FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B.TECH. ELECTRONICS & COMPUTER ENGINEERING

(Credit Based Evaluation and Grading System)

(SEMESTER: I – IV)

Session: 2019-20

GURU NANAK DEV UNIVERSITY AMRITSAR

B.Tech. (Electronics & Computer Engineering) Semester System
(Credit Based Evaluation and Grading System)

Eligibility:

a) Senior Secondary Examination (12th grade) with Physics, Chemistry, Mathematics and English with at least 50% marks in aggregate.
b) Any other examination recognized equivalent thereto by GND University, Amritsar.

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. **	SOA101	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.**

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

List of Electives–II:

1.	PBL131	Punjabi (Compulsory) **OR**	2	0	0	
2. *	HSL102	Punjab History & Culture (1717-1947) **OR**	2	0	0	
3. *	PBL132	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
4. **	SOA101	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..**

B.Tech. (Electronics & Computer Engineering) Semester System
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SEMESTER – III

COURSE		**CREDITS**		
Code	**Course Name**	**L**	**T**	**P**
MTL–201	Mathematics – III	3	1	0
ECL–231	Digital Logic Design	3	1	1
ECL-232	Data Structures & Programming Methodology	3	1	0
ECL–234	Analog Device & Circuits	3	1	1
CSL-233	Programming in C++	2	1	1
ESL–220	Environmental Studies (Compulsory ID Course)	4	0	0
ECP–236	Matlab using Simulink	0	0	2
ECE–216	Summer Training**	– S/US –		
	Sub Total:	**14**	**5**	**5**
	Total Credits:	**24**		

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

B.Tech. (Electronics & Computer Engineering) Semester System
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SEMESTER – IV

COURSE		**CREDITS**		
Code	**Course Title**	**L**	**T**	**P**
	Interdisciplinary Course – I	4	0	0
ECL–222	Communication Signals and Systems	3	1	0
ECL–241	Analog Integrated Circuits	3	1	1
ECL-242	Operating System	3	1	0
ECL-243	Computer Architecture	3	1	0
	Elective – III	3	0	1
ECP–226*	Electronic Design & Implementation Lab.	0	0	2
	Sub Total:	**19**	**4**	**4**
	Total Credits:	**27**		

***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
ECL–263	Network Theory	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.

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

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

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

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 – 44

	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

	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

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

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.

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

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	
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.

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**

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. 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
	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

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.

(*ELECTIVES*)

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।

(*ELECTIVES*)

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.

(*ELECTIVES*)

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।

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(COMPULSARY 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.

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.	

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.

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

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

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

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.

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

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).

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. Atomic structure and interatomic bonding. Lattices, basic idea of symmetry.	11
	SECTION - B	
2	Lattice structure: Bravais lattices, unit cells, crystal structures, crystal planes and directions, co-ordination number. Single crystals, polycrystalline, non-crystalline, nano-crystal line materials. Imperfections in solids: point defects, line defects, surface defects.	12
	SECTION - C	
3	Solid solutions: phases, phase diagrams. Diffusion phenomenon, phase transformations. Strengthening mechanisms.	12

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.).

(ELECTIVES)

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 : **ਪੇਮੀ 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 : **ਲੱਛਮੀ**
(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।

(ELECTIVES)

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.

(ELECTIVES)

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 ਵਿਸ਼ੇਸ਼ਣ)

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।

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(COMPULSARY 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.

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**

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 objective of the course is to make the understanding of random phenomena and to introduce students to the theory of probability. The course will also apprise the students to the applications of theory of probability to study the reliability of the system, noise in signal, modeling the life length of the components. The emphasis of the course is to acquaint the students with Monte Carlo simulation for the study of the random experiment and computational methods.

Total No. of Lectures – 48

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

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.

Course Name	**:**	**Digital Logic Design**
Course Code	**:**	**ECL-231**
Credits	**:**	**5**
LTP	**:**	**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:

1. To make students aware of various number system schemes in digital electronic designs.
2. To make students aware of combinational and sequential circuits and their designs for use in analog as well as in digital communication circuits.
3. To make students capable of understanding the Logic families and memory storage technologies being used in the latest circuits
4. To make students aware of VHDL design techniques used in microelectronics.

Total No. of Lectures –38

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
	Number System and Logic Gates: Introduction to number system, Signed and unsigned number, number system arithmetic,Compliment and Subtractions using 1's and 2's compliment; ASCII code. Excess 3 codes and Gray code. **Minimization of logic function**: Logic gates, Basic theorems of Boolean Algebra,SOP and POS canonical form. Minimization using Boolean Algebra, minimization using K–map and Q–M method. Don't care functions.	10

	SECTION – B	
	Combinational and Sequential Circuit designs : Introduction to combinational circuit design, multiplexer, demultiplexer, encoders, decoders, adders, subtracter and code converters, parity checker, BCD display drive, magnitude comparators. **Sequential Circuits**: Introduction to flip flop, SR. JK, D, T. Edge triggered and clocked flip–flop, Registers. Types of Registers, counters, Design of synchronous and asynchronous counters, counter design with state equation state diagram.	10
	SECTION – C	
	D/A and A/D Converters: Introduction, Weighted register D/A converter, binary ladder D/A converter, DAC parameters, parallel A/D converter, Counter type A/D converter, Successive approximation A/D converter, Single and dual slope A./D converter, ADC parameters. **Semiconductor Memories and logic families:** Introduction, Memory organization, Classification and characteristics of memories. Sequential memories, ROMs, RAM memories, Content addressable memories, programmable logic arrays, charged–coupled device memory. Introduction and specifications of logic families, RTL, DCTL, DTL, TTL, ECL and CMOS logic families.	10
	SECTION - D	
	VHDL Introduction, A brief history of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, Brief comparison of VHDL and Verilog. Data-Flow Descriptions: Highlights of Data flow descriptions, Structure of data-flow description, Data type-vectors, HDL Models of Combinational Circuits	8

Course Outcomes:	
	At the end of this course students will demonstrate the ability to : 1. Solve Boolean Expressions using minimization techniques. 2. Design and implement the combinational circuits using mapping method. 3. Design and implement the sequential circuits depending upon the excitation states. 4. Implement the various ADC/DAC converters. 5. Analyze the different VHDL design tools.

Suggested / Reference Books:		
1	Digital Principle and Applications:	Malvino and Leach (TMH)
2	Modern Digital Electronics :	R.P. Jain (TMH) 2008.
3	Digital Design:	Morris Mano 5th Edition
4	Fundamentals of Digital Circuits:	A. Anand Kumar (PHI) 3rd Edition, 2014
5	An Engg. Approach to Digital Design :	Fletcher (PRI)
6.	VHDL: Programming by Example	Douglas Perry (TMH) 4th Edition

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.

Course Name	**:**	**Data Structures & Programming Methodology**
Course Code	**:**	**ECL-232**
Credits	**:**	**4**
LTP	**:**	**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:

1. To make the students aware of introductory concepts of data structures
2. To make the students familiar with arrays , queues and concepts of string processing
3. To acquire the basic understanding of linked lists, trees, binary search trees and graphs etc.

Total No. of Lectures –36

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
	Introduction: About data structure, Data structure operations, Algorithm: Def., Complexity, Time-space tradeoff, Algorithmic notations, Big O notation. **Arrays:** Linear array, Representation of Linear array in memory, Traversing linear array, Inserting, Deleting, Sorting (Bubble sort), Searching (Linear search, Binary search).	9
	SECTION – B	
	Stacks: Introduction, operations, Arithmetic expression, Polish notations, Transforming infix to postfix, Quick sort, Recursion concept, Tower of Hanoi. **Queues:** Define Queues, Operations, Dequeues, Priority Queues. **String Processing:** Introduction, Basic terminology, Storing strings, String operations, Word processing.	9

	SECTION – C	
	Linked List: Representation in memory, Traversing, Searching, Insertion, deletion, HeaderLinked List, Two ways List: operations. **Trees:** Binary trees, Representation in memory, Traversing, Traversal algorithms using stacks,	9
	SECTION - D	
	Binary Search trees: Searching, Inserting and Deleting. Heap and Heap sort. **Graphs:** Graph Theory Terminology, Sequential Representation, Warshall's Algorithm, Linked Representation, Traversing a graph, Hashing.	9

Course Outcomes:	
	At the end of this course, students will have the ability to : 1. Understand basic concepts of data structures such as arrays, stacks , linked lists, tree, etc. 2. Students will be able to perform different programming tasks in different programming languages by having basic understanding of data structures.

Suggested / Reference Books:	
1	Seymour Lipschutz : Theory and Problems of Data Structures, Schaum's Outline Series
2	Aho A. V. J. E. Hopcroft, J.D. Ullman; Data Structures and Algorithms, Addison–Wesley, 1983.
3	Baase, S Computer Algorithms; Introduction to Design and Analysis, Addison – Wesley,1978.
4	Berztiss, A. T.: Data Structures, Theory and practice: 2nd ed., Academic Press, 1977.
5	Collins, W.J. Data Structures, An Object–Oriented Approach, Addison – Wesley, 1992.
6.	Goodman, S.E., S.T.Hedetniemi: Introduction to the Design and Analysis of Algorithms,McGraw
7.	Horowitz, E.S. Sahni: Algorithms: Design and Analysis, Computer Science Press, 1977.
8.	Kunth, D.E. The Art of Computer Programming. Vols. 1–3, Addison – Wesley, 1973.
9.	Kurse, R.L. Data Structures and Program Design, 2nd Ed., Prentice Hall, 1987.
10.	Lorin, H.: Sorting and Sort Systems, Addison – Wesley, 1975.
11.	Standish, T.A.: Data Structure Techniques, Addison – Wesley, 1980.
12.	Tremblay, J.P., P.G. Sorenson: An Introduction to Data Structures with Applications,McGraw Hill, 1976.
13.	Wirth, N.: Algorithms + Data Structures = Programs, Prentice Hall, 1976.

Course Name	**:**	**Analog Devices & Circuits**
Course Code	**:**	**ECL-234**
Credits	**:**	**5**
L TP	**:**	**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:

At the end of this course**, t**he student should be able to understand the operation of various important electronic devices and have the knowledge of electronic circuits using these devices. The course contents are designed to cover basic solid state devices and their applications in various electronic circuits and systems.

Total No. of Lectures – 40

	Topic	**Number of Lectures**
	SECTION – A	
1	**Diode Applications: T**unnel diode, Varactor diode, Shotkey diode, Rectifiers- half wave, full wave and Bridge, Filters- L, C, L-Section, π-Filter, Clippers and Clampers.	10
2	**Bipolar Junction Transistors:** Transistor at low frequency, Transistor hybrid model, H–parameters, conversion formulas, analysis using h–parameters, Transistor at high frequency and its hybrid (pi) CE model.	
	SECTION-B	
3.	**Transistor Biasing and Stabilization:** Operating point, Bias stability, various biasing circuits, stabilization against variation in Ico, VBE and beta, Bias compensation, Thermister and Sensistor compensation, Thermal Runaway.	10
4.	**Field Effect Transistors:** The JFET, JFET parameters, Drain and mutual characteristics, Small signal model of FET, MOSFET- Enhancement type and depletion type, CMOS, FET as a VVR, V-FET	

	SECTION-C	
5.	**Feedback Amplifiers:** Feedback concept, Types of Feedback Amplifiers, Effect of negative feedback on transfer gain, input and output resistance, bandwidth, stability, distortion and frequency Response.	10
6.	**Multistage Amplifiers:** Types of Multistage amplifiers like RC, LC, Transformer coupled, Direct coupled amplifiers, their frequency response curves and analysis.	
	SECTION-D	
7.	**Power Amplifier:** Classification of Power amplifiers, analysis of class Class A direct coupled with resistive load, Transformer coupled with resistive load, Class B, C and AB amplifiers, harmonic distortion in amplifiers. push pull amplifier, operation of class-B push-pull amplifier, crossover distortion, transistor paraphrase amplifier, complementary-symmetry amplifier	10

Course Outcomes:	
1	To gain knowledge regarding the various electronics devices such as Diode, BJT, FET, MOSFET, CMOS etc..
2	To know the working principle and their applications.
3	To know the biasing conditions and stabilization techniques for the operating point.
4	To get an insight about the concept of feedback in amplifiers
5	To learn the use of multistage amplifiers in various communication applications.
6	To acquire knowledge about various types of power amplifiers and their application in a particular area

Suggested / Reference Books:	
1	Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.
2	Integrated Electronics, Millman, J and Halkiias, C.C, TMH, 2007.
3	Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.
4	Microelectronic Circuits, Sedra& Smith, V Edition, Oxford University Press, 2007
5	Electronic Devices and Circuits by J.J. Cathey, Schaum's Outline Series, TMH, IInd Edition, 2004.
6.	Electronic Devices and Circuits, J.B. Gupta, S.K.Kataria and Sons, 2014

PRACTICAL:

1. Study of an emitter follower circuit.
2. Determination of h–parameters of a transistor.
3. Design of transistor biasing circuits.
4. To study the performance characteristics of phase shift oscillator and to determine the frequency of oscillation.
5. To study the performance characteristics of Hartley / Colpitts oscillator and to determine the frequency of oscillation
6. Study of frequency response of CE–BJT amplifier.
7. Study of frequency response of CS–FET amplifier.
8. Study of frequency response of RC coupled amplifier.
9. Study of Class A/B Transformer coupled power amplifier.
10. Study of Class B Complementary symmetry amplifier.
11. Study of positive and negative feedback in amplifiers

Course Name	**:**	**Programming in C++**
Course Code	**:**	**CSL-233**
Credits	**:**	**4**
LTP	**:**	**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:

1. To make students aware of fundamental concepts of C++.
2. To develop problem solving skills in students using C++

Total No. of Lectures –24

THEORY

	Lecture wise breakup	Number of Lectures
	SECTION - A	
	Difference between C, C++ and VC++. Brief introduction to data types, operators and controlstatements in C++. Advanced preprocessor statements, Features of C++, I/O statements in C++,Manipulators,	6
	SECTION – B	
	Arrays and Strings, Classes and Objects, Access Specifiers, Function Overloading, Inline Functions, Friend Functions and Friend Class. Constructors & Destructors: Types of Constructors, Inheritance, Types of Inheritance,Ambiguity in Inheritance,	6
	SECTION – C	
	Polymorphism: Virtual Functions, Pure virtual Functions, OperatorOverloading.	6 6
	SECTION - D	
	Pointers, Array of pointers, Dynamic memory allocation in C++, File handling in C++,Templates and Exception Handling.	6 6

Course Outcomes:	
	At the end of this course students will demonstrate the ability to : 1. Solve different application specific problems related to various fields using C++ programming 2. Students will have the understanding of basic concepts of C++.

PROGRAMMING LANGUAGES LAB:

Students should be asked to write programs in C++ using different statements, Libraries andFunctions, Designing Unique Manipulators for the development of program in all areas of datastructures covered in the course. Emphasis should be given on development of recursive as wellas non recursive algorithms involving arrays, string handling, stacks and queues, linked list treesand graphs. Use of pointers for dynamic memory allocation.

List of suggested programs for practice

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 using hierarchical inheritance program in C++.

Suggested / Reference Books:	
1	Object Oriented programming in C++ - Robert Lafore
2	Programming ANSI and TURBO C++ - Kamdhane
3	Let Us C++ - YashwantKanetkar
4	The C++ Programming Language - BjarneStroustrup

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, 2018.

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.

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.

Course Name	**:**	**Matlab using Simulink**
Course Code	**:**	**ECP-236**
Credits	**:**	**2**
LTP	**:**	**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

Course Name	**:**	**SUMMER TRAINING**
Course Code	**:**	**ECE-216**
Credits	**:**	**-**
LTP	**:**	**-S/US-**

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.

Course Name	**:**	**Communication Signals & Systems**
Course Code	**:**	**ECL-222**
Credits	**:**	**4**
L TP	**:**	**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 objective of this subject is to develop analytical and problem solving capability of students, by which they would be able to understand and handle real-time signal processing related problems and projects.The knowledge of basics of signals and systems, Convolution and sampling operations, Fourier series analysis, different types of transforms such as Fourier Transform, Laplace transform and Z transforms, random signal theory will help students to work in multi-disciplinary fieldsof engineering in group activities.

Total No. of Lectures –36

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	**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.	7
	SECTION - B	
2	**Fourier Representation:** Continuous and discrete time Fourier series, Trigonometric & exponential Fourier series, Properties of Fourier series, Parseval's theorem, Continuous and discrete time Fourier transforms and its properties, Analysis of discrete time signals and systems, Correlation, Autocorrelation, Relation to Laplace transform andZ-Transform.	11

SECTION - C		
3	**Signal Transmission Through Linear Networks:** Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling - Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.Correlation of Signals, Concept of convolution theorem in Time domain and Frequency domain, Graphical representation of Convolution	11
SECTION - D		
4	**Random Signals:** Probability, Random variables, Gaussian distribution, Transformation of random variables, Random processes, Stationary processes, Correlation and Covariance Functions, Regularity and Ergodicity, Gaussian Process, Transmission of deterministic and indeterministic signals through a linear time invariant system, Spectral density.	7

Course Outcomes:	
1	Acquired knowledge about classification of signals and systems, different properties of signals and systems.
2	Gained knowledge about Fourier series and Fourier transform analysis of signals
3	Acquired knowledge about convolution theorem and sampling theorem for low pass and band pass filters.
4	Obtained basic idea about Random Signals & probability.

Suggested / Reference Books:	
1	Oppenheim, A.V., Willsky, A.S. and Nawab, S.H., "Signals & Systems", 2nd Ed., Prentice-Hall of
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

Course Name	**:**	**Analog Integrated Circuits**
Course Code	**:**	**ECL–241**
Credits	**:**	**5**
L TP	**:**	**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 introduce the basic building blocks of linear integrated circuits.
- To teach electrical parameters and applications of operational amplifier integrated circuit.
- To introduce the use and applications of integrated circuits like 741, 351, 555, 78XX, 79XX, 566, MC 1408 etc.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Total No. of Lectures – 42

	Lecture wise breakup	**Number of**
	SECTION - A	
1	**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	2
2	Swamping Resistors, Constant Current Bias, Current Mirror	3
3	**Introduction to Op–Amp:** Overview and pin description of 741 C op-amp. Operational Amplifier: Block diagram, characteristics and linear applications	4
4	Interpretation of data sheets: characteristics, important electrical parameters and their values.	3

SECTION - B		
5	**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.	5
6	**Filters:** Introduction and Design of Low Pass, High Pass, Band Pass, Band Reject, Butterworth and all pass filters.	3
SECTION - C		
7	**Operational Amplifier Applications:** Peaking amplifier, scaling and averaging amplifier, V to I and I to V converter, log and antilog amplifier,	5
8	Instrumentation and Isolation amplifier, Analog multiplier, Integrator, Differentiator, Sample and Hold circuit, Schmitt Trigger	6
9	Function Generator, Spectrum Analyzer, Precision rectifiers, Clippers and clampers, Peak detectors.	5
SECTION - D		
10	**Specialized IC Applications:** Introduction, block diagram and applications of 555 timer as Monostable, Astable and BistableMultivibrator.	3
11	Phased Locked Loops: Operating principles, characteristics and applications, Voltage Regulators: Fixed, Adjustable and Switching.	3

PRACTICALS -: LIST OF PRACTICALS

Section A

1. Design a circuit using op-Amp 741 to find input offset current and bias current characteristics.
2. Design a circuit using op-Amp 741 to find input offset voltage and output offset voltage characteristics.
3. Design a circuit using op-Amp 741 to find its slew rate.

Section B

4. Design a circuit using op-Amp 741 to find its input and output resistance characteristics.
5. Design a wein bridge oscillator using operational amplifier IC 741. (ME-655)

Section C
6. To study the conversion of input voltage into proportional current irrespective of load for inverting & non-inverting modes. (ETB-169) 7. To study the principles of voltage controlled current source. 8. To study conversion of current to proportional voltage in inverting and non-inverting modes. (ETB-170) 9. To study the conversion of analogue D.C. voltage into proportional frequency with 50% duty cycle having linear relationship, using integrator, Schmitt trigger and master slave j.k. flip flop in toggle mode. (ETB-171) 10. To study schmitt's trigger circuit for the desired values of upper threshold voltage and lower threshold value and also study the effect of feedback on threshold voltages. (ETB-181)
Section D
11. Design an astable multi vibrator using 555 timer for generation of rectangular and square wave forms. 12. Design voltage to time convertor and voltage to frequency convertor using 555 timer. 13. Design power supplies with voltage regulations of +5 V and -5 V using 7805 and 7905 rectifier IC's.

Course Outcomes:	
1	At the end of this course, the student should be able to understand the concepts and common parameters of Integrated circuits (IC). The course will build enough confidence among the learners about the handling and use of commercially available IC's for various practical applications.

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

Course Name	**:**	**Operating System**
Course Code	**:**	**ECL-242**
Credits	**:**	**4**
L TP	**:**	**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 objective of this course is to :

1. To have the basic understanding of fundamental concepts of operating system
2. To understand process management, device management, memory management and dick scheduling concepts.
3. To acquire knowledge about functioning of different operating systems such as Windows 8x/XP/2000, UNIX, LINUX etc.

Total No. of Lectures –36

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	**Introduction to Operating Systems**, Main Functions and characteristics of Operating Systems, Types of Operating Systems, System Calls **Process Management:** Process States, Process Control Block, Process Scheduling, CPUScheduling, Resource allocation graph, Deadlocks: Deadlock Avoidance and Deadlock Handling	9
	SECTION - B	
2	**Process Synchronization**: Race Condition, Critical Section, Semaphores, Classical problems ofsynchronization, Monitors	9

	SECTION - C	
3	**Memory Management**: External fragmentation, Internal fragmentation, Compaction, Paging, Segmentation, Virtual memory, Demand paging. **Device Management:** Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O Device handlers.	9
	SECTION - D	
4	**Disk Scheduling:** FCFS, SSTF, SCAN, C–SCAN, N–Stop Scan Introduction to Multiprocessor and Distributed Operating Systems **Case Studies:** Windows 8x/XP/2000, UNIX, LINUX to be discussed briefly.	9

Course Outcomes:	
1	Acquired knowledge about basics of operating system
2	Gained knowledge about design and functioning of different types of operating systems such as Windows 8x/XP/2000, UNIX, LINUX etc.

Suggested / Reference Books:	
1	Peter B. Galvin, A. Silberchatz: Operating System Concepts, Addison Wesley, 6th Edi., 2003.
2	A.S. Tenenbaum: Operating System: Design and Implementation PHI, 1989
3	Madnick and Donovan: Operating System, McGraw Hill, 1973.
4	P.B. Henson: Operating System Principles, Prentice Hall, 1973
5	P.B. Henson: Architecture of concurrent programs, Prentice Hall, 1977.
6	A.C. Shaw: Logic Design of operating System, Prentice Hall, 1974.
7	M.J. Bach: Design of UNIX Operating system, PHI, 1986.

Course Name	**:**	**Computer Architecture**
Course Code	**:**	**ECL-243**
Credits	**:**	**4**
L TP	**:**	**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 objective of this course is to :

1. To have the basic understanding of fundamental concepts of basic computer organization and design.
2. To understand programming and controlling of basic computer along with CPU architecture, memory management and I/O Management.

Total No. of Lectures –36

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	**Basic computer Organization and design:** Register Transfer language & operations, various Arithmetic, Logic & Shift micro-operations instructions, codes, computer registers, instructions, timing & control, instruction cycle, design of a complete basic computer & it's working.	6
	SECTION - B	
2	**Programming & controlling the basic computer:** Machine & Assembly Language, hardwired&Micro programmed control, Design of a control unit. **CPU Architecture:** General register & stack organization, instruction formats and addressing modes, ALU & Control unit architecture.	6

	SECTION - C	
3	**Memory Organization:** Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation. **I/O Organization:** Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA, I/O Processors, controller, I/O scheduler, I/O Device handlers.	6
	SECTION - D	
4	**Parallel & Multiprocessing Environment:** Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, inter-processor communication &synchronization.	6

Course Outcomes:	
1	Acquired knowledge about basic concepts about computer structure, its programming and controlling.
2	Gained knowledge about CPU architecture, memory management and I/O management.

Suggested / Reference Books:	
1	Morris Mano: Computer System Architecture, PHI.
2	Hayes J.P.: Computer Architecture &Organisation, McGraw Hill.
3	Stone: Introduction to Computer Architecture: Galgotia.
4	Tanenbaum: Structured Computer Organisation, PHI.

Course Name	**:**	**Electronic Design and Implementation Lab.**
Course Code	**:**	**ECP-226**
Credits	**:**	**2**
L TP	**:**	**0-0-2**

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.

(Elective – III)

Course Name	**:**	**Linear Control System**
Course Code	**:**	**ECL 261**
Credits	**:**	**4**
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.

Course Objectives:
The purpose of this course is to introduce and teach students the fundamentals of control engineering. This course aims to provide description of linear control systems, its stability and error analysis in time and frequency domain. Control engineering is one of the fundamental courses and is a gateway course to many engineering subjects

Total No. of Lectures –36

Lecture wise breakup		**Lectures**
	SECTION - A	
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.	9
2	**Modelling:** Formulation of equation of linear electrical, mechanical, thermal pneumatic and hydraulic system, electrical and mechanical analogies. Transfer function, concepts of state variable modelling. Block diagram representation and reduction, signal flow graphs and associated algebra, characteristics equation, transfer function of discrete data system.	

(Elective – III)

	SECTION - B	
3 4	**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. **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.	10
	SECTION - C	
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.	9
	SECTION - D	
6 7	**Compensation:** Necessity of compensation series and parallel compensations, compensating network, application of lag and lead compensation. **Control components:** Error detectors – potentiometers and synchronous, servo motor A.C and D.C. techno generators, magnetic amplifiers.	8

Course Outcomes: After completion of this course, the students would be able to::	
	• Learn the representation of systems, their transfer function models • Find the time response of systems subjected to test inputs and the associated steady state/dynamic errors • Analyze the concept of stability in time domain and frequency domain • Learn basics of compensation • Use of various control components

Prescribed 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 -: LIST OF 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.

(Elective – III)

Course Name	**:**	**Electrical and Electronic Measurements**
Course Code	**:**	**ECL 262**
Credits	**:**	**4**
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.

	Lecture wise breakup	**Lectures**
	SECTION - A	
1 2	**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. **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.	9
	SECTION - B	
3 4	**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. 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.	10

	SECTION - C	
5 6	**Measurement of Resistances;–** Low, Medium & High Resistance their measurement. **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.	9
	SECTION - D	
7 **8**	**Instrument Transformers** Theory and construction of current and potential transformer, ratio and phase angle error and their minimization, testing of CTS & PTS. **Cathodes Ray Oscilloscopes:** Principles and working of CRO, CRO– probes, Measurement of voltage, frequency and phase angle with CRO.	8

Suggested / Reference 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.

(Elective – III)

Course Name	**:**	**Network Theory**
Course Code	**:**	**ECL-263**
Credits	**:**	**4**
L TP	**:**	**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

- Analysis of electrical network using different simplification theorems and Laplace Transform
- Synthesis of an electrical network for a given impedance/ admittance function

	Lecture wise breakup	Lectures
	SECTION - A	
1	Circuit Concepts and Theorems: Circuit elements, independent and dependent sources, Mesh & Nodal Analysis,SupermeshandSupernodal analysis, source transformation and duality, Network Theorems: Superposition, Thevenin, Norton, Maximum power Transfer, Tellegen, Reciprocity theorem, Millman and compensation theorem	9
	SECTION - B	
2	Signal Waveforms and Time Domain Analysis:Singularity functions, step, ramp, impulse and doublet function with Laplace transform,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, Time domain behaviors from poles and zeros	10
	SECTION - C	
3	Filters Synthesis: Classification of filters, characteristicimpedance 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	9

(Elective – III)

	SECTION - D	
4	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.	8

Course Outcomes: After the completion of course, the student will be able to	
1	Identify different types of input signals
2	Analyze the circuit using Network simplification theorems
3	Analyze different networks in time and frequency domain
4	Design different filtersand evaluate two-port network parameters
5	Synthesize of one port networks

Suggested / Reference Books:	
1	Circuit and Network Analysis & Synthesis by R. Sudhakar, McGraw-Hill Education.
2	Network Analysis and Synthesis by Ravish R. Singh, McGraw-Hill Education.
3	Network and Systems by D.R.Choudhury, New Age International Publishers.

Practical:

1. Verification of Kirchhoff's Laws, Superposition Theorem, Thevenin Theorem, Norton Theorem, Maximum Power Transfer Theorem and Reciprocity Theorem.
2. Study the transfer characteristics of different filters
3. Design of k and m derived filters
4. Verification of network theorems using PSpice
5. Designing of filters using PSpice