVIRONMENTAL STUDIES

Credits: 4-0-0

Teaching Methodologies
The Core Module Syllabus for Environmental Studies includes class room teaching and field work. The syllabus is divided into 8 Units [Unit-1 to Unit-VII] covering 45 lectures + 5 hours for field work [Unit-VIII]. The first 7 Units will cover 45 lectures which are class room based to enhance knowledge skills and attitude to environment. Unit-VIII comprises of 5 hours field work to be submitted by each candidate to the Teacher in-charge for evaluation latest by 15 December, 2019.

Exam Pattern: **End Semester Examination- 75 marks**
Project Report/Field Study- 25 marks [based on submitted report]
Total Marks- 100

The structure of the question paper being:

Part-A, Short answer pattern with inbuilt choice – **25 marks**
Attempt any five questions out of seven distributed equally from Unit-1 to Unit-VII.
Each question carries 5 marks. Answer to each question should not exceed 2 pages.

Part-B, Essay type with inbuilt choice – **50 marks**
Attempt any five questions out of eight distributed equally from Unit-1 to Unit-VII. Each question carries 10 marks. Answer to each question should not exceed 5 pages.

Project Report / Internal Assessment:

Part-C, Field work – **25 marks [Field work equal to 5 lecture hours]**
The candidate will submit a hand written field work report showing photographs, sketches, observations, perspective of any topic related to Environment or Ecosystem. The exhaustive list for project report/area of study are given just for reference:

1. Visit to a local area to document environmental assets: River / Forest/ Grassland / Hill / Mountain / Water body / Pond / Lake / Solid Waste Disposal / Water Treatment Plant / Wastewater Treatment Facility etc.
2. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of tree in your areas with their botanical names and soil types
5. Study of birds and their nesting habits
6. Study of local pond in terms of wastewater inflow and water quality
7. Study of industrial units in your area. Name of industry, type of industry, Size (Large, Medium or small scale)
8. Study of common disease in the village and basic data from community health centre
9. Adopt any five young plants and photograph its growth
10. Analyze the Total dissolved solids of ground water samples in your area.
11. Study of Particulate Matter ($PM_{2.5}$ or PM_{10}) data from Sameer website. Download from Play store.
12. Perspective on any field on Environmental Studies with secondary data taken from Central Pollution Control Board, State Pollution Control Board, State Science & Technology Council etc.

B.Tech. (Electronics & Communication Engineering) 3rd Semester
(Credit Based Evaluation and Grading System)

Unit-I

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

(2 lectures)

Unit-II

Natural Resources: Renewable and non-renewable Resources:

Natural resources and associated problems.

(a) Forest resources: Use and 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, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 Lectures)

Unit-III

Ecosystems:

- 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 ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

(6 Lectures)

Unit-IV

Biodiversity and its conservation:

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation

- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

(8 Lectures)

Unit-V

Environmental Pollution:

Definition:

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- 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

(8 Lectures)

Unit-VI

Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and 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, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

(7 Lectures)

Unit-VII

Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- 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

(6 Lectures)

Unit-VIII

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. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. & Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.

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

ECL– 221: ELECTROMAGNETIC FIELD THEORY

Credits:
L T P
3 1 0

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

1. Introduction: Review of Electrostatics and Magnetostatics.
2. Time Varying Fields: Maxwell's equations in differential and integral forms concept of displacement current. Boundary conditions.

SECTION-II

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

SECTION -III

4. Guided Waves: Waves between parallel planes, TE and TM waves and their characteristics. TEM wave, velocities of waves
5. 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.

SECTION–IV

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

Books Recommended:

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

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

ECL–222 COMMUNICATION SIGNALS AND SYSTEMS

Credits:
L T P
3 1 0

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

Signals, Systems and Analysis: Classification and representation of signals & systems with their properties, Impulse response and step response of a system, Time and Frequency domain analysis, Energy and power spectral density.

SECTION–II

Signal Transmission Through Linear Networks: Convolution theorem, its graphical interpretation. Convolution function with a SECTION impulse function, Sampling theorem and its implications for low pass and band pass network, Reconstruction, Aliasing and its effect, Matched filter.

SECTION–III

Fourier Representation: Signal representation using Fourier series and its complex exponential representation, Fourier Transform and its properties, amplitude and phase spectra, Discrete Time Fourier Transform, Parseval's Theorem, Review of Laplace Transform and Z-Transform with properties and their relationships with the Fourier Transform.

SECTION–IV

Random Process: Introduction to random process, input output relations with random inputs, noise temperature, noise figure and its experimental determination. Applications of signals and systems theory in communication.

Recommended Books:

1. Oppenheim, A.V., Willsky, A.S. and Nawab, S.H., "Signals & Systems", 2nd Ed., Prentice-Hall of India.
2. Haykin, S. and Van Been, B., "Signals and Systems" 2nd Ed., John Wiley & Sons.
3. Lathi, B. P., "Linear Systems and Signals", 2nd Ed., Oxford University Press.
4. Anand Kumar, A., "Signals and Systems", 2nd Ed., Prentice-Hall of India

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

ECL–224 FIBER OPTICS

Credits:
L T P
3 1 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

1. **A General Introductory Discussion:**
Elementary discussion of propagation in fibers using a Ray Model Attenuation of Optical fibers.
2. **Signal Degradation in Optical Fibers:**
Attenuation, absorption, scattering losses and bending losses in optical fibers. Signal distortion in optical wave guide due to material dispersion and wave guide dispersion.

SECTION–II

3. **Mode Theory of Circular Wave Guide:**
Wave equation in step index fiber, model equation, modes in step index fiber, power flow in step index fiber, modes in graded index fiber.
4. **Fiber Materials and Fabrication:**
Fiber materials–Doping of fiber material, Glass fibers, plastic clad glass fibers, plastic fibers, fiber fabrication, drawing and coating.

SECTION–III

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

SECTION-IV

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

Books Recommended:

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

PRACTICALS:

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. (Electronics & Communication Engineering) 4th Semester
(Credit Based Evaluation and Grading System)

ECP–226 ELECTRONIC DESIGN AND IMPLEMENTATION LAB

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

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

ECL–261: LINEAR CONTROL SYSTEM

Credits:
L T P
3 0 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

1. Introduction: 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. Modeling: 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 modeling, Block diagram representation signal flow graphs and associated algebra, characteristics equation, transfer function of discrete data system.

SECTION-II

3. Time Domain Analysis: Typical test –input signals, transient response of the first and second order systems, Time domain specifications, dominant closed loop poles of higher order systems, Steady state error and co–efficient, Pole–zero location and stability, Routh–Hurwitz criterion, stability of discrete data systems, steady state error analysis of discrete data systems.

4. Root Locus Techniques: The extreme points of the root loci for positive gain, Asymptotes to the locii breakaway points, intersection with imaginary exits, location of roots with given gain & sketch of the root locus plot, root loci of discrete data control system.

SECTION–III

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.

SECTION–IV

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.

Recommended Books:

1. Nagrath IJ and Gopal M, "Control System Engineering", Wiley Eastern
2. Dorf RC and Bishop RH, "Modern Control System", Addison
3. Ogata K, "Modern Control Engineering", Prentice Hall
4. Kuo B C, "Automatic Control System", Prentice Hall

PRACTICALS:

Section A

1. Some experiments are to be performed using software tools such as MATLAB & SIMULINK.
2. To study input–output characteristics of a potentiometer and to use two potentiometers as an error deflector.

Section B

3. To study transmitter–receiver characteristics of a synchro set and to use the set as control component.
4. To study the operation of a D–C positional servo system and to investigate the effect of damping and supply voltage on its response.
5. Design of a suitable cascade compensator for the given system and verify the resulting improvement.

Section C

6. Study of Simulated Relay Control System.
7. To design different compensating network for the given cut off frequencies and to plot frequency response of these networks.
8. To simulate a servo–system and obtain its characteristics with the use of controllers

Section D

9. To study PID – Controller and to obtain the effect of proportional, integral and derivative control action.
10. Study of the performance of first, second and third order system.

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

ECL–262 ELECTRICAL AND ELECTRONIC MEASUREMENTS

Credits:
L T P
3 0 1

Total Marks: 100
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–I

1. **SECTIONs, Dimensions and Standards:**
SI SECTIONs, Determination of absolute SECTIONs of current and resistance, Standards of EMF, Resistance, Capacitance, Mutual inductance and their construction, Equivalent circuit representation, Figures of Merit, Construction of variable standards and Decade Boxes.
2. **General Theory of Analog Instruments:**
Primary and secondary instruments, Indicating recording and integrating types, operating torques damping and controlling torques, Torque/ weight ratio, pointers and scales.

SECTION–II

3. **Analog Measuring Instruments:**
Principles of operation, Construction, Errors, calibration, areas of application of the following types of instruments for measurement of voltage, current, power, energy, frequency and power factor: (a) PMMC (b) Dynamometer (c) Moving Iron (d) Induction (e) Thermal (f) Electrostatic Extension of Ranges by Shunts. Multipliers: Power and Energy Measurements in Poly phase Circuits.
4. Potentiometers (Only Principles, Operation & applications of DC & AC potentiometer)
(a) Simple concepts of potentiometers.
(b) Principle of DC potentiometer, applications.
(c) Principle operation of AC potentiomerter with advantages/ Disadvantages/ applications.

SECTION–III

5. **Measurement of Resistances;–**
Low, Medium & High Resistance their measurement.
6. **Bridges:**
Measurement of R,L,C,M,O by wheatstone, Kelvin, Maxwell Hay, Anderson, Owen, Heaviside, Campbell, Schering, Wien bridges, Bridge sensitivity, Errors, Detectors, Shielding and screening, Wanger ,Earthing.

SECTION-IV

7. **Instrument Transformers**
Theory and construction of current and potential transformer, ratio and phase angle error and their minimization, testing of CTS & PTS.
8. **Cathodes Ray Oscilloscopes:**
Principles and working of CRO, CRO– probes, Measurement of voltage, frequency and phase angle with CRO.

Recommended Books:

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

PRACTICALS:

LIST OF EXPERIMENTS:

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

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)

ECL311: COMMUNICATION SYSTEMS–I

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PART – I

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

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

3. AM Transmission and Reception:
AM Transmission:
Introduction, Basic Principle of AM Generation, Low Level and High Level Modulation, Square Law Diode Modulation, Suppressed Carrier AM Generation (Balanced Modulator): Ring Modulator, Product Modulator/Balanced Modulator, Introduction to SSB (Single Side Band) Transmission

PART – II

AM Reception:
Introduction, AM Receiver Parameters, Tuned Radio Frequency (TRF) Receiver, Super heterodyne Receiver, Basic Elements of AM Super-heterodyne Receiver, RF Amplifiers, Neutralization of RF Amplifiers, Image Frequency Rejection, Frequency Conversion, Mixers and types of mixer, Tracking and Alignment, IF Amplifier, AM Detector: Square law Detector, Envelope or Diode Detectors, AM Detector with AGC, AM Receiver Using a phase locked loop (PLL), Double hetero-dyne Receiver, Introduction to SSB (Single Side Band) Reception.

4. FM Transmission and Reception
FM Transmission
FM Allocation Standards, Generation of FM by Direct Method: Varactor Diode Modulation, Reactance Modulation; Indirect Generation of FM: The Armstrong Method, FM Stereo Transmitter.

PART – III

FM Receptions
Introduction to FM Receiver, Direct Methods of Frequency Demodulation, Travis Detector/Frequency Discrimination (Balanced Slope Detector), Foster Seeley or Phase: Discrimination, Radio Detector, Indirect Method of FM Demodulation, FM Detector Using PI Zero Crossing, Pre-emphasis and de-emphasis, Limiters, FM Stereo Receiver

5. Pulse Modulation Transmission and Reception
Introduction, Pulse Amplitude Modulation (PAM), Natural PAM, Flat-top PAM, Modulation and demodulation of PAM Signals, Pulse Width Modulation and Demodulation (PWM), Pulse Position Modulation and Demodulation (PPM)

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. Modern Digital and Analog Communication Systems by B.P.Lathi, Zhi Ding (Oxford University Press), Fourth Edition, 2010.
5. Electronic Communication Systems by Bernard Davis, S.R.M. Prasanna, Goerge Kennedy, Tata McGraw- Hill Education, Fifth Edition, 2012.

PRACTICAL:

1. To amplitude modulate the information signal with a high frequency carrier and observe input/output waveforms on the CRO.
2. To study the input and output waveforms of amplitude demodulator circuit.
3. To frequency modulate the information signal with a high frequency carrier and observe input/output waveforms on the CRO.
4. To study the input and output waveforms of frequency demodulator circuit.
5. To study the sensitivity of a superheterodyne receiver.
6. To study the selectivity of a superheterodyne receiver.
7. To study the fidelity of a superheterodyne receiver.
8. Study of Pulse amplitude modulation/demodulation.
9. Study of Pulse width modulation/demodulation.
10. Study of Pulse position modulation/demodulation.
11. Some experiments related to modulation and demodulation are to be performed using MATLAB.
12. To study the operation of balanced modulator.

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)

ECL–312 MICROPROCESSOR AND ITS APPLICATIONS

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PART – I

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

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

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

PART – II

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

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

PART – III

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

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

Books :

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

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)

PRACTICAL:

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. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)

ECL–313 ANTENNA AND WAVE PROPAGATION

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PART – I

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

PART – II

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

PART – III

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

Books Recommended:

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

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)

ECL – 318 COMPUTER NETWORK

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PART – I

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

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

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

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

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

PART – II

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

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

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

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

PART – III

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

Books Recommended:

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

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)
(Elective – IV)

ECL–352 INDUSTRIAL ELECTRONICS

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PART – I

1. **Characteristics of selected devices**

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

2. **Controlled Rectifier**

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

PART – II

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

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

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

PART – III

5. **Switched Mode Power Suppliers**

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

6. **Motor Control**

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

References:

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

PRACTICAL:

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 Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)
(Elective – IV)

ECL–353 INSTRUMENTATION AND INDUSTRIAL AUTOMATION

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Part-I

Transducers - Introduction, generalized measurement system, performance characteristics. Classification, basic working principle of resistive, capacitive, inductive, piezoelectric transducers. Measurement of displacement, velocity, acceleration and force. Measurement of pressure, flow, temperature, liquid level and humidity.

Part-II

Introduction to Programmable Logic Controllers (PLCs) - PLC evolution, advantages, block diagram, principle of operation. List of various PLCs available,

PLC programming- Introduction to Logic Ladder Design. Symbols used and simple instructions. Equivalent Ladder Diagram of AND, OR, NOT, XOR, NAND and NOR Gate. Equivalent ladder diagram to demonstrate De Morgan theorem. Programming examples.

Part- III

Data Acquisition Systems (DAS) : Computers in process control, Data loggers, DAS, Alarms,

Direct Digital Control (DDC), Supervisory digital control (SCADA), Introduction & Brief History, SCADA Hardware & Software.

Applications of PLC's and SCADA in Industrial Automation.

References:

1. Programmable Logic Controllers: Programming Methods and Applications – Hackworth, Pearson Education, 2003.
2. PLCs & SCADA-Theory and Practice - Rajesh Mehra and Vikrant Raj, Laxmi publications, 2017.
3. A Course in Electrical and Electronic Measurements and Instrumentation- A.K.Sawhney, Dhanpat Rai & Co. Ltd., 2008.

PRACTICAL:

Experiments related to PLC programming & experiments using SCADA software to be performed by the students in addition to the basic experiments based on transducers.

B.Tech. (Electronics & Communication Engineering) 5th Semester
(Credit Based Continuous Evaluation Grading System)
(Elective – IV)

CSL344 OBJECT ORIENTED PROGRAMMING USING JAVA

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Part-I

Evolution of Java: Importance of JAVA to Internet, Features of JAVA, Bytecode, Object Oriented Approach.
Data Types, Variables and Arrays: Data types, Declaration of Variable, Type Conversion and Casting, One Dimensional and Multidimensional arrays
Operators and Control Structures: Arithmetic, Bitwise, Relational, Boolean, Assignment Operators, Operator precedence, Selection Statements, Iteration Statements, Jump statements.
Classes: Class Fundamentals, Declaring objects, introducing methods, constructors, this keyword, Overloading constructors, Recursion, Nested and Inner classes.
Inheritance: Creating Multilevel hierarchy, Method Overriding, Abstract Classes.

Part -II

Packages and Interface: Packages, Access Protection, Importing Packages, Interfaces, Defining, Implementing, Applying Interfaces, Extending Interfaces
Exception Handling: Fundamentals, Exception Types, uncaught exceptions, try and catch.
Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Interthread communication, Suspending Resuming and Stopping Threads.
Java I/O: I/O Basics, Streams, reading Console input and writing console output, PrintWriter class, Reading & writing Files, Byte Streams, Character Streams & Serialization.

Part –III

Applets: Applet basics, Applet Architecture, Applet: Display, Repaint, Parameter Passing.
Event Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces
AWT: Window Fundamentals, Working with Frame Windows, Graphics, Color and Fonts.
Servlets: Life Cycle of a Servlet, The Servlet API, Reading Servlet Parameters, Handling HTTP Requests and Responses, Cookies & Session Tracking.
JDBC: Database Programming, Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data.

References:

1. The Complete Reference–JAVA 2 by Ptrick Naughton & Herbert Schildt TMH Publications, 2007.
2. Balagurusamy: Programming in JAVA, Tata McGraw Hill, 2004.
3. The Java Tutorial Continued by Compione, Walrath, Huml SUN JAVA Tutorial Team. Addison Wessley, 2007.
4. The Java Handbook by Patrick Naughton, Michael Morrison Publisher: Osborne/McGraw-Hill
5. Horstmann, “Computing Concepts with Java 2 Essentials”, John Wiley
6. Bert Bates,Kathy Sierra ,”HeadFirst Java”, O’Reilly Media

PRACTICAL:

Exercises (at least twenty five) depending of data types, classes, inheritance, handling etc.

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

ECL–321 MICROWAVE ENGINEERING

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PART – I

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

PART – II

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

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

PART – III

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

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

References:

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

PRACTICAL:

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 Engineering) 6th Semester
(Credit Based Continuous Evaluation Grading System)

ECL – 322 COMMUNICATION SYSTEMS – II

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3 1 1

PART – I

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

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

PART – II

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

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

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PART – III

5. Space Communications

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

Books:

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

PRACTICALS:

1. To study the sampling theorem, pulse code modulation (PCM) & reconstruction of signal.
2. To study Delta Modulation & Demodulation & it's characteristics
3. To study Adaptive Delta Modulation & Demodulation.
4. To study Amplitude Shift Keying (ASK) Modulation & Demodulation.
5. To study Frequency Shift Keying (FSK) Modulation & Demodulation.
6. To study Binary Phase Shift Keying (QPSK) Modulation & Demodulation.
7. To study Quadrature Phase Shift Keying (BPSK) Modulation & Demodulation.
8. To study Quadrature Amplitude Modulation (QAM) Modulation & Demodulation.
9. Capture range & Lock range measurement of a PLL.
10. **Frequency demodulation using PLL.**

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ECL-325 MICRO CONTROLLERS

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Part -I

Introduction: 8051 Microcontroller, Comparison of Microprocessor and Microcontroller, 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

Part -II

Arithmetic instructions and programs, Logic instructions and programs, Single bit instructions and programming, Timer/Counter Programming in 8051programming, Serial Communication: 8051 connection to RS 232, 8051 serial communication programming. Real World Interfacing: LCD, ADC and sensors, stepper motor, keyboard, DAC and external memory.

Part –III

ADC and sensors, stepper motor, keyboard, DAC and external memory,Study of different microcontroller: AVR Microcontroller and its architecture, AVR general purpose registers, AVR Atmega32 Pin Diagram, PIC Microcontroller and its architecture

Reference Books:

1. The 8051 Microcontroller and embedded systems using Assembly and C, By Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay
2. The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, SarmadNaimi and SepehrNaimi, Pearson Education
3. PIC Microcontroller: Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey

Practical:

1. Experiments related with programming of all microcontrollers listed above in the syllabus.
2. To develop applications using microcontrollers related to day-to-day usages and have real life applications.

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ENL351 COMMUNICATION SKILL FOR ENGINEERS

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PART–I

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

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

PART–II

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

PART–III

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

Books Recommended:

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

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

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ECP 324 PROJECT

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

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(Elective – V)

ECL–361 DIGITAL COMMUNICATION

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PART – I

1. Data Transmission

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

PART – II

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

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

PART – III

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

Recommended Books:

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

B.Tech. (Electronics & Communication Engineering) 6th Semester
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(Elective – V)

ECL–363 VLSI TECHNOLOGY AND DESIGN

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PART – I

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

PART – II

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

PART – III

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

Books Recommended:

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

B.Tech. (Electronics & Communication Engineering) 6th Semester
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(Elective - V)

ECL–367 SOFTWARE ENGINEERING

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PART – I

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

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

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

PART – II

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

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

PART – III

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

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

Suggested Text Book & References:

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

B.Tech. (Electronics & Communication Engineering) 6th Semester
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(Elective - V)

ECL–368 OPERATING SYSTEM

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PART – I

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

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

PART – II

Process Management II: Deadlock 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 Engineering) 7th Semester
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ECL–453: COMPUTER ARCHITECTURE & ORGANIZATION

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PART–I

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

PART–II

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

PART–III

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

Recommended Books:

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

B.Tech. (Electronics & Communication Engineering) 7th Semester
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ECL–412: DIGITAL SIGNAL PROCESSING

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PART – I

1. **Introduction:** Limitations of analog signal processing, Advantages of digital signal processing and its applications, classification of discrete time sequences and systems, representation of signals, manipulation of discrete time signals, linear convolution, correlation and autocorrelation, Concepts of stability, causality, linearity, difference equations.
2. **Z–transform:** Introduction, definition of Z-Transform, Region of convergence, properties of Z transform, evaluation of inverse Z– transforms by different methods.

PART – II

3. **Discrete and Fast Fourier Transform:** Introduction, Discrete Time Fourier Transform, Magnitude and Phase Spectra, Discrete Fourier Transform, computing inverse DFT by using a direct IDFT, Fast Fourier Transform using decimation in time and decimation frequency algorithms, Goertzel algorithm.
4. **Finite Impulse Response (FIR) filters:** Introduction, magnitude and phase response of digital filters, frequency response of linear phase FIR filters, Design methods for FIR filter, design of optimal linear phase transformation.
5. Infinite Impulse Response (IIR) Filters: Introduction, IIR filters design by derivatives, impulse invariant, bilinear transformation & Matched Z-Transformation method, Frequency transformation.

PART – III

6. Finite Precision Effects: Fixed point and Floating point representations, Effects of coefficient unitization, Effect of round off noise in digital filters, Limit cycles.

Books Recommended:

1. "Digital Signal Processing Principles, Algorithms and Application" John G Proakis, Dimtris G Manolakis 4th 2009.
2. "Discrete-Time Signal Processing" Alan V Oppenheim, Ronald W Schafer, John R Back 2nd 2008, Prentice Hall.
3. "Digital Signal Processing" S. Salivahan, A Vallavaraj, Gnanpiya 1st 2008 Tata McGraw Hill.
4. "Digital Signal Processing-A Computer Based Approach" S. K. Mitra 1st 2006 Tata McGraw Hill.
5. Jervis, Pearson Education India.
6. "Introduction to Digital Signal Processing" Johny R.Johnson.

Practical:

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

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(Elective - VI)

ECL–451: OPTICAL COMMUNICATION

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PART – I

1. INTRODUCTION
Evolution of fiber optic systems, Elements of optical fiber transmission links, Brief review of basic concepts and transmission characteristics of optical fibers.

2. POWER LAUNCHING AND COUPLING
Source of fiber power launching– source output pattern, power coupling calculations, equilibrium numerical aperture, LED coupling to single mode fiber, Lensing schemes for coupling improvement. Fiber to Fiber joints, Fiber splicing, Optical fiber connectors and couplers.

PART – II

3. PHOTO DETECTOR
p–i–n photo detector, avalanche photo detector, photo detector noise, detector response time, photo diode materials.

4. POINT TO POINT OPTICAL LINK DESIGN
System considerations, Link power budget, Rise time budget, Line coding– NRZ, RZ, Optical Manchester and block codes.

PART – III

5. WDM FIBER OPTIC NETWORKS
Overview, Time division and wave length division multiplexing in fiber optic networks, Add/ drop problem. Repeaters and amplifiers, Transmitter and receiver requirements in WDM networks. Semiconductor optical amplifiers and Erbium doped fiber amplifiers (EDFAs).

6. PASSIVE COMPONENTS, SWITCHES AND FUNCTIONAL MODULES OF FIBER OPTIC NETWORKS
Couplers/ Splitters, WDM multiplexers and demultiplexers, Filters: Fixed and tunable. Isolators, Circulators and attenuators, optical switches: Single and multistage switches. Basic principle of wavelength converters. Functional modules of Fiber optic networks like Add/ Drop multiplexers and optical cross connects with and without wavelength conversions.

Books Recommended:

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

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(Elective - VI)

ECL–457: DIGITAL SYSTEM DESIGN (Verilog VHDL)

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PART–I

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

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

PART–II

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

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

PART–III

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

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

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

B.Tech. (Electronics & Communication Engineering) 7th Semester
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(Elective – VI)

ECL-460: WIRELESS SENSOR NETWORKS

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Part I

Introduction to Wireless Sensor Networks

Constraints and Challenges of sensor networks, Emerging technologies for wireless sensor networks, Node architecture, Hardware components overview, Energy consumption of Sensor nodes, Dynamic energy and power management on System level, some examples of Sensor nodes, Optimization goals and figures of merit, QOS, Energy Efficiency, scalability, robustness Advantages of sensor networks, Sensor network applications.

Part II

Topology Control

Location driven, Geographic Adaptive Fidelity (GAF), Geographic Random Forwarding (GeRaF), GEAR, Connectivity driven, SPAN, ASCENT.

WSN Sensors

Physical Layer Design, Transceiver Design, MAC Protocols for WSN, Low Duty Cycle Protocols & Wakeup Concepts, S-MAC, Mediation Device Protocol, Wakeup Radio Concepts, Address & Name Management, Assignment of MAC Addresses, Routing Protocols, Energy Efficient Routing, Geographic Routing.

Part III

WSN Platforms & Tools

Sensor Node Hardware, Berkeley Motes, Programming Challenges, Node-level software platforms, Node level Simulators, State-centric programming.

Reference Books:

1. Holger Karl & Andreas Willig, "Protocols & Architectures for Wireless Sensor Networks", John Wiley, 2005.

2. Feng Zhao & Leonidas J. Guibas, ―Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

3. Waltenegus Dargie and Christian Poellabauer, ―Fundamentals of Wireless Sensor Networks – Theory and Practice‖, John Wiley and Sons, first edition, 2010.

4. Holger Karl and Andreas Willig, ―Protocols and Architectures for Wireless Sensor Networks‖, John Wiley and Sons, 2007.

B.Tech. (Electronics & Communication Engineering) 7th Semester
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(Elective – VII)

ECL–411: NEURAL NETWORK & FUZZY LOGIC

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PART – I

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

PART – II

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

PART – III

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

Recommended Books:

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

B.Tech. (Electronics & Communication Engineering) 7th Semester
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(Elective – VII)

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.

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ECL–459: FUNDAMENTAL OF NANO ELECTRONICS

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PART – I

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

PART – II

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

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

Recommended Books:

1. Nanotechnology: A Gentle Introduction to Nxt Big Idea: Mark Ratner. Daniel Ratner, Prentice Hall.
2. Nano Technology De Mystified– A Self Teaching Guide: Linda Williams, Dr. Wade Adams, McGraw Professional.
3. Fundamentals of Nanotechnology: Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep Dutta, Taylor and Francis.
4. Nano Technology: Fundamentals And Applications: Manasi Karkare, I. K. International Pvt Ltd.
5. Fundamentals of Nanotechnology: Hanson.
6. Nano Technology: Lynn E. Foster, Pearson India.

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ECL–452: WIRELESS COMMUNICATION

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PART – I

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

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

PART – II

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

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

PART – III

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

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

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

Recommended Text Books:

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

B.Tech. (Electronics & Communication Engineering) 7th Semester
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(Elective – VIII)

ECL–455: CELLULAR and 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. (Electronics & Communication Engineering) 7th Semester
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(Elective – VIII)

ECL–456: Bio–Sensors and MEMS

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PART–I

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

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

PART–II

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

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

PART–III

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

References:

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

B.Tech. (Electronics & Communication Engineering) 7th Semester
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(Elective – VIII)

ECL – 458: RADAR SYSTEM ENGINEERING

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PART–I

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

PART–II

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

PART–III

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

Recommended Books:

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

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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.