Programme Structure

School of Polytechnic

Diploma in Electronics & Communication Engineering

Programme Code: SPB13

Batch: 2023-2026

Vision of the University

To be recognized as an Institution of excellence, facilitating learning, fostering creativity, knowledge creation, innovations, consultancy and leadership in multiple areas to build a conscious community that will positively impact living beings for a sustainable future.

Mission of the University

1. **Offers a wide range of Undergraduate and Post graduate Courses.**
   To create conducive environment for an interactive and application oriented experiential learning making the Institute a preferred destination for work and study.
2. **Research, Innovation, Consultancy & Entrepreneurial Culture**
   To Foster creativity, research and innovation orientation in students and faculty in basic and applied areas in all of its disciplines, provide cost effective solutions and nurture entrepreneurial capabilities to accelerate growth.
3. **Social Relevance with local actions on global thoughts**
   To act as a catalyst in social change by developing academic, social, political, technological, scientific, industrial and business leadership in the spirit "Think Globally and Act Locally"; by providing ample opportunities to develop team spirit, sportsmanship and love for culture and national heritage.

Core Values

Integrity
Leadership
Diversity
Community

Vision of the School of Polytechnic

To become a center of excellence for providing quality and value based education in the field of diploma engineering that will produce skilled technocrats to meet industry requirements.

Mission of the School of Polytechnic

- To provide technical knowledge and skills by using latest engineering tools.
- To facilitate industry-institute interaction to explore the industrial knowledge of the students.
- To inculcate ethical and professional values among students.
- To impart quality education to the students coming from rural parts and to conduct different curricular & co-curricular activities to enhance the academic.

Core Values

Integrity
Leadership
Diversity
Community

Programme Educational Objectives (PEO's)

PEO 1. To provide solid foundation in electronics engineering along with good communication and entrepreneurship skills for tackling social issues.

PEO 2. To impart students with good scientific and engineering knowledge in order to analyse, design and create novel products for giving practical solutions to real life problems.

PEO 3. To create engineers with sound technical knowledge for facing all sorts of challenges in industry or in pursuance of higher studies.

PEO 4. To motivate students, to acquire aptitude for lifelong learning along with leadership skills, team spirit and ethical values so that they upgrade themselves with the latest trends in the field of engineering in order to serve the society.

PROGRAMME OUTCOMES (POs)

PO 1. Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO 2. Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO 3. Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO 4. Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO 5. Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO 6. Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO 7. Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1. An ability to design and analyze the concepts and applications in the field of communication/ networking and semiconductor technology.

PSO 2. An ability to learn the courses related to Electronic Devices & Circuits, Digital Electronics, Microprocessors and Communication Systems to develop solutions to real world problems.

PSO 3. An ability to specify, design, implement and test analog and digital electronic systems using the state of the art components and software tools.

PSO 4. An ability to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for social and environmental impact.

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Session- 2023-24 **Semester - I**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	DE-ASH-23101	*Applied Mathematics - I	3	0	0	3	3	50	50	100	45
2	DC	DE-ASH-23102	*Applied Physics – I	3	0	0	3	3	50	50	100	45
3	DC	DE-ASH-23103	*Applied Chemistry	3	0	0	3	3	50	50	100	45
4	AE	DE-ASH-23104	*Communication Skills H & E-I	2	0	0	2	2	50	50	100	45
5	OE	DE-ME-23105	Engineering Mechanics and Materials	3	0	0	3	3	50	50	100	45
6	OE	DE-ME-23106	*Engineering Drawing-I	0	0	4	4	2	50	50	100	45
7	DC	DE-ASH-23112	*Applied Physics-1 Lab	0	0	2	2	1	60	40	100	45
8	DC	DE-ASH-23113	*Applied Chemistry Lab	0	0	2	2	1	60	40	100	45
9	AE	DE-ASH-23114	*Communication Skills H & E -I Lab	0	0	2	2	1	60	40	100	45
10	SE	DE-ME-23116	*General Workshop Practice - I	0	0	4	4	2	60	40	100	45
	Total			14	0	14	28	21	540	460	1000	450

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SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Session- 2023-24 **Semester - II**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	DE-ASH-23201	*Applied Mathematics - II	3	0	0	3	3	50	50	100	40
2	DC	DE-ASH-23202	*Applied Physics – II	3	0	0	3	3	50	50	100	40
3	DC	DE-EE-23209	Electrical Engineering -I	3	0	0	3	3	50	50	100	40
4	DC	DE-ECE-23204	Electronic Components and Devices	3	0	0	3	3	50	50	100	40
5	DC	DE-ASH-23212	*Applied Physics-II Lab	0	0	2	2	1	60	40	100	40
6	DC	DE-EE-23219	Electrical Engineering-I Lab	0	0	2	2	1	60	40	100	40
7	DC	DE-ECE-23214	Electronic Components and Devices Lab	0	0	2	2	1	60	40	100	40
8	SE	DE-CSE-23215	*Basics of Information Technology Lab	0	0	4	4	2	60	40	100	40
9	SE	DE-ME-23216	*General Workshop Practice - II	0	0	4	4	2	60	40	100	40
	Total			12	0	14	26	19	500	400	900	360

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SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Session- 2023-26 **Semester - III**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	SPB13230301	Applied Mathematics-III	4	0	0	4	3	50	50	100	40
2	DC	SPB13230302	Electrical Engineering -II	4	0	0	4	3	50	50	100	40
3	DC	SPB13230303	Electronic Devices and Circuits	4	0	0	4	2	50	50	100	40
4	DC	SPB13230304	Digital Electronics & Logic Design	4	0	0	4	2	50	50	100	40
5	VAC	SPB13230305	*Universal Human Values	2	0	2	4	3	60	40	100	40
6	VAC	SPB13230306	Environmental Studies	2	0	0	2	2	50	50	100	40
7	DC	SPB13230352	Electrical Engineering -II Lab	0	0	2	2	1	60	40	100	40
8	DC	SPB13230353	Electronic Devices and Circuits Lab	0	0	2	2	1	60	40	100	40
9	DC	SPB13230354	Digital Electronics & logic Design Lab	0	0	2	2	1	60	40	100	40
10	DC	SPB13230355	Electronics Workshop	0	0	2	2	1	60	40	100	40
11	VAC	SPB13230356	Environmental Studies Lab	0	0	2	2	1	60	40	100	40
	Total			20	0	12	32	20	610	490	1100	440

*Universal Human Values - Assessment will be done via practical exam only

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SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Session- 2023-24 **Semester - IV**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	SPB13230401	Industrial Electronics and Transducers	4	0	0	4	2	50	50	100	40
2	DC	SPB13230402	Network Filters and Transmission Line	4	0	0	4	2	50	50	100	40
3	DC	SPB13230403	Electronic Instruments and Measurement	4	0	0	4	3	50	50	100	40
4	DC	SPB13230404	Principles of Communication Engineering	4	0	0	4	3	50	50	100	40
5	AE	SPB13230405	*Communication Skill H & E-II	2	0	0	2	2	50	50	100	40
6	VAC	SPB13230406	*Energy Conservation	2	0	0	2	2	50	50	100	40
7	DC	SPB13230451	Industrial Electronics and Transducers Lab	0	0	2	2	1	60	40	100	40
8	DC	SPB13230452	Network Filters and Transmission Line Lab	0	0	2	2	1	60	40	100	40
9	DC	SPB13230453	Electronic Instruments and Measurement Lab	0	0	2	2	1	60	40	100	40
10	DC	SPB13230454	Principles of Communication Engineering Lab	0	0	2	2	1	60	40	100	40
11	AE	SPB13230455	*Communication Skill H & E - II Lab	0	0	2	2	1	60	40	100	40
12	VAC	SPB13230456	*Energy Conservation Lab	0	0	2	2	1	60	40	100	40
	Total			20	0	12	32	20	660	540	1200	480

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SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Session- 2023-24 **Semester - V**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	SPB13230501	Microprocessor & Peripheral Devices	3	0	0	3	3	50	50	100	40
2	DC	SPB13230502	Optical Fibre Engineering	3	0	0	3	3	50	50	100	40
3	DC	SPB13230503	Consumer Electronics	3	0	0	3	2	50	50	100	40
4	SE	SPB13230504	Industrial Management & Entrepreneurship Development	3	0	0	3	2	50	50	100	40
5	OE	SPB13230505	Programming in C	3	0	0	3	2	50	50	100	40
6	DC	SPB13230551	Microprocessor & Peripheral Devices Lab	0	0	2	2	1	60	40	100	40
7	DC	SPB13230552	Optical Fibre Engineering Lab	0	0	2	2	1	60	40	100	40
8	DC	SPB13230553	Consumer Electronics Lab	0	0	2	2	1	60	40	100	40
9	OE	SPB13230555	Programming in C Lab	0	0	2	2	1	60	40	100	40
10	DC	SPB13230556	Minor project work	0	0	2	2	1	60	40	100	40
11	DC	SPB13230560	Industrial Training / Internship	0	0	0	0	3	0	100	100	40
	Total			15	0	10	25	20	550	550	1100	440

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SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Session- 2023-24 **Semester - VI**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	SPB13230601	Microwave & Radar Engineering	3	0	0	3	3	50	50	100	40
2	DC	SPB13230602	Microcontroller and Embedded system	3	0	0	3	3	50	50	100	40
3	DC	SPB13230603	Wireless and Mobile Communication	3	0	0	3	3	50	50	100	40
4	DC	SPB13230604	Communication Network	3	0	0	3	3	50	50	100	40
5	DC	SPB13230651	Microwave & Radar Engineering Lab	0	0	2	2	1	60	40	100	40
6	DC	SPB13230652	Microcontroller and Embedded system Lab	0	0	4	4	2	60	40	100	40
7	DC	SPB13230653	Wireless and Mobile Communication Lab	0	0	2	2	1	60	40	100	40
8	DC	SPB13230654	Communication Network Lab	0	0	2	2	1	60	40	100	40
9	DC	SPB13230663	Project Work	0	0	4	4	3	120	80	200	80
	Total			12	0	14	26	20	560	440	1000	400

Semester 1st

APPLIED MATHEMATICS - I

(DE-ASH-23101)

L	T	P
3	0	0

JUSTIFICATION

This course offers a fundamental understanding of elementary mathematics and its applications in engineering problem-solving. Students will learn to utilize key mathematical functions, including logarithms, partial fractions, matrices, as well as basic 2D geometry and curves. By mastering these concepts, students will gain the necessary skills to address engineering challenges across all disciplines effectively.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify arithmetic or geometric progressing series and Utilize Determinants and Cramer's Rule to solve systems of linear equations and analyse engineering problems that involve multiple variables, leading to efficient solutions in real-world scenarios.
2. Incorporate Vectors and Complex Numbers to address various engineering problems, allowing them to analyse AC circuits, control systems, and other phenomena that involve harmonic oscillations and phase shifts.
3. Apply trigonometric functions (sine, cosine, tangent, cosecant, secant, cotangent) and inverse trigonometric functions to model and analyse periodic phenomena, such as oscillations and waves, determining angles and distances in real-world applications like navigation, surveying, and control systems.
4. Apply differential calculus to analyse functions, identify their domains and ranges, and determine continuity and differentiability using elementary tests. They will apply various methods to find derivatives, including trigonometric, exponential, and logarithmic differentiation, as well as derivatives of inverse trigonometric and implicit functions.
5. Apply Higher Order differential calculus to find tangents, normals, points of maxima/minima, identify increasing/decreasing functions, and analyse rates, measures, velocity, acceleration, errors, and approximations in various engineering applications.

DETAILED CONTENTS

UNIT 1: Algebra **8 Periods**

1.1 Series : AP and GP; Sum, nth term, Mean

1.2 Matrices and Determinants : Matrix, Types and basic properties, Elementary properties of determinant of order 2 and 3, , Consistency of equation, Crammer's rule

UNIT 2: Algebra -II **8 Periods**

2.1 Complex number: Complex numbers, Representation, Modulus and amplitude Demoivre theorem, its application in solving algebraic equations.

2.2 Addition and subtraction of Vectors, Resolution of vectors, Dot and Cross product of Vectors

UNIT 3: Trigonometry and Inverse Trigonometric Functions **10 Periods**

3.1 Trigonometric Functions and Identities.

3.2 Inverse Trigonometric functions : Simple case only

UNIT 4: Differential Calculus - I **16 Periods**

4.1 Functions, limits, continuity, functions and their graphs, range and domain,

elementary methods of finding limits (right and left), elementary test for continuity and differentiability.

4.2 Methods of finding derivative, Trigonometric functions, exponential function, Function of a function, Logarithmic differentiation, Differentiation of Inverse trigonometric function, Differentiation of implicit functions.

UNIT 5: Differential Calculus - II **16 Periods**

5.1 Higher order derivatives, Simple applications.

5.2 Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration.

RECOMMENDED BOOKS

1. **Applied Mathematics-I** by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut
2. **Elementary Engineering Mathematics** by BS Grewal, Khanna Publishers, New Delhi
3. **Engineering Mathematics, Vol I & II** by SS Sastry, Prentice Hall of India Pvt. Ltd.,
4. **Applied Mathematics-I** by Chauhan and Chauhan, Krishna Publications, Meerut.

COURSE OUTCOMES

At the end of this course students will demonstrate the ability to:

	Course Outcomes	**Bloom's Knowledge level**
CO1	**Identify and explain** the concept of determinants and **apply** for solving linear simultaneous equations.	**K1 & K3**
CO2	**Demostrate** the basics of vectors algebra and complex numbers and its **applications** in engineering and physics.	**K1 & K3**
CO3	**Demostrate** the basics of trigonometric and inverse trigonometric functions and its **applications** in engineering and physics.	**K1 & K3**
CO4	**Apply** differential calculus to analyse functions, **identify** their domains and ranges, and determine continuity and differentiability using elementary tests.	**K2 & K3**
CO5	**Identify** the application of differential calculus and **apply** for evaluating maxima, minima, Increasing/ decreasing function etc.	**K3 & K5**

APPLIED PHYSICS-1

(DE-ASH-23102)

L	T	P
3	0	0

JUSTIFICATION

Physics is a field that explores various subjects relevant to our surroundings. It seeks to understand the natural world through observation and predicting how objects interact. The course emphasizes a strong understanding of physical laws and their practical applications in engineering and technology across different disciplines. Through this study, students gain insights into the behaviour of objects and their relevance in real-world scenarios.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Demonstrate a thorough understanding of fundamental and derived physical quantities, systems of units (FPS, CGS, SI), and conversion between different unit systems. They will be proficient in handling measurement errors, accuracy, and precision of instruments, along with representation and operations with scalar and vector quantities.
2. Analyse various forces and their effects on linear and circular motion. They will understand the principles of conservation of linear momentum and conservation of mechanical energy, applying them to real-world examples involving impulsive forces, circular motion, and work-energy transformations.
3. Demonstrate the concepts related to work, friction, power, and energy, along with their practical applications in various engineering scenarios. They will be able to analyse and solve problems involving these principles and apply them to real-world situations.
4. Demonstrate the concepts of translatory and rotational motions, torque, angular momentum, and moment of inertia. They will apply these principles in solving problems related to rotational kinetic energy, rolling motion, and the comparison of linear and rotational motion.
5. Demonstrate the concepts of elasticity, stress, strain, and different types of moduli of elasticity. They will apply Hooke's law and understand stress-strain curves. Additionally, they will learn about pressure, surface tension, viscosity, and fluid dynamics, including the application of Bernoulli's theorem and Reynold's number.

DETAILED CONTENTS

UNIT 1: Fundamentals of Units, Measurement, Errors and Vector Analysis **12 Periods**

1.1 Need of Measurement, physical Quantity - fundamental and derived, systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities. conversion of numerical values of physical quantities from one system of units into another

1.2 Error in measurement, accuracy and precision of instruments, percentage error, Combination of errors in addition, subtraction, multiplication, division and powers, rules for representing significant figures in calculation.

1.3 Scalar and vector quantities – examples, representation of vector, types of Vectors, Unit Vector, Vector Addition and Subtraction, Triangle and Parallelogram law (Statement only), difference between vector and scalar addition using examples, Scalar and Vector Product, Resolution of Vectors using the example of stationary object, falling object, moving object.

UNIT 2: Force and Motion **10 Periods**

2.1 Force, Momentum, Statement of Conservation of linear momentum, discuss using

examples such as recoil of gun, Impulsive force and its examples,

2.2 Circular motion (Uniform and Non-uniform), definition of angular, displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (numerical practice)

Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist, Principle of centrifuge, Application of various forces in lifts, cranes, large steam engines and turbines.

UNIT 3: Work, Power and Energy **10 Periods**

3.1 Work: and its units, examples of zero work, positive work and negative work, conservative and non-conservative force,

Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications

Application of Friction in brake system of moving vehicles, bicycle, scooter, car trains etc.

3.2 Power and its units, calculation of power in numerical problems

3.3 Energy and its units: Kinetic energy and potential energy with examples and their derivation, work energy theorem, Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.

UNIT 4: Rotational Motion and Gravitational Force **10 Periods**

4.1 Concept of translatory and rotatory motions with examples, Definition of torque with examples, Angular momentum, Conservation of angular momentum and its examples

4.2 Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only). Concept of Fly wheel.

4.3 Rotational kinetic energy, Rolling of sphere on the slant plane, Comparison of linear motion and rotational motion, Application of rotational motions in transport vehicles, and machines

4.4 Gravitational force, Acceleration due gravity and its variation

UNIT 5: Properties of Matter & Thermodynamics **14 Periods**

5.1 Elasticity: definition of stress and strain, different types of moduli of elasticity, Hooke's law, significance of stress strain curve

5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications

5.3 Surface tension: concept, its units, angle of contact, Capillary action and determination of surface tension from capillary rise method, applications of surface tension, effect of temperature and impurity on surface tension

5.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.

5.5 Concept of fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem and their applications

5.6 Difference between heat and temperature, Modes of transfer of heat (Conduction, convection and radiation with examples), Different scales of temperature and their relationship, Isothermal and Adibatic process, Zeroth, First and second law of thermodynamics, Heat engine (concept Only), Carnot cycle, Application of various systems of thermometry in refrigeration and air-conditioning etc

RECOMMENDED BOOKS

1. **Text Book of Physics for Class XI** (Part-I, Part-II); N.C.E.R.T., Delhi
2. **Concepts in Physics** by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. **Comprehensive Practical Physics**, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd.
4. **Engineering Physics** by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. **Engineering Physics** by DK Bhhatacharya & Poonam Tandan; Oxford University Press.
6. **Modern Engineering Physics** by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications
7. **Physics-I** by V. Rajendran, Tata McGraw-Hill raw Hill publication, New Delhi.

COURSE OUTCOMES

At the end of this course students will demonstrate the ability to:

	Course Outcomes	**Bloom's Knowledge level**
CO1	**Demonstrate** a thorough understanding of fundamental and derived physical quantities, systems of units, inter conversion, proficient in handling measurement errors, along with representation and operations with scalar and vector quantities.	**K2 & K3**
CO2	**Demonstrate** about various forces and their effects on linear and circular motion, the principles of conservation of linear momentum and conservation of mechanical energy, **applying** them to real-world examples.	**K2 & K3**
CO3	**Demonstrate** the concepts related to work, friction, power, and energy, along with their practical **applications** in various engineering scenarios.	**K2 & K3**
CO4	**Demonstrate** and **Apply** the concepts of translatory and rotational motions, torque, angular momentum, and moment of inertia.	**K2 & K3**
CO5	**Demonstrate and apply** the concepts of elasticity, stress, strain, and different types of moduli of elasticity, stress-strain curves.	**K2 & K3**

APPLIED CHEMESTRY

(DE-ASH-23103)

L	T	P
3	0	0

JUSTIFICATION

The use of various chemicals and chemical products in diverse technical and Engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility. This situation demands principles of Applied Chemistry in diploma engineering courses. Principles of Applied Chemistry will enable budding engineers and technocrats to develop scientific temper and appreciate physical, chemical and engineering properties of materials. Hence the subject of Applied Chemistry.

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:

1. Classify various substances based on state of aggregation
2. Substantiate the laws and principles on which structure of atom is established.
3. Explain and predict properties of substances.
4. Explain sources of water and various characteristics of water (quantitatively).
5. Explain cause and factors which can adversely affecting natural water quality and remedial measures

1. Available for water purification

6. Think critically, develop and adapt water conservation techniques.
7. Explain corrosion of metal and their preventive measures.
8. Explain chemical nature and causes of corrosion
9. Apply correct and efficient methods of corrosion prevention.
10. Explain chemistry of fuels and their relative advantages.
11. Select most efficient fuel for the engine and engineering applications.
12. Suggest how to subside air pollution caused by the use of fossil fuels
13. Explain the chemistry of various polymers and plastics
14. Verify suitability and select polymer/rubber/plastic materials for engineering applications.

DETAILED CONTENTS

UNIT 1: Atomic Model and Chemical Bonding **15 Periods**

1.1 Bohr's model of atom and successes and limitations of atomic theory (qualitative treatment only).

1.2 Atomic number, atomic mass number isotopes and isobars.

1.3 Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance, Aufbau's principle, Pauli's exclusion principle and Hund's rule

1.4 Electronic configuration of elements with atomic number (Z) = 30 only. Modern periodic law and periodic table, groups and periods, classification of elements into s, p, d and f blocks (periodicity in properties - excluded),

1.5 Chemical bonding and cause of bonding.

UNIT 2: Fuels **10 Periods**

2.1 Definition of fuel, Calorific value-higher calorific value, lower calorific value,

classification of fuels, characteristics of good fuel, relative merits of gaseous, liquid and solid fuels, Determination of calorific value fuel using Bomb calorimeter.

2.2 Coal - types of coal and proximate analysis of coal

Petroleum and its refining process, Fuel rating – Octane number and Cetane number.

Gaseous fuels like natural gas (CNG), LPG, producer gas, water gas and biogas, their calorific value and applications.

Elementary idea on – hydrogen as future fuels

UNIT 3: Water **15 Periods**

3.1 Demonstration of water resources on Earth using pie chart.

Classification of water – soft water and hard water, types of hardness, causes of hardness, units of hardness – mg per liter (mgL^{-1}) and part per million (ppm) and simple numerical.

Removal of hardness -Permutit process and Ion-exchange process.

3.2 pH and buffer solutions and their applications

3.3 Physico-Chemical methods for Water Quality Testing

a) Determination of pH using pH meter, total dissolved solids (TDS)

b) Testing and Estimation of- alkalinity, indicator their types and application

total hardness by EDTA method (chemical reaction of EDTA method are excluded).

UNIT 4: Electrochemistry & Corossion **10 Periods**

4.1 Redox Reaction, Electrochemical cell (Galvanic and Electrolytic), application of electrochemistry – electroplating, galvanisation

4.2 Definition of corrosion and factors affecting corrosion rate.

4.3 Theories of a) Dry (chemical) corrosion & b) Wet corrosion in acidic atmospher

Galvanic series,

4.4 Corrosion control: Internal corrosion preventive measures

UNIT 5: Organic compounds, Polymers and Plastics **10 Periods**

5.1 Classification of organic compounds and IUPAC Nomenclature

5.2 Functional Groups and IUPAC Nomenclature

5.3 Definition of polymer, monomer and degree of polymerization

5.4 Classification of addition and condensation polymers with suitable examples (PE, PS, PVC, Teflon, Nylon -66 and Bakelite). Applications of polymers in industry and daily life.

5.5 Definition of plastics, thermo plastics and thermo setting plastics with suitable examples, distinctions between thermo and thermo setting plastics

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose & J. Rajaram, Tata McGraw Hill,Publishing Company Limited,
New Delhi.
2. Engineering Chemistry by P.C. Jain & Monika Jain, Dhanapat Rai PublishingCompany, New Delhi.
3. Eagle' s Applied Chemistry - I by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4. Engineering Chemistry − A Text Book by H. K. Chopra & A. Parmar, NarosaPublishing House, New Delhi.
5. Applied Chemistry - I by Dr. P. K Vij & Shiksha Vij, Lords Publications, Jalandhar.

COMMUNICATION SKILL H & E-I

(DE-ASH-23104)

L	T	P
2	0	0

JUSTIFICATION

Proficiency in the Hindi & English language plays a pivotal role in advancing one's career. This subject focuses on instilling fundamental principles of effective communication while prioritizing the cultivation of essential skills such as active listening, articulate speaking, proficient reading, and proficient writing as integral components of Communication Skills development.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify the building blocks of sentences (like nouns and verbs), and write sentences that make sense using the right words.
2. Understand the importance of communication well in life, both personally and professionally.
3. Identify how people share ideas, feelings, and information, and you'll be able to explain it to others.
4. Become proficient in reading and comprehending unseen passages. They will also have the ability to perform tasks such as one-word substitution, identifying prefixes and suffixes, and recognizing antonyms and synonyms based on the passages.
5. Read and understand new texts, and write different types of things like stories, announcements, and essays, using the right rules and style.

DETAILED CONTENTS

UNIT 1: Basics of Communication **8 Periods**

1.1 Definition and process of communication

1.2 Types of communication - formal and informal, oral and written, verbal and non-verbal

1.3 Communications barriers and how to overcome them

1.4 Barriers to Communication, Tools of Communication

UNIT 2: Application of Grammar **8 Periods**

2.1 Parts of Speech (Noun, verb, adjective, adverb) and modals

2.2 Sentences and its types

2.3 Tenses

2.4 Active and Passive Voice

2.5 Punctuation

2.6 Direct and Indirect Speech

UNIT 3: English Reading Practices **10 Periods**

3.1 Reading unseen passage

3.2 Analyse language elements such as one-word substitutions, prefixes, suffixes, antonyms, synonyms, and more.

UNIT 4: English Reading & Writing Practices **10 Periods**

4.1 Writing practice: Summarizing short passages.

4.2 Introduction to formal letter writing.

4.3 Introduction to Notice writing.

UNIT 5: Hindi Reading & Writing Practices **16 Periods**

5.1 Writing practice: Summarizing short passages.

5.2 Introduction to formal letter writing.

5.3 Introduction to common Hindi idioms (Muhavare) and proverbs (Lokpriya Kahavatein)

5.4 Writing practice: Short essays on Hindi culture and literature.

5.5 Learning about famous Hindi writers, poets, Indian present and past personalities, and their works.

RECOMMENDED BOOKS

1. **Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.**
2. **Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.**
3. **High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.**
4. **Communication Skills** – I by R Thakur, Nageen Prakashan Publication, Meerut, UP, India
5. **Excellent General English**-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
6. **The Functional aspects of Communication Skills** – Dr. P. Prsad, S.K. Katria & Sons, New Delhi

COURSE OUTCOMES

At the end of this course students will demonstrate the ability to:

	Course Outcomes	Bloom's Knowledge level
CO1	**Identify and explain** the basics of communication, communication barriers and will possess strategies to overcome them.	**K1 & K2**
CO2	**Identify** the building blocks of sentences (like nouns and verbs), and **apply** them in write sentences that make sense using the right words.	**K1 & K3**
CO3	**Demonstrate** the English reading skills and will also gain the **ability** to perform tasks such as one-word substitution, identifying prefixes and suffixes, and recognizing antonyms and synonyms based on the passages.	**K2 & K3**
CO4	**Demonstrate** the English writing skills by writing different types of things like stories, announcements, and essays, using the right rules and style**.**	**K2 & K3**
CO5	**Demonstrate** the Hindi writing skills by writing different types of things like letters, announcements, and essays, using the right rules and style.	**K2 & K3**

ENGINEERING MECHANICS AND MATERIALS

(DE-ME-23105)

L	T	P
3	0	0

JUSTIFICATION

The Engineering Mechanics & Materials Subject is quite essential for a student of electronics engineering diploma programme. The subject will expose the concept like force analysis, condition of equilibrium, types of materials to be used in electronic application. Lot of development has taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the basic laws and principles of mechanics.
2. Analyze and solve simple problems related to engineering mechanics.
3. Understand the characteristics and properties of different materials used in electronics.

DETAILED CONTENTS

UNIT 1: Introduction **08 Periods**

1.1 Mechanics and its utility, Concept of scalar and vector quantities, Effect of a force, Tension & compression, Rigid body, Principle of physical independence of force, Principle of transmissibility of a force.

UNIT 2: Force Analysis **13 Periods**

2.1 Concept of coplanar and non-coplanar forces including parallel forces, Concurrent and non-concurrent forces, Resultant forces, Equilibrium of forces, Law of parallelogram of forces, Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, condition of equilibrium of coplanar concurrent force system.

UNIT 3: General Condition of Equilibrium: **12 Periods**

3.1 General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

UNIT 4: Stresses and strains **12 Periods**

4.1 Concept of stress and strain, Concept of various types of stresses and strains, Definitions of tension, compression, shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Mechanical properties of MS, SS, etc.

UNIT 5: Materials & Concept Used In Electronics **8 Periods**

5.1 (A) Soldering materials-

Type, chemical composition and properties, Soldering alloy – Tin lead, Tin antimony, Tin silver, Lead silver, Tin zinc, Different types of flux and their properties, Properties of plastics materials, Epoxy materials for PCB (Single and multi-layer board), Emulsion parameters, Film emulsion, Type of laminates (Phenolic, Epoxy, Polyester, Silicon,

Melamine, Polyamide), Properties of copper clad laminates, Materials (Filler,

Resin, Copper Foil) Photo printing basics for double sided PCB, photo resin materials coating process materials, Screen printing and its materials Etching agent, Film processing and used materials.

5.2 (B) Soldering & Brazing

For black Galvanized and Tin Coated Iron sheet, Brass and copper sheets only.

1. Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering.

2. Soldering operation – edge preparation of joints, pickling and degreasing, Fluxing, Tinning and Soldering. Wave soldering, solder mask, Dip soldering, Drag soldering,

3. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits.

4. Electric soldering iron, other soldering tools.

5. Common defects likely to occurs during and after soldering.

6. Safety of Personnel, Equipment & Tools to be observed.

RECOMMENDED BOOKS

1. A Text Book of Engineering Mechanics (Applied Mechanics) by R.K. Khurmi;S.Chand and Co. Ltd. New Delhi
2. A Text Book of Applied Mechanics by R.K. Rajput;Laxmi Publications.
3. A Text Book of Materials Science by R.K. Rajpur;Katson Publications, Ludhiana
4. Material Science and Processes by Hazara Chaudhary; Indian Book Distributors

ENGINEERING DRAWING - I

(DE-ME-23106)

L	T	P
0	0	4

JUSTIFICATION

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

Note:

i) First angle projection is to be followed
ii) Minimum of 18 sheets to be prepared and atleast 2 sheets on AutoCAD
iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify and use of different grades of pencils and other drafting instruments which are used in engineering field
2. Draw free hand sketches of various kinds of objects.
3. Utilize various types of lines used in engineering drawing.
4. Read and apply different dimensioning methods on drawing of objects.
5. Use different types of scales and their utilization in reading and reproducing drawingsof objects and maps.
6. Draw 2 - dimensional view of different objects viewed from different angles (orthographic views)
7. Draw and interpret complete inner hidden details of an object which are otherwise not visible in normal view
8. To make projections of Solid
9. Generate isometric (3D) drawing from different 2D (orthographic) views/sketches
10. Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances

DETAILED CONTENTS

UNIT 1 Introduction to Engineering Drawing & Dimensioning Technique **6 Periods**

1.1 Introduction to drawing instruments, materials, layout and sizes of drawing
1.2 Sheets and drawing boards.
1.3 Different types of lines in Engineering drawing as per BIS specifications
1.4 Practice of vertical, horizontal and inclined lines, geometrical figures such as
1.5 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)
1.6 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches
1.7 Scales –their needs and importance (theoretical instructions), type of scales,
1.8 Definition of R.F. and length of scale

UNIT 2 English Reading & Writing Practices **6 Periods**

2.1 Theory of orthographic projections (Elaborate theoretical instructions)

2.2 Projection of Points in different quadrant

2.3 Projection of Straight Line (1st and 3rd angle)
4.3.1. Line parallel to both the planes
4.3.2. Line perpendicular to any one of the reference plane
4.3.3. Line inclined to any one of the reference plane.

2.4 Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one plane, parallel and perpendicular to another plane in 1st angle only

2.5 Three views of orthographic projection of different objects. (At least one sheet in 3rd angle)

2.6 Identification of surfaces

UNIT 3 Projection of Solid **6 Periods**

3.1 Definition and salient features of Solid

3.2 Types of Solid (Polyhedron and Solid of revolution)

3.3 To make projections, sources, Top view, Front view and Side view of various types of Solid.

3.4 Importance and salient features Sections

3.5 Drawing of full section, half section, partial or broken out sections, Offset

3.6 sections, revolved sections and removed sections.

3.7 Convention sectional representation of various materials, conventional breaks

UNIT 4 Isometric Views and Common Symbols used in Engineering **16 Periods**

4.1 Fundamentals of isometric projections and isometric scale.

4.2 Isometric views of combination of regular solids like cylinder, cone, cube and

4.3 Civil Engineering sanitary fitting symbols

4.4 Electrical fitting symbols for domestic interior installations

UNIT 5 Basic of various commands in AutoCAD **2 Periods**

5.1 Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets on AutoCAD of cube, cuboid, cone, pyramid, truncated cone and pyramid, sphere and combination of above solids.
*** Auto CAD drawing will be evaluated internally by sessional marks and not by final theory paper.**

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar

APPLIED PHYSICS LAB

(DE-ASH-23112)

L	T	P
0	0	2

DETAILED CONTENTS

1	To find radius of wire and its volume and the maximum permissible error in these quantities by using both screw gauge.
2	To find diameter of metallic bob and use it to calculate its volume. Also Find the maximum permissible error in these quantities by using Vernier callipers.
3	To verify parallelogram law of vector addition and Subtraction.
4	To find the Moment of Inertia of a flywheel about its axis of rotation.
5	To find the value of acceleration due to gravity on the surface of earth by using a simple pendulum.
6	To study conservation of energy of a ball or cylinder rolling down an inclined plane.
7	To determine the viscosity of glycerin by Stoke's method
8	To determine force constant of spring using Hooks law
9	Simulation Practical-1
10	Simulation Practical-2

SCHOOL OF ENGINEERING & TECHNOLOGY

APPLIED CHEMISTRY LAB

(DE-ASH-23113)

L	T	P
0	0	2

JUSTIFICATION

The use of various chemicals and chemical products in diverse technical and Engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility. This situation demands principles of Applied Chemistry in diploma engineering courses. Principles of Applied Chemistry will enable budding engineers and technocrats to develop scientific temper and appreciate physical, chemical and engineering properties of materials.

DETAILED CONTENTS

1	Estimation of total hardness of water using standard EDTA solution
2	Estimation of total alkalinity of given water sample by titrating it against standard sulphuric acid solution
3	Proximate analysis of solid fuel)
4	Estimation of temporary hardness of water sample by O'Heners Method.
5	Determination of flash and fire point of given lubricating oil using Able's flash point apparatus.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose & J. Rajaram, Tata McGraw Hill,Publishing Company Limited, New Delhi
2. Engineering Chemistry by P.C. Jain & Monika Jain, Dhanapat Rai PublishingCompany, New Delhi.
3. Eagle' s Applied Chemistry - I by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4. Engineering Chemistry − A Text Book by H. K. Chopra & A. Parmar, NarosaPublishing House, New Delhi.
5. Applied Chemistry - I by Dr. P. K Vij & Shiksha Vij, Lords Publications, Jalandhar.

COMMUNICATION SKILL H & E-I LAB

(DE-ASH-23114)

L	T	P
0	0	2

JUSTIFICATION

Proficiency in the Hindi & English language plays a pivotal role in advancing one's career. This subject focuses on instilling fundamental principles of effective communication while prioritizing the cultivation of essential skills such as active listening, articulate speaking, proficient reading, and proficient writing as integral components of Communication Skills development.

DETAILED CONTENTS

1. Self and peer introduction
2. Newspaper reading
3. Just a minute session-Extempore
4. Greeting and starting a conversation
5. Leave taking
6. Thanking
7. Wishing well
8. Talking about likes and dislikes
9. Group Discussion
10. Listening Exercises.

RECOMMENDED BOOKS

1. **Communicating Effectively in English, Book-I** by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. **Communication Techniques and Skills** by R. K. Chadha; DhanpatRai Publications, New Delhi.
3. **High School English Grammar and** Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. **Communication Skills** – I by R Thakur, Nageen Prakashan Publication, Meerut, UP, India
5. **Excellent General English**-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
6. **The Functional aspects of Communication Skills** – Dr. P. Prsad, S.K. Katria & Sons, New Delhi

GENERAL WORKSHOP PRACTICE -I

(DE-ME-23116)

L	T	P
0	0	4

JUSTIFICATION

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify tools and equipment used and their respective functions.
2. Identify different types of materials and their basic properties.
3. Use and take measurements with the help of basic measuring tools/equipment.
4. Select proper tools for a particular operation.
5. Select materials, tools, and sequence of operations to make a job as per given specification/drawing.

DETAILED CONTENTS

1. CARPENTRY SHOP

1.1 General Shop Talk

1.1.1 Name and use of raw materials used in carpentry shop : wood & alternative materials

1.1.2 Names, uses, care and maintenance of hand tools such as different types of Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, Marking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools,supporting tools, holding tools , measuring tools etc.

1.1.3 Specification of tools used in carpentry shop.

1.1.4 Different types of Timbers, their properties, uses & defects.

1.1.5 Seasoning of wood.

1.2 Practice

1.2.1 Practices for Basic Carpentry Work

1.2.2 Sawing practice using different types of saws

1.2.3 Assembling jack plane – Planning practice including sharpening of jack plane cutter

1.2.4 Chiselling practice using different types of chisels including sharpening of chisel

1.2.5 Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs.

1.3 Job Practice

Job 1 Marking, sawing, planning and chiselling and their practice

Job II Half Lap Joint (cross, L or T – any one)

Job III Mortise and Tenon joint (T-Joint)

Job IV Dove tail Joint (Lap or Bridle Joint)

Demonstration of job showing use of Rip Saw, Bow saw and Tenon saw, method of sharpening various saws.

2. PAINTING AND POLISHING SHOP

2.1 Introduction of paints, varnishes, Reason for surface preparation, Advantages of

Painting, other method of surface coating ie. Electroplating etc.

2.2 Job Practice

Job 1: To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.

Job II: To prepare metal surface for painting, apply primer and paint the same.

Job III: To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

The sequence of polishing will be as follows:

i) Abrasive cutting by leather wheel

ii) Polishing with hard cotton wheel and with polishing material

iii) Buffing with cotton wheel or buff wheel.

3. ELECTRICAL SHOP

3.1 Study, demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, fuses, cleats, clamps and allied items, tools and accessories.

3.2 Study of electrical safety measures and protective devices.

Job I Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs.

Job II Carrying out house wiring circuits using fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-caping.

3.3 Study of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.

3.4 Introduction to the construction of lead acid battery and its working.

Job III Installation of battery and connecting two or three batteries in series and parallel.

3.5 Introduction to battery charger and its functioning.

Job IV Charging a battery and testing with hydrometer and cell tester

4. WELDING SHOP

4.1 Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.

4.2 Job Practice

Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).

Job II Practice of depositing beads on plate at different current levels.(Minimum 4 beads on M.S. plate at four setting of currentlevel).

Job III Preparation of lap joint using arc welding process.

Job IV Preparation of T-joint using gas welding or arc welding on 100 mm x 6 mm MS Flat

5. PLUMBING SHOP

5.1 Use of personal protective equipments, safety precautions while working and cleaning of shop.

5.2 Introduction and demonstration of tools, equipment and machines used in plumbing shop.

5.3 Introduction of various pipes and pipe fittings of elbow, nipple, socket, union etc.

5.4 Job Practice

Job 1 : Preparation of job using elbow, bend and nipple

Job II: Preparation of job using Union, Tap, Plug and Socket.

Job III: Threading practice on pipe with die

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media
2. Promoters and Publishers Pvt. Ltd. Mumbai.
3. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House,Jalandhar.
4. Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
5. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., NewDelhi
6. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi

Semester 2nd

APPLIED MATHEMATICS - II

(DE-ASH-23201)

L	T	P
3	0	0

JUSTIFICATION

Basic elements of integral calculus, differential calculus, numerical methods, differential m equations included in this course will play a vital role in understanding engineering problem mathematically. This will also develop analytical as well as conceptual abilities among students.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Calculate simple integration by methods of integration
2. Evaluate the area under curves, surface by using definite integrals.
3. Calculate the area and volume under a curve along areas.
4. Solve the engineering problems with numerical methods.
5. Understand the geometric shapes used in engineering problems by co-ordinate geometry.

DETAILED CONTENTS

UNIT 1: Integral Calculus-I — **12 Periods**

Method of Indefinite Integration: Integration by substitution, Integration by rational function, Integration by partial fraction, Integration by Parts, Integration of special function

UNIT 2: Integral Calculus -II — **10 Periods**

Meaning and properties of definite integrals, Evaluation of definite integrals, Application : Length of simple curves, Finding areas bounded by simple curves Volume of solids of revolution, centre of mean of plane areas.

UNIT 3: Numerical Iteration Methods — **10 Periods**

Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application
in simple cases. Numerical solutions of algebraic equations; Bisections method, Regula-Falsi method, Newton-Raphson's method(without proof), Numerical solutions of simultaneous equations; Gauss elimination method(without proof)

UNIT 4: Co-ordinate Geometry (2 Dimension) — **11 Periods**

Circle , Equation of circle in standard form. Centre - Radius form, Diameter form,
Two intercept form.

UNIT 5: Co-ordinate Geometry (3 Dimension) — **12 Periods**

Straight lines and planes in space
Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line (without proof)

RECOMMENDED BOOKS

1. **Applied Mathematics-II** by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut
2. **Elementary Engineering Mathematics** by BS Grewal, Khanna Publishers, New Delhi
3. **Engineering Mathematics, Vol I & II** by SS Sastry, Prentice Hall of India Pvt. Ltd.,
4. **Applied Mathematics-II** by Chauhan and Chauhan, Krishna Publications, Meerut.

(DE-ASH-23202)

L	T	P
3	0	0

JUSTIFICATION

Applied physics includes the study of a diversified topics related to the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.
2. Define the terms: frequency, amplitude, wavelength, velocity of a wave.
3. Explain various Engineering, Medical and Industrial applications of Ultrasonics.
4. Apply acoustics principles to various types of buildings to get best sound effect.
5. Explain diffraction, interference, polarization.
6. Define capacitance and its unit. They will be able to explain the function of capacitors in simple circuits, solve simple problems using C=Q/V
7. Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.
8. Explain the concept of electric current, resistance and its measurement
9. List the effects of an electric current and their common applications, State and apply Ohm's law, calculate the equivalent resistance of a variety of resistor combinations, determine the energy consumed by an appliance, distinguish between AC and DC electricity
10. State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field
11. Explain operation of moving coil galvanometer, simple DC motor

DETAILED CONTENTS

UNIT 1: WAVE MOTION AND ITS APPLICATIONS **12 periods**

1.1 Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application

1.2 Wave equation $y = r \sin \omega t$, phase, phase difference, principle of superposition of waves

1.3 Simple Harmonic Motion (SHM): definition and characteristic, expression for displacement, velocity, acceleration, time period, frequency in S.H.M., Energy of a body executing S. H. M., simple pendulum, concept of simple harmonic

1.4 Concepts of Pitch, Loudness, Echo , Ultrasonics

UNIT 2: WAVE OPTICS **6 Periods**

2.1 Dual nature of light, wave theory of light, laws of reflection and refraction,

Snell's law, Power of lens, magnification.

2.2 Two-Source Interference, Double-Slit interference, Interference due to thin films, Fresnel's biprism.

2.3 Diffraction, Single Slit diffraction, Intensity calculation etc

2.4 Polarization of electromagnetic waves, polarizing sheets, polarizing by Reflection (Brewser's law), Malus law, use of polariods.

UNIT 3: ELECTROSTATICS **12 Periods**

3.1 Concept of charge, Coulombs law, Electric field of point charges, Electric lines of force and their properties, Electric flux, Electric potential and potential difference.

3.2 Gauss law of electrostatics: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

3.3 Capacitor and its working principle, Capacitance and its units. Capacitance of parallel plate capacitor. Series and parallel combination of capacitors.

3.4 Dielectric and its effect on capacitance.

3.5 Application of electrostatics in electrostatic precipitation of microbes and moisture separation from air and gases in industry for pollution control (Brief explanation only)

UNIT 4: Magneto Statics and Electromagnetism **12 Periods**

4.1 Magnet, Magnetic poles, Magnetic Lines of Force, Different magnetic lines patterns due to interaction of two magnets, Electromagnetism, Magnetic field due to a straight conductor, Magnetic field due to a loop, Magnetic field due to a solenoid, Flemings Left Hand Rule, force on a current carrying conductor

4.2 Faraday's law of Electromagnetic Induction, Lenz' law, Flemings Right hand rule.

4.3 Magnetization, Gauss' law for magnetism.

4.4 Types of magnetic materials. Dia, para and ferromagnetic materials with their properties, Application of electromagnetism in ac/dc motors and generators.

UNIT 5: Semiconductor physics **12 Periods**

5.1 Types of materials (insulator, semi conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction diode working and its V-I characteristics

5.2 Diode as rectifier – half wave and full wave rectifier (centre taped),

5.3 Semiconductor transistor, pnp and npn (concepts only)

5.4 Application of semiconductor diodes (Zener, LED) and transistor as switch.

RECOMMENDED BOOKS

1. **Text Book of Physics for Class XI** (Part-I, Part-II); N.C.E.R.T., Delhi
2. **Concepts in Physics** by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. **Comprehensive Practical Physics**, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd.
4. **Engineering Physics** by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. **Engineering Physics** by DK Bhhatacharya & Poonam Tandan; Oxford University Press.
6. **Modern Engineering Physics** by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications
7. **Physics-II** by V. Rajendran, Tata McGraw-Hill raw Hill publication, New Delhi.

ELECTRICAL ENGINEERING-I

(DE-EE-23203)

L	T	P
3	0	0

JUSTIFICATION

The objective of this subject is to impart fundamental knowledge and skills regarding basic electrical engineering, which diploma holders will come across in their professional life. This course will provide the student to understand the basic concept and principles of dc and ac fundamentals, electromagnetism, batteries, electrical materials, electrical safety etc.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Classify various materials into conductor, semiconductor and insulator.
2. Describe the properties of conducting, insulating and magnetic materials.
3. Understand Kirchhoff's laws to solve simple DC circuit.
4. Understand various network theorems such as Thevenin's theorem, Norton theorem, and
5. Superposition theorem to solve simple circuit problems.
6. Understand AC Circuit Theory.
7. Understand construction, rating & safety measures for batteries.

DETAILED CONTENTS

UNIT 1: Conducting & Insulating Materials **12 Periods**

1.1 Classification of materials into conducting materials, insulating materials and Semiconducting materials with reference to their atomic structures.

1.2 Resistivity and factors affecting resistivity such as temperature, alloying and Mechanical stressing.

1.3 Classification of conducting materials into low resistivity and high resistivity Materials. Some examples of each and their typical applications.

1.4 Electrical Properties:
Volume resistivity, surface resistance, Dielectric loss, Dielectric strength (Break down voltage) and Dielectric constant.

1.5 Chemical Properties:
Solubility, Chemical resistance and Weatherability.

1.6 Physical Properties:
Hygroscopicity, Tensile and Compressive strength, Abrasive resistance, Brittleness.

1.7 Thermal Properties:
Heat resistance, classification according to permissible temperature rise, Effect of electrical overloading on the life of an electrical appliance.

1.8 Plastic Insulating Materials:
Classification into thermoplastic and thermosetting categories, example of each and their typical applications.

UNIT 2: Electro Magnetism **12 Periods**

2.1 Ferromagnetism, Domains, permeability, hysteresis loop-(including coercive force and residual magnetism) and magnetic saturation.

2.2 Soft and Hard magnetic materials, their examples and typically applications.

2.3 Concept of mmf, flux, reluctance and permeability.

2.4 Energy stored in a magnetic field and an inductor.

2.5 Solution of problems on magnetic circuits

2.6 Faraday's laws of electromagnetic induction, Lenz's law, Physical explanation of self and mutual inductance.

2.7 B-H curve, Hysteresis, Eddy currents-elementary ideas and significance.

2.8 Growth and decay of current in an inductive circuit.

2.9 Force between two parallel current carrying conductors and its significance

2.10 Current carrying conductors in magnetic field and its significance

UNIT 3: D.C Circuits **08 Periods**

3.1 Ohm's law, resistivity, effect of temperature on resistances, heating effect of Electric current, conversion of mechanical units into electrical units.

3.2 Kirchhoff's laws, application of Kirchhoff laws to solve simple dc circuits

3.3 Thevenin's theorem, maximum power transfer theorem, Norton's theorem and super position theorem, simple numerical problems.

UNIT 4: A.C Theory **11 Periods**

4.1 Concept of alternating voltage and current, difference between AC and DC .

4.2 Generation of alternating voltage, equation of sinusoidal waveform.

4.3 Definition and concept of cycle, frequency, Time period, amplitude, instantaneous

Value, average value, RMS value, peak value, form factor, Peak factor.

4.4 Phase and phase difference, representation of alternating quantities by phasor, Addition and subtraction of alternating quantities.

UNIT 5: Batteries **04 Periods**

5.1 Construction of lead acid and nickel cadmium batteries.

5.2 Charging and maintenance of batteries.

5.3 Rating of batteries.

5.4 Back up batteries (Lithium & Silver Oxide batteries).

5.5 Shelf life of batteries.

RECOMMENDED BOOKS

1. Electrical Technology by B L Thareja; S Chand & Co.
2. Basic Electrical Engineering by J B Gupta; S K Kataria and Sons, New Delhi
3. Basic Electrical Engineering by J S Katre; Technical Max. Publication Pune

ELECTRONIC COMPONENTS & DEVICES

(DE-ECE-23204)

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JUSTIFICATION

Knowledge of Electronic components & devices is quite essential for a student of electronic engineering diploma programme. With the knowledge of these active and passive components he will work successful in every field of the branch. Therefore a diploma student in electronics engineering must be equipped with the fundamental knowledge about electronic components, voltage and current source, semi conductor diode, transistors and FET for successful handling of industrial problems.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Indentify and distinguish between active components (BJT, FET etc) and passive components (Resistor, Capacitor, inductor etc).
2. Understand voltage and current sources as well as their inter conversions.
3. Understand the working and application of semiconductor diode including half wave rectifier & Full wave rectifier.
4. Understand the working of BJT and hence able to design amplifier using it.
5. Compare various transistors biasing circuit and stabilize their operating points.
6. Understand the working of FET and hence able to design amplifier using it.
7. Compare BJJT, JFET, MOSFET & CMOS.

DETAILED CONTENTS

UNIT 1: Introduction to Electronics **12 Periods**

1.1 Application of electronic in different fields.

1.2 Brief introduction to active components and devices.

1.3 Resistor- Working characteristics/properties, Resistors-Carbon film, metal-film, carbon composition, wire wound and variable type (presets and potentiometers) constructional details, characteristics (size, voltage, tolerance temperature and frequency dependence) , noise consideration, specification, Testing, mutual Comparison and typical applications, Voltage Dependent Resistor (VDR).

1.4 Capacitors- Working characteristics/properties, Capacitors-polyester, Metalized polyester, ceramic paper mica and electrolytic tantalum and solid aluminum types; construction details and testing, specifications, mutual comparison & typical Applications.

1.5 Inductors, Transformers and RF coils- Working characteristics/properties Methods of manufacture of inductors, RF coils and small power and AF transformer and their testing, Properties of cores, Needs and type of shielding.

1.6 Concept of constant voltage sources, symbol and graphical representation, characteristics of ideal and practical voltage sources.

1.7 Concept of constant current source, symbol and graphical representation, Characteristics of ideal and practical current sources.

1.8 Conversion of voltage sources into a current sources and vice-versa.

1.9 Concept of floating and grounded D.C. supplies.

UNIT 2: Semiconductor Diode **12 Periods**

2.1 P-N junction diode, Mechanism of current flow in P-N junction, drift and diffusion currents, depletion layer, potential barriers, P-N junction diode

characteristics, Zener & avalanche breakdown, Concept of junction capacitance in forward & reverse bias conditions.

2.2 Semiconductor diode characteristics, dynamic resistance & their calculation from diode characteristics, dynamic resistance of diode in terms of diode current, Variation of leakage current and forward voltage with temperature (No derivations).

2.3 Diode (P-N Junction) as rectifier, Half wave rectifier, full wave rectifier including bridge rectifier, relationship between D.C output voltage and A.C input voltage, rectification efficiency and ripple factor for rectifier circuits, filter circuits- shunt capacitor, series inductor, bleeder resistance, working of the filter and typical application of each type

2.4 Different types of diodes, characteristics and typical application of power diodes, zener diodes, varactor diodes, point contact diodes, tunnel diodes, LEDs and photo diodes

2.5 Important specification of rectifier diode and zener diode.

UNIT 3: Introduction to Bipolar Transistor: **12 Periods**

3.1 Concept of bipolar transistor as a two junction three terminal device having two kinds of charge carriers, PNP an NPN transistor, their symbol and mechanism of current flow, explanation of fundamental current relations, Concept of leakage current, effect of temperature on leakage current, Standard notation for current and voltage polarity.

3.2 **CB, CE and CC configurations.**

a.) Common base configuration (CB): input and output characteristics, determination of transistor parameters (input and output) dynamic resistance, current amplification factor.

b.) Common emitter configuration (CE): current relations in CE configuration, collector current in term of base current and leakage current (ICEO) relationship between the leakage current in CB and CE configuration , input and output characteristics, determination of dynamic input and output resistance and current amplification factor β from the characteristics.

c.) Common collector configuration (CC): Expression for emitter current in terms of base current and leakage current in CC configuration.

3.3 Comparison of CB and CE configuration with regards to dynamic input and output resistance, current gain and leakage current performance of CE configuration for low frequency voltage amplification, Typical application of CB configuration in amplification.

3.4 **Transistor as an amplifier in CE configuration.**

a.) DC load line, its equation and drawing it on collector characteristics.

b.) Determination of small signal voltage and current gain of basic transistor amplifier using CE output characteristics and DC load line, Concept of power gain as a product of voltage gain and current gain.

UNIT 4: Transistor Biasing And Stabilization Of Operating Point **09 Periods**

4.1 Different transistor biasing circuits for fixing the operating points, effect of Temperature on operating point. Need and method for stabilization of operating point. Effect of fixing operating point in cut-off or saturation region on performance of amplifier.

4.2 Calculation of operating point for different biasing circuits, use of Thevenin's theorem in analyzing potential divider biasing circuit.

4.3 Simple design problems on potential divider biasing circuits.

UNIT 5: Single Stage Transistor Amplifier **09 Periods**

5.1 Analysis of Single Stage CE, CB and CC amplifier.

5.2 Single stage CE amplifier circuits with proper biasing components.

5.3 Construction, operation, characteristics and Biasing of Junction FET.

5.4 Analysis of Single Stage CS,CG and CD amplifiers. (Only Brief Idea)

5.5 Construction, operation, Characteristics and Biasing of MOSFET in both depletion and enhancement modes.

5.6 Analysis of Single Stage CS, CG and CD amplifiers. (Only Brief Idea)

5.7 Construction, operation and Characteristics of CMOS in both depletion and Enhancement modes.

5.8 Use of CMOS as Invertor, Different application of CMOS, CMOS IC

5.9 Comparison of JEET, MOSFET and Bipolar Transistor.

RECOMMENDED BOOKS

1. Bhargava, Kulshreshttha& Gupta – "Basic Electronics & Linear Circuits" – Tata Mcgraw- Hill.
2. Malvino, A. P.- "Electronics Principles" –Tata Mcgraw-Hill
3. Robert.L.Boylestad – "Electronic Devices & Circuits Theory" – Pearson Publication.
4. V.K.Mehta- "Principles of electronics" – S.Chand Publication.

APPLIED PHYSICS-II LAB
(DE-ASH-23212)

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DETAILED CONTENTS

1. To determine the velocity of sound with the help of resonance tube
2. To find the focal length of convex lens by displacement method.
3. To find the refractive index of the material of given prism using spectrometer
4. To find the wavelength of sodium light using Fresnel's biprism.
5. To verify laws of resistances in series and parallel combination
6. To verify ohm' s laws by drawing a graph between voltage and current.
7. To measure very low resistance and very high resistances using Slide Wire bridge
8. Conversion of Galvanometer into an Ammeter and Voltmeter of given range.
9. To draw hysteresis curve of a ferromagnetic material.
10. To draw characteristics of a pn junction diode and determine knee and break down voltages.
11. To find wave length of the laser beam.
12. To find numerical aperture of an optical fiber.

ELECTRICAL ENGINEERING-I LAB

(DE-EE-23213)

L	T	P
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DETAILED CONTENTS

1. Ohm's law verification.
2. To verify the laws of series and parallel connection of resistance.
3. To verify the laws of series and parallel connection of capacitance.
4. To verify Kirchhoff's laws.
5. To measure the resistance of an ammeter and a voltmeter and to conclude that ammeter has very low resistance whereas voltmeter has very high resistance.
6. To verify Thevenin';s and maximum power transfer theorems.
7. To find the ratio of inductance values of a coil having air core and iron core respectively and thus see that by the introduction of magnetic material inside the coil, the induction value of coil is substantially increased.
8. To test a battery for charged and discharged condition and to make connections for its charging.
9. To show that the range of an ammeter (dc and ac) and a voltmeter (dc and ac) can be extended with the use of shunts and multipliers
10. To convert the given galvanometer into voltmeter and an ammeter.

ELECTRONIC COMPONENTS & DEVICES LAB

(DE-ECE-23214)

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DETAILED CONTENTS

1. Identification of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (Germanium, point contact, silicon low power, high power and switching diode).
2. Familiarization with lab instruments (Multi-meter/CRO), etc.
3. Testing of various passive and active components.
4. Plotting of forward V-1 characteristics for a point contact and P-N junction diode (Silicon & Germanium diode).
5. To Plot forward and reverse V-I characteristics for a zener diode.
6. Rectifier circuits using semiconductor diode, measurement of input and output voltage and plotting of input and output wave shapes.

   i) Half wave rectifier

   ii) Full wave rectifier (centre tapped and bridge rectifier circuits
7. To Plot wave shapes of a full wave rectifier with shunt capacitor, series inductor and filter circuit.
8. To Plot the input and output characteristics and calculation of parameters of a transistor in common base configuration
9. To Plot input and output characteristics and calculation of parameters of a transistor in common emitter configuration.
10. Transistor Biasing circuits
    i) Measurement of operating point (Ic &Vce) for a fixed bias circuit.
    ii) Potential divider biasing circuits. (Measurement can be made by changing the transistor in the circuits by another of a same type number).
11. Plot the FET characteristics and determination of its parameters from these characteristics.
12. Measurement of voltage gain at 1 KHZ for different load resistance for a BJT amplifier circuit.
13. Measurement of voltage gain for a JFET amplifier circuit.
14. Measurement of voltage gain for a MOSFET amplifier circuit

BASIC OF INFORMATION TECHNOLOGY LAB

(DE-CSE-23215)

L	T	P
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JUSTIFICATION

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools using MS Office/Open Office/Libre Office using internet etc., form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify Computer Hardware Components, Network Components and Peripherals.
2. Explain the role of an Operating System.
3. Install System and Application Software.
4. Explain the function of the system components including Processor, Motherboard and Input-output devices.
5. Use Word Processing Software to prepare document.
6. Use Spreadsheet Software to create workbooks and automate calculation.
7. Use Presentation Software to create interactive presentation.
8. Perform fundamental tasks common to most application software including print, scan,save, edit, cut, copy, paste, format, spell and grammar check.
9. Use online office tools(Google suits)
10. Install Antivirus.

DETAILED CONTENTS

1. Identify various components, peripherals of computer and list their functions.
2. Installation of various application software and peripheral drivers
3. Installation of operating system (windows/linux/others)
4. Creation and Management (Rename, delete, search of file and folders)
5. Installation of Antivirus and remove viruses
6. Scanning and printing documents
7. Browsing, Downloading, Information using Internet
8. E-Mail ID creation, comparing, sending and receiving e-mail. Attaching a file with e-mail message.
9. **Word Processing (MS Office/Open Office)**

   a) File Management: Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, giving password protection for a file

   b) Page set up: Setting margins, tab setting, ruler, indenting

   c) Editing a document: Entering text, cut, copy, paste using tool- bars

   d) Formatting a document: Using different fonts, changing font size and colour, changing the appearance through bold/italic/underlined, highlighting a text, changing case, using subscript

and superscript, using different underline methods, Aligning of text in a document, justification of document, inserting bullets and numbering Formatting paragraph, inserting page breaks and column breaks, line spacing, Use of headers, footers: Inserting footnote, end note, use of comments, autotext, Inserting date, time, special symbols, importing graphic images, drawing tools

e) Tables and Borders: Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table, Print preview, zoom, page set up, printing options Using find, replace options

f) Using Tools like: Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and lables, Using shapes and drawing toolbar, Working with more than one window.

10. **Spread Sheet Processing (MS Office/Open Office/Libre Office)**

a) Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, save worksheet, switching between different spread sheets

b) Menu commands: Create, format charts, organise, manage data, solving problem by analyzing data. Programming with Excel Work Sheet, getting information while working

c) Work books: Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet, conditional formatting

d) Creating a chart: Working with chart types, changing data in chart, formatting a chart, use chart to analyze data, Using a list to organize data, sorting and filtering data in list

e) Retrieve data with query: Create a pivot table, customizing a pivot table. Statistical analysis of data

f) Exchange data with other application: Embedding objects, linking to other applications, import, export document.

11. **PowerPoint Presentation (MS Office/Open Office/Libre office)**

a) Introduction to PowerPoint: How to start PowerPoint, Working environment: concept of toolbars, slide layout & templates, Opening a new/existing presentation Different views for viewing slides in a presentation: normal, slide sorter.

b) Addition, deletion and saving of slides

c) Insertion of multimedia elements

Adding text boxes, Adding/importing pictures, Adding movies and sound. Adding tables and charts etc. , Adding organizational chart Editing objects, Working with Clip Art

d) Formatting slides

Using slide master, Text formatting, Changing slide layout, Changing slide colour scheme, Changing background, Applying design template

12. Google Suits Using Google drive, Google shut, Google docs, Google slides

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Information Technology for Management by Henery Lucas, Tata McGraw Hills, New Delhi
3. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar
4. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

SCHOOL OF ENGINEERING & TECHNOLOGY

GENERAL WORKSHOP PRACTICE –II

(DE-ME-23216)

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JUSTIFICATION

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify tools and equipment used and their respective functions.
2. Identify different types of materials and their basic properties.
3. Use and take measurements with the help of basic measuring tools/equipment.
4. Select proper tools for a particular operation.
5. Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
6. Prepare simple jobs independently and inspect the same.
7. Follow safety procedures and precautionary measures.
8. Use safety equipment and Personal Protection Equipment.

DETAILED CONTENTS

UNIT 1: FITTING SHOP **12 Periods**

Use of personal protective equipment and safety precautions while working.

Basic deburring processes.

Introduction to fitting shop tools, marking and measuring devices/equipment.

Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)

Identification of various steel sections (flat, angle, channel, bar etc.).

Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).

Job Practice:

Job I Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge).

Job II Filing a rectangular/square piece to maintain dimensions within an accuracy of ± .25 mm.

Job III Making a cut-out from a square piece of MS flat using hand hacksaw and chipping

Job IV Drilling and tapping practice on MS Flat.

UNIT 2: SHEET METAL SHOP **6 Periods**

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.

Introduction and demonstration of hand tools used in sheet metal shop.

Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine,

Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.

Study of various types of nuts, bolts, rivets, screws etc.

Job Practice:

Job I: Shearing practice on a sheet using hand shears.

Job II: Practice on making Single riveted lap joint/Double riveted lap Joint.

Job III: Practice on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint.

UNIT 3: WELDING SHOP-I **12 Periods**

Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.

Job Practice:

Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).

Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).

Job III Preparation of lap joint using arc welding process.

Job IV Preparation of T-joint using gas welding or arc welding on 100 mm x 6 mm MS Flat

UNIT 4: FOUNDRY SHOP **6 Periods**

Study of metal and non metals

Study and Sketch of the Foundry tools

Study and sketch of Cupola and pit furnace

To prepare green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

Casting of non ferrous (lead or aluminium)

UNIT 5: MACHINE SHOP **12 Periods**

Study and sketch of lathe machine

Study and Sketch of grinders, milling machine, drilling machine and CNC machine.

Plain and step turning and knurling practice.

Study and sketch of planning/shaping machine and to plane a rectangle of cast iron.

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.
2. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.
3. Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
4. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi
5. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., Ne

Semester 3rd

SCHOOL OF POLYTECHNIC

APPLIED MATHEMATICS - III

(SPB13230301)

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4	0	0

JUSTIFICATION

Contents of this course provide understanding of some elementary and advanced mathematics algorithms and their applications of solving engineering problems. Content of this course will enable students to use some advanced techniques like Beta-Gamma function, Fourier series, Laplace transform and probability distributions in solving complex engineering problems.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand matrix operations and uses of matrix in different problems.
2. Apply elementary row and column operations in finding inverse of a matrix.
3. Find Eigen values, Eigen vectors of a matrix and their different properties.
4. Understand degree/order of differential equations and their solution techniques.
5. Use differential equations in engineering problems of different areas.
6. Find Fourier series expansion of a function
7. Apply Laplace transform and their applications in solving engineering problems.
8. Understand concept of probability distribution and their applications.

DETAILED CONTENTS

UNIT-1 Matrices **10 Periods**

1.1 Algebra of Matrices, Inverse ,Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, ,Symmetric, Skew symmetric, Hermitian, Skew hermition, Orthagonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.

1.2 Elementry Row/Column Transformation

Meaning and use in computing inverse and rank of a matrix.

1.3 Linear Dependence, Rank of a Matrix Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.

1.4 Eigen Pairs, Cayley-Hamilton Theorem, Definition and evaluation of eign values and eign vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof)and its verification, Use in finding inverse and powers of a matrix.

UNIT 2 Differential Calculus **8 Periods**

2.1 Function of two variables, identification of surfaces in space, conicoids

2.2 Partial Differentiation Directional derivative, Gradient, Use of gradient f, Partial derivatives, Chain rule, Higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.

2.3 Vector Calculus: Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

UNIT 3 Differential Equation **12 Periods**

3.1 Formation, Order, Degree, Types, Solution ,Formation of differential equations through physical, geometrical,

mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.

3.2 First Order Equations :Variable separable, equations reducible to separable forms, Homogeneous equations, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.

3.3 Higher Order Linear Equation :

Property of solution, Linear differential equation with constant coefficients

(PI for X= $e$ax, Sinax, Cosax, Xn, $e$axV, XV

3.4 Simple Applications: LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system

UNIT 4 Integral Calculus-II **10 Periods**

4.1 Beta and Gamma Functions

Definition, Use, Relation between the two, their use in evaluating integrals.

4.2 Fourier Series

Fourier series of f(x),-n<x<n, Odd and even function,Half range series.

4.3 Laplace Transform Definition, Basic theorem and properties, Unit step and Periodic functions, inverse laplace transform, Solution of ordinary differential equations

UNIT 5 Integral Calculus-II **8 Periods**

5.1 Probability: Introduction, Addition and Multiplication theorem and simple problem.

5.2 Distribution

Discrete and continuous distribution, Binomial Distribution, Poisson distribution, Normal Distribution.

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
3. Applied Mathematics-III by Chauhan and Chauhan, Krishna Publications, Meerut.
4. Applied Mathematics-II by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR,Chandigarh.

SCHOOL OF POLYTECHNIC

ELECTRICAL ENGINEERING-II

(SPB13230302)

L	T	P
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JUSTIFICATION

Electricity is said to be the life of industries. We cannot think of an industry without using electricity. Theelectrical appliances commonly used for industrial application are Transformers, D.C. and A.C. motors and generators. Therefore basic knowledge of these appliances should be known to the student to facilitate him in routine working.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the concept of AC theory and phasor diagram
2. Understand one elementary idea of 3-phase supply
3. Demonstrate the operation of transformers
4. Acquire the knowledge of DC machines and starters for DC machine.
5. Understand the working principle of alternators and synchronous motors.
6. Understand the working principle of single phase induction motor.

DETAILED CONTENTS

UNIT-1 A.C.Theory **10 Periods**

1.1 Representation of sinusoidal quantities by phasors.

1.2 Physical explanation of the phase relationship between voltage and current when sinusoidal alternating voltage is applied across:-

(a) Pure resistance,

(b) Pure inductance and

(c) Pure capacitance.

1.3 Explanation of inductive reactance, capacitive reactance and their significance.

1.4 Relationship between voltage and current when alternating voltage is applied to

(a) Resistance and inductance in series,

(b) Resistance and capacitance in series.

1.5 Power in pure resistance, inductance and capacitance; power in combination of R-L-C circuits; power factor.

1.6 Active and reactive currents and their significance; practical importance of power factor.

1.7 Series and parallel resonance in R-L-C circuits, Q-factor of coils and capacitance.

UNIT 2 Three Phase Supply **10 Periods**

2.1 Elementary idea about 3-phase supply.

2.2 Star and delta connection. Relationship between phase and line voltage and currents.

2.3 Power and power factor in three phase system and their measurement. Comparison between three phase and single phase supply.

UNIT 3 Transformers **10 Periods**

3.1 Principle of operation.

3.2 E.M.F equation, Voltage & Current relations.

3.3 Construction and applications of small transformers used in electronics and communication engg., construction of auto transformers, constant voltage transformer.

3.4 Phasor diagram of a transformer on load; Definition of regulation and efficiency; Elementary idea of losses in transformer, open circuit and short circuit test.

UNIT 4 D.C. Machines **8 Periods**

4.1 D. C. Generator: Working principle, constructional details, e.m.f equation, types of generators and their applications.

4.2 D. C. Motor: Working principle, back e.m.f., types of D. C. motor and elementary idea of their characteristics, torque equation, methods of speed control (Description only).

4.3 Starters for D.C. Machines

UNIT 5 Induction Motors and synchronous Machine **8 Periods**

5.1 Single Phase Induction Motor :Principle of operation and constructional details of single phase FHP induction motors (Split phase, capacitor start capacitor run, shaded pole, reluctance start, A.C. series, universal, hysterisis, servo and stepper motors their applications).

5.2 Starters for Induction motors

5.3 Alternators: Working principle, types of alternators, (brief description)

5.4 Synchronous Motors: Working principle, construction details, vector diagram, effect of excitation on armature current and power factor, synchronous condenser.

5.5 Application of synchronous machines.

RECOMMENDED BOOKS

1. A Text book of Electrical Technology by B.L. Thereja, A.K Theraja by S. Chand
2. Publication.
3. Basic Electrical Engineering by V.K Mehta, Rohit Mehta, S. Chand Publication.
4. Electrical Engineering by J. B. Gupta; S.K Kataria& Sons Publication.
5. E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

ELECTRONIC DEVICES AND CIRCUITS

(SPB13230303)

L	T	P
4	0	0

JUSTIFICATION

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Demonstrate the concept of single stage amplifiers and multistage amplifier.
2. Describe the operation of large signal amplifiers.
3. Demonstrate the concept of negative and positive feedback.
4. Understand the operation of oscillators (Hartley, Colpitt, Wein Bridge)
5. Describe the various types of tuned voltage amplifiers
6. Design various wave-shaping circuits
7. Describe the concept of multi-vibrators and operational amplifiers
8. Understand the concept of regulated DC supplies.

DETAILED CONTENTS

UNIT-1 Single and Multistage Amplifiers **10 Periods**

1.1 Introduction to h-parameter in two port network. Transistor hybrid low frequency model in CE configuration and its characteristics. Need for multistage amplifier

1.2 Gain of multistage amplifier, Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth

UNIT 2 Large Signal Amplifier and Feedback Amplifiers **12 Periods**

2.1 Difference between voltage and power amplifiers

- Importance of impedance matching in amplifiers

- Class A, Class B, Class AB, and Class C amplifiers,

2.2 Single ended power amplifiers, Graphical method of calculation (without derivation) of output power; heat dissipation curve and importance of heat sinks. Push-pull amplifier, and complementary symmetry push-pull amplifier

2.3 Basic principles and types of feedback, Derivation of expression for gain of an amplifier employing feedback, Effect of feedback (negative) on gain, stability, distortion and bandwidth of an

amplifier

2.4 RC coupled amplifier with emitter bypass capacitor, Emitter follower amplifier and its application

UNIT 3 Sinusoidal Oscillators and Tuned Voltage Amplifiers **8 Periods**

3.1 Use of positive feedback: Barkhausen criterion for oscillations,Different oscillator circuits-tuned collector

3.2 Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles (no mathematical derivation but only simple numerical problems)

3.3 Series and parallel resonant circuits and bandwidth of resonant circuits.
Single and double tuned voltage amplifiers and their frequency response characteristics

UNIT 4 Clipper and Clamper Circuit and Operational Amplifiers **10 Periods**

4.1 Introduction to Clipper
- Series and shunt Clipper, positive and negative peak Clipper, Bias Clipper using diode

4.2 Clipper using Zener diode
- Introduction to Clamper
- Clamper Circuit analysis

4.3 Characteristics of an ideal operational amplifier and its block diagram
- IC-741 and its pin configuration, equivalent circuit of OPAMP.

4.4 Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current, offset voltage, Bias current

4.5 Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator,
and integrator, log amplifiers, anti-log amplifier, comparator, Schmitt triggers, sample and hold circuit.

UNIT 5 Multivibrator Circuits and IC Timer and Regulated Power Supplies **8 Periods**

5.1 Working principle of transistor as switch - Concept of multi-vibrator: astable, monostable, and bistable and their applications- Basic idea of ICs, fabrication of IC

5.2 Block diagram of IC555 and its working and applications Monostable, Bistable and Astablemultivibrator by using IC-555

5.3 Basic regulated circuit by using Zener diode- Concept of DC power supply. Line and load regulation

5.4 Concept of fixed voltage, IC regulators (like 78XX, 79XX) and variable voltage regulator like (IC 723)

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuits by NN Bhargava; Tata McGraw Hill, New Delhi
2. Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad
3. Malvino A. P- Electronics principles "Tata McGraw- Hill"
4. Electronics Devices and Circuits by Robert L. Boylestad and L:ovis Nasherslay- Pearson Publication
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

DIGITAL ELECTRONICS & LOGIC DESIGN

(SPB13230304)

L	T	P
4	0	0

JUSTIFICATION

This course has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Explain the importance of digitization
2. Verify and interpret truth tables for all logic gates.
3. Realize all logic functions with NAND and NOR gates
4. Design and demonstrate adder and substractor circuits
5. Verify and interpret truth tables of multiplexer, demultiplexer, encoder and decoder ICs
6. Design and realize different sequential circuit(Flip flops, counters and shift registers)
7. Verify performance of different A/D and D/A converters.
8. Explain the features and applications of different memories

DETAILED CONTENTS

UNIT-1 Introduction, Number System and Codes and Parity **10 Periods**

1.1 Distinction between analog and digital signal.Applications and advantages of digital signals.

1.2 Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa. Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction.

1.3 Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.Concept of parity, single and double parity and error detection

UNIT 2 Logic Gates and Families, Logic Simplification and Arithmetic circuits **10 Periods**

2.1 Concept of negative and positive logic Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR,Gates, NAND and NOR as universal gates.

2.2 SSI, MSI, LSI, VLSI (Definition) Propagation delay, Noise Margin, Fan in, Fan out, Power dissipation.

2.3 Comparison between TTL, CMOS, ECL, MOS on basis of diff parameter.
Introduction to Bipolar logic, MOS, ECL, TTL and CMOS logic families
Basic logic gate using NMOS, PMOS, CMOS

2.4 Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits

2.5 Half adder and Full adder circuit, design and implementation. Half Subtractor and Full Subtractor or Circuit, design and implementation.

UNIT 3 Combinational Circuit and Introduction to Sequential circuit **8 Periods**

3.1 Introduction to Sequential: Comparison between combinational and sequential circuit, Concept and types of latch with their working and applications

3.2 Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops. Difference between a latch and a flip flop

UNIT 4 Counters and Shift Registers **8 Periods**

4.1 Introduction to Asynchronous and Synchronous counters, Binary counters, Divide by N ripple counters, Decade counter, Ring counter and twisted Ring counter.

4.2 Introduction and basic concepts including shift left and shift right.

a) Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.

b) Universal shift register

UNIT 5 A/D and D/A Converters and Semiconductor Memories **10 Periods**

5.1 Working principle of A/D and D/A converters, Brief idea about different techniques of A/D conversion and study of :

Simultaneous or flash type A/D converter

Successive Approximation A/D Converter

Single Slope A/D converter

Dual Slope A/D converter

5.2 Brief idea of :

- Binary Weighted D/A converter
- R/2R ladder D/A converter

11.4 Applications of A/D and D/A converter.

5.3 Memory organization, classification of semiconductor memories (RAM, ROM, PROM,

EPROM, EEPROM), static and dynamic RAM.

RECOMMENDED BOOKS

1. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
2. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
4. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

UNIVERSAL HUMAN VALUES

(SPB13230305)

L	T	P
2	0	2

JUSTIFICATION

The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence. It is free from any dogma or value prescriptions. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

DETAILED CONTENTS

UNIT-1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education — **8 Periods**

- 1.1 Understanding the need, basic guidelines, content and process for Value Education
- 1.2 Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration
- 1.3 Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- 1.4 Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

UNIT 2 Understanding Harmony in the Human Being - Harmony in Myself! — **8 Periods**

- 2.1 Understanding human being as a co-existence of the sentient ‘I’ and the material the Body’
- 2.2 Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha
- 2.3 Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer).
- 2.4 Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT 3 Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship — **8 Periods**

- 3.1 Understanding Harmony in the family – the basic unit of human interaction

3.2 Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; a. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

3.3 Understanding the meaning of Vishwas; Difference between intention and competence

3.4 Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

3.5 Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals

3.6 Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj)

UNIT 4 Understanding Harmony in the Nature and Existence - Whole existence as Coexistence **8 Periods**

4.1 Understanding the harmony in the Nature

4.2 Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature

4.3 Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

4.4 Holistic perception of harmony at all levels of existence

UNIT5: Implications of the above Holistic Understanding of Harmony on Professional Ethics **6 Periods**

5.1 Natural acceptance of human values

5.2 Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

5.3 Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

5.4 To inculcate Human Values among Students: The Role of self ,Parents and Teachers

5.5 Practical Session also Includes Different Yogic Exercises and Meditation Session

RECOMMENDED BOOKS

1. Value Education websites, http://uhv.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, an Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology–the Untold Story
6. Case study Hevade Bazar Movie
7. Universal Human Values by Ankit Kumar, J.N.P Meerut.

SCHOOL OF POLYTECHNIC

ENVIRONMENTAL STUDIES

(SPB13230306)

L	T	P
2	0	0

JUSTIFICATION

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the ecosystem and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. Energy conservation is the need of hour. He should know the concept of energy management and its conservation.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Comprehend the importance of ecosystem and sustainable
2. Demonstrate interdisciplinary nature of environmental issues
3. Identify different types of environmental pollution and control measures.
4. Take corrective measures for the abatement of pollution.
5. Explain environmental legislation acts.
6. Define energy management, energy conservation and energy efficiency
7. Demonstrate positive attitude towards judicious use of energy and environmental Protection
8. Practice energy efficient techniques in day-to-day life and industrial processes.
9. Adopt cleaner productive technologies
10. Identify the role of non-conventional energy resources in environmental protection.
11. Analyze the impact of human activities on the environment

DETAILED CONTENTS

UNIT 1: Introduction — **8 Periods**

1.1 Basics of ecology, eco system- concept, and sustainable development, Resources renewable and non-renewable.

1.2 **Air Pollution:** Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air pollution control methods.

UNIT2: Water Pollution: — **8 Periods**

2.1 Impurities in water Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of dissolved O2, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard

UNIT3: Soil Pollution — **6 Periods**

3.1 Sources of soil pollution

3.2 Types of Solid waste- House hold, Hospital, From Agriculture, Biomedical, Animal and human, excreta, sediments and E-waste

3.3 Effect of Solid waste

3.4 Disposal of Solid Waste- Solid Waste Management

UNIT4: Noise pollution — **8 Periods**

4.1 **Noise pollution:** Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.

4.2 **Environmental Legislation:** Introduction to Water (Prevention and Control of Pollution) Act 1974, Introduction to Air (Prevention and Control of

Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board and National Green Tribunal (NGT), Environmental Impact Assessment (EIA).

UNIT5: Impact of Energy Usage on Environment: **6 Periods**

5.1 Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings.

RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
7. Environmental Engineering and Management by Suresh K Dhamija; S K Katariaand Sons, New Delhi.
8. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

ELECTRICAL ENGINEERING-II LAB

(SPB13230352)

L	T	P
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JUSTIFICATION

Electricity is said to be the life of industries. We cannot think of an industry without using electricity. The electrical appliances commonly used for industrial application are Transformers, D.C. and A.C. motors and generators. Therefore basic knowledge of these appliances should be known to the student to facilitate him in routine working.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. understand the concept of AC theory and phasor diagram
2. understand one elementary idea of 3-phase supply
3. demonstrate the operation of transformers
4. acquire the knowledge of DC machines and starters for DC machine.
5. understand the working principle of alternators and synchronous motors.
6. understand the working principle of single phase induction motor.

DETAILED CONTENTS

1 To verify that in an A.C. circuit, the phasor sum (not the algebraic sum) of currents at any junction is zero.

2 To find the voltage-current relationship in a R-L series circuit and to measure power and power factor of the circuit.

3 To measure power and power factor in three phase system by two wattmeter method.

4 To determine the efficiency and regulation of a transformer by performing direct Loading.

5 To measure the induced emf of separatly excited D.C. generator as a function of field current.

6 To measure the terminal voltage of a D.C. shunt generator as a function of load current.

7 To measure the speed of a separately excited D.C. motor as a function of load torque at rated armature voltage.

8 To observe the difference in the starting current at switching on single phase capacitor start induction motor with :-

(a) The capacitor disconnected and

(b) The capacitor connected.

Also to determine how to reverse the direction of rotation.

9 To determine V curves of a synchronous motor.

SCHOOL OF POLYTECHNIC

ELECTRONIC DEVICES AND CIRCUITS LAB

(SPB13230353)

L	T	P
0	0	2

JUSTIFICATION

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Demonstrate the concept of single stage amplifiers and multistage amplifier.
2. Describe the operation of large signal amplifiers.
3. Demonstrate the concept of negative and positive feedback.
4. Understand the operation of oscillators (Hartley, Colpitt, Wein Bridge)
5. Describe the various types of tuned voltage amplifiers
6. Design various wave-shaping circuits
7. Describe the concept of multi-vibrators and operational amplifiers
8. Understand the concept of regulated DC supplies.

DETAILED CONTENTS

1	Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
2	To measure the gain of push-pull amplifier at 1KHz
3	To measure the voltage gain of emitter follower circuit and plot its frequency response
4	Plot the frequency response curve of Hartley and Colpitt's Oscillator
5	Plot the frequency response curve of phase shift and Wein bridge Oscillator
6	Use of IC 555 as monostable multivibrator and observe the output for different values of RC
7	Use of IC 555 as astable multivibrator and observe the output at different duty cycles
8	To use IC 741 (op-amplifier) as i) Inverter, ii) Adder, iii) Subtractor iv) Integrator
9	To realize positive and negative fixed voltage DC power supply using three terminal voltage regulator IC (7805, 7812, 7905)
10	Observation of output waveform of different type of Clipper and Clamper Circuit

SCHOOL OF POLYTECHNIC

DIGITAL ELECTRONICS & LOGIC DESIGN LAB

(SPB13230354)

L	T	P
0	0	2

JUSTIFICATION

This course has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Explain the importance of digitization
2. Verify and interpret truth tables for all logic gates.
3. Realize all logic functions with NAND and NOR gates
4. Design and demonstrate adder and subtractor circuits
5. Verify and interpret truth tables of multiplexer, demultiplexer, encoder and decoder ICs
6. Design and realize different sequential circuit(Flip flops, counters and shift registers)
7. Verify performance of different A/D and D/A converters.
8. Explain the features and applications of different memories

DETAILED CONTENTS

1	Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates
2	Realization of logic functions with the help of NAND or NOR gates
3	Design of a half adder using XOR and NAND gates and verification of its Operation: Construction of a full adder circuit using XOR and NAND gates and verify its operation
4	Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).
5	Verification of truth table for encoder and decoder ICs, Mux and DeMux
6	To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
7	To design a 4 bit ring counter and verify its operation.
8	Use of Asynchronous Counter ICs (7490 or 7493)

SCHOOL OF POLYTECHNIC

ELECTRONICS WORKSHOP

(SPD13230355)

L	T	P
0	0	2

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Plan and Wire a small domestic building for a given load requirement.
2. Specify the wiring plans of semi-industrial installations with three phase supply and a maximum of 5 KVA load.

DETAILED CONTENTS

PART-A ELECTRICAL WORKSHOP:

1 Identification and study of commonly used electrical materials such as wires, cables, switches, fuses, coiling, roses, battens, cleats and allied items.

2 Identification and study of various tools used in Electrical Workshop and safety measures.

3 Making connection of single lamp and three pin plug socket to supply using batten wiring.

4 Making Electrical connection for staircase wiring.

5 Making of extension board with proper supply.

PART-B ELECTRONICS WORKSHOP

1 Name and function of different tools and accessories including Tapes, Solders, Solders tips, Fluxes; De-soldering wick, Solder cleaning fluids, Sleeves, Tags.

2 Demonstrate the correct use of accessories mentioned in (1) above.

3 Given different type of power supply mention in (c), the student should be able to find out the operating range and regulate the power supplies Equipment Type.

4 Test waveform Generator :- Audio oscillator, Function, Generator, Signal Generator, Spectrum Analyzer.

5 Measurement Equipment ; Single beam CRO, Double beam/Dual trace CRO, electronic and Digital multimeters, Transistor tester/Curve tracer, IC tester etc.

6 Power Supply - UPS, Invertor, different types of DC/AC power supplies

7 Various types of Single/Multicored, Insulated screened, Power type/ Audio/ Video/General purpose wires and cables

8 Exercises to be performed

9 Study and testing of different types of Resistor, Capacitor, Inductor, Diode, Transistor

(BJT, FET, MOS, CMOS) and ICs (All Popular Families).

10. Study of different processes by performing in assembling- Soldering, Desoldering,Cutting, Stripping and connecting.

11 Making of different types of mini electronic projects

PART-C PREPARATION OF PRINTED CIRCUIT BOARDS

1 Acquire skill in silk screen printing techniques for the purpose of making the printed circuits boards.

2 Exposure to Non dry-method of PCB making using photoprocessing techniques.

3. Prepare, check, drill and store PCBs.

SCHOOL OF POLYTECHNIC

ENVIRONMENTAL STUDIES LAB

(SPB13230356)

L	T	P
0	0	2

JUSTIFICATION

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the ecosystem and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. Energy conservation is the need of hour. He should know the concept of energy management and its conservation.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Comprehend the importance of ecosystem and sustainable
2. Demonstrate interdisciplinary nature of environmental issues
3. Identify different types of environmental pollution and control measures.
4. Take corrective measures for the abatement of pollution.
5. Explain environmental legislation acts.
6. Define energy management, energy conservation and energy efficiency
7. Demonstrate positive attitude towards judicious use of energy and environmental Protection
8. Practice energy efficient techniques in day-to-day life and industrial processes.
9. Adopt cleaner productive technologies
10. Identify the role of non-conventional energy resources in environmental protection.
11. Analyze the impact of human activities on the environment

DETAILED CONTENTS

1	Determination of pH of drinking water
2	Determination of TDS in drinking water
3	Determination of TSS in drinking water
4	Determination of hardness in drinking water
5	Determination of oil & grease in drinking water
6	Determination of alkalinity in drinking water
7	Determination of acidity in drinking water
8	Determination of organic/inorganic solid in drinking water
9	Determination of pH of soil
10	Determination of N&P (Nitrogen & Phosphorus) of soil

Semester 4th

SCHOOL OF POLYTECHNIC
INDUSTRIAL ELECTRONICS AND TRANSDUCERS

(SPB13230401)

L	T	P
4	0	0

JUSTIFICATION

Measurement of different parameters in required in industries to maintain the product within specified limits. The measurement can be done by direct or indirect method. Transducers are used as sensing elements in indirect system of measurements. The students equipped with knowledge about thyristors will prove useful in the world of work.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. understand the thyristor family such as SCR, DIAC, TRIAC etc
2. describe the application of thyristor such as AC Phase control using SCR
3. understand the working principle of Induction and dielectric heating.
4. understand basic idea and principle of transducer such as thermistor and piezoelectric
5. crystal demonstrate how the weak transducer signals are processed.

DETAILED CONTENTS

UNIT 1: Thyristors families **12 Periods**

1.1 Name, symbol and typical applications of members of thyristor family.

1.2 SCR, Triac and Diac-Basic structure, operation, V-I characteristics and ratings, gate circuits, ratings, triggering process and triggering circuits, turn off methods and circuits, selections of heat sinks, mounting of thyristor on heat sinks, basic Idea of protection of thyristor circuits.

1.3 Operation, V-I characteristics, equivalent circuit and parameters of an UJT: Description of UJT relaxation oscillator, use of UJT relaxation oscillator for Triggering thyristors.

UNIT 2: Thyristor Applications **12 Periods**

2.1 Single phase, various type of phase controlled rectifiers using SCR for resistive and inductive load explanation using wave shapes and appropriate mathematical equation (No derivation).

2.2 A.C. phase control using SCRs and triacs, Application of phase controlled rectifiers and A.C, phase control circuits in illumination control. Temperature control, variable speed derives using D.C.. motors and small A.C. machines

2.3 Half wave,. Full wave (including bridge) using SCRs; explanation using wave shapes and formula (no derivation)

2.4 Principle of operation of basic inverter circuits, basic series and parallel commutated inverters, principle of operation of cycloconverter, choppers and dual converter. Basic idea of U.P.S and SMPS.

UNIT 3: Induction and Dielectric Heating **04 Periods**

3.1 Principles and Applications of Induction and Dielectric Heating (No Mathematical Treatment)

UNIT 4: Transducers **10 Periods**

4.1 Basic idea and principle of operation of the following types of transducers and their applications in measuring physical parameters.

4.2 Variable Resistance Type: Potentiometric Resistance, strain gauge, Resistance Thermometer, Resistance Temperature detector, Thermistors.

4.3 Variable Capacitance Type : Variable capacitance pressure guage, Capacitor microphone, Dilectricguage

4.4 Variable Inductance Type: Differential Transformer.

4.5 Piezoelectric Type : Crystal Microphone, Crystal Oscillator

UNIT 5: Processing of Transducer Signals **8 Periods**

5.1 Characteristic of instrumentation amplifiers in respect of input impedance, output impedance, drift, dc offset, noise, gain common mode rejection, frequency response.

5.2 Introduction to AC and DC signal conditioning (only Block diagram)

RECOMMENDED BOOKS

1. Power Electronics by M. D. Singh and K.B Khanchandani; McGraw Hill Publication
2. Industrial Electronics and Control by SK. Bhattacharya, S. Chatterjee, TTTI, Chandigarh.
3. Electrical and Electronic Measurement by A. K. Sawhney.
4. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

NETWORK FILTERS AND TRANSMISSION LINES

L	T	P
4	0	0

(SPB13230402)

JUSTIFICATION

The study of networks, filters and transmission lines leads to understanding of line communication, audio and video communication, and microwave communication. Particularly the study of networks takes off from principles of A.C. theory and introduces the student to parameters and characteristics of various networks, including filters. Also the study of transmission lines becomes important as its analogy is used in study of transmission of plane electromagnetic waves in bounded media.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Describe the concept of symmetrical, asymmetrical, balanced, unbalanced, T, PI, ladder, lattice, L and Bridge T networks
2. Demonstrate the operation of attenuators and filters.
3. Understand the concept and applications of transmission lines.
4. Measure standing wave ratio and characteristic impedance of the line

DETAILED CONTENTS

UNIT 1: Networks **10 Periods**

1.1 Two port (four terminals) network: Basic concepts of the following terms: Symmetrical and asymmetrical networks: Balanced and unbalanced network; Tnetwork, π network, Ladder network; Lattice network; L-network and Bridge Tnetwork

1.2 Symmetrical Network: - Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss.- T-network and π Network (No Derivation)

1.3 Asymmetrical Network- Concept and significance of iterative impedance, image impedance,- The half section (L-section); symmetrical T and π sections into half sections (No Derivation)

UNIT 2: Attenuators **10 Periods**

2.1 Units of attenuation (Decibels and Nepers): General characteristics of attenuators

2.2 Analysis and design of simple attenuator of following types; Symmetrical T and π type, L type.

UNIT 3: Filters **12 Periods**

3.1 Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters.

3.2 Prototype Filter Section:
- Impedance characteristics vs frequency characteristics of a low and high pass filter and their significance
- Simple design problems of prototype low pass section.

M-Derived Filter Sections
Limitation of prototype filters, need of m-derived filters
- Crystal Filters
Crystal and its equivalent circuits, special properties of piezoelectric filters and their use- Active Filters Basic concept of active filters and their comparison with passive filters

UNIT 4: Transmission Lines **10 Periods**

4.1 Transmission Lines, their types and applications. Distributed constants, T and π representation of transmission line section, Concept of infinite line- Condition for

minimum distortion and minimum attenuation of signal on-the- line and introduction to loading methods.

4.2 Concept of reflection and standing waves, definition of reflection coefficient, SWR &VSWR and their relation (no derivation).- Concept of transmission lines at high frequencies.

Unit 5: Introduction to stubs. (single, open and short stubs). 6 Periods

5.1 - HVDC (High Voltage DC transmission) – Concept and Advantage, Disadvantage and areas of application.

RECOMMENDED BOOKS

1. Network Filters and Transmission Lines by AK Chakarvorty; Dhanpat Rai and Co. Publication, New Delhi
2. Network Analysis by Soni and Gupta; Dhanpat Rai and Co. Publication, New Delhi.
3. Network Filters and Transmission Line by Yash Pal; Ishan Publications, Ambala City.
4. Electrical and Electronics Measuring instrumentation, A.K Sawhney; Dhanpat Rai and Co. Publication, New Delhi.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

ELECTRONIC INSTRUMENTS AND MEASUREMENT

(SPB13230403)

L	T	P
4	0	0

JUSTIFICATION

In the real world of work, the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. The study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Describe the specifications of measuring instruments.
2. Demonstrate the working principle voltage, current and resistance measurement along with their applications.
3. Understand the working of various parts of CRT.
4. Measure frequency, voltage, time period and phase using CRO and DSO
5. Demonstrate the working of RF signal generator, pulse generator and analysers
6. Understand the working principle of DC/AC bridges and meters.

DETAILED CONTENTS

UNIT 1: Basics of Measurements and Voltage, Current and Resistance Measurement **12 Periods**

1.1 Measurement, method of measurement, types of instruments Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors, loading effect, importance and applications of standards and calibration

1.2 Principles of measurement of DC voltage, DC current, AC voltage, AC current,- Principles of operation and construction of permanent magnet moving coil (PMMC) instruments and Moving iron type instruments,

UNIT 2: Cathode Ray Oscilloscope **8 Periods**

2.1 Construction and working of Cathode Ray Tube(CRT)- Block diagram description of a basic CRO and triggered sweep oscilloscope, front panel controls

2.2 Specifications of CRO and their explanation

2.3 Measurement of current, voltage, frequency, time period and phase using CRO-Digital storage oscilloscope (DSO) : block diagram and working principle - Working Principle of spectrum analyser

UNIT 3: Impedance Bridge Q Meters **10 Periods**

3.1 Wheat stone bridge AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sautys bridge, Schering bridge and Anderson bridge

3.2 Bock diagram description of laboratory type RLC bridge, specifications of RLC bridge. Block diagram and working principle of Q meter.

UNIT 4: Signal Generators and Analytical Instruments **8 Periods**

4.1 Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator - Distortion factor meter

4.2 Instrumentation amplifier: its characteristics, need and working

UNIT 5: Digital Instruments **10 Periods**

5.1 Comparison of analog and digital instruments

- Working principle of ramp, dual slope and integration type digital voltmeter
- Block diagram and working of a digital multi-meter

5.2 Specifications of digital multi-meter and their applications- Limitations of digital multi-meters. - Working principle of logic probe, logic pulser, logic analyzer and signature analyzer.

RECOMMENDED BOOKS

1. 1 .Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Sons, New Delhi
2. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
3. Electronics Instrumentation by JB Gupta, Satya Prakashan, New Delhi
4. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

PRINCIPLES OF COMMUNICATION ENGINEERING

(SPB13230404)

L	T	P
4	0	0

JUSTIFICATION

The study of principles of communication systems leads to further specialized study of audio and video systems, line communications and microwave communication systems. Thus the diploma-holder in Electronics and Communication Engineering shall find employment in areas of R and D, production, servicing and maintenance of various communication systems. The students should understand the advantage and limitations of various analog and digital modulation systems on a comparative a scale and relate to them while studying practical communication systems.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Explain the concept and need of modulation and demodulation
2. Measure the modulation index of the Amplitude Modulated wave and frequency deviation of FM.
3. Use different types of modulators and demodulators.
4. Obtain modulating signal from an AM Detector Circuit and FM detector
5. Use different types of Pulse Modulation Techniques (PAM, PPM, PWM and PCM)
6. Classify different radio transmitters and radio receivers.

DETAILED CONTENTS

UNIT 1: Introduction **4 Periods**

1.1 Need for modulation, modulation and demodulation in communication systems

Basic scheme of a communication system.

UNIT 2: Amplitude modulation and Frequency modulation **10 Periods**

2.1 Derivation of expression for an amplitude modulated wave. Carrier and side band components. Modulation index. Spectrum and BW of AM Wave. Relative power distribution in carrier and side bands.

2.2 Elementary idea of DSB-SC, SSB-SC, SSB and VSB modulations, their comparison, and areas of applications

2.3 Expression for frequency modulated wave and its frequency spectrum (without Proof and analysis of Bassel function) Modulation index, maximum frequency deviation and deviation ratio, BW of FM signals, Carson's rule.

2.4 Effect of noise on FM carrier. Noise triangle, Role of limiter, Need for pre-emphasis and de-emphasis, capture effect.

2.5 Comparison of FM and AM in communication systems

UNIT 3: Phase modulation and Principles of AM Modulators and Principles of FM Modulators **8 Periods**

3.1 Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation.

3.2 Circuit Diagram and working operation of:

a) Collector and Base Modulator

b) Square Low Modulator

c) Balanced Modulator

3.3 Working principles and applications of reactance modulator, varactor diode modulator,

VCO and Armstrong phase modulator.

3.4 Stabilization of carrier using AFC (Block diagram approach).

UNIT 4: Demodulation of AM Waves and Demodulation of FM Waves and Pulse Modulation and Pulse Code Modulation **12 Periods**

4.1 Principles of demodulation of AM wave using diode detector circuit

4.2 Basic principles of FM detection using slope detector

Principle of working of the following FM demodulators

i. Foster-Seeley discriminator

ii. Ratio detector

iii. Block diagram of Phase locked Loop (PLL) FM demodulators (No Derivation)

4.3 Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM)

4.4 Pulse Amplitude Modulation (PAM), Pulse Position Modulation (PPM), Pulse Width Modulation (PWM).

4.5 Basic concept of sampling theorem, quantization, coding and Shanon's theorem. Types of PCM system and its application(Basic idea only) Digital modulation techniques. (ASK, FSK,PSK, DPSK (Brief idea only)

UNIT 5: Radio Transmitter and Radio Receiver. **12 Periods**

5.1 Classification of transmitters on the basis of power, frequency and modulation. Block diagram of an AM transmitters and working of each stage. Low level and High level modulation. Block diagram and working principle of reactance tube and Armstrong FM transmitters

5.2 Brief description of crystal and TRF radio receivers; Need for and principles of super heterodyne radio receiver

5.3 Block diagram of super- heterodyne AM receiver, function of each block and typical waveforms at the input and output of each block.

5.4 Block diagram of an FM receiver, function of each block and wave/forms at input and output at different blocks.

RECOMMENDED BOOKS

1. An Introduction to Analog and Digital Communication by Simon Haykin, Wiley Student Edition.
2. Electronics Communication System by Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Principle of communication Engineering by Taub, TMH Publication.
4. E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

COMMUNICATION SKILLS H & E – II

(SPB13230405)

L	T	P
2	0	0

JUSTIFICATION

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

LEARNING OUTCOMES

After completing this course, students will be able to:
Frame correct sentences with illustrations

1. Comprehend the language correctly
2. Interpret the language correctly
3. Use given material in new situations.
4. Correspond effectively using various types of writings like letters, memos etc.
5. Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

DETAILED CONTENTS

UNIT-1 Functional Grammar — **8 Periods**

- **1.1** Prepositions
- **1.2** Framing Questions
- **1.3** Conjunctions
- **1.4** Tenses

UNIT-2 Reading — **8 Periods**

- **2.1** Unseen Passage for Comprehension (Vocabulary enhancement - Prefixes, Suffixes, one word substitution, Synonym and Antonym) based upon the passage should be covered under this topic.

UNIT-3 Writing Skill-1 — **8 Periods**

- **3.1** Correspondence a) Business Letters- Floating Quotations, Placing Orders, Complaint Letters. b) Official Letters- Letters to Government and other Offices

UNIT-4 Writing Skill-2 & Report Writing — **4 Periods**

- **4.1** Memos, Circular, Office Orders
- **4.2** Agenda & Minutes of Meeting
- **4.3** Report Writing Format

UNIT-5 Hindi Speaking & Writing Practices — **4 Periods**

- **5.1** Business letter in hindi
- **5.2** Report Writing in hindi
- **5.3** Essays on Famous Indian personalities
- **5.4** Hindi Speaking

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC
ENERGY CONSERVATION

(SPB13230406)

L	T	P
2	0	0

JUSTIFICATION

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Define principles and objectives of energy management and energy audit.
2. Understand Energy Conservation Act 2001 and its features.
3. Understand various forms & elements of energy.
4. Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
5. Identify areas of energy conservation and adopt conservation methods in various systems.
6. Evaluate the techno economic feasibility of the energy conservation technique adopted.

DETAILED CONTENTS

UNIT-1 Basics of Energy **12 Periods**

1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.

1.2 Global fuel reserve

1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)

1.4 Impact of energy usage on climate

1.5 **Energy Conservation and EC Act 2001:** Introduction to energy management, energy conservation, energy efficiency and its need

1.6 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.

1.7 Standards and Labelling: Concept of star rating and its importance, Types of product available for star rating

UNIT-2 Electrical Supply System and Motors **10 Periods**

2.1 Types of electrical supply system

2.2 Single line diagram

2.3 Losses in electrical power distribution system

2.4 Understanding Electricity Bill: Transformers Tariff structure, Components of power (kW, kVA and kVAR) and power factor, improvement of power factor, Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

2.5 Transformers: Introduction, Losses in transformer, transformer Loading, Tips for energy savings in transformers

2.6 Electric Motors Types of motors, Losses in induction motors Features and characteristics of energy efficient motors, Estimation of motor loading, Variation in efficiency and power factor with loading, Tips for energy savings in mot

2.7 **Lighting Systems**: Basic definitions- Lux, lumen and efficacy, Types of different lamps and their features, Energy efficient practices in lighting

2.8 **DG Systems:** Introduction, Energy efficiency opportunities in DG systems, Loading estimation

UNIT-3 Energy Efficiency in Electrical Utilities **10 Periods**

3.1 Pumps: Introduction to pump and its applications, Efficient pumping system operation, Energy efficiency in agriculture pumps, Tips for energy saving in pumps

3.2 Compressed Air System: Types of air compressor and its applications, Leakage test, Energy saving opportunities in compressors.

3.3 Energy Conservation in HVAC and Refrigeration System: Introduction, Concept of Energy Efficiency Ratio (EER), Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

3.4 **Energy Efficiency in Thermal Utilities** Thermal Basics: Thermal energy, Energy content in fuels, Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

3.5 Energy Conservation in boilers and furnaces : Introduction and types of boilers, Energy performance assessment of boilers, Concept of stoichiometric air and excess air for combustion, Energy conservation in boilers and furnaces, Do's and Don'ts for efficient use of boilers and furnaces

3.6 Cooling Towers: Basic concept of cooling towers, Tips for energy savings in cooling towers

3.7 Efficient Steam Utilization

UNIT 4 Energy Conservation Building Code (ECBC) **8 Periods**

4.1 ECBC and its salient features

4.2 Tips for energy savings in buildings: New Buildings, Existing Buildings

4.3 **Waste Heat Recovery and Co-Generation**: Concept, classification and benefits of waste heat recovery

4.4 Concept and types of co-generation system

UNIT-5 General Energy Saving Tips Energy saving tips in: **8 Periods**

5.1 Lighting, Room Air Conditioner ,Refrigerator , Water Heater , Computer, Fan, Heater, Blower and Washing Machine, Colour Television , Water Pump , Cooking ,Transport

5.2 **Energy Audit:** Types and methodology , Energy audit instruments , Energy auditing reporting format

RECOMMENDED BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi & Shashank Jain published by TERI. Latest Edition

SCHOOL OF POLYTECHNIC
INDUSTRIAL ELECTRONICS AND TRANSDUCER LAB

(SPB13230451)

L	T	P
0	0	2

JUSTIFICATION

Measurement of different parameters in required in industries to maintain the product within specified limits. The measurement can be done by direct or indirect method. Transducers are used as sensing elements in indirect system of measurements. The students equipped with knowledge about thyristors will prove useful in the world of work.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the thyristor family such as SCR, DIAC, TRIAC etc
2. Describe the application of thyristor such as AC Phase control using SCR
3. Understand the working principle of Induction and dielectric heating.
4. Understand basic idea and principle of transducer such as thermistor and piezoelectric crystal
5. Demonstrate how the weak transducer signals are processed.

DETAILED CONTENTS

1 Identification of various types of packages and terminals of various low and high power thyristors (SCR and Triac).

2 To determine and plot firing characteristic voltage.

a) By varying the anode to chathode voltage.

b) By varying the gate current.

3 Observing voltage wave shapes at various points of UJT relaxation oscillator circuit.

4 Observation of wave shapes at relevant points of the circuit of a single phase controlled rectifier using SCR and UJT relaxation oscialltor.

5 Test of A. C. phase control circuit using triac and observe wave shapes and voltages at relevant points in circuits (while using for lamp intensity control and/or A. C. fan speed control).

6 To study the working of a single phase SCR/transistor inverter circuit by observing wave shapes at input and output.

7 To measure force and pressure by using strain guage transducer**.**

8 To observe the working of Piezo crystal as transducer.

SCHOOL OF POLYTECHNIC

NETWORK FILTERS AND TRANSMISSION LINES LAB

(SPB13230452)

L	T	P
0	0	2

JUSTIFICATION

The study of networks, filters and transmission lines leads to understanding of line communication, audio and video communication, and microwave communication. Particularly the study of networks takes off from principles of A.C. theory and introduces the student to parameters and characteristics of various networks, including filters. Also the study of transmission lines becomes important as its analogy is used in study of transmission of plane electromagnetic waves in bounded media.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Describe the concept of symmetrical, asymmetrical, balanced, unbalanced, T, PI, ladder, lattice, L and Bridge T networks
2. Demonstrate the operation of attenuators and filters.
3. Understand the concept and applications of transmission lines.
4. Measure standing wave ratio and characteristic impedance of the line

DETAILED CONTENTS

1	To measure the characteristic impedance of symmetrical T and π networks
2	To measure the image impedance of a given asymmetrical T and π networks
3	For a prototype low pass filter: a) Determine the characteristic impedance experimentally b) Plot the attenuation characteristic
4	To design and measure the attenuation of a symmetrical T/ π type attenuator
5	For a prototype high pass filter: Determine the characteristic impedance experimentally - To plot the attenuation characteristic
6	a) To plot the Impedance characteristic of a prototype band-pass filter b) To plot the attenuation characteristic of a prototype band pass filter
7	a) To plot the impedance characteristic of m- derived low pass filter b) To plot the attenuation characteristics of m-derived high pass filter
8	To observe the information of standing waves on a transmission line and measurement of SWR and characteristic impedance of the line
9	Draw the attenuation characteristics of a crystal filter

SCHOOL OF POLYTECHNIC

ELECTRONIC INSTRUMENTS AND MEASUREMENT LAB

(SPB13230453)

L	T	P
0	0	2

JUSTIFICATION

In the real world of work, the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. The study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Describe the specifications of measuring instruments.
2. Demonstrate the working principle voltage, current and resistance measurement along with their applications.
3. Understand the working of various parts of CRT.
4. Measure frequency, voltage, time period and phase using CRO and DSO
5. Demonstrate the working of RF signal generator, pulse generator and analysers
6. Understand the working principle of DC/AC bridges and meters.

DETAILED CONTENTS

1	Measurement of voltage, resistance, frequency using digital multimeter
2	Measurement of voltage, frequency, time period and phase using CRO
3	Measurement of voltage, frequency, time and phase using DSO
4	Measurement of Q of a coil
5	Measurement of resistance and inductance of coil using RLC Bridge
6	Measurement of impedance using Maxwell Induction Bridge
7	To find the value of unknown resistance using Wheat Stone Bridge
8	Measurement of distortion using Distortion Factor Meter

SCHOOL OF POLYTECHNIC

PRINCIPLES OF COMMUNICATION ENGINEERING LAB

(SPB13230454)

L	T	P
0	0	2

JUSTIFICATION

The study of principles of communication systems leads to further specialized study of audio and video systems, line communications and microwave communication systems. Thus the diploma-holder in Electronics and Communication Engineering shall find employment in areas of R and D, production, servicing and maintenance of various communication systems. The students should understand the advantage and limitations of various analog and digital modulation systems on a comparative a scale and relate to them while studying practical communication systems.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Explain the concept and need of modulation and demodulation
2. Measure the modulation index of the Amplitude Modulated wave and frequency deviation of FM.
3. Use different types of modulators and demodulators.
4. Obtain modulating signal from an AM Detector Circuit and FM detector
5. Use different types of Pulse Modulation Techniques (PAM, PPM, PWM and PCM)
6. Classify different radio transmitters and radio receivers

DETAILED CONTENTS

1	a) To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation b) To measure the modulation index of the wave obtained in above practical
2	a) To obtain an AM wave from a square law modulator circuit and observe waveforms b) To measure the modulation index of the obtained wave form.
3	To obtain an FM wave and measure the frequency deviation for different modulating signals.
4	To obtain modulating signal from FM detector.
5	To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output.
6	To observe and note the pulse amplitude modulated signal (PAM) and compare them with the corresponding analog input signal
7	To observe PPM and PWM signal and compare it with the analog input signal
8	To observe wave form of different modulation Technique (ASK, FSK, DPSK)

SCHOOL OF POLYTECHNIC

COMMUNICATION SKILLS H & E – II LAB

(SPB13230455)

L	T	P
0	0	2

JUSTIFICATION

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

LEARNING OUTCOMES

After completing this course, students will be able to:
Frame correct sentences with illustrations

1. Comprehend the language correctly
2. Interpret the language correctly
3. Use given material in new situations.
4. Correspond effectively using various types of writings like letters, memos etc.
5. Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

DETAILED CONTENTS

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.
4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

SCHOOL OF POLYTECHNIC

ENERGY CONSERVATION LAB

(SPB15230456)

L	T	P
0	0	2

JUSTIFICATION

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Define principles and objectives of energy management and energy audit.
2. Understand Energy Conservation Act 2001 and its features.
3. Understand various forms & elements of energy.
4. Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
5. Identify areas of energy conservation and adopt conservation methods in various systems.
6. Evaluate the techno economic feasibility of the energy conservation technique adopted.

DETAILED CONTENTS

1 To conduct load survey and power consumption calculations of small building.

2 To check efficacy of different lamps by measuring power consumption and lumens using lux meter.

3 To measure energy efficiency ratio (EER) of an air conditioner**.**

4 To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.

5 To measure and calculate energy saving by arresting air leakages in compressor.

6 To measure the effect of blower speed on energy consumed by it.

Semester 5th

SCHOOL OF POLYTECHNIC

MICROPROCESSORS AND PERIPHERAL DEVICES

(SPB13230501)

L	T	P
3	0	0

JUSTIFICATION

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings the students face-to-face with mainframe enabling them to get employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the concept of microcomputer system
2. Describe Architecture and pin details of 8085
3. Write assembly language program using mnemonics
4. Interface various peripheral devices with microprocessor.
5. Use various data transfer techniques
6. Describe architecture and pin detail of 8086
7. Describe the idea of advance microprocessors like Pentium series and dual core.

DETAILED CONTENTS

UNIT 1: Evolution of Microprocessor and Architecture of a Microprocessor **10 Periods**

1.1 Typical organization of a microcomputer system and functions of its various blocks. Microprocessor, its evolution, function and impact on modern society

1.2 (With reference to 8085 microprocessor) Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals,

1.3 Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme.

UNIT 2: Instruction Timing and Cycles and Programming (with respect to 8085 microprocessor) **12 Periods**

2.1 Instruction cycle, machine cycle and T-states, Fetch and execute cycle, Timing cycle diagram.

2.2 Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

UNIT 3: Memories and I/O interfacing and Interrupts **10 Periods**

3.1 Concept of memory mapping, partitioning of total memory space. Address decoding, concept of peripheral mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices.

3.2 Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various

hardware interrupts of 8085, Servicing interrupts, extending interrupt system

UNIT 4: Data Transfer Techniques and Peripheral devices **8 Periods**

4.1 Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data

4.2 8255 PPI, 8253 PIT and 8257 DMA controller

UNIT 5: Architecture of 8086 Microprocessor and Advance Microprocessors **8 Periods**

5.1 Block diagram , Minimum and Maximum mode , Pin and Signals ,Addressing Modes

5.2 Introduction to Pentium series processors and core 2 duo, dual core (core i3, i5, i7)

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
2. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Microprocessor programming & applications.by Sudhir Goyal, North Publication.
4. Microprocessor and interfacing by Douglas.V.Hall, McGraw Hill Higher Education, New Delhi.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

OPTICAL FIBER ENGINEERING

(SPB13230502)

L	T	P
3	0	0

JUSTIFICATION

Progressing from communication over copper wire to today's fiber optic communication, we have increased our ability to transmit more information, more quickly and over longer distances. This has expanded our boundaries and is finding a good slot in communication system. Optical fiber has replaced existing transmission media due to its advantages. As a result the technicians are supposed to have knowledge of optical communication. This subject will provide basic concepts and requisite knowledge and skill required for optical fiber communication system.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand various components and light propagation methods in optical fiber communication.
2. Demonstrate various types of optical fibers.
3. Identify and test losses in optical fibers.
4. Explain and demonstrate characteristics of optical source and optical detector.
5. Connect and provide joints in optical fibers.
6. Components and tools used in optical fiber.
7. Compare various optical amplifiers.

DETAILED CONTENTS

UNIT 1: Introduction **6 Periods**

1.1 Historical perspective, basic communication systems, optical frequency range, advantages of optical fiber communication, application of fiber optic communication

1.2 Electromagnetic spectrum used, Advantages and disadvantages of optical communication, optical windows.

1.3 Principle of light penetration, reflection, critical angle, numerical aperture, acceptance angle.

UNIT 2: Optical Fibers and losses in optical fiber cable **10 Periods**

2.1 Constructional details of various optical fibers, multimode and mono-mode fibers, step index and graded index fibers, acceptance, angle and types of optical fiber cables.

2.2 Optical Multiplexing (WDM) , Optical Switching

2.3 Absorption Losses: Scattering Losses, Radiation losses, Connector losses, Bending loses. Dispersion: Types and its effect on data rate.

2.4 Testing of losses using OTDR(Optical Time Domain Reflectometer).

UNIT 3: Optical Sources **10 Periods**

3.1 Intrduction to Optical Transport Networks(OTN) Characteristics of light sources (LED and LASER) used in optical communication, principle of operation of LED, different types of LED structures used and their brief description,

3.2 Injection laser diode, principle of operation, different injection laser diodes, comparison of LED and ILD.

UNIT 4: Optical Detectors and Connectors and splicers **10 Periods**

4.1 Characteristics of photo detectors used in optical communication; PN-photo diode, PIN diode and avalanche photo diode (APD),brief idea of Noise in detectors

4.2 Optical Fibers cable connectors and splicing techniques (Mechanical, fusion)

UNIT 5: Optical Amplifiers **8 Periods**

5.1 Types of optical amplifiers, semiconductor & fiber optical amplifiers, principle of operation of SOA, types of SOA.

5.2 EDFA, Raman amplifiers. Comparison of SOA, EDFA and Raman Amplifiers

RECOMMENDED BOOKS

1. Optical fiber Communication by John M Senior, Prentice Hall of India, New Delhi .
2. Optical fiber Communication by J. Gower , Prentice Hall of India, New Delhi
3. Optical fiber Communication by Gerd Keiser, McGraw Hill International Editions
4. E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

CONSUMER ELECTRONICS

(SPB13230503)

L	T	P
3	0	0

JUSTIFICATION

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices. This in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the various types of microphones and loud speakers.
2. To identify the various digital and analog signal.
3. Describe the basis of television and composite video signal.
4. Describe the various kinds of colour TV standards and system.
5. Compare the various types of digital TV system.
6. Understand the various types of consumer goods.

DETAILED CONTENTS

UNIT-1 Audio Systems **10 Periods**

1.1 Microphones and Loudspeakers

1.2 a) Carbon, moving coil, cordless microphone

b) Direct radiating and horn loudspeaker

c) Multi-speaker system

d) Hi-Fi stereo and dolby system.

1.3 Concept to fidelity, Noise and different types of distortion in audio system.

UNIT 2 Digital Audio Fundamentals **8 Periods**

2.1 Audio as Data and Signal, Digital Audio Processes Outlined, Time Compression and Expansion.

UNIT 3 Television **12 Periods**

3.1 Basics of Television

- Elements of TV communication system
- Scanning and its need
- Need of synchronizing and blanking pulses, VSB
- Composite Video Signal

3.2 Colour Television

- Primary, secondary colours
- Concept of Mixing, Colour Triangle

-Camera tube

- PAL TV Receiver
- NTSC, PAL, SECAM (brief comparison)

UNIT 4 Digital Transmission and Reception **8 Periods**

4.1 Digital satellite television, Direct-To-Home(DTH) satellite television, Introduction

to :Video on demand, CCTV, High Definition(HD)-TV.

Introduction to Liquid Crystal and LED Screen Televisions Basic block diagram of LCD and LED Television and their comparison.

UNIT 5 Introduction to different type of domestic/commercial appliances 10 Periods

5.1 Operation of Micro-wave oven

- Food Processors
- Digital Electronic Lock
- Vacuum cleaner
- Xerox Machine
- Scanner

RECOMMENDED BOOKS

1. Modern Television Practice by R. R. Gulai; New Age International Publishers.
2. Audio Video Systems by R. G. Gupta; McGraw Hill Education System.
3. Audio Video Systems Principles Practices and Troubleshooting by Bali & Bali; Khanna Publishing Company
4. Consumer Electronics by S. P. Bali; Pearson Education, New Delhi
5. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

(SPB00230504)

L	T	P
3	0	0

JUSTIFICATION

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mindset with managerial skills helps the student in the job market. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- Explain the principles of management including its functions in an organization.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organization.
- Use marketing skills for the benefit of the organization.
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, JIT and CRM.

DETAILED CONTENTS

UNIT 1:	**ENTREPRENEURSHIP**	**04 Periods**
1.1	**Introduction**: Concept /Meaning and its need	
1.2	Qualities and functions of entrepreneur and barriers in entrepreneurship	
1.3	Sole proprietorship and partnership forms and other forms of business organization's	
1.4	Schemes of assistance by entrepreneurial support agencies at National, State, District –level, organization: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks	
UNIT2:	**Market Survey and Opportunity Identification/Ideation**	**10 Periods**
2.1	Scanning of the business environment	
2.2	Salient features of National and Haryana State industrial policies and resultant business opportunities	
2.3	Types and conduct of market survey	
2.4	Assessment of demand and supply in potential areas of growth	
2.5	Identifying business opportunity	
2.6	Considerations in product selection	
2.7	Converting an idea into a business opportunity	
2.8	**Project report Preparation** : Preliminary project report	
2.9	Detailed project report including technical, economic and market feasibility	
2.10	Common errors in project report preparations	

2.11	Exercises on preparation of project report	
2.12	Sample project report	
UNIT3:	**Introduction to Management**	**12 Periods**
3.1	Definitions and importance of management	
3.2	Functions of management: Importance and process of planning, organising, staffing, directing and controlling	
3.3	Principles of management (Henri Fayol, F.W. Taylor)	
3.4	Concept and structure of an organisation	
3.5	Types of industrial organisations and their advantages	
3.6	Line organisation, staff organisation	
3.7	Line and staff organisation	
3.8	Functional organisation	
3.9	**Leadership:** Definition and Need, Qualities and functions of a leader, Manager Vs leader, Types of leadership, Case studies of great leaders	
3.10	**Motivation:** Definition and characteristics, Importance of self-motivation, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, Douglas, McGregor)	
UNIT4:	**Management Scope in Different Areas**	**10 Periods**
4.1	Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment and selection, Introduction to performance appraisal methods	
4.2	Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ	
4.3	Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to promotion mix, Sales promotion	
4.4	Financial Management: Introductions, importance and its functions, knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST	
4.5	**Work Culture** : Introduction and importance of Healthy Work Culture in organization	
4.6	Components of Culture	
4.7	Importance of attitude, values and behavior	
4.8	Behavioral Science – Individual and group behavior.	
4.9	Professional ethics – Concept and need of Professional Ethics and human values	
UNIT5:	**Basic of Accounting and Finance**	**10 Periods**
5.1	Basic of Accounting: Meaning and definition of accounting, Double entry system of book keeping, Trading account, PLA account and balance sheet of a company	
5.2	Objectives of Financial Management: Profit Maximization v/s Wealth Maximization	
5.3	**Miscellaneous Topics** : Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just in time (JIT)	
5.4	Intellectual Property Right (IPR) : Introduction, definition and its importance, Infringement related to patents, copy right, trade mark	

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai & Sons, Delhi.
3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
4. Handbook of Small Scale Industry by PM Bhandari
5. Entrepreneurship Development and Management by MK Garg
6. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

PROGRAMMING IN C

(SPB13230505)

L	T	P
3	0	0

JUSTIFICATION

Computers play a vital role in present day life, more so, in the professional life of technician engineers. People working in the field of computer industry, use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers. The knowledge of C language will be reinforced by the practical exercises.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the concepts of C programming language
2. Install C software on the system and debug the programme
3. Identify a problem and formulate an algorithm for it.
4. Identify various control structures and implement them.
5. Identify various types of variables.
6. Use pointer in an array and structure.
7. Implement the language control structure
8. Understand and execute member functions of C in the programme
9. Implement array concept in C programmer execute pointers

DETAILED CONTENTS

UNIT-1	**Algorithm and Programming Development**	**6 Periods**
1.1	Steps in development of a program Flow charts, Algorithm development Programme Debugging Basis of C programming	
UNIT 2	**Program Structure and Control Structures**	**12 Periods**
2.1	I/O statements, assign statements Constants, variables and data types Operators and Expressions Standards and Formatted IOS Data Type Casting	
2.2	Introduction Decision making with IF − statement IF − Else and Nested IF While and do-while, for loop Break. Continue, goto and switch statements	
UNIT 3	**Pointers**	**8 Periods**
3.1	Introduction to Pointers Address operator and pointers Declaring and Initializing pointers, Single pointer,	
UNIT 4	**Functions**	**10 Periods**
4.1	Introduction to functions Global and Local Variables Function Declaration	

Standard functions
Parameters and Parameter Passing
Call - by value/reference
Recursion

UNIT 5 Arrays **8 Periods**

5.1 Introduction to Arrays
Array Declaration, Length of array
Single and Multidimensional Array.
Arrays of characters
Passing an array to function
Pointers to an array

RECOMMENDED BOOKS

1. Let us C by Yashwant Kanetkar
2. Programming in ANSI C by E Balaguruswami, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Programming in C by Reema Thareja; Oxford University Press, New Delhi
4. Programming in C by Gottfried, Schaum Series, , Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Exploring C by Yashwant Kanetkar; BPB Publications, New Delhi
6. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh

SCHOOL OF POLYTECHNIC

MICROPROCESSORS AND PERIPHERAL DEVICES LAB

(SPB13230551)

L	T	P
0	0	2

JUSTIFICATION

The diploma holder in Computer Science & Engineering needs to have hands-on knowledge of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer., which they will encounter in their professional careers.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the concept of microcomputer system
2. Describe Architecture and pin details of 8085
3. Write assembly language program using mnemonics
4. Interface various peripheral devices with microprocessor.
5. Use various data transfer techniques
6. Describe architecture and pin detail of 8086
7. Describe the idea of advance microprocessors like Pentium series and dual core.

DETAILED CONTENTS

1	Familiarization of different keys of 8085 microprocessor kit and its memory map
2	Steps to enter, modify data/program and to execute a programme on 8085 kit
3	Writing and execution of ALP for addition and subtraction of two 8 bit numbers
4	Writing and execution of ALP for multiplication and division of two 8 bit numbers
5	Writing and execution of ALP for arranging 10 numbers in ascending/descending order
6	Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)
7	Interfacing exercise on 8255 like LED display control
8	Interfacing exercise on 8253 programmable interval timer
9	Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display
10	Writing and execution of different ALP for 8086 (any four)
11	Generation of square wave of desired frequency using 8255.

SCHOOL OF POLYTECHNIC

OPTICAL FIBER ENGINEERING LAB

(SPB13230552)

L	T	P
0	0	2

JUSTIFICATION

Progressing from communication over copper wire to today's fiber optic communication, we have increased our ability to transmit more information, more quickly and over longer distances. This has expanded our boundaries and is finding a good slot in communication system.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand various components and light propagation methods in optical fiber communication.
2. Demonstrate various types of optical fibers
3. Identify and test losses in optical fibers
4. Explain and demonstrate characteristics of optical source and optical detector
5. Connect and provide joints in optical fibers
6. Components and tools used in optical fiber
7. Compare various optical amplifiers

DETAILED CONTENTS

1	To identify and use various components and tools used in optical fiber communication
2	To set up fiber analog link
3	To set up optic digital link
4	To measure bending losses in optical fibers
5	To observe and measure the splice or connector loss
6	To measure and calculate numerical aperture of optical fiber
7	To observe characteristics of optical source
8	To observe characteristics of optical detector
9	To splice the available optical fiber
10	To connect a fiber with connector at both ends

SCHOOL OF POLYTECHNIC
CONSUMER ELECTRONICS LAB

(SPB13230553)

L	T	P
0	0	2

JUSTIFICATION

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices. This in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the various type of microphones and loud speakers.
2. To identify the various digital and analog signal.
3. Describe the basis of television and composite video signal.
4. Describe the various kind of colour TV standards and system.
5. Compare the various types of digital TV system.
6. Understand the various type of consumer goods

DETAILED CONTENTS

1	To plot the directional response of a Microphone
2	To plot the directional response of a Loud Speaker
3	To study public address system and its components.
4	To perform fault identification in TV.
5	Installation of Dish Antenna for best reception.
6	Installation of CCTV system.
7	To study the various parameters in the Smartphone and Tablet, PC

SCHOOL OF POLYTECHNIC

PROGRAMMING IN C LAB

(SPB13230555)

L	T	P
0	0	2

JUSTIFICATION

Computers play a vital role in present day life, more so, in the professional life of technician engineers. People working in the field of computer industry, use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers. The knowledge of C language will be reinforced by the practical exercises.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the concepts of C programming language
2. Install C software on the system and debug the programme
3. Identify a problem and formulate an algorithm for it.
4. Identify various control structures and implement them.
5. Identify various types of variables.
6. Use pointer in an array and structure.
7. Implement the language control structure
8. Understand and execute member functions of C in the programme
9. Implement array concept in C programmer execute pointers

DETAILED CONTENTS

1	Programming exercises on executing and editing a C program.
2	Programming exercises on defining variables and assigning values to variables.
3	Programming exercises on arithmetic and relational operators.
4	Programming exercises on arithmetic expressions and their evaluation.
5	Programming exercises on formatting input/output using printf and scanf and their return type values.
6	Programming exercises using if statement.
7	Programming exercises using if – Else.
8	Programming exercises on switch statement
9	Programming exercises on do – while, statement.
10	Programming exercises on for – statement.
11	Programs on one-dimensional array.

SCHOOL OF POLYTECHNIC

MINOR PROJECT WORK

(SPB13230556)

L	T	P
0	0	2

JUSTIFICATION

Minor project work aims at exposing the students to various industries dealing with computers. It is expected from them to get acquainted with computer environment. For this purpose, student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Use effectively oral, written and visual communication
2. Demonstrate skill and knowledge of current information and technological tools and
3. Techniques specific to the professional field of study.
4. Identify, analyze and solve problems creatively through sustained critical investigation.
5. Develop co-worker and leadership abilities.
6. Apply fundamental and disciplinary concepts and methods in ways appropriate to their
7. Areas of study.

DETAILED CONTENTS

1	Industrial practices in installation and maintenance of computers and computer networks
2	Fabrication of computers
3	Fault diagnosis and testing of computers
4	Industrial practices in respect of documentation and fabrication
5	A variety of computers and peripherals in assembly organizations
6	Software package development organizations
7	Maintenance of database
8	Write procedure or functions which can be attached as the library objects to the main projects
9	Write a procedure function to convert number of words.
10	Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), Library classes in C++ (same application).,
11	design web applications using PHP

SCHOOL OF POLYTECHNIC

Industrial Training

(SPB13230560)

L	T	P
0	0	0

JUSTIFICATION

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of 4 weeks duration to be organised during the semester break starting after second year i.e. after 4th semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An external assessment of 50 marks has been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details. The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

a) Punctuality and regularity 15%
b) Initiative in learning new things 15%
c) Presentation and VIVA 15%.
d) Industrial training report 55%

Semester 6th

SCHOOL OF POLYTECHNIC

MICROWAVE AND RADAR ENGINEERING

(SPB13230601)

L	T	P
3	0	0

JUSTIFICATION

This subject includes an exposure to microwaves engineering, radar systems, fiber optics and satellite communication. In microwaves industry, job opportunities are available in the area of assembly, production, installation, repair and maintenance of microwave transmitters and receivers. The knowledge of radar systems allows opportunities with civil and defense organizations dealing with aircraft and shipping. Fiber optics is the latest thrust area in communication with vast opportunities in the private sector.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify and demonstrate operating principles and typical applications of tubes and diodes.
2. Understand the various types and propagation modes of wave guides
3. Describe the various types of antennas and wave propagation techniques
4. Know the basic principle of radar and interpret the various parameters used in radar equations measure VSWR of a given load
5. Identify the block diagram and explain the operating principles of CW(Doppler), FMCW, MTI radar interpret radar display PPI
6. Describe the working principles of microwave communication link

DETAILED CONTENTS

UNIT-1 Introduction to Microwaves **10 Periods**

1.1 Introduction to microwaves and its applications, Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, Ku, Ka, Sub mm)

1.2 Microwave Devices
Characteristics, operating principles and typical applications of the following devices (No mathematical treatment)
- Multi cavity klystron
- Reflex klystron
- Multi-cavity magnetron
- Traveling wave tube
-Gunn diode
- IMPATT diode
- TRAPATT diode
- PIN diode

UNIT 2 Wave guides **8 Periods**

2.1 Rectangular and circular wave guides and their applications. Mode of wave guide; Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide.

UNIT 3 Antenna and Wave Propagation **12 Periods**

3.1 Physical concept of radiation electromagnetic energy from an antenna, relationship between the direction of electric and magnetic fields with direction of propagation; concept of polarization of EM waves.

3.2 Electromagnetic spectrum and its various range VLF, LF, HF, VHF, UHF, Micro wave, Optical waves etc.

3.3 Definition and physical concepts of the terms used with antennas like point source, gain, power gain, directivity aperture, effective area, radiation pattern, (field strength power and phase) beam angle, beam width and radiation resistance.

3.4 Types of antennas- Brief description, characteristics and typical applications of medium wave antenna, shortwave antenna, HF antenna, VHF, UHF and Microwave antenna e.g., half wave dipole, ground plane, yagi and ferrit rod antenna in transistor receiver. Brief idea about rhombic antenna, dish antenna, Horn, Parabolic reflector and Lens antenna.

3.5 Antenna arrays-Brief description of broad side and end fire arrays their radiation pattern and application (without analysis)

3.6 Basic idea about different modes of radio wave propagation- ground wave propagation, space wave propagation and sky wave propagation, their characteristics and typical areas of application. (e.g. medium wave, short wave, TC communication.)

3.7 Explanation of the terms-critical frequency, maximum usable frequency (MUF) and skip distance.

UNIT 4 Radar Systems **8 Periods**

4.1 Introduction to radar, its various applications, radar range equation (no derivation) and its applications.

UNIT 5 Satellite Communication **10 Periods**

5.1 Basic idea passive and active satellites.
- Meaning of the terms Orbit, Apogee and Perigee
- Geo- stationary satellite and its need.
- Block diagram and explanation of a satellite communication link.
- Differentiate between various types of satellites.

RECOMMENDED BOOKS

1. Microwave Devices and Components by Sylio; Prentice Hall of India, New Delhi
2. Electronics Communication by Roddy and Coolen; Pearson Publishers.
3. Electronics Communication System by KS Jamwal; Dhanpat Rai and Sons, Delhi
4. Microwave Engineering by Das; Tata McGraw Hill Education Pvt Ltd , New Delh
5. Microwave & Radar Engineering by Navneet Kaur; Ishan Publications, Ambala City
6. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

MICROCONTROLLERS & EMBEDDED SYSTEM

(SPB13230602)

L	T	P
3	0	0

JUSTIFICATION

The study of microcontrollers in terms of architecture, software and interfacing techniques leads to the understanding of working of microcontrollers and applications of microcontroller in electronic industries. Microcontroller is the heart of the programmable devices. Embedded systems and Micro-controllers have also assumed a great significance in the electronic and consumer goods industry and are a very vital field. Students of electronics and related engineering branches often use microcontroller to introduce programmable control in their projects, automation and fault finding in industry. The subject aims expose students to the embedded systems besides giving them adequate knowledge of micro controllers.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the working of microcontrollers
2. Understand the Instruction set and programming related to microcontrollers
3. Describe embedded system
4. Explain embedded operating systems
5. Program PIC microcontroller and AVR microcontroller
6. Interface sensors with microcontroller

DETAILED CONTENTS

UNIT-1	**Microcontroller series (MCS)**	**10 Periods**
1.1	Architecture of 8051Microcontroller Pin details I/O Port structure Memory Organization Special Function Registers (SFRs) External Memory	
UNIT 2	**Instruction Set for Microcontroller Programming**	**8 Periods**
2.1	Instruction Set of 8051 Addressing Modes, Types of Instructions Timer operation Serial Port operation Interrupts	
UNIT 3	**Introduction to Embedded System and Embedded operating systems**	**10 Periods**
3.1	Embedded system, history of embedded systems, embedded system architecture, Functional structure of embedded system	
3.2	Real-time operating system, factors affecting embedded systems, applications of embedded systems, embedded systems characteristics and features,	
UNIT 4	**Introduction of PIC microcontroller and Programming concepts of microcontrollers.**	**10 Periods**
4.1	Block diagram, function of each block. Introduction of AVR microcontroller, block diagram, function of each block.	
4.2	Basic introduction of Software used in microcontrollers. How to transfer C or ASM code in microcontrollers.	
UNIT 5	**Input/output interface and Internet of Things**	**10 Periods**
5.1	Sensors, 7-segemtn display, LCD, LED and relay	

5.2 Introduction to Internet of things
- Application, architecture, protocols
- Functional blocks of IoT, Characteristics of IoT
- Brief idea of Arduino IDE

RECOMMENDED BOOKS

1. Fundamentals of Microprocessor and Microcontroller by B. Ram , Dhanpat Rai Publications.
2. Microcotroller and Embedded Systems using Assembly And C by Muhammad Ali Mazidi, RolinMckinlay, Janice GilispieMazidi: Pearson
3. PIC Microcontroller and Embedded Systems : Using assembly and C by Muhammad Ali Mazidi, RolinMckinlay, Danny Causey; Pearson
4. Microcotroller and Embedded Systems using Assembly and C by Muhammad Ali Mazidi, RolinMckinlay, Janice GilispieMazidi, Pearson
5. Embedded Systems - Architecture, Programming, Design, by Kamal, R. Tata McGraw Hill, New Delhi
6. YashavantKanetkar, ShrirangKorde, "21 Internet Of Things (IOT) Experiments"
7. Neerparaj Rai , "Arduino Projects For Engineers"
8. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SCHOOL OF POLYTECHNIC

WIRELESS AND MOBILE COMMUNICATION

(SPB13230603)

L	T	P
3	0	0

JUSTIFICATION

The wireless/mobile communication technology though complex but is spreading at a very fast rate. People use more of mobile phones in comparison to land line phones. It is expected that within very short period, almost everybody will be using mobile communication. Technology is also changing very fast. Therefore, the students should know the functioning of wireless/mobile system/equipment to keep themselves abreast of this latest application of communication.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify and explain the features, specification and working of cellular mobile
2. Measure and analyze signal strength at various points from a transmitting antenna with mobile phone.
3. Understand generation of cellular phones.
4. Describe and analyze different Multiple Access Techniques for Wireless Communication (FDMA, TDMA and CDMA)
5. Describe different Mobile Communication Systems(GSM and CDMA)
6. Demonstrate call processing on a GSM and CDMA trainer Kit
7. Demonstration of SIM, LTE, Vo-LTE and mobile network
8. Describe the idea of LAN, MAN, WAN

DETAILED CONTENTS

UNIT-1 Wireless Communication **10 Periods**

1.1 Basics
Advantages of wireless communication
Electromagnetic waves.
Frequency Spectrum used.
Cellular Network Systems.

UNIT 2 Cellular Concept **10 Periods**

2.1 Introduction to 1G, 2G, 3G, 4G, and 5G

2.2 Cell area
Cell Site Structure
Capacity of cell
Frequency Reuse (Concept)

2.3 Interference (Co-channel, Adjacent channel)
Power Control for reducing Interference
Fundamentals of cellular network planning
a) Coverage planning
b) Capacity planning
c) Cell splitting and sectoring

UNIT 3 Multiple Access Techniques for Wireless Communication **8 Periods**

3.1 Introduction to Multiple Access.
Code Division Multiple Access (CDMA), WCDMA

3.2 Frequency Division Multiple Access (FDMA)

3.3 Time Division Multiple Access (TDMA)

3.4 Distinction between TDMA FDD and TDMA TDD

UNIT 4 Introduction to Bluetooth technology and Wi-Fi Technology and Mobile Communication Systems **10 Periods**

4.1 Introduction of Global Systems for Mobile Communication (GSM) and its architecture, Introduction of CDMA System, comparison of CDMA and GSM Systems and frequency bands.

4.2 Introduction to GPRS and EDGE, Introduction to Architecture and Features of UMTS

4.3 HSPA (High Speed Packet Access)

4.4 Features and Architecture of LTE (Long Term Evolution), Vo-LTE(Voice Over Long Term Evolution)

4.5 Brief description of Y-Max technology and SIM, IMIE
Introduction to GPS(Global Position System)

UNIT 5 Digital and Data Communication **10 Periods**

5.1 Data Transmission Basics: Review of digital data anlog modulation and digital formats. Data rates, Baud Rates, Channel capacity, Mediums for communication, Synchronous and ashnchronous data communication.

5.2 ISO-OSI model and TCP/IP model of network, Protocols and services. Connection oriented and connectionless services.

5.3 IEEE 208 standards for computer networks. Internet and ISDN services.

RECOMMENDED BOOKS

1. Wireless Communications, Principles and Practice, by ThedoreS.Rappaport.
2. Wireless Communications and Networking, by William Stallings.
3. Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi
4. Wireless and Mobile Communication VK Sangar, Ishan Publication, Ambala.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR.

SCHOOL OF POLYTECHNIC

COMMUNICATION NETWORKS

(SPB13230604)

L	T	P
3	0	0

JUSTIFICATION

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in electronics and communication engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Recognize physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognize various types of connectors RJ-45, RJ-11,BNC and SCST.
3. Demonstrate various types of networking models and protocol suites.
4. Install and configure a network interface card in a workstation.
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation configure routers.
6. Demonstrate sub netting of IP address.
7. Identify connectivity troubleshooting using PING, IPCONFIG, IFCONFIG.
8. Explain concept of wireless networking configure different Network devices.
9. Understand network security management and configuration.

DETAILED CONTENTS

UNIT-1 Networks Basics **8 Periods**

1.1 What is network
Peer-to −peer Network
Server Client Network
LAN, MAN and WAN

1.2 Network Services
Network Topologies

1.3 Switching Techniques −Circuit switching, Packet switching and level switching, Next generation network concept

1.4 Cloud Computing

UNIT 2 OSI Model and I P Addressing **12 Periods**

2.1 Standards, OSI Reference Model, OSI Physical layer concepts and application, OSI Data-link layer concepts and application, OSI Networks layer concepts and application

2.2 OSI Transport layer concepts and application, OSI Session layer concepts and application, OSI presentation layer concepts and application

2.3 OSI Application layer concepts and application, Reference madel OSI and TCP/IP

2.4 Concept of physical and logical addressing, Different classes of IP addressing, special IP address, Sub netting and super netting

2.4 Loop back concept, IPV4 and IPV6 packet Format, Configuring IPV4 and IPV6

UNIT 3 Cables and Connectors **8 Periods**

3.1 Types of Cables(Coaxial, Twisted Pair), Shielded and Unshielded Pair of Cables, Fiber optic cable.(Straight through Cable, Cross Over Cables) with colour coding.

3.2 Ethernet Specification and Standardization: 10 Mbps (Traditional Ethernet), 100

Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet), Leased lines.

3.3 Use of RJ45, RJ11, BNC, SCST.

UNIT 4 Network Connectivity **12 Periods**

4.1 Network connectivity Devices, NICs, Hubs, Bridges, Repeaters

4.2 Switches Routers and Routing Protocols, Routing Algorithm Configuring of Routers. VOIP and Internet Telephony

UNIT 5 Network Connectivity and Wireless Networking **8 Periods**

5.1 Client/Server Technology, Server Management, RAID management and mirroring Cryptography, Ethical Hacking

5.2 Basics of Wireless: Wireless MAN, Networking, Wireless LAN, Wi-Fi, WiMax (Broad-band Wireless) and Li-Fi.

RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi
2. Data Communications and Networking by Forouzan, (Edition 2nd and 4th),Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Data and Computer Communication by William Stallings, Pearson Education, New Delhi
4. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR.

SCHOOL OF POLYTECHNIC

MICROWAVE AND RADAR ENGINEERING LAB

(SPB13230651)

L	T	P
0	0	2

JUSTIFICATION

This subject includes an exposure to microwaves engineering, radar systems, fiber optics and satellite communication. In microwaves industry, job opportunities are available in the area of assembly, production, installation, repair and maintenance of microwave transmitters and receivers. The knowledge of radar systems allows opportunities with civil and defense organizations dealing with aircraft and shipping. Fiber optics is the latest thrust area in communication with vast opportunities in the private sector.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Identify and demonstrate operating principles and typical applications of tubes and diodes.
2. Understand the various types and propagation modes of wave guides
3. Describe the various types of antennas and wave propagation techniques
4. Know the basic principle of radar and interpret the various parameters used in radar equations measure VSWR of a given load
5. Identify the block diagram and explain the operating principles of CW(Doppler), FMCW, MTI radar interpret radar display PPI
6. Describe the working principles of microwave communication link

DETAILED CONTENTS

1	To measure electronics and mechanical tuning range of a reflex klystron
2	To measure VSWR of a given load.
3	To plot radiation pattern of horn antenna in horizontal and vertical plane.
4	To plot VI characteristics of GUNN-Diode.
5	To determine the frequency and wavelength of a rectangular waveguide working in TE10 mode.
6	To study and test various parameters such as gain, noise, bandwidth and voltage at different point of a microwave amplifier.
7	To measure the power gain and beam width of a microwave dish antenna.

SCHOOL OF POLYTECHNIC

MICROCONTROLLERS & EMBEDDED SYSTEM LAB

(SPB13230652)

L	T	P
0	0	4

JUSTIFICATION

The study of microcontrollers in terms of architecture, software and interfacing techniques leads to the understanding of working of microcontrollers and applications of microcontroller in electronic industries. Microcontroller is the heart of the programmable devices. Embedded systems and Micro-controllers have also assumed a great significance in the electronic and consumer goods industry and are a very vital field. Students of electronics and related engineering branches often use microcontroller to introduce programmable control in their projects, automation and fault finding in industry.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Understand the working of microcontrollers
2. Understand the Instruction set and programming related to microcontrollers
3. Describe embedded system
4. Explain embedded operating systems
5. Program PIC microcontroller and AVR microcontroller
6. Interface sensors with microcontroller

DETAILED CONTENTS

1	Familiarization with Micro-controller Kit and its different sections
2	Programming to interface switches and LEDs
3	Programming and interface of Seven Segment and LCD.
4	Programming for A/D converter, result on LCD.
5	Programming for D/A converter, result on LCD.
6	Programming for serial data transmission from PC to Kit or Vice versa.
7	Programming and interfacing of RELAY and Buzzer
8	Design PIC based Security System
9	Design AVR based Temperature indicator cum controller
	Practical using Arduino-interfacing sensors
10	Interfacing Light Emitting Diode(LED)- Blinking LED
11	Interfacing Button and LED – LED blinking when button is pressed
12	Interfacing Light Dependent Resistor (LDR) and LED, displaying automatic night lamp
13	Interfacing Relay module to demonstrate Bluetooth/wifi based home automation application. (using Bluetooth/wifi and relay).

SCHOOL OF POLYTECHNIC

WIRELESS AND MOBILE COMMUNICATION LAB

(SPB13230653)

L	T	P
0	0	2

JUSTIFICATION

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7. Demonstration of SIM, LTE, Vo-LTE and mobile network
8. Describe the idea of LAN, MAN, WAN

DETAILED CONTENTS

1	Study the features, specification and working of cellular mobile
2	Measurement of signal strength at various points from a transmitting antenna
3	Demonstration of Base Trans Receiver(BTS) with nearby cellular tower
4	Observing call processing of GSM trainer kit.
5	Repair of a GSM mobile phone
6	Troubleshooting GSM Mobile Phone Assembling and dissembling of GSM phone Study parts of Mobile Phone Testing of various parts

SCHOOL OF POLYTECHNIC

COMMUNICATION NETWORKS LAB

(SPB13230654)

L	T	P
0	0	2

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LEARNING OUTCOMES

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6. Demonstrate sub netting of IP address.
7. Identify connectivity troubleshooting using PING, IPCONFIG, IFCONFIG.
8. Explain concept of wireless networking configure different Network devices.
9. Understand network security management and configuration.

DETAILED CONTENTS

1 Configure local area network using topologies.
2 Configure different network devices used in LAN- hub/switch/routers/bridges.
3 Create different types of cables for straight through and cross over cable
4 Configure Ethernet network
5 Install NIC and locate MAC address
6 Configure TCP/IP addressing
7 Install Network printer and sharing content

SCHOOL OF POLYTECHNIC

PROJECT WORK

(SPB13230663)

L	T	P
0	0	4

JUSTIFICATION

Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project.
2. Develop understanding regarding the size and scale of operations and nature of fieldwork in which students are going to play their role after completing the courses of study
3. Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
4. Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
5. Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.
6. Assemble/fabricate and test an electronics gadget.

GENERAL GUIDELINES

1. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute.
2. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students.
3. The project assignment can be individual assignment or a group assignment.
4. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.
5. This practical training cum project work should not be considered as merely conventional industrial training in which students are sent at work places with either minimal or no supervision.
6. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students.
7. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

Some of the project activities are given below:

1. Projects related to designing small electronic equipment / instruments.
2. Projects related to increasing productivity in electronic manufacturing areas.
3. Projects related to quality assurance.
4. Projects connected with repair and maintenance of plant and equipment.
5. Projects related to design of PCBs.
6. Projects related to suggesting substitutes of electronics components being used.
7. Projects related to design of small oscillators and amplifier circuits.
8. Projects related to design, fabrication, testing and application of simple digital circuits and components.
9. Projects related to microprocessor/microcontroller based circuits/ instruments.

DETAILED CONTENTS

1	Some of the projects based on above areas are listed below for the benefit of students: Microprocessor/Microcontroller based rolling display/bell and calendar
2	Microprocessor based stepper motor control.
3	Speed control of DC Machines by Microprocessor/Microcontrollers
4	Temperature monitoring using Microprocessor/Microcontroller based systems.
5	Microprocessor/Microcontroller based liquid level indicator and control
6	Fabrication and assembling of digital clock.
7	Fabrication of ON line/OFF line UPS of different ratings and inverters
8	Design, fabrication and testing of different types of experimental boards
9	Repair of oscilloscope, function generator
10	Microprocessor/Microcontroller based solar tracking system