FACULTY OF ENGINEERING &TECHNOLOGY

SYLLABUS

FOR

M.TECH. (MECHATRONICS ENGINEERING) DUAL DEGREE PROGRAMME

(Credit Based Evaluation and Grading System)

(SEMESTER: I-II)

Session: 2019–2020

GURU NANAK DEV UNIVERSITY AMRITSAR

M.Tech. (Mechatronics Engineering) Dual Degree Programme
(Credit Based Evaluation and Grading System)

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.	* HSL101	Punjab History & Culture (1450-1716) **OR**	2	0	0	2
3.	* PBL122	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
4.	** SOA 101	Drug Abuse: Problem, Management and Prevention (Compulsory)	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. **** Credits will not be included in SGPA, Student can opt this Paper whether in 1st or 2nd Semester.**

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SEMESTER – II

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CEL120	Engineering Mechanics	3	1	0	4
2.	MEL120	Engineering Graphics & Drafting	2	0	2	4
3	MTL102	Mathematics-II	3	1	0	4
4.	PHL183	Physics	3	1	1	5
5.	MEL110	Introduction to Engg. Materials	3	0	0	3
6.		Elective-II	2	0	0	2
List of Electives–II:						
1.	PBL131	Punjabi (Compulsory) **OR**	2	0	0	
2.	* HSL102	Punjab History & Culture (1717-1947) **OR**	2	0	0	2
3.	* PBL132	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
4.	** SOA 101	Drug Abuse: Problem, Management and Prevention (Compulsory)	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. **** Credits will not be included in SGPA, Student can opt this Paper whether in 1st or 2nd Semester.**

3. **PSL-053 ID Course Human Rights & Constitutional Duties (Compulsory Paper) Students can opt. in any semester except Semester 1st. This ID Paper is one of the total ID Papers of this course.**

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

Instructions for the Paper Setters:-

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

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

Total No. of Lectures –45

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

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

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List of Practicals:
1. Determination of total hardness of Water.

2. Determination of temporary and permanent hardness of water.

3. To determine the strength of sodium carbonate in given sample of washing soda.

4. To determine the strength of sodium carbonate and sodium hydroxide in caustic soda solution.

5. To determine the strength of acetic acid in vinegar

6. Find the strength of $KMnO_4$ solution with oxalic acid

7. Find the strength of $KMnO_4$ 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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–I)
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Course Name	:	Mathematics-I
Course Code	:	MTL-101
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester	:	20% weightage
End Semester	:	80% weightage

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

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

Total No. of Lectures –

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

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	SECTION - C	
3	**Differential Calculus:** Partial Derivatives, Euler's theorem on homogeneous functions, Maclaurin's and Taylor's expansions of single and two variables, Maxima and minima of functions of several variables, Lagrangian method of multipliers, Multiple integrals and their use in obtaining surface areas and volumes of solids.	12
	SECTION – D	
4	**Vector Calculus:** Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field, Line integral of a vector field, Surface integral of vector field, Volume integral of a scalar field, Green's theorem, stokes theorem, Gauss divergence theorem (without proofs) and their applications.	12

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

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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–I)
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Course Name	:	**Basic Electrical & Electronics Engineering**
Course Code	:	**ECL-119**
Credits (L-T-P)	:	**5 (4-0-1)**
Total Marks	:	**100**
Mid Semester Examination	:	**20% weightage**
End Semester Examination	:	**80% weightage**

Instructions for the Paper Setters:-

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

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

Total No. of Lectures –48

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

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

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

Suggested / Reference Books:	
1	Principles of Electrical Engineering by Gupta BR; S. Chand and Company, New Delhi.
2	Electrical Technology by Hughes Edward; The English Language Book Society and Longmans.
3	Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.
4	Basic Electrical Engineering by T.K. Naggarkar& Ms. Sakhija Seventh Edition 2008, Oxford University Press.
5	Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.
6	Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.
7	Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.

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PRACTICAL:

1. Study of VI characteristics of PN junction

2. Study of Half wave, full wave & Bridge rectifiers.

3. Study of simple capacitive, T & II filters.

4. Study of zener as a voltage regulator.

5. Study of transistor characteristics in CC, CB and CE configuration

6. To study the performance characteristic of clipper circuit

7. To study the performance characteristic of clamper circuit

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

Instructions for the Paper Setters:-

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

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

Total No. of Lectures –

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

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

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

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

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

Course Objectives:

At the end of this course, the student should be able to understand the
1. Understand applications of hand tools and power tools.
2. Understand the operations of machine tools.
3. Select the appropriate tools required for specific operation.
4. Comprehend the safety measures required to be taken while using the tools.

Total No. of Practicals – 48

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

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

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

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

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

ENL-101: COMMUNICATIVE ENGLISH

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

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

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

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

Prescribed Text Books:
- *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.

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

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

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

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

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

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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 ਵਿੱਚੋਂ 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); ਵਿਸਰਾਮ ਚਿੰਨ੍ਹ, ਸ਼ਬਦ ਜੋੜ (ਸ਼ੁਧ–ਅਸ਼ੁਧ)

ਸੈਕਸ਼ਨ–ਬੀ

I. **ਦੋ ਰੰਗ** (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋਂ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ)
    ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ ਵਿੱਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
    (ੳ)   ਫਿਰੋਜ਼ਦੀਨ ਸਰਫ
    (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 ਵਿੱਚੋਂ ਹੇਠ ਲਿਖੇ ਕਵੀ :
    (ੳ)   ਨੰਦ ਲਾਲ ਨੂਰਪੁਰੀ
    (ਅ)   ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ
    (ੲ)   ਡਾ. ਹਰਿਭਜਨ ਸਿੰਘ
            (ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ–ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਾਵਿ–ਕਲਾ)
II. ਸ਼ੁੱਧ, ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿੱਚੋਂ 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 ਵਿੱਚੋਂ 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 ਵਿੱਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਇੱਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ–ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

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

Credits: 2-0-0
Total Marks: 100

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

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

Section-A
1. Land and the People.
2. Bhakti Movement

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

Section-C
5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

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

Suggested Reading:

1. Kirpal Singh (Ed.), *History and Culture of the Punjab, Part-ii, Punjabi University,* Patiala, 1990.

2. Fauja Singh (Ed.), *History of Punjab, Vol, III Punjabi University, Patiala, 1987.*

3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*

4. Khushwant Singh, *A History of the Sikhs,* Vol. I, OUP, New Delhi, 1990.

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

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

Credits: 2-0-0
Total Marks: 100

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

ਪਾਠ-ਕ੍ਰਮ

ਸੈਕਸ਼ਨ-ਏ

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

ਸੈਕਸ਼ਨ-ਬੀ

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

ਸੈਕਸ਼ਨ-ਸੀ

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

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

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(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.

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

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.

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

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

Course Objectives:
• To understand distributed force systems, centroid/ centre of gravity and method of finding centroids of composite figures and bodies.
• To understand moment of inertia and method of finding moment of inertia of areas and bodies.

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.	

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

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.

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

Instructions for the Paper Setters:-

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

Course Objectives:
At the end of this course, the student should be able to understand the
1. Increase ability to communicate with people
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic CAD skills.
5. Learn basic engineering drawing formats
6. Prepare the student for future Engineering positions

Total No. of Lectures – 48

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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

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

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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

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 –

	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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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.

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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).

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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

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

Course Objectives:
At the end of this course, the student should be able to understand the:
1. To review physics and chemistry in the context of materials science & engineering.

2. To describe the different types of bonding in solids, and the physical outcomes of these differences.

3. Give an introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.

4. Give an introduction to the relation between processing, structure, and physical properties.

5. Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.

6. Give the beginning student practice in basic expository technical writing.

Total No. of Lectures – 47

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

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

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

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

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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 ਮੁਸਾਫ਼ਿਰ : **ਬਾਗੀ ਦੀ ਧੀ**
(ੲ)   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 ਰੂਪਾਂਤਰੀ), 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, ਧਾਰਮਿਕ 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**
(ੲ)   ਪ੍ਰੇਮ ਪ੍ਰਕਾਸ਼ : **ਲੱਛਮੀ**
            (ਕਹਾਣੀਕਾਰ ਦਾ ਜੀਵਨ, ਕਹਾਣੀ ਸਾਰ, ਵਿਸ਼ਾ–ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ)
II. ਮੁਹਾਵਰੇ ਤੇ ਅਖਾਣ (ਅਖਾਣ ਤੇ ਮੁਹਾਵਰਾ ਕੋਸ਼ ਵਿਚੋਂ) 200 ਮੁਹਾਵਰਿਆਂ ਅਤੇ 100 ਅਖਾਣਾਂ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤਣ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ (ਕਲਾਸ ਵਿਚ ਤੇ ਘਰ ਲਈ)।

ਸੈਕਸ਼ਨ–ਡੀ

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

ਅੰਕ–ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

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

B.Tech. (Electronics & Communication Engineering) 2nd Semester
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HSL–102: Punjab History & Culture (1717-1947)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Credits: 2-0-0
Total Marks: 100

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

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

Section-A
1. Sikh Struggle for Sovereignty.
2. Ranjit Singh: Conquests, Administration and the Anglo-Sikh Relations.
Section-B
3. Anglo-Sikh Wars and the Annexation.
4. The Punjab under the British: New Administration, Education and social Change.
Section-C
5. Economic Changes: Agricultural
6. Socio-Religious Reform Movements.
Section-D
7. Role of Punjab in the Freedom Struggle.
8. Fairs and Festivals.

Suggested Readings:

1. Kirpal Singh (Ed.), *History and Culture of the Punjab,* Part-II, Punjabi University, Patiala, 1990.

2. Fauja Singh (Ed.), *History of Punjab,* Vol, III, Punjabi University, Patiala, 1987.

3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*

4. Khushwant Singh, *A History of the Sikhs,* Vol. I, OUP, New Delhi, 1990.

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

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

Credits: 2-0-0

Total Marks: 100

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

ਪਾਠ–ਕ੍ਰਮ

ਸੈਕਸ਼ਨ-ਏ

ਸਬਦ ਸ੍ਰੇਣਾਆ : ਪਛਾਣ ਅਤ ਵਰਤ

(ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਾਰਾਆ ਵਿਸ਼ੇਸ਼ਣ)

ਸੈਕਸ਼ਨ-ਬੀ

ਾਨਤ ਵਰਤ ਦਾ ਪਜਾਬਾ ਸ਼ਬਦਾਵਲਾ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਾਰਸ਼ਤ-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

ਪਰ੍ਾ 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 ਤੋ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(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.

M.Tech. (Mechatronics Engineering) Dual Degree Programme (Semester–II)
(Credit Based Evaluation and Grading System)

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.