STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ELECTRONICS ENGINEERING

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1	*Communication Skills-I	4	-	2	4	20	10	30	50	2 ½	20	3	70	100
1.2	*Applied Mathematics - I	5	-	-	4	20	-	20	50	2 ½	-	3	50	70
1.3	*Applied Physics – I	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
1.4	*Applied Chemistry	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
1.5	*Engineering Drawing-I	-	-	8	2	40		40	60	3	-	-	60	100
1.6	Engineering Mechanics and Materials	4	-	-	3	20	-	20	50	2 ½	-	-	50	70
1.7	General Workshop Practice-I	-	-	8	2	-	40	40	-	-	60	4	60	100
	#Student Centred Activities (SCA)	-	-	3	1	-	30	30	-	-	-	-	-	30
	Total	**23**	**-**	**25**	**26**	**140**	**100**	**240**	**310**	**-**	**120**	**-**	**430**	**670**

* Common with other diploma programmes

\# Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SECOND SEMESTER (ELECTRONICS ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	*Applied Mathematics - II	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
2.2	*Applied Physics -II	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
2.3	*Basics of Information Technology	-	-	6	2	-	40	40	-	-	60	3	60	100
2.4	Electrical Engineering -I	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
2.5	Electronic Components and Devices	6	-	6	7	20	30	50	50	2 ½	50	3	100	150
2.6	General Workshop Practice-II	-	-	8	2	-	40	40	-	-	60	4	60	100
	#Student Centred Activities (SCA)	-	-	2	1	-	30	30	-	-	-	-	-	30
	Total	**20**	**-**	**28**	**26**	**80**	**180**	**260**	**200**	**-**	**240**	**-**	**440**	**700**

*   Common with other diploma programmes

Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

1.1   COMMUNICATION SKILLS – I

L   T   P
4   -   2

RATIONALE

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 undergoing the subject, the students will be able to:

.
- Understand the importance of effective communication
- Describe the process of communication
- Communicate effectively in different contexts
- Identify parts of speech
- Write correct sentences using appropriate vocabulary
- Reproduce and match words and sentences in a paragraph
- Write various types of paragraphs, notices for different purposes and composition on picture with appropriate format
- Read unseen texts with comprehension
.

DETAILED CONTENTS

1   Basics of Communication   (13 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

2 Application of Grammer   (18 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

3 Reading Skill   (10 periods)
Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4 Writing Skill   (15 periods)

  4.1 Picture composition
  4.2 Writing paragraph
  4.3 Notice writing

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.
Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

Listening and Speaking Exercises

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.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centred activities in class room and actively participate in listening exercises

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-semester and end-semester written tests
- Actual practical work, exercises and viva-voce
- Presentation and viva-voce

RECOMMENDED BOOKS

1.   Communicating Effectively in English, Book-I by RevathiSrinivas; 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.   e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.
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
7.   Q. Skills for success – Level & Margaret Books, Oxford University Press.

Websites for Reference:

1. http://www.mindtools.com/ page 8.html – 99k
2. http://www.letstalk.com.in
3. http://www.englishlearning.com
4. http://learnenglish.britishcouncil.org/en/
5. http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	13	24
2	18	32
3	10	16
4	15	28
Total	**56**	**100**

1.2   APPLIED MATHEMATICS - I

                                                          L   T   P

                                                          5   -   -

RATIONALE

Contents of this course provide fundamental base for understanding elementary mathematics and their uses in solving engineering problems. Contents of this course will enable students to use basic mathematical function like logarithms, partial fractions, matrices and basic 2D, curves in solving various engineering problems of all fields.

LEARNING OUTCOMES

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

- Apply Binomial theorem to solve engineering problems
- Apply determinants properties and Crammer's rule to solve engineering problems
- Apply dot & cross product of vectors to find the solution of engineering problems
- Use complex numbers in various engineering problems
- Apply differential calculus and higher order to solve engineering problems
- Find velocity, acceleration, errors and approximation in engineering problems with application of derivatives.

DETAILED CONTENTS

1.   Algebra -I   (08 Periods)

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

       1.2   Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

2. Algebra- II   (08 Periods)

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number.

Complex numbers, Representation, Modulus and amplitude Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..

3. Trigonometry   (06 Periods)

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relation ship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. Differential Calculus - I   (10 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, Logaritimic differentiation, Differentiation of Inverse trigonometric function, Differentiation of implicit functions.

5. Differential Calculus - II   (10 Periods)

5.1 Higher order derivatives, Leibnitz theorem (without proof). Simple applications.

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

INSTRUCTONAL STRATEGY

The basic instructional strategy to teach basic mathematics, Binomial theorem, trigonometry, differential equations etc. should be conceptual with real world applications of relevant branch. More numerical and theory examples can be used for clear understanding of the content**.**

MEANS OF ASSESSMENT

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

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-I by Chauhan and Chauhan, Krishna Publications, Meerut**.**
4. Applied Mathematics-I (A) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	08	20
2.	08	20
3.	06	12
4	10	24
5	10	24
Total	**42**	**100**

1.3 APPLIED PHYSICS – I

L   T   P

5   -   2

RATIONALE

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.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.

LEARNING OUTCOMES

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

- Identify the use of S.I. system of measurement with accuracy and how it is used in   engineering
- Represent physical quantities as scalars and vectors, applying the physical laws and concepts of linear and circular motion in everyday life.

- Solve difficult problems (walking of man, horse and cart problem, flying of bird/ aircraft, etc.)

- Analyse and design banking of roads/railway tracks and apply conservation of momentum principle to Explain rocket propulsion, recoil of gun etc.

- Derive work, power and energy relationship and solve problems about work and power.

- Define work, energy and power and their units.

- Describe conservation of energy and its applications

- Understand the concept of rotational motion of a rigid body and its applications

- Apply the physical laws and concepts of gravity, its variation with longitude and latitude and its uses in space satellite etc.   .

- Understand the concept of elasticity, surface tension, pressure and the laws governing movement of fluids.

- Express physical work in term of heat and temperature; Measure temperature in various processes on different scales (Celsius, Kelvin, Fahrenheit etc.)

- Distinguish between conduction, convection and radiation, identify the different methods for reducing heat losses

- Understand the laws of thermodynamics, Carnot cycle and their applications.

DETAILED CONTENTS

1. Units and Dimensions   (10 Periods)

    1.1   Need of Measurement in engineering and science, unit of a physical quantities - fundamental and derived units, systems of units (FPS, CGS and SI units)
    1.2   Dimensions and dimensional formulae of physical quantities.
    1.3   Principle of homogeneity of dimensions
    1.4   Dimensional equations and their applications, conversion of numerical values of physical quantities from one system of units into another, checking the correctness of physical equations and deriving relations among various physical quantities
    1.5   Limitations of dimensional analysis
    1.6   Error in measurement, accuracy and precision of instruments, random and systematic errors, absolute error, relative error, and percentage error, Estimation of probable errors in the results of measurement (combination of errors in addition, subtraction, multiplication, division and powers), rules for representing significant figures in calculation.
    1.7   Application of units and dimensions in measuring length, diameter, circumference, volume, surface area etc. of metallic and non metallic blocks, wires, pipes etc (at least two each).

2. Force and Motion   (10 periods)

    2.1   Scalar and vector quantities – examples, representation of vector, types of   vectors
    2.2   Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product.
    2.3   Resolution of Vectors and its application to lawn roller.
    2.4   Force, Momentum, Statement and Derivation of Conservation of linear momentum, its applications such as recoil of gun.

2.5 Impulse and its Applications

2.6 Circular motion (Uniform and Non-uniform), definition of angular displacement, angular velocity, angular acceleration, frequency, time period.

2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)

2.8 Central force, Expression and Applications of Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist, Principle of centrifuge.

2.9 Application of various forces in lifts, cranes, large steam engines and turbines

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,

3.2 Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications.

3.3 Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications

3.4 Energy and its units: Kinetic energy and potential energy with examples and their derivation, work energy theorem.

3.5 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.

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

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

4 Rotational Motion (10 periods)

4.1 Concept of translatory and rotatory motions with examples

4.2 Definition of torque with examples

4.3 Angular momentum, Conservation of angular momentum (quantitative) and its examples

4.4 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.

4.5 Rotational kinetic energy, Rolling of sphere on the slant plane,

4.6 Comparison of linear motion and rotational motion.

4.7 Application of rotational motions in transport vehicles, and machines.

5 Motion of planets and satellites (08 periods)

5.1 Gravitational force, Kepler's law of planetary motion,

5.2 Acceleration due gravity and its variation,

5.3 Gravitational Potential and Gravitational potential energy,

5.4 Motion of satellite, orbital velocity and time period of satellite, Total energy and Binding energy of a satellite, Escape energy and escape velocity,

5.5 Types of satellites, Geo-stationary satellite, semi-synchronous, polar satellite (concept only) and their uses in science and technology,

5.6 Concept of Black Holes,

6. Properties of Matter (12 periods)

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

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

6.3 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

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

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

7. Heat and Thermodynamics (10 periods)

7.1 Difference between heat and temperature

7.2 Modes of transfer of heat (Conduction, convection and radiation with examples)

7.3 Different scales of temperature and their relationship

7.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them

7.5 Heat conduction in a metal rod, Temperature gradient, Concept of Co-efficient of thermal conductivity, Uses and effects of Heat conduction in Daily life.

7.6 Isothermal and Adibatic process

7.7 Zeroth, First and second law of thermodynamics, Heat engine (concept Only), Carnot cycle.

7.8 Application of various systems of thermometry in refrigeration and air-conditioning etc.

LIST OF PRACTICALS (to perform minimum six experiments)

1 To find radius of wire and its volume and the maximum permissible error in these quantities by using both vernier calipers and screw gauge.

2 To find the value of acceleration due to gravity on the surface of earth by using a simple pendulum.

3 To determine the Radius of curvature of (i) convex mirror, (ii) concave mirror by spherometer

4 To verify parallelogram law of forces

5 To study conservation of energy of a ball or cylinder rolling down an inclined plane.

6 To find the Moment of Inertia of a flywheel about its axis of rotation

7 To determine the atmospheric pressure at a place using Fortin's Barometer

8 To determine the viscosity of glycerin by Stoke's method

9 To determine the coefficient of linear expansion of a metal rod

10 To determine force constant of spring using Hooks law

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

MEANS OF ASSEMENTS

- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- VivaVoice

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., New Delhi

4   B.Sc.Practical Physics by C L Arora, S. Chand Publication..

5   Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6   Engineering Physics by DK Bhhatacharya & Poonam Tandan; Oxford University Press, New Delhi
7   Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications
8   V. Rajendran,physics-I, Tata McGraw-Hill raw Hill publication, New Delhi
9   Arthur Beiser, Applied Physics, Tata McGraw-Hill raw Hill publication, New Delhi
10 Physics Volume 1, 5th edition, Haliday Resnick and Krane, Wiley publication

TOPIC WISE DISTRIBUTION OF PERIODS AND MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	15
2	10	15
3	10	15
4	10	15
5	08	10
6	12	16
7	10	14
Total	**70**	**100**

1.4   APPLIED CHEMISTRY

L T P
5 - 2

RATIONALE

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:

- Classify various substances based on state of aggregation
- Substantiate the laws and principles on which structure of atom is established.
- Explain and predict properties of substances.
- Explain sources of water and various characteristics of water (quantitatively).
- Explain cause and factors which can adversely affecting natural water quality and remedial measures available for water purification
- Think critically, develop and adapt water conservation techniques.
- Explain corrosion of metal and their preventive measures.

- explain chemical nature and causes of corrosion
- apply correct and efficient methods of corrosion prevention.
- explain chemistry of fuels and their relative advantages.
- select most efficient fuel for the engine and engineering applications.
- suggest how to subside air pollution caused by the use of fossil fuels
- explain the chemistry of various polymers and plastics
- verify suitability and select polymer/rubber/plastic materials for engineering applications.

DETAILED CONTENTS

1. Atomic Structure, Periodic Table and Chemical Bonding   (14 periods)

    1.1   Fundamental particles- mass and charges of electrons, protons and neutrons with names of the scientists who discovered these fundamental particles.

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

    1.3   Atomic number, atomic mass number isotopes and isobars.

    1.4   Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance,

    1.5   Aufbau's principle, Pauli's exclusion principle and Hund's rule electronic configuration of elements with atomic number (Z) = 30 only. (Electronic configurations of elements with atomic number greater than 30 are excluded).

    1.6   Modern periodic law and periodic table, groups and periods, classification of elements into s, p, d and f blocks (periodicity in properties - excluded)

    1.7   Chemical bonding and cause of bonding and types such as ionic bond in NaCl sigma (σ) and pi (π) covalent bonds in H_2, HCl, Cl_2, elementary idea of hybridization in $BeCl_2$, BF_3, CH_4, NH_3 and H_2O, VSEPR, Molecular orbital Theory

    1.8   States of Matter: Solid, Liquid & Gas, Metallic bonding- explanation with the help of electron gas (sea) model.

2. Fuels and Lubricants   (18 periods)

    2.1   Definition of fuel, classification of fuels, characteristics of good fuel, relative merits of gaseous, liquid and solid fuels

    2.2   Calorific value-higher calorific value, lower calorific value, determination of calorific value of solid or liquid fuel using Bomb calorimeter and numerical examples.

2.3   Coal - types of coal and proximate analysis of coal

2.4   Fuel rating – Octane number and Cetane number, fuel-structural influence on Octane and Cetane numbers

2.5   Gaseous fuels – chemical composition, calorific value and applications of natural gas (CNG), LPG, producer gas, water gas and biogas.

2.6   Elementary ideal on – hydrogen as future fuels, nuclear fuels.

2.7   Lubricants: Definition and properties, mechanism, industrial application and its function in bearings.

2.8   Synthetic lubricants and cutting fluids.

3.   Water   (14 periods)

3.1   Demonstration of water resources on Earth using pie chart.

3.2   Classification of water – soft water and hard water, action of soap on hard water, types of hardness, causes of hardness, units of hardness – mg per liter (mgL^{-1}) and part per million (ppm) and simple numerical, pH and buffer solutions and their applications.

3.3   Disadvantages caused by the use of hard water in domestic and boiler feed water. Primming and foaming and caustic embrittlement in boilers.

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

3.5   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 and O'Hener's Method. (chemical reaction of EDTA method are excluded).
        c)   Understanding of Indian Water Quality standards as per WHO

3.6   Natural water sterilization by chlorine and UV radiation and reverse osmosis.

3.7   Municipality waste water treatment. Definition of B.O.D and C.O.D.

4.   Electrochemistry   (4 periods)

Redox Reaction, Electrode Potential, Nernst equation, Electrochemical cell (Galvanic and Electrobytes); Nernst equation.

5.   Corrosion and its Control   (10 periods)

5.1   Definition of corrosion and factors affecting corrosion rate.

5.2 Theories of
    a) Dry (chemical) corrosion- Pilling Bedworth rule
    b) Wet corrosion in acidic atmosphere by hydrogen evolution mechanism

5.3 Definition of passivity and galvanic series

5.4 Corrosion control:
    a) Metal coatings – Cathodic protection, Cementation on Base Metal Steel –Application of Metal Zn (Sheradizing),Cr (Chromozing) and Al (Calorizing), Sacrificial protection and impressed current voltage
    b) Inorganic coatings – Anodizing and phosphating,
    c) Organic coatings - use of paints varnishes and enamels
    d) Internal corrosion preventive measures- alloying (with reference to passivating, neutralizing and inhibition) and heat treatment (quenching, annealing)

6. Organic compounds, Polymers and Plastics   (10 periods)

6.1 Classification of organic compounds and IUPAC Nomenclature
6.2 Definition of polymer, monomer and degree of polymerization
6.3 Brief introduction to addition and condensation polymers with suitable examples (PE, PS, PVC, Teflon, Nylon -66 and Bakelite)
6.4 Definition of plastics, thermo plastics and thermo setting plastics with suitable examples, distinctions between thermo and thermo setting plastics
6.5 Applications of polymers in industry and daily life

LIST OF PRACTICALS

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 sulfuric acid solution

3. Proximate analysis of solid fuel)

4. Estimation of temporary hardness of water sample by O' Hener's Method.

5. Determination of flash and fire point of given lubricating oil using Able's flash point apparatus

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions. In addition, students should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career.

MEANS OF ASSEMENTS
- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- VivaVoice

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 Publishing Company, 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, Narosa Publishing House, New Delhi.
5. Applied Chemistry - I by Dr. P. K Vij & Shiksha Vij, Lords Publications, Jalandhar.
6. Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, Meerut, India

SUGGESTED DISTRIBUTION OF MARKS

Topics	Time Allotted (hrs)	Marks Allotted (%)
1.	14	20
2.	18	24
3.	14	20
4.	4	6
5.	10	15

6.	10	15
Total	**70**	**100**

1.5   ENGINEERING DRAWING - I

L T P
- - 8

RATIONALE

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 undergoing the subject, the students will be able to:

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

DETAILED CONTENTS

1.   Introduction to Engineering Drawing   (03 sheets)

 1.1   Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards.

 1.2   Different types of lines in Engineering drawing as per BIS specifications

 1.3   Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments.

 1.4   Free hand and instrumental lettering (Alphabet and numerals) – upper case (Capital Letter), single stroke, vertical and inclined at 75 degree, series of 5,8,12 mm of free hand and instrumental lettering of height 25 to 35 mm in the ratio of 7:4

2.   Dimensioning Technique   (01 sheet)

2.1   Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

2.2   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

3.   Scales   (02 sheets)

3.1   Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale

3.2   Drawing of plain and diagonal scales

4.   Orthographic Projections   (06 sheets)

4.1   Theory of orthographic projections (Elaborate theoretical instructions)

4.2   Projection of Points in different quadrant

4.3   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.

4.4   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

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

4.6   Identification of surfaces

5   Projection of Solid   (02 sheets)

5.1.   Definition and salient features of Solid

5.2.   Types of Solid (Polyhedron and Solid of revolution)

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

6.   Sections   (02 sheets)

6.1   Importance and salient features

6.2   Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.

6.3   Convention sectional representation of various materials, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections

6.4   Orthographic sectional views of different objects.

7.   Isometric Views   (02 sheets)

7.1   Fundamentals of isometric projections and isometric scale.

7.2   Isometric views of combination of regular solids like cylinder, cone, cube and prism.

8.   Common Symbols and Conventions used in Engineering   (02 sheets)

8.1   Civil Engineering sanitary fitting symbols

8.2   Electrical fitting symbols for domestic interior installations

*9.   Introduction to AutoCAD   (02 sheets)

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.**

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. The institute should procure AutoCAD or other engineering graphics software for practice in engineering drawings. Teachers should undergo training in AutoCAD/Engineering Graphic. Separate labs for practice on AutoCAD should be established.

MEANS OF ASSESSMENT

Sketches
Drawing
Use of software

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

5.   Engineering Drawing I by DK Goel, GBD Publication.

1.6 ENGINEERING MECHANICS AND MATERIALS

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RATIONALE

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 undergoing the subject, the student will be able to:
- Understand the basic laws and principles of mechanics.
- Able to analyze and solve simple problems related to engineering mechanics.
- Understand the characteristics and properties of different materials used in electronics.

DETAILED CONTENTS

1.   Introduction   (08 Periods)

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.

2. Force Analysis   (13 Periods)
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.

3. General Condition of Equilibrium: (11 Periods)
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.

4. Stresses and strains: (12 Periods)
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.

5. Materials & Concept Used In Electronics: (12 Periods)
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.
(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.

INSTRUCTIONAL STRATEGY:

Engineering mechanics and materials needs to be handled very carefully in such a manner that students develop clear understanding of basic laws and principles of mechanics. The teacher may lay more emphasis on numerical analysis and give assignments to inculcate self-study.

ASSESSMENT TOOLS:

1. Class Tests
2. Home Assignments
3. Attendance
4. Sessional Test

RECOMMENDED BOOKS

1. R.K. Khurmi – "A Text Book of Engineering Mechanics (Applied Mechanics) - S.Chand and Co. Ltd. New Delhi
2. R.K. Rajput – "A Text Book of Applied Mechanics" – Laxmi Publications..
3. R.K. Rajpur – " A Text Book of Materials Science"-Katson Publications Ludhiana
4. Hazara Chaudhary - "Material Science and processes". Indian book distributors

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	No. of Periods	Marks (%)
1.	8	14
2.	13	24
3.	11	20
4.	12	21
5.	12	21
Total	**56**	**100**

1.7   GENERAL WORKSHOP PRACTICE – I
(For Electronics Engineering)

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RATIONALE

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 the course, the students will be able to:

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

DETAILED CONTENTS (PRACTICAL EXERCISES)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:

1   Fitting Shop
2   Sheet Metal Shop
3   Welding Shop
4   Plumbing Shop

1.   FITTING SHOP

1.1   Use of personal protective equipment and safety precautions while working.
1.2   Basic deburring processes.

1.3   Introduction to fitting shop tools, marking and measuring devices/equipment.
1.4   Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)
1.5   Identification of various steel sections (flat, angle, channel, bar etc.).
1.6   Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).

1.7   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 $\pm .25$ 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.

2. SHEET METAL SHOP

2.1.   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.

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

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

2.4   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.

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

2.6   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.

3   WELDING SHOP – I

3.1   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.

3.2   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 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

4.   PLUMBING SHOP

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

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

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

4.4.   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

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva voce

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., New Delhi
6. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi
7. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.

2.1   APPLIED MATHEMATICS - II

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RATIONALE

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 undergoing this course, the students will be able to:
- Calculate simple integration by methods of integration
- Evaluate the area under curves, surface by using definite integrals.
- Calculate the area and volume under a curve along areas
- Solve the engineering problems with numerical methods.

- Understand the geometric shapes used in engineering problems by co-ordinate geometry.

DETAILED CONTENTS

1. Integral Calculus - I   (12 Periods)

   Methods of Indefinite Integration :-

   1.1   Integration by substitution.
   1.2   Integration by rational function.
   1.3   Integration by partial fraction.
   1.4   Integration by parts.
   1.5   Integration of special function

2. Integral Calculus - II: (12 Periods)

   2.1   Meaning and properties of definite integrals, Evaluation of definite   integrals..

   2.2   Application : Length of simple curves, Finding areas bounded by simple curves Volume of solids of revolution, centre of mean of plane areas.

   2.3   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)

3. Co-ordinate Geometry (2 Dimension)   (10 Periods)

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

Two intercept form.

4. Co-ordinate Geometry (3 Dimension)   (08 Periods)

   4.1   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)

INSTRUCTONAL STRATEGY

Basic elements of Differential Calculus, Integral Calculus and differential equations can be taught conceptually along with real engineering applications in which particular algorithm and theory can be applied. Numerical examples will be helpful in understanding the content of the subject.

MEANS OF ASSESSMENT

-   Assignments and Quiz/Class Tests
-   Mid-term and End-term Written Tests
-   Model/Prototype Making

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-II by Chauhan and Chauhan, Krishna Publications, Meerut**.**

4.   Applied Mathematics-I (B) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)

1.	12	28
2.	12	28
3.	10	24
4	08	20
Total	**42**	**100**

2.2 APPLIED PHYSICS – II

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5 - 2

RATIONALE

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.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.

LEARNING OUTCOMES

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

- Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.
- Define the terms: frequency, amplitude, wavelength, velocity of a wave.
- Explain various Engineering, Medical and Industrial applications of Ultrasonics.
- Apply acoustics principles to various types of buildings to get best sound effect
- Explain diffraction, interference, polarization.
- 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
- Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.
- Explain the concept of electric current, resistance and its measurement.
- 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
- Explain Biot-Savart Law, Ampere's law, Lorenz Force.
- State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field
- Explain operation of moving coil galvanometer, simple DC motor
- Apply the knowledge of diodes in rectifiers, adapters IC's and various electronic circuits. Apply the concept of light amplification in designing of various LASER based instruments and optical sources.
- Explain total internal reflection and apply this concept for optical fibre and its uses in Medical field and Communication.

DETAILED CONTENTS

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 $y = r \sin wt$, 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 progressive wave,

1.4 Free, Damped and forced oscillations, Resonance with examples, Q-factor

1.5 Definition of pitch, loudness, quality and intensity of sound waves, intensity level, Echo and reverberation, Sabine formula for reverberation time(without derivation), coefficient of absorption of sound, methods to control reverberation time and their applications, Accoustics of building defects and remedy.

1.6 Ultrasonics –production, detection, properties and applications in engineering and medical applications.

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 use of interference making highly efficient solar panel.

2.4 diffraction, Single Slit diffraction, Intensity calculation etc

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

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 (numericals), charging and discharging of a capacitor.

3.4 Dielectric and its effect on capacitance, dielectric break down.

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)

4. Current Electricity   (12 periods)

4.1 Electric Current, Resistance, Specific Resistance, Conductance, Specific　　Conductance, Series and Parallel combination of Resistances. Factors affecting Resistance, Colour coding of carbon Resistances, Ohm's law. Superconductivity.

4.2 Kirchhoff's laws, Wheatstone bridge and its applications (meter bridge and slide wire bridge)

4.3 Concept of terminal potential difference and Electro motive force (EMF), potentiometer.

4.4 Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy

4.5 Examples of application of DC circuits in various electrical and electronics equipment such as C.R.O, T.V., Audio-Video System, Computers etc.

5. Magneto Statics and Electromagnetism　　　　　　　　　　　(12 periods)

5.1 Magnetic poles, force on a moving charge, circulating charges, force on a current carrying wire, Hall effect, torque on a current loop.

5.2 Magnetic field due to moving charge(Biot-Savart Law), due to current (Biot-Savart Law), parallel currents, field of a solenoid, Ampere's law.

5.3 Faraday's law, Lenz' law, motional emf, induced electric fields.

5.4 Magnetic dipole and force on a magnetic dipole in a non-uniform field, Magnetization, Gauss' law for magnetism.

5.5 Types of magnetic materials. Dia, para and ferromagnetic materials with their properties,

5.6 Application of electromagnetism in ac/dc motors and generators.

6. Semiconductor physics　　　　　　　　　　　　　　　(8 periods)

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

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

6.3 Semiconductor transistor, pnp and npn (concepts only)

6.4 Application of semiconductor diodes (Zener, LED) and that of transistor as amplifier and oscillator.

7. Modern Physics (8 Periods)

    7.1   Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; laser and its characteristics, population inversion, Types of lasers; Ruby and He-Ne lasers, engineering and medical applications of lasers.

    7.2   Fibre optics: Total internal reflection and its applications, Critical angle and conditions for total internal reflection, introduction to optical fibers, light propagation, types, acceptance angle and numerical aperture, types and applications of optical fibre in communication.

    7.3   Introduction to nanotechnology, nanoparticles and nano materials,

LIST OF PRACTICALS (To perform minimum six experiments)

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.

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

MEANS OF ASSESSMENT

- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- Viva-Voice

RECOMMENDED BOOKS

1. Text Book of Physics (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. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
4. Practical Physics, by C. L. Arora, S Chand publications
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6. Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications.
7. Physics Volume 2, 5th edition, Haliday Resnick and Krane, Wiley publication
8. Fundamentals of Physics by Haliday, Resnick & Walker 7th edition, Wiley publication

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	18
2	6	8
3	12	18
4	12	16
5	12	16
6	8	12
7	8	12
Total	**70**	**100**

2.3   BASICS OF INFORMATION TECHNOLOGY

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RATIONALE

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.

Note:

Explanation of Introductory part should be demonstrated with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify Computer Hardware Components, Network Components and Peripherals.
- Explain the role of an Operating System.
- Install System and Application Software.
- Explain the function of the system components including Processor, Motherboard and Input-output devices.
- Use Word Processing Software to prepare document.
- Use Spreadsheet Software to create workbooks and automate calculation.
- Use Presentation Software to create interactive presentation.
- Perform fundamental tasks common to most application software including print, scan, save, edit, cut, copy, paste, format, spell and grammar check.
- Find and evaluate information on the Web.
- Install Antivirus.
- Safeguard against Online Frauds, threats and crimes.
- Use online office tools(Google suits)

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1. Introduction to Computers and Peripherals.

   Components of Computer, Types of Computer, CPU, RAM, ROM, Hard disk, USB, Flash drive, CD, DVD,Blue ray, Keyboard, Mouse, Monitor, LCD, Printer, Plotter, Scanner, Modem, Sound Cards, Speakers, CMOS battery, Sharing of Printers.

2. Operation System and Application Software

   System Software, Application Software, Virtualization Software, Utility Software, MS Office/Open Office/Libreoffice, Working with window, Desktop components, Menu bars, creating shortcut of program. Installation of Application softwares, Antivirus and Drivers.

3. Word Processing, Spreadsheet and Presentation

   Usage and creation of word document, spreadsheets and presentation, Google Suits (Google drive, google sheet, google doc. Google presentation)

.
4. Internet

   Basics of Networking – LAN, WAN, Wi-Fi technologies, Concept of IP Addrsses, DNS, Search Engines, e-mail, Browsing and cyber laws.

LIST OF PRACTICAL EXERCISES

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.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS Office/Open Office/Libre office/Google Suit in addition to working on internet. The student should be made capable of working on computers independently.

MEANS OF ASSESSMENT

- Class Tests/Quiz
- Software Installation and Use
- Viva-Voce
- Presentation

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. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi

4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.

5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

8. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

9. On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi

10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

Online Resources
1. www. tutorialspoint..com
2. www.sf.net
3. Gsuite.google.com
4. Spoken-tutorial.org
5. Swayam.gov.in

2.4   ELECTRICAL ENGINEERING-I

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RATIONALE

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 undergoing the subject, the student will be able to:

- Classify various materials into conductor, semiconductor and insulator.

- Describe the properties of conducting, insulating and magnetic materials.

- Understand Kirchhoff's laws to solve simple DC circuit.

- Understand various network theorems such as Thevenin's theorem, Norton theorem, and superposition theorem to solve simple circuit problems.

- Understand AC Circuit Theory.

- Understand construction, rating & safety measures for batteries.

DETAILED CONTENTS

1. Classification   (2 Periods)

Classification of materials into conducting materials, insulating materials and Semi-conducting materials with reference to their atomic structures.

2. Conducting Materials   (6 Periods)
   2.1   Resistivity and factors affecting resistivity such as temperature, alloying and mechanical stressing.
   2.2   Classification of conducting materials into low resistivity and high resistivity materials. Some examples of each and their typical applications.

3. Insulating Materials   (10 Periods)
   3.1   Electrical Properties:
   Volume resistivity, surface resistance, Dielectric loss, Dielectric strength (Break down voltage) and Dielectric constant.
   3.2.   Chemical Properties:
   Solubility, Chemical resistance and Weatherability.
   3.3   Physical Properties:
   Hygroscopicity, Tensile and Compressive strength, Abrasive resistance, Brittleness.
   3.4   Thermal Properties:
   Heat resistance, classification according to permissible temperature rise, Effect of electrical overloading on the life of an electrical appliance.
   3.5   Plastic Insulating Materials:
   Classification into thermoplastic and thermosetting categories, example of each and their typical applications.

4. Magnetic Materials   (4 Periods)
   4.1   Ferromagnetism, Domains, permeability, hysteresis loop-(including coercive force and residual magnetism) and magnetic saturation.
   4.2   Soft and Hard magnetic materials, their examples and typically applications.

5. Electro Magnetism   (8 Periods)
   5.1   Concept of mmf, flux, reluctance and permeability.
   5.2   Energy stored in a magnetic field and an inductor.
   5.3   Solution of problems on magnetic circuits.
   5.4   Faraday's laws of electromagnetic induction, Lenz's law, Physical explanation of self and mutual inductance.
   5.5   B-H curve, Hysteresis, Eddy currents-elementary ideas and significance.
   5.6   Growth and decay of current in an inductive circuit.
   5.7   Force between two parallel current carrying conductors and its significance.
   5.8   Current carrying conductors in magnetic field and its significance

6. D.C Circuits   (11 Periods)
    6.1   Ohm's law, resistivity, effect of temperature on resistances, heating effect of electric current, conversion of mechanical units into electrical units.
    6.2   Kirchhoff's laws, application of Kirchhoff laws to solve simple dc circuits.
    6.3   Thevenin's theorem, maximum power transfer theorem, Norton's theorem and super position theorem, simple numerical problems.

7.   A.C Theory   (11 Periods)

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

    7.2   Generation of alternating voltage, equation of sinusoidal waveform.

    7.3   Definition and concept of cycle, frequency, Time period, amplitude, instantaneous value, average value, RMS value, peak value, form factor, Peak factor.
    7.4   Phase and phase difference, representation of alternating quantities by phasor, addition and subtraction of alternating quantities.

8. Batteries   (4 Periods)
    8.1   Construction of lead acid and nickel cadmium batteries.
    8.2   Charging and maintenance of batteries.
    8.3   Rating of batteries.
    8.4   Back up batteries (Lithium & Silver Oxide batteries).
    8.5   Shelf life of batteries.

LIST OF PRACTICALS

1. Ohm's law verification.

2. To verify the laws of series and parallel connection of resistance i.e. to verify:-

    i.   Total resistance in series connections.

$R_T = R_1 + R_2 + R_3$ …….

Where R_T is total resistance and R_1, R_2, R_3 etc. are the resistances connected in series.

   ii.   Total resistance in parallel connections.

$1/R_T = 1/R_1 + 1/R_2 + 1/R_3$ ……….

Where R_T is total resistance and R_1, R_2, R_3 etc. are the resistances connected in parallel circuit.

3. To verify the laws of series and parallel connection of capacitance i.e. to verify:-

   i.   Total capacitance in series connections.

$1/C_T = 1/C_1 + 1/C_2 + 1/C_3$ ……….

Where C_T is total capacitance and C_1, C_2, C_3 etc. are the capacitances connected in series.

   ii.   Total capacitance in parallel connections.

$C_T = C_1 + C_2 + C_3$ …….

Where C_T is total capacitance and C_1, C_2, C_3 etc. are the capacitances connected in parallel.

4. To verify Kirchhoff's following laws:-
   i.   The algebraic sum of the currents at a junction is zero.

   ii.   The algebraic sum of the emf in any closed circuit is equal to the algebraic sum of IR products (drops) in that circuit.

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.

INSTRUCTIONAL STRATEGY

The teachers should give emphasis on understanding of concept and various terms used in the Electrical Engineering. Practical exercises will reinforce various concepts.

ASSESSMENT TOOLS

Class Tests

Home Assignments

Attendance

Sessional Test

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	No. of Periods	Marks (%)
1.	02	04
2.	06	11
3.	10	18
4.	04	07
5.	08	13
6.	11	20
7.	11	20
8.	04	07
Total	**56**	**100**

2.5 ELECTRONIC COMPONENTS & DEVICES

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RATIONALE

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 undergoing the subject, the student will be able to:

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

DETAILED CONTENTS

1.   INTRODUCTION TO ELECTRONICS: (06 Periods)
    1.1   Application of electronic in different fields.
    1.2   Brief introduction to active components and devices.

2.   PASSIVE COMPONENTS: (12 Periods)
    2.1. 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).
    2.2. Capacitors- Working characteristics/properties, Capacitors-polyester, Metalized polyester, ceramic paper mica and electrolytic tantalum and solid aluminium types; construction details and testing, specifications, mutual comparison & typical applications.
    2.3. 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.

3. VOLTAGE AND CURRENT SOURCES: (06 Periods)

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

3.2. Concept of constant current source, symbol and graphical representation, characteristics of ideal and practical current sources.

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

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

4. SEMICONDUCTOR DIODE: (12 Periods)

4.1. 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.

4.2. 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).

4.3 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.

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

4.5. Important specification of rectifier diode and zener diode.

5. INTRODUCTION TO BIPOLAR TRANSISTOR: (12 Periods)

5.1. 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.

5.2. 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 (I_{CEO}) 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.

5.3. 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.

5.4. 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.

6.   TRANSISTOR BIASING AND STABILIZATION OF OPERATING POINT:
(09 Periods)

6.1. 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

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

6.3. Simple design problems on potential divider biasing circuits.

7. SINGLE STAGE TRANSISTOR AMPLIFIER: (09Periods)
7.1. Analysis of Single Stage CE, CB and CC amplifier.
7.2. Single stage CE amplifier circuits with proper biasing components.

8. FIELD EFFECT TRANSISTOR (FET) (06 Periods)
8.1. Construction, operation, characteristics and Biasing of Junction FET.
8.2. Analysis of Single Stage CS,CG and CD amplifiers. (Only Brief Idea)

9. MOSFET: (06 Periods)
9.1 Construction, operation, Characteristics and Biasing of MOSFET in both depletion and enhancement modes.
9.2 Analysis of Single Stage CS, CG and CD amplifiers. (Only Brief Idea)

10. CMOS: (06 Periods)
10.1 Construction, operation and Characteristics of CMOS in both depletion and enhancement modes.
10.2 Use of CMOS as Invertor, Different application of CMOS, CMOS IC.
10.3 Comparison of JEET, MOSFET and Bipolar Transistor.

LIST OF PRACTICALS
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.

INSTRUCTIONAL STRATEGY

Electronic Components & Devices being a fundamental subject, it needs to be handled very carefully and in a manner such that students develop clear understanding of the related concepts and principles. The teacher may lay more emphasis on laboratory work and give home assignments to students to inculcate self study and problem solving abilities amongst them.

ASSESSMENT TOOLS

1. Class Tests
2. Home Assignments
3. Attendance
4. Sessional Test

LIST OF BOOKS

1. Bhargava, Kulshreshttha& Gupta – "Basic Electronics& Linear Circuits" – Tata Mc- graw-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.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Period Allotted	Marks Allotted (%)

1.	6	7
2.	12	14
3.	6	7
4.	12	14
5.	12	15
6.	9	11
7.	9	11
8.	6	7
9.	6	7
10.	6	7
Total	**84**	**100**

2.6   GENERAL WORKSHOP PRACTICE –II
(For Electronics Engineering)

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RATIONALE

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 the course, the students will be able to:

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

DETAILED CONTENTS (PRACTICAL EXERCISES)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the

following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:

1. Carpentry Shop
2. Painting and Polishing Shop
3. Electroplating Shop
4. Computer Shop

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)

1.4.   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.   ELECTROPLATING SHOP

3.1.   Use of personal protective equipments and safety precautions while working.

3.2.   Introduction and demonstration of machines and equipment used in electroplating shop

3.3   Practice Job

Job I : Electroplating practice i.e. Nickel plating

4. COMPUTER SHOP

4.1   Keyboard
        4.1.1   Types of Keyboards
        4.1.2   Interfacing (PS2, USB port, DIN connector)
        4.1.3   Working

4.2   Mouse
        4.2.1   Types of Mouse
        4.2.2   Interfacing (serial, PS2, USB)
        4.2.3   Working

4.3   Printers
        4.3.1   Types (Dot matrix, Inkjet, Laserjet)
        4.3.2.   Interfacing (parallel port, USB port, Networking)
        4.3.3.   Working
        4.3.4.   Maintenance (cartridge change etc)
        4.3.5   Installation of printers
        4.3.6   Troubleshooting (Driver compatibility, Paper jam, printing problems due to uncleaned drum in laserjet printers, belt related problems in inkjet printer, jets choking problem in inkjet printer, color alignment problem).
        4.3.7   Tracing network printer and sharing it.

4.4 Scanner
        4.4.1   Types

4.4.2 Interfacing

4.4.3 Scanning a document

4.5 Monitor

4.5.1 Types and Interfacing

4.5.2 Fault finding and repairing

4.6 CPU

4.6.1. Motherboard connection (dimensions, processor, chipset, BIOS, EFI (Extended Firmware Interfacing), UFI (Unified Firmware Interfacing).

4.6.2 SMPS-AT

– Working

– Voltage levels

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva voce

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., New Delhi
6. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi
7. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.