# C-16 CURRICULUM

# DIPLOMA IN ELECTRICAL& ELECTRONICS ENGINEERING

# SCHEME OF INSTRUCTIONS AND EXAMINATIONS

**(FIRST YEAR)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subject Code | Name of the Subject | Instruction period / week | Total Period / year | Scheme of Examination |
| Theory | Practical/Tutorial | Duration (hours) | Sessional Marks | End Exam Marks | Total Marks |
| THEORY: |
| EE-101 | English | 3 | - | 90 | 3 | 20 | 80 | 100 |
| EE-102 | Mathematics - I | 5 | - | 150 | 3 | 20 | 80 | 100 |
| EE-103 | Engineering Physics | 4 | - | 120 | 3 | 20 | 80 | 100 |
| EE-104 | Engineering Chemistry&Environmental studies | 4 | - | 120 | 3 | 20 | 80 | 100 |
| EE-105 | Electrical Engineering Materials | 3 | - | 90 | 3 | 20 | 80 | 100 |
| EE-106 | Basic Electrical Engineering | 5 | - | 150 | 3 | 20 | 80 | 100 |
| PRACTICAL: |
| EE-107 | Engineering Drawing  | - | 6 | 180 | 3 | 40 | 60 | 100 |
| EE-108 | 108-Basic Electrical Work Shop Practice  | - | 6 | 180 | 3 | 40 | 60 | 100 |
| EE-109 | 109-A Physics Laboratory Practice109-B Chemistry Laboratory Practice | - | 3 | 90 | 1½ | 20 | 30 | 50 |
| 1½ | 20 | 30 | 50 |
| EE-110 | Comp. Fundamentals Laboratory Practice | - | 3 | 90 | 3 | 40 | 60 | 100 |
| TOTAL | 24 | 18 | 1260 |  | 280 | 720 | 1000 |

# DIPLOMA IN ELECTRICAL& ELECTRONICS ENGINEERING

# SCHEME OF INSTRUCTIONS AND EXAMINATIONS

**III Semester**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subject Code | Name of the Subject | Instructionperiod / week | Total Period / Sem | Scheme of Examination |
| Theory | Practical/Tutorial | Duration (hours) | Sessional Marks | End Exam Marks | TotalMarks |
| THEORY: |
| EE- 301 | Mathematics - II | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE -302 | Electric circuits | 5 | - | 75 | 3 | 20 | 80 | 100 |
| EE -303 | Power systems-I (Generation) | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE-304 | DC Machines | 5 | - | 75 | 3 | 20 | 80 | 100 |
| EE-305 |  Electrical & Electronic Measuring Instruments | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE-306 | Electronics Engg | 5 | \_ | 75 | 3 | 20 | 80 | 100 |
| PRACTICAL: |
| EE-307 | DC Machines Laboratory Practice | - | 3 | **45** | 3 | 40 | 60 | 100 |
| EE-308 | Communication Skills Practice and Life Skills | - | 3 | 45 | 3 | 40 | 60 | 100 |
| EE-309 | Circuits and Measurements Laboratory Practice | - | 6 | 90 | 3 | 40 | 60 | 100 |
| EE-310 | Electronics Laboratory Practice | - | 3 | 45 | 3 | 40 | 60 | 100 |
| TOTAL | 27 | 15 | 630 |  | 280 | 720 | 1000 |

# DIPLOMA IN ELECTRICAL& ELECTRONICS ENGINEERING

# SCHEME OF INSTRUCTIONS AND EXAMINATIONS

**IV Semester**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subject Code | Name of the Subject | Instructionperiod / week | Total Period / Sem | Scheme of Examination |
| Theory | Practical/Tutorial | Duration (hours) | Sessional Marks | End Exam Marks | TotalMarks |
| THEORY: |
| EE - 401 | Programming in C | 4 |  | 60 | 3 | 20 | 80 | 100 |
| EE - 402 | A.C. Machines - I  | 5 |  | 75 | 3 | 20 | 80 | 100 |
| EE - 403 | Power Systems – II (T&D) | 5 |  | 75 | 3 | 20 | 80 | 100 |
| EE - 404 | Electrical Installation and Estimation | 4 |  | 60 | 3 | 20 | 80 | 100 |
| EE - 405 | Digital Electronics and Microcontrollers | 5 |  | 75 | 3 | 20 | 80 | 100 |
| EE - 406 | General mechanical Engineering | 4 |  | 60 | 3 | 20 | 80 | 100 |
| PRACTICAL: |
| EE - 407 | Electrical Engineering Drawing  | - | 6 | 90 | 3 | 40 | 60 | 100 |
| EE - 408 | C-Language Programming Lab | - | 3 | 45 | 3 | 40 | 60 | 100 |
| EE - 409 | A.C. Machines-I Laboratory Practice | - | 3 | 45 | 3 | 40 | 60 | 100 |
| EE - 410 | Digital Electronics and Microcontrollers Laboratory |  | 3 | 45 | 3 | 40 | 60 | 100 |
| TOTAL | 27 | 15 | 630 |  | 280 | 720 | 1000 |

# DIPLOMA IN ELECTRICAL& ELECTRONICS ENGINEERING

# SCHEME OF INSTRUCTIONS AND EXAMINATIONS

**V Semester**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subject Code | Name of the Subject | Instructionperiod / week | Total Period / Sem | Scheme of Examination |
| Theory | Practical/Tutorial | Duration (hours) | Sessional Marks | End Exam Marks | TotalMarks |
| THEORY: |
| EE-501 | Industrial Management | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE-502 | A.C. Machines - II | 5 | - | 75 | 3 | 20 | 80 | 100 |
| EE-503 | Power Systems – III (Switch Gear and Protection) | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE-504 | Power Electronics | 4 | - | 60 | 3 | 20 | 80 | 100 |
| EE-505 | Electrical drives and Traction | 5 | - | 75 | 3 | 20 | 80 | 100 |
| EE-506(A) | Electrical utilization Automation | 5 | - | 75 | 3 | 20 | 80 | 100 |
| EE-506(B) | Electrical utilization and Renewable Energy sources | 5 | - | 75 | 3 | 20 | 80 | 100 |
| PRACTICAL: |
| EE-507 | Electrical CAD & PLC Laboratory | - | 3 | 45 | 3 | 40 | 60 | 100 |
| EE-508 | Power Electronics | - | 3 | 45 | 3 | 40 | 60 | 100 |
| EE-509 | A.C. Machines-I I Laboratory Practice | - | 6 | 90 | 3 | 40 | 60 | 100 |
| EE-510 | Project work | - | 3 | 45 | 3 | 40 | 60 | 100 |
| TOTAL | 27 | 15 | 630 |  | 280 | 720 | 1000 |

# DIPLOMA IN ELECTRICAL& ELECTRONICS ENGINEERING

# SCHEME OF INSTRUCTIONS AND EXAMINATIONS

**EE-601-INDUSTRIAL TRAINING (Practical Training)**

**VI Semester**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **SUBJET** | **DURATION** |
| 1 | EE-601 | 6 Months |

**ENGLISH**

**(Common to all Branches)**

**Subject Title** : **English**

**Subject Code : EE- 101**

**Periods per Week : 03**

**Periods per Year : 90**

**Time Schedule**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl No** | **Major Topics** | **No. of Periods** | **Weightage of Marks** |  **No of Short Answers** | **No of Long Answers** |
| 1 | Speaking | 19 | 20 | 10 | - |
| 2 | Listening | 06 | 04 | 02 | - |
| 3 | Reading | 12 | 10 | - | 1 |
| 4 | Grammar | 27 | 34 | 07 | 2 |
| 5 | Writing | 23 | 52 | 01 | 5 |
| 6 | Unit tests-3 | 03 |  | - | - |
|  | 90 | 120 | 20 | 08 |

**Introduction**

Globalization has ushered in an era of opportunities for those who have the necessary competencies. Effective communication is one among them. In C-16 Curriculum the focus is therefore on improving communicative abilities resulting in students becoming industry – ready and employable.

**Objectives:**

On completion of the course the students shall be able to

• Understand basic principles of language usage and apply them

• Read and comprehend passages

• Write short paragraphs, letters and reports

• Use English appropriately in day-to-day communication

**Specific Instructional objectives**

**1.0 Read and comprehend English.**

1.1 Identify main ideas

1.2 Identify specific details

1.3 Draw inferences

1.4 Give contextual meanings of the words

1.5 Perceive tone in a text

**2.0 Learn to excel in various forms of written communication.**

2.1 Identify components of a good paragraph

2.2 Write different types of paragraphs

2.3 Distinguish between formal and informal letters

2.4 Write personal letters

2.5 Write official letters

2.6 Prepare a resume

2.7 Write a cover letter

2.8 Report industrial visits

2.9 Make notes

2.10 Present and interpret data from flow chart, tree diagram and table

**3.0 Practice spoken communication suited to various situations.**

3.1 Use proper expressions to make requests

3.2 Use proper expressions for asking and giving directions

3.3 Use suitable expressions to state feelings

3.4 Use suitable expressions to express obligations

3.5 Use suitable expressions to extend and accept invitations

3.6 Fix and cancel appointments

3.7 Express likes and dislikes

3.8 Give instructions

3.9 Use everyday expressions in the class room

**4.0 Listen and understand.**

4.1 Main ideas

4.2 Specific details

4.3 Make inferences

**5.0 Learn various grammatical structures.**

5.1 Use the present tense

5.2 Use the past tense

5.3 Use the future tense

5.4 Identify and use adjectives

5.5 Use prepositions

5.6 State basic sentence structures

5.7 Frame questions to elicit information

5.8 Frame questions for confirmation

5.9 Use active voice

5.10 Use passive voice

5.11 Use indirect speech

5.12 Use direct speech

5.13 Identify and correct errors

**Course Material**

The text book prepared by the faculty of English of Polytechnics.

**Reference Books**

1. Essential English Grammar Raymond Murphy

2. Learn English Santanu Sinha Chaudhuri

3. Grammar Builder Oxford University Press

4. Word Power made Easy Norman Lewis

5. Spoken English Shashi Kumar and Dhamija

6. English Grammar and Composition – David Greene (Mc Millan)

|  |
| --- |
| **Engineering Mathematics – I (Common to all )****Subject Title : Engineering Mathematics-I****Subject Code : EE-102** **Periods per week : 05** **Periods per Semester : 150** |
| **Blue Print** |
|  |  |  |  |  |  |  |  |  |  |  |
| **S. No** | **Major Topic** | **No of Periods** | **Weightage of Marks** | **Short Type** | **Essay Type** |
|  | **Unit - I : Algebra** | **Theory** | **Practice** |   | **R** | **U** | **App** | **R** | **U** | **App** |
| **1** | Logarithms | 3 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| **2** | Partial Fractions | 5 | 1 | 4 | 1 | 1 | 0 | 0 | 0 | 0 |
| **3** | Matrices and Determinants | 20 | 6 | 16 | 1 | 2 | 0 | 0 | ½ | ½ |
|  | **Unit - II : Trigonometry** |   |   |   |   |   |   |   |   |   |
| **4** | Compound Angles | 5 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| **5** | Multiple and Submultiple angles | 6 | 2 | 4 | 1 | 1 | 0 | 0 | 0 | 0 |
| **6** | Transformations | 8 | 3 | 10 | 0 | 0 | 0 | 0 | ½ | ½ |
| **7** | Inverse Trigonometric Functions | 8 | 3 | 10 | 0 | 0 | 0 | 0 | ½ | ½ |
| **8** | Properties of triangles | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| **9** | Hyperbolic Functions | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **10** | Complex Numbers | 4 | 2 | 4 | 1 | 1 | 0 | 0 | 0 | 0 |
|  | **Unit III : Co-ordinate Geometry** |   |   |   |   |   |   |   |   |   |
| **11** | Straight Lines | 4 | 2 | 9 | 1 | 1 | 0 | 0 | ½ | 0 |
| **12** | Circles | 5 | 2 | 9 | 1 | 1 | 0 | 0 | ½ | 0 |
|  | **Unit – IV : Differential Calculus** |   |   |   |   |   |   |   |   |   |
| **13** | Limits and Continuity | 6 | 2 | 4 | 1 | 1 | 0 | 0 | 0 | 0 |
| **14** | Differentiation | 22 | 10 | 24 | 1 | 1 | 0 | 0 | 1 | 1 |
| **S. No** | **Major Topic** | **No of Periods** | **Weightage of Marks** | **Short Type** | **Essay Type** |
|  | **Unit - V : Applications of Differentiation** | **Theory** | **Practice** | **R** | **U** | **App** | **R** | **U** | **App** |
| **15** | Geometrical Applications | 5 | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 1 |
| **16** | Maxima and Minima | 5 | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 1 |
|  | Total | 110 | 40 | 120 | 11 | 9 |  |  | 3½ | 4½ |
|  |  |   |   | Marks | 22 | 18 | 0 | 0 | 35 | 45 |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  | **R:** | **Remembering type** | **22** | marks |  |
|  |  | **U:** | **Understading type** | **53** |  marks |  |
|  |  | **App:** | **Application type** | **45** | marks |  |  |

**ENGINEERING MATHEMATICS – I**

**COMMON TO ALL BRANCHES – 102**

**Objectives**

**Upon completion of the course the student shall be able to:**

**UNIT – I**

**Algebra**

**1.0 Use Logarithms in engineering calculations**

1.1 Define logarithm and list its properties.

1.2 Distinguish natural logarithms and common logarithms.

1.3 Explain the meaning of e and exponential function.

1.4 State logarithm as a function and its graphical representation.

1.5 Use the logarithms in engineering calculations.

**2.0 Resolve Rational Fraction into sum of Partial Fractions in engineering problems**

2.1 Define the following fractions of polynomials:

1. Rational,
2. Proper and
3. Improper

2.2 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

 

  

**3.0 Use Matrices for solving engineering problems**

3.1 Define a matrix and order of a matrix.

3.2 State various types of matrices with examples (emphasis on 3rd order square matrices).

3.3 Compute sum, scalar multiplication and product of matrices.

3.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

3.5 Define the transpose of a matrix and write its properties.

3.6 Define symmetric and skew-symmetric matrices.

3.7 Resolve a square matrix into a sum of symmetric and skew- symmetric matrices with examples in all cases.

3.8 Define minor, co-factor of an element of a 3x3 square matrix with examples.

3.9 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.

3.10 Distinguish singular and non-singular matrices.

3.11 Apply the properties of determinants to solve problems.

3.12 Solve system of 3 linear equations in 3 unknowns using Cramer’s rule.

3.13 Define multiplicative inverse of a matrix and list properties of adjoint and inverse.

3.14 Compute adjoint and multiplicative inverse of a square matrix.

3.15 Solve system of 3 linear equations in 3 unknowns by matrix inversion method

3.16 State elementary row operations.

3.17 Solve a system of 3 linear equations in 3 unknowns by Gauss- Jordan method

**UNIT – II**

**Trigonometry :**

**4.0 Solve simple problems on Compound Angles**

4.1 Define compound angles and state the formulae of Sin(A±B), Cos(A±B), tan(A±B) and Cot(A±B)

4.2 Give simple examples on compound angles to derive the values of Sin150, Cos150 , Sin750 , Cos750, tan 150 , tan750 etc.

4.3 Derive identities like Sin(A+B) .Sn(A–B) = Sin 2 A – Sin2 B etc.,

4.4 Solve simple problems on compound angles.

**5.0 Solve problems using the formulae for Multiple and Sub- multiple Angles**

5.1 Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.

5.2 Derive useful allied formulas like sin2A = (1– cos2A)/2 etc.

5.3 Solve simple problems using the above formulae

**6.0 Apply Transformations for solving the problems in Trigonometry**

6.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa - examples on these formulae.

6.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

**7.0 Use Inverse Trigonometric Functions for solving engineering problems**

7.1 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

7.2 Define inverses of six trigonometric functions along with their domains and ranges.

7.3 Derive relations between inverse trigonometric functions so that given A = sin-1x, express angle A in terms of other inverse trigonometric functions - with examples.

7.4 State various properties of inverse trigonometric functions and identities like sin-1x+cos-1 x =  etc.

7.5 Derive formulae like  etc., and solve simple problems.

**8.0 Appreciate Properties of triangles**

8.1 State sine rule, cosine rule, tangent rule and projection rule .

**9.0 Represent the Hyperbolic Functions in terms of logarithm functions**

9.1 Define Sinh x, cosh x and tanh x and list the hyperbolic identities.

9.2 Represent inverse hyperbolic functions in terms of logarithms.

**10.0 Represent Complex numbers in various forms**

10.1 Define complex number, its modulus , conjugate and list their properties.

10.2 Define the operations on complex numbers with examples.

10.3 Define amplitude of a complex number

10.4 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples.

**UNIT - III**

**Coordinate Geometry**

**11.0 Solve the problems on Straight lines**

11.1 Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form

11.2 Solve simple problems on the above forms

11.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

**12.0 Solve the problems on Circles**

12.1 Define locus of a point – circle and its equation.

12.2 Find the equation of a circle given

1. Center and radius
2. Two ends of a diameter
3. Centre and a point on the circumference
4. Three non-collinear points
5. Centre and tangent

12.3 Write the general equation of a circle and find the centre and radius.

12.4 Write the equation of tangent and normal at a point on the circle.

12.5 Solve the problems to find the equations of tangent and normal.

**UNIT - IV**

**Differential Calculus**

**13.0 Use the concepts of Limit and Continuity for solving the problems**

13.1 Explain the concept of limit and meaning of  and state the properties of limits .

13.2 Mention the Standard limits       (All without proof).

13.3 Solve the problems using the above standard limits

13.4 Evaluate the limits of the type  and 

13.5 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.

**14.0 Appreciate Differentiation and its meaning in engineering situations**

14.1 State the concept of derivative of a function y = f(x) – definition, first principle as

  and also provide standard notations to denote the derivative of a function.

14.2 State the significance of derivative in scientific and engineering applications.

14.3 Find the derivatives of elementary functions like xn , ax, ex, log x, sin x, cos x, tanx, Secx, Cosecx and Cot x using the first principles.

14.4 Find the derivatives of simple functions from the first principle .

14.5 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.

14.6 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples such as

 (i**)  (ii)  (iii)  (iv) .**

14.7 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.

14.8 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.

14.9 Find the derivatives of hyperbolic functions.

14.10 Explain the procedures for finding the derivatives of implicit function with examples.

14.11 Explain the need of taking logarithms for differentiating some functions with examples like [f(x)]g(x).

14.12 Explain the concept of finding the higher order derivatives of second and third order with examples.

14.13 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.

14.14 Explain the definition of Homogenous function of degree n

14.15 Explain Euler’s theorem for homogeneous functions with applications to simple problems.

**UNIT - V**

**Applications of the Differentiation**

**15.0 Understand the Geometrical Applications of Derivatives**

15.1State the geometrical meaning of the derivative as the slope of the tangent to the curve y=f(x) at any point on the curve.

15.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve y=f(x) at any point on it.

15.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve y=f(x) .

15.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

**16.0 Use Derivatives to find extreme values of functions**

16.1 Define the concept of increasing and decreasing functions.

16.2 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

 16.3 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable - simple problems yielding maxima and minima.

16.4 Solve problems on maxima and minima in applications like finding areas, volumes, etc.

**COURSE CONTENT**

**Unit-I**

**Algebra**

1. Logarithms :

Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation.

2. Partial Fractions :

Rational, proper and improper fractions of polynomials. Resolving rational fractions in to their partial fractions covering the types mentioned below:

 

  

**Matrices**:

3. Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, scalar multiplication and product of matrices. Transpose of a matrix, Symmetric, skew-symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace’s expansion, properties of determinants. Singular and non-singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 3 variables-Solutions by Cramers’s rule, Matrix inversion method-examples-Elementary row operations on matrices -Gauss-Jordan method to solve a system of equations.

**Unit-II**

**Trigonometry :**

4. Compound angles: Formulas of sin(A±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.

5. Multiple and sub-multiple angles: trigonometric ratios of multiple angles 2A, 3A and submultiple angle A/2 with problems.

6. Transformations of products into sums or differences and vice versa simple problems

7. Inverse trigonometric functions : definition, domains and ranges-basic properties- problems.

8. Properties and solutions of triangles: relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule – statements only .

9. Hyperbolic functions: Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.

10. Complex Numbers : Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form, Exponential form(Euler) form of a complex number- Problems.

**UNIT-III**

**Coordinate geometry**

11. Straight lines: various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.

12. Circle: locus of a point, Circle definition-Circle equation given (i) center and radius, (ii) two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points and (v) centre and tangent equation - general equation of a circle - finding center, radius: tangent, normal to circle at a point on it.

**UNIT-IV**

**Differential Calculus**

13. Concept of Limit- Definition- Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.

14. Concept of derivative- definition (first principle)- different notations-derivatives of elementary functions - problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarthmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables – partial differentiation, Euler’s theorem-simple problems.

**UNIT-V**

**Applications of Derivatives:**

15. Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, subtangent and subnormal to the curve at any point . Angle between the curves - problems.

16. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

**Reference Books :**

1. A text book of matrices by Shanti Narayan,

2. Plane Trigonometry, by S.L Loney

3. Co-ordinate Geometry, by S.L Loney

4. Thomas Calculus, Pearson Addison-Wesley publishers

5. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

**ENGINEERING PHYSICS**

**Subject Title : Engineering Physics**

**Subject Code : EE -103**

**Periods per week : 04**

**Total periods per year : 120**

**TIME SCHEDULE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.No** | **Major Topics** | **No. of****Periods** | **Weightage of Marks** | **Short****Answer Type**(2 marks) | **Essay Type**(10 marks) |
| 1. | Units and Dimensions | 08 | 04 | 2 | - |
| 2. | Elements of Vectors | 12 | 14 | 2 | 1 |
| 3. | Kinematics | 12 | 14 | 2 | 1 |
| 4. | Friction | 08 | 04 | 2 | - |
| 5. | Work, Power and Energy | 10 | 10 | - | 1 |
| 6. | Simple Harmonic Motion | 12 | 14 | 2 | 1 |
| 7. | Heat & Thermodynamics | 12 | 14 | 2 | 1 |
| 8. | Sound  | 12 | 14 | 2 | 1 |
| 9. | Properties of matter | 10 | 08 | 4 | - |
| 10. | Electricity & magnetism | 14 | 14 | 2 | 1 |
| 11. | Modern Physics | 10 | 10 | - | 1 |
|  | **Total:** | **120** | **120** | **20** | **8** |

**OBJECTIVES**

 **Upon completion of the course the student shall be able to**

**1.0 Understand the concept of Units and dimensions**

 1.1 Explain the concept of Units

 1.2 Define the terms

 a) Physical quantity, b) Fundamental physical quantities and

 c) Derived physical quantities

1.3 Define unit

1.4 Define fundamental units and derived units

1.5 State SI units with symbols

1.6 State Multiples and submultiples in SI system

1.7 State Rules of writing S.I. units

1.8 State advantages of SI units

1.9 Define Dimensions

1.10 Write Dimensional formulae

1.11 Derive dimensional formulae of physical quantities

1.12 List dimensional constants and dimensionless quantities

1.13 State the principle of Homogeneity of Dimensions

1.14 State the applications of Dimensional analysis (without problems)

1.15 State the limitations of dimensional analysis

**2.0 Understand the concept of Elements of Vectors**

 2.1 Explain the concept of Vectors

 2.2 Define Scalar and Vector quantities

 2.3 Give examples for scalar and vector quantities

 2.4 Represent a vector graphically

 2.5 Classify the Types of Vectors

 2.6 Resolve the vectors

 2.7 Determine the Resultant of a vector by component method

 2.8 Represent a vector in space using unit vectors ( i, j, k )

 2.9 State triangle law of addition of vectors

 2.10 State parallelogram law of addition of vectors

 2.11 Illustrate parallelogram law of vectors in case of flying bird and sling.

 2.12 Derive an expression for magnitude and direction of resultant of two vectors

 2.13 State polygon law of addition of vectors

 2.14 Explain subtraction of vectors

 2.15 Define Dot product of two vectors with examples (Work done, Power)

 2.16 Mention the properties of Dot product

 2.17 Define Cross products of two vectors and state formulae for torque and linear velocity

 2.18 Mention the properties of Cross product.

 2.19 Solve the related numerical problems

**3.0 Understand the concept of Kinematics**

 3.1 Write the equations of motion in a straight line

 3.2 Explain the acceleration due to gravity

3.3 Derive expressions for vertical motion

a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight

3.4 Derive an expression for height of a tower when a body projected vertically upwards from the top of a tower.

 3.5 Explain projectile motion with examples

 3.6 Explain Horizontal projection

 3.7 Derive an expression for the path of a projectile in horizontal projection

 3.8 Explain Oblique projection

 3.9 Derive an expression for the path of projectile in Oblique projection

 3.10 Derive formulae for projectile in Oblique projection

a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight

 e) Horizontal Range, f) Maximum range

 3.11 Solve the related numerical problems

**4.0 Understand the concept of Friction**

 4.1 Define friction and state its causes

 4.2 Classify the types of friction

 4.3 Explain the concept of Normal reaction

 4.4 State the laws of friction

 4.5 Define coefficients of friction

 4.6 Explain the Angle of friction

 4.7 Derive an expression for acceleration of a body on a rough horizontal surface

 4.8 Derive an expression for the displacement and time taken to come to rest over a

 rough horizontal surface

 4.9 List the Advantages and Disadvantages of friction

 4.10 Mention the methods of minimizing friction

 4.11 Solve the related numerical problems

**5.0 Understand the concept of Work, Power, and Energy**

 5.1 Define the terms Work, Power and Energy.

 5.2 State SI units and dimensional formula for Work, Power, and Energy

 5.3 Define potential energy

 5.4 Derive an expression for Potential energy with examples

 5.5 Define kinetic energy

 5.6 Derive an expression for kinetic energy with examples

 5.7 State and prove Work- Energy theorem

 5.8 Explain the relation between Kinetic energy and momentum

 5.9 State the law of conservation of energy

 5.10 Verify the law of conservation of energy in the case of a freely falling body

 5.11 Solve the related numerical problems

**6.0 Understand the concept of Simple harmonic motion**

6.1 Define Simple harmonic motion

 6.2 State the conditions of Simple harmonic motion

 6.3 Give examples for Simple harmonic motion

 6.4 Show that the tip of the projection of a body moving in circular path with uniform

 speed is SHM

 6.5 Derive an expression for displacement of a body executing SHM

 6.6 Derive an expression for velocity of a body executing SHM

 6.7 Derive an expression for acceleration of a body executing SHM

 6.8 Derive expressions for Time period and frequency of S H M

 6.9 Define phase of S H M

 6.10 Derive expression for Time period of a simple pendulum

 6.11 State the laws of simple pendulum

 6.12 Explain seconds pendulum

 6.13 Solve the related numerical problems

**7.0 Understand the concept of Heat and thermodynamics**

 7.1 Explain the concept of expansion of gases

 7.2 Explain Boyle’s law

 7.3 State Charle’s laws in terms of absolute temperature

 7.4 Define absolute zero temperature

 7.5 Explain absolute scale of temperature

 7.6 Define ideal gas

 7.7 Derive the ideal gas equation.

 7.8 Define gas constant and Universal gas constant

 7.9 Explain why universal gas constant is same for all gases

 7.10 State SI unit of universal gas constant

 7.11 Calculate the value of universal gas constant

 7.12 State the gas equation in terms of density

 7.13 Distinguish between r and R

 7.14 Define Isothermal process

 7.15 Define adiabatic process

 7.16 Distinguish between isothermal and adiabatic process

 7.17 State first and second laws of thermodynamics

 7.18 Define specific heats & molar specific heats of a gas

 7.19 Derive the relation Cp – Cv = R

 7.20 Solve the related numerical problems

**8.0 Understand the concept of Sound**

 8.1 Define the term sound

 8.2 Explain longitudinal and transverse wave motion

 8.3 Distinguish between musical sound and noise

 8.4 Explain noise pollution and state SI unit for noise

 8.5 Explain causes of noise pollution

 8.6 Explain effects of noise pollution

 8.7 Explain methods of minimizing noise pollution

 8.8 Explain the phenomenon of beats

 8.9 List the applications of beats

 8.10 Define Doppler effect

 8.11 List the Applications of Doppler effect

 8.12 Explain reverberation and reverberation time

 8.13 Write Sabine’s formula

 8.14 Explain echoes

 8.15 State conditions of a good auditorium

 8.16 Solve the related numerical problems

**9.0 Understand the properties of matter**

9.1 Define terms Elasticity and plasticity

 9.2 Define the terms stress and strain

 9.3 State the units and dimensional formulae for stress and strain

 9.4 State the Hooke’s law

 9.5 Define the surface tension

 9.6 Explain Surface tension with reference to molecular theory

 9.7 Define angle of contact

 9.8 Define capillarity and state examples

 9.9 Write the formula for surface tension based on capilarity

 9.10 Explain the concept of Viscosity

 9.11 Provide examples for surface tension and Viscosity

 9.12 State Newton’s formula for viscous force

 9.13 Define co-efficient of viscosity

 9.14 Explain the effect of temperature on viscosity of liquids and gases

 9.15 State Poiseulle’s equation for Co-efficient of viscosity

 9.16 Solve the related numerical problems

**10.0 Understand the concept of Electricity and Magnetism**

 10.1 Explain the concept of Electricity

 10.2 State the Ohm’s law

 10.3 Explain the Ohm’s law

 10.4 Define specific resistance, conductance and their units

 10.5 State Kichoff’s laws

 10.6 Explain Kichoff’s laws

 10.7 Describe Wheatstone’s bridge with legible sketch

 10.8 Derive an expression for balancing condition of Wheatstone’s bridge

 10.9 Explain the basic concept of Meter Bridge with legible sketch

 10.10 Explain the concept of magnetism

 10.11 State the Coulomb’s inverse square law of magnetism

 10.12 Define magnetic field and magnetic lines of force

 10.13 State the Magnetic induction field strength-units and dimensions

 10.14 Describe the moment of couple on a bar magnet placed in a uniform magnetic field

 10.15 Solve the related numerical problems

**11.0 Understand the concept of Modern physics**

 11.1 Explain Photo-electric effect

 11.2 Write Einstein‘s photoelectric equation

 11.3 State the laws of photoelectric effect

 11.4 Explain the Working of a photoelectric cell

 11.5 List the Applications of photoelectric effect

 11.6 Recapitulate refraction of light and its laws

 11.7 Define critical angle

 11.8 Explain the Total Internal Reflection

 11.9 Explain the basic principle of optical Fiber

 11.10 Mention types of optical fibbers

 11.11 List the applications of optical Fiber

 11.12 Define super conductor and superconductivity

 11.13 List the examples of superconducting materials

 11.14 List the applications of superconductors

**COURSE CONTENT**

**1.** **Units and Dimensions**:

Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and Derived units- SI units –Multiples and Sub multiples – Rules for writing S.I. units-Advantages of SI units – Dimensions and Dimensional formulae- Dimensional constants and Dimensionless quantities- Principle of Homogeneity- Applications and limitations of Dimensional analysis.

**2. Elements of Vectors**:

Scalars and Vectors –Types of vectors(Proper Vector, Null Vector, Unit Vector, Equal , Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector).Addition of vectors- Representation of vectors- Resolution of vectors - Parallelogram, Triangle and Polygon laws of vectors–Subtraction of vectors- Dot and Cross products of vectors-Problems

**3.** **Kinematics:**

Introduction- Concept of acceleration due to gravity- Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range - problems

**4.** **Friction:**

Introduction to friction- Causes- Types of friction- Laws of friction -Angle of friction— Motion of a body over a horizontal surface- Advantages and disadvantages of friction- Methods of reducing friction – Problems

**5. Work, Power and Energy:**

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy-Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems

**6.** **Simple Harmonic Motion:**

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum- Problems

**7.** **Heat and Thermodynamics:**

Expansion of Gases- Boyle’s law- Absolute scale of temperature- Charle’s laws- Ideal gas equation- Universal gas constant- Differences between r and R- Isothermal and adiabatic processes- Laws of thermodynamics- Specific heats of a gas - Problems

**8.** **Sound:**

Sound- Nature of sound- Types of wave motion - Musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation-Reverberation time-Sabine‘s formula-Condition of good auditorium- Problems

**9. Properties of matter**

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain-The Hooke’s law- Definition of surface tension-Explanation of Surface tension with reference to molecular theory - Definition of angle of contact - Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton’s formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseulle’s equation for Co-efficient of viscosity- The related numerical problems

**10.** **Electricity & Magnetism:**

Ohm’s law and explanation- Specific resistance- Kirchoff’s laws- Wheatstone’s bridge - Meter bridge- Coulomb’s inverse square law magnetic field- magnetic lines of force-Magnetic induction field strength-moment of couple-problems.

**11. Modern Physics;**

Photoelectric effect –Einstein’s photoelectric equation-laws of photoelectric effect - photoelectric cell –Applications of photo electric effect- Total internal reflection- fiber optics- -principle of an optical fiber-types of optical fibers - Applications of optical fibers- concepts of superconductivity - applications

**REFERENCE BOOKS**

 1. Intermediate physics Volume- I & 2 Telugu Academy

 2. Text book of physics Resnick & Holiday

 3. Engineering physics Gaur and Gupta

 4. Fundamental Physics Volume -1 & 2 K.L.Gomber and K.L.Gogia

**Blue Print for setting question paper at different levels**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.No** | **Major Topics** | **No. of****Periods** | **Weightage of Marks** | Short answertype | Essay type |
| K | U | A | K | U | A |
| 1. | Units and Dimensions | 08 | 04 | 2 | 0 | 0 | 0 | 0 | 0 |
| 2. | Elements of Vectors | 12 | 14 | 0 | 0 | 2 | 0 | 1 | 0 |
| 3. | Kinematics | 12 | 14 | 0 | 2 | 0 | 1 | 0 | 0 |
| 4. | Friction | 08 | 04 | 2 | 0 | 0 | 0 | 0 | 0 |
| 5. | Work, Power and Energy | 10 | 10 | 0 | 0 | 0 | 0 | 1 | 0 |
| 6. | Simple Harmonic Motion | 12 | 14 | 0 | 0 | 2 | 0 | 1 | 0 |
| 7. | Heat & Thermodynamics | 12 | 14 | 0 | 2 | 0 | 1 | 0 | 0 |
| 8. | Sound  | 12 | 14 | 0 | 2 | 0 | 0 | 0 | 1 |
| 9. | Properties of Matter | 10 | 08 | 2 | 2 | 0 | 0 | 0 | 0 |
| 10. | Electricity & magnetism | 14 | 14 | 0 | 2 | 0 |  0 | 1 | 0 |
| 11. | Modern Physics | 10 | 10 | 0 | 0 | 0 | 0 |  1 | 0 |
|  | **Total:** | **120** | **120** | **6** | **10** | **4** | **2**  | **5** | **1** |

**ENGG. CHEMISTRY & ENVIRONMENTAL STUDIES**

**(Common Subject)**

**Subject Title : Engg. Chemistry & Environmental Studies**

**Subject Code : EE -104**

**Total periods per year : 120**

**Curriculum : C-16**

**Blue Print**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Major topic** | **No of Periods** | **Weight age of marks** | **Short Type (2 Marks)** | **Essay Type (10 Marks)** | **Remarks** |
| 1 | **Fundamentals of Chemistry** | 18 | 18 | 4 | 1 |  |
| 2 | **Solutions** | 10 | 9 | 2 | ½ | 5 mark |
| 3 | **Acids and bases** | 10 | 9 | 2 | ½ | 5 mark |
| 4 | **Principles of Metallurgy** | 10 | 10 | 0 | 1 |  |
| 5 | **Electrochemistry** | 14 | 14 | 2 | 1 |  |
| 6 | **Corrosion** | 8 | 10 | 0 | 1 |  |
| 7 | **Water Technology** | 14 | 14 | 2 | 1 |  |
| 8 | **Polymers** | 12 | 14 | 2 | 1 |  |
| 9 | **Fuels** | 6 | 4 | 2 | 0 |  |
| 10 | **Environmental Studies** | 18 | 18 | 4 | 1 |  |
|  | **Total** | 120 | 120 | 20 | 08 |  |
|  |  | 40 | 80 |  |

**OBJECTIVES**

**Upon completion of the course the student shall be able to**

1. **ENGINEERING CHEMISTRY**

**1**.**0 Fundamentals of Chemistry**

1.1 Explain the fundamental particles of an atom like electron, proton and neutron etc.,

1.2 Explain the concept of atomic number and mass number

1.3 State the Postulates of Bohr’s atomic theory and its limitations

1.4 Explain the concept of Quantum numbers with examples

1.5 Explain 1.Aufbau’s principle, 2.Hund’s rule and 3.Pauli’s exclusion principle with examples.

1.6 Define Orbital.

1.7 Draw the shapes of s, p and d Orbitals.

1.8 Distinguish between Orbit and Orbital

1.9 Write the electronic configuration of elements up to atomic number 30

1.10 Define chemical bond.

1.11 Explain the Postulates of Electronic theory of valency

1.12 Define and explain three types of Chemical bonding viz., Ionic, Covalent, Coordinate covalent bond with examples.

1.13 Explain bond formation in NaCl and MgO

1.14 List the Properties of Ionic compounds

1.15 Explain covalent bond formation in Hydrogen molecule, Oxygen molecule, and Nitrogen molecule using Lewis dot method.

1.16 List the Properties of Covalent compounds

1.17 Distinguish between ionic compounds and covalent compounds.

1.18 Define the terms 1.Oxidation, 2.Reduction 3.Oxidation number 4. Valency, with examples.

1.19 Calculate the Oxidation Number

1.20 Differentiate between Oxidation Number and Valency.

**2.0 Solutions**

2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent

2.2 Classify solutions based on physical state.

2.3 Define solubility, unsaturated, saturated and super saturated solutions.

2.4 Define mole.

2.5 Explain Mole concept with examples.‘

2.6 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight

2.7 Calculate Molecular weight and Equivalent weight of Acids, Bases and Salts.

2.8 Define 1.Molarity and Normality.

2.9 Solve Numerical problems on Mole, Molarity and Normality

**3.0 Acids and bases**

3.1 Explain Arrhenius theory of Acids and Bases

3.2 State the limitations of Arrhenius theory of Acids and Bases

3.3 Explain Bronsted – Lowry theory of acids and bases.

3.4 State the limitations of Bronsted – Lowry theory of acids and bases.

3.5 Explain Lewis theory of acids and bases

3.6 State the limitations of Lewis theory of acids and bases

3.7 Explain the Ionic product of water

3.8 Define pH and explain Sorenson scale

3.9 Solve the Numerical problems on pH (Strong Acids and Bases)

3.10 Define buffer solution and give examples.

3.11 State the applications of buffer solutions.

**4. 0 Principles of Metallurgy**

4.1 List the Characteristics of Metals.

4.2 Distinguish between Metals and Non Metals

4.3 Define the terms 1.Mineral, 2.Ore, 3. Gangue, 4. Flux and 5. Slag

4.4 Describe Froth Floatation method of concentration of ore.

4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.

4.6 Explain the purification of Metals by Electrolytic Refining

4.7 Define an Alloy

4.8 Write the Composition of the following alloys:1.Brass, 2.German silver, and Nichrome

4.9 List the uses of following Alloys: Brass, German silver, Nichrome

**5.0 Electrochemistry**

5.1 Define the terms1. conductor, 2. Insulator, 3.Electrolyte and 4.Non – electrolyte

5.2 Types of electrolytes.- strong and weak with examples.

5.3 Distinguish between metallic conductors and Electrolytic conductors.

5.4 Explain Arrhenius theory of electrolytic dissociation

5.5 Explain electrolysis of fused NaCl.

5.6 Explain Faraday’s laws of electrolysis

5.7 Define Chemical equivalent, Electrochemical equivalent.

5.8 Solve the Numerical problems based on Faraday’s laws of electrolysis

5.9 Define Galvanic cell

5.10 Explain the construction and working of Galvanic cell

5.11 Distinguish between electrolytic cell and galvanic cell

5.12 Explain the standard electrode potentials

5.13 Define electrochemical series and explain its significance.

5.14 Define and explain emf of a cell.

5.15 Solve the numerical problems on emf of cell

**6.0 Corrosion**

6.1 Define the term corrosion

6.2 Explain the Factors influencing the rate of corrosion

6.3 Explain the concept of electrochemical theory of corrosion

6.4 Describe the formation of a) composition cell, b) stress cell c) concentration cell

6.5 Define rust and explain the mechanism of rusting of iron with chemical reactions.

6.6 Explain the methods of prevention of corrosion: a) Protective coatings

 b) Cathodic protection (Sacrificial anode process and Impressed – voltage process)

**7. 0 Water Technology**

7.1 State the various Sources of water.

7.2 Define the terms soft water and hard water with examples

7.3 Define hardness of water.

7.4 Explain temporary and permanent hardness of water.

7.5 List the usual chemical compounds causing hardness (with Formulae)

7.6 Define Degree of hardness, units of hardness in ppm (mg/L) and numerical problems related to hardness.

7.7 Disadvantages of using hard water in industries.

7.8 Explain the methods of softening of hard water: a) permutit process b).Ion-Exchange process.

7.9 Essential qualities of drinking water.

7.10 Explain municipal treatment of water for drinking purpose.

7.11 Define Osmosis and Reverse Osmosis(RO).

7.12 List the advantages of RO

**8.0 Polymers**

8.1 Explain the concept of polymerisation

8.2 Describe the methods of polymerisation a) addition polymerisation b) condensation polymerization with examples.

8.3 Define the term plastic

8.4 Types of plastics with examples.

8.5 Distinguish between thermoplastics and thermosetting plastics

8.6 List the Characteristics of plastics.

8.7 State the advantages of plastics over traditional materials

8.8 State the disadvantages of using plastics.

8.9 Explain the methods of preparation and uses of the following plastics:

 1. Polythene, 2. PVC, 3.Teflon, 4. Polystyrene 5. Urea formaldehyde 6. Bakelite

 (only flow chart i.e. without chemical equations).

8.10 Define the term natural rubber

8.11 State the structural formula of Natural rubber

8.12 Explain the processing of Natural rubber from latex

8.13 List the Characteristics of natural rubber

8.14 Explain the process of Vulcanization

8.15 List the Characteristics of Vulcanized rubber

8.16 Define the term Elastomer

8.17 Describe the preparation and uses of the following synthetic rubbers a) Butyl rubber, b) Buna-s and c) Neoprene rubber

**9.0 Fuels**

9.1 Define the term fuel

9.2 Classify the fuels based on physical state – solid, liquid and gaseous fuels with examples.

9.3 Classify the fuels based on occurrence- primary and secondary fuels with examples.

9.4 List the characteristics of a good fuel.

9.5 State the composition and uses of the following gaseous fuels:

 a) water gas, b) producer gas, c) natural gas, d) coal gas, e) Bio gas and f) acetylene

**B. ENVIRONMENTAL STUDIES**

1.1 Define the term environment

1.2 Explain the scope and importance of environmental studies

1.3 Define and understand the following terms 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere, 5)Pollutant, 6).Contaminant 7) Pollution 8)receptor 9)sink 10) particulates, 11)Dissolved oxygen(DO), 12).Threshold limit value(TLV), 13).BOD, and 14).COD

1.4 Explain the growing energy needs

1.5 Explain renewable(non-conventional) and non renewable(conventional) energy sources with examples.

1.6 Define an Ecosystem. Understand biotic and abiotic components of ecosystem.

1.7 Define the terms:

 1).Producers, 2).Consumers and 3).Decomposers with examples.

1.8 Explain biodiversity and threats to biodiversity

1.9 Define air pollution

1.10 Classify the air pollutants- based on origin and states of matter

1.11 Explain the causes of air pollution

1.12 Explain the use and over exploitation of forest resources and deforestation

1.13 Explain the effects of air pollution on human beings, plants and animals

1.14 Explain the green house effect - ozone layer depletion and acid rain

1.15 Explain the methods of control of air pollution

1.16 Define water pollution

1.17 Explain the causes of water pollution

1.18 Explain the effects of water pollution on living and non living things

1.19 Understand the methods of control of water pollution.

**COURSE CONTENT**

**A. ENGINEERING CHEMISTRY**

**1. Fundamentals of Chemistry**

**Atomic Structure:** Introduction - Fundamental particles – Bohr’s theory – Quantum numbers - Aufbau principle - Hund’s rule - Pauli’s exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

**Chemical Bonding:** Introduction – Valency, types of chemical bonds – Ionic, covalent and co-ordinate covalent bond with examples – Properties of Ionic and Covalent compounds

**Oxidation-Reduction:** Concepts of Oxidation-Reduction, Oxidation Number- calculations,

**2. Solutions**

Introduction-concentration methods – Mole concept, Molarity, Normality, Equivalent weights, Numerical problems on Mole, Molarity and Normality

**3. Acids and Bases**

Introduction – theories of acids and bases and limitations – Arrhenius theory-Bronsted –Lowry theory – Lewis acid base theory – Ionic product of water – pH and related numerical problems – buffer solutions –Applications.

**4. Principles of Metallurgy**

Characteristics of Metals and distinction between Metals and Non Metals, Metallurgy, ore, Gangue, Flux, Slag - Concentration of Ore –Froth floatation - Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of Brass, German silver and Nichrome

**5. Electrochemistry**

Conductors, insulators, electrolytes - Arrhenius theory of electrolytic dissociation – electrolysis – Faraday’s laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electro chemical series –emf and numerical problems on emf of a cell

**6. Corrosion**

Introduction - factors influencing the rate of corrosion - electrochemical theory of corrosion - composition, stress and concentration cells– rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection

**7. Water technology**

Introduction –soft and hard water – causes of hardness – types of hardness

–disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process – numerical problems related to degree of hardness – drinking water – municipal treatment of water for drinking purpose – Osmosis, Reverse Osmosis - advantages of Reverse osmosis

**8. Polymers**

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials – Disadvantages of using plastics – preparation and uses of the following plastics: 1. Polytehene 2. PVC 3. Teflon 4. Polystyrene 5. Urea formaldehyde 6. Bakelite – Rubber – Natural rubber – processing from latex –Vulcanization – Elastomers – Butyl rubber, Buna-s, Neoprene rubber and their uses.

**9. Fuels**

 Definition and classification of fuels – characteristics of good fuel - composition and

 uses of gaseous fuels- a) water gas,b) producer gas, c) natural gas, d) coal gas,

 e) Bio gas and f) acetylene

**B. ENVIRONMENTAL STUDIES**

Introduction – environment –scope and importance of environmental studies important terms – renewable and non renewable energy sources – Concept of ecosystem, producers, consumers and decomposers – Biodiversity, definition and threats to Biodiversity.

air pollution - causes-Effects – forest resources : uses and over exploitation, deforestation, acid rain, green house effect –ozone depletion – control of air pollution – Water pollution – causes – effects – control measures,

**REFERENCE BOOKS**

1. Intermediate chemistry Vol 1&2 Telugu Acedemy
2. Engineering Chemistry Jain & Jain
3. Engineering Chemistry O.P. Agarwal, Hi-Tech.
4. Engineering Chemistry Sharma
5. Engineering Chemistry A.K. De

#

ELECTRICAL ENGINEERING MATERIALS

**Subject Title : Electrical Engineering Materials**

**Subject Code : EE-105**

**Periods/Week : 03**

**Periods/Year : 90**

 **TIME SCHEDULE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Major Topics** | **Periods** | **Weightage** | **Short questions** | **Essay questions** |
| 1. | Conducting Materials | 18 | 26 | 04 | 02 |
| 2. | Semi Conducting Material | 12 | 13 | 02 | 01 |
| 3. | Insulating Materials | 15 | 13 | 02 | 01 |
| 4. | Di- electric Materials | 9 | 8 | 02 | 1/2 |
| 5. | Magnetic Materials  | 9 | 13 | 02 | 1 |
| 6. | Special Purpose Materials | 9 | 11 | 04 | 1/2 |
| 7. | Batteries  | 18 | 26 | 04 | 02 |
|  | Total | 90 | 110 | 20 | 08 |

**OBJECTIVES**

Upon completion of the course the student shall be able to

1. **Comprehend the Conducting Materials**

1.1 Define Conducting Materials

 1.2 State the properties of conducting materials

 1.3 Define the terms (i) Hardening (ii) Annealing

 1.4 Explain the effects of Hardening and Annealing on copper with regard

 Electrical and Mechanical properties.

 1.5 State the main requirements of Low Resistivity Materials

 1.6 State the main requirements of HighResistivity materials.

1.7 List some examples of i)Low Resistivity Materials

 ii)High Resistivity materials

 1.8 Mention the Properties & Applications of Copper and Aluminium

 1.9 Distinguish between Copper and Aluminium.

 1.10 Mention the properties & applications of ACSR Conductors and AAAC.

 1.11 State the requirements of High Resistive Materials.

 1.12 State the types of High Resistive Materials.

 1.13 List the properties & Applications of High Resistive Materials.

1. Manganin ii) Eureka

iii) Constantan iv) Nichrome

v) Tungsten vi) Platinum

vii) Mercury viii) Carbon

1.14 List the colour codes of the resistors as per BIS.

**2.0 Understand the Semi conducting Materials**

2.1Define Semi-conducting materials

2.2 Understand Semi-conducting materials.

2.3 Classify Semi-conducting materials.

2.4 Define i) Intrinsic Semi-conductors and ii)Extrinsic Semi-conductors.

2.5 Distinguish between Intrinsic and Extrinsic semi-conductors.

2.6 Explain the formation of i) P type semi-conductor and

ii)N type semi-conductors.

2.7 Distinguish between P and N type semi-conductors.

**3.0 Comprehend the Insulating Materials**

3.1Define Insulating Materials

3.2 Draw energy level diagrams of conductors, insulators and semi-Conductors.

3.3 Distinguish between conductors, insulators and semi-Conductors

3.4 State the important electrical properties of Insulating materials.

(i) Insulating resistance (ii) Volume and (iii)Surface resistance

3.5 Explain factors affecting insulating resistance.

3.6 Classify Insulating materials on the basis of temperature

i.e (Y, A, E, B, F, H and C class)

3.7 Classify insulating materials.

3.8 State the properties of i) Impregnated paper ii) Wood iii)Cardboard iv)Asbestos v)Mica vi)Ceramics and vii)Glass.

 3.9 List the applications of the above insulating materials.

3.10 Explain Thermoplastic & Thermosetting resins with examples.

3.11 Explain the properties of PVC

3.12 List the applications of PVC.

3.13 State the effects of the following on P.V.C

(i) Filler (ii) Stabilizer (iii) Plasticizer (iv) Additives.

3.14 State the Properties of the following gasses

i) Air (ii) Nitrogen (iii) Hydrogen (iv) Sulphur – Hexafluoride (SF6).

3.15 List the applications of the following gasses

i) Air (ii) Nitrogen (iii) Hydrogen (iv) Sulphur – Hexafluoride (SF6).

4.0 **Know the Di- electric materials**

4.1 Give the Permittivity of commonly used di - electric materials

1. Air ii) Bakelite

iii) Glass iv) Mica

v) Paper vi) Porcelain

vii) Transformer oil

4.2 Explain Polarization.

4.3 Explain Dielectric Loss.

4.4 List any four the application of Dielectrics.

4.5 List the colour codes of the capacitors as per BIS.

**5.0 Know the Magnetic Materials**

5.1 Classify the Magnetic Material as:

(i) Ferro (ii) Para (iii) Dia-Magnetic materials with examples

5.2 Explain i)Soft Magnetic materials and ii) Hard Magnetic materials

5.3 Draw i) B-H. Curves and ii)Hysteresis loop

5.4 Explain. Hysteresis loop.

5.5 Explain Hysteresis loss and State Steinmetz equation (No-Problems)

5.6 Explain Eddy Current Losses

5.7 State Curie point

5.8 Define Magnetostriction.

1. **Understand the Special Purpose Materials**

6.1 State the need for protective materials

6.2 List the various protective materials like Lead, Paints, Steel Tapes etc.

6.3 Explain the thermo couple materials.

6.4 State the Bi-metals

6.5 State the soldering materials

6.6 Define fuse

6.7 State the different types of materials used for fuse.

6.8 Explain the process of Galvanising and Impregnation

6.9 State the use of Enamel coated copper wires (thin, medium and thick).

6.10 State the importance of Nano Materials.

**7.0 Comprehend the** **Batteries**

7.1 Classify cells as primary and secondary cells.

* 1. Distinguish between primary and secondary cells.

7.3 Name the types of storage cells as lead acid, Nickel iron and Nickel Cadmium.

7.4 Explain the parts of lead acid battery.

7.5 Write chemical reactions during charging and discharging of lead acid battery.

7.6 List indications of fully charged lead acid battery.

* 1. Explain parts of Nickel – iron cells

7.8 Write chemical reactions during charging and discharging of Nickel – iron cell.

7.9 State applications of (i) Lead acid battery (ii) Nickel iron cell

(iii) Nickel Cadmium battery.

7.10 Compare Lead acid cell with Nickel iron cell.

7.11 Explain charging of batteries by i)Constant current method and

ii)Constant Voltage method.

7.12 State precautions to be taken during charging & discharging of batteries.

7.13 Explain trickle charging

7.14 State capacity of a battery and factors affecting capacity.

7.15 State Ampere- hour efficiency and Watt- hour efficiency of battery

7.16 Solve problems on the Ampere – Hour Efficiency and Watt – Hour

Efficiency

7.17 Define maintenance free battery

7.18 Differentiate between maintenance free batteries and lead-acid batteries

7.19 Explain the construction and working of maintenance free batteries

7.20 State the applications of maintenance free batteries.

**COURSE CONTENT**

1. **Conducting Materials**

Hardening, Annealing - Low Resistive Materials – Requirements – Properties and applications of Copper and Aluminum - Comparison between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements- Properties and applications.

**2. Semi conducting Materials**

Semi-conductors - Intrinsic and extrinsic semi- conductors-`P’ and `N’ type Materials

**3. Insulating Materials**

Properties -Insulation resistance - Factors effecting Insulation resistance - Classification of Insulation materials - Properties – Applications.

**4**. **Di- electric materials**

Permittivity of di - electric materials- Polarisation - Dielectric Loss –

Application of Dielectrics – Colour codes.

**5. Magnetic Materials**

Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves - Hysteresis loop - Hysteresis loss - Steinmetz constant - Eddy Current Loss -- Curie Point – Magnetostriction.

**6**. **Special Purpose Materials**

 Protective materials – Thermocouple - Bi-Metals- Soldering- Fuses -Galvanizing and Impregnating - Nano Materials.

**7. Batteries**

Primary cell and Secondary cells-Lead acid, Nickel iron and Nickel - cadmium-Chemical reactions during charging and discharging – Charging of Batteries- Constant current method and constant voltage method-Trickle charging - Capacity of Battery - Ampere-hour efficiency and watt-hour efficiency - Maintenance free batteries

# REFERENCES

1. Electronic Components -Dr. K.Padmanabham
2. Electronic Components -D.V.Prasad

 3 Electrical Engineering Materials – N.I T.T.T.R Publications

 4 Introduction to Engineering materials – B.K.Agarwal.

 5 Materials science for Electrical and Electronic Engineers – Ian P.Jones (Oxford Publications)

BASIC ELECTRICAL ENGINEERING

**Subject Title : Basic Electrical Engineering**

**Subject Code : EE-106**

**Periods/Week : 05**

 **Periods/Year : 150**

 **TIME SCHEDULE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Major Topics** | **Periods** | **Weightage** | **Short questions** | **Essay questions** |
| 1. | Electric Current-Ohm’s law, Resistance. | 35 | 26 | 04 | 02 |
| 2. | Work, Power and Energy | 10 | 13 | 02 | 01 |
| 3. | Heating effects of electric Current | 15 | 13 | 02 | 01 |
| 4. | Magnetic effects of Electric current | 30 | 16 | 04 | 01 |
| 5. | Electromagnetic Induction | 35 | 26 | 04 | 02 |
| 6. | Electrostatics  | 25 | 16 | 04 | 01 |
|  | Total | 150 | 110 | 20 | 08 |

**OBJECTIVES**

Upon completion of the course the student shall be able to

* 1. **Comprehend the basic Principles of Electricity**
	2. Distinguish between conductor, insulator and semi-conductor with respect to valence

 electrons.

* 1. State Ohm’s Law.
	2. Explain Ohm’s Law
	3. List the limitations of Ohms Law.
	4. Explain the concept of Resistance to flow of electrons.
	5. Define the terms i)specific resistance ii)conductance and iii)conductivity.
	6. Deduce the relation R =( ρl ) / a
	7. Solve simple problems based on the Ohm’s Law & R =( ρl ) / a.
	8. State the effect of Alloying on Resistivity.
	9. Explain the effects of temperature on resistance

1.11 Develop the expression for resistance at any temperature as R t = Ro (1+∝o t)

1.12 Define temperature co- efficient of resistance and give its unit.

1.13 Develop the formula for co-efficient of resistance at any temperature as **∝**t**=∝o /(**1+**∝o**t)

1.14 Solve problems based on the R t = Ro (1+∝o t) & **∝**t**=∝o /(**1+**∝o**t).

1.15 Develop the expressions for equivalent Resistance with simple series connections.

1.16 Develop the expressions for equivalent Resistance with simple parallel connections.

1.17 Solve problems on equivalent resistance in the case of series- parallel networks.

1.18 Solve problems on division of current when Two Resistors are connected in parallel.

1. **Explain the concept of work, power & energy**

2.1 State the S.I. System of units for work, power and energy

* 1. Express work, power and energy in Electrical, Mechanical and Thermal Units.
	2. Define efficiency.
	3. Calculate electricity bill for domestic consumers.
	4. Solve problems on work, power and energy in Electrical, Mechanical and Thermal units.
1. **Appreciate the Heating effects of Electric Current**

3.1 Explain the Mechanical equivalent of heat.

3.2 State the heat produced due to flow of current.

3.3 Explain the applications of heat produced due to Electric current in

i) Metal Filament lamps ii)Electric kettle iii) Electric cooker iv) Electric Iron

v) Space heaters vi) Geyser vii) Infrared lamp.

3.4 Define thermal efficiency.

3.5 Solve problems on the above.

1. **Appreciate the magnetic effects of Electric Current**

4.1 Draw the lines of force around a magnetic.

4.2 Explain the concept of field lines around current carrying conductors

4.3 State Right hand thumb rule.

4.4 Plot the field pattern due to

i) Straight current carrying conductor ii) Solenoid and iii) Toroid.

4.5 Explain Work law and its applications.

4.6 State Laplace law (Biot-Savart’s Law)

4.7 Give expressions for field strength (No derivation)

1. At Centre of a circular conductor
2. At any point on the axis of a circular conductor
3. Around a Straight conductor
4. On the axis of a solenoid

4.8 Explain the Mechanical force on a current carrying Conductor in a Magnetic field.

4.9 Derive an expression for magnitude of the force on a conductor in a magnetic field.

4.10 State the Fleming’s left hand rule

4.11 Derive an expression for the force between two parallel current carrying conductors.

4.12 State the nature of the force with different directions of the currents

4.13 Define ampere

4.14 Solve problems on the above.

4.15 Define i) magnetizing force ii)permeability iii) flux and iv)Reluctance

4.16 Derive the concept of the Magnetic circuits

4.17 Solve problems on simple magnetic circuits

4.18 Compare magnetic circuit with electric circuit.

4.19 State Magnetic leakage co-efficient.

1. **Explain Electro Magnetic Induction**

5.1 State Faraday’s laws of electro - magnetic induction.

5.2 Explain dynamically and statically induced E.M.F.

5.3 State Lenz’s law

5.4 Explain Fleming’s right hand rule.

5.5 Explain the concept of self and mutual inductance.

5.6 Derive expressions for self and mutual inductance.

5.7 State co-efficient of coupling.

5.8 Explain the total inductance with series connections with reference to direction of flux.

5.9 Develop an expression for energy stored in a magnetic field.

5.10 Develop an expression for energy stored per unit volume

5.11 Develop an expression for lifting power of a magnet.

5.12 Solve problems on the above.

1. **Comprehend Electric Charge and Electrostatic Field**

6.1 State Coulomb’s law of electrostatics and define unit charge

6.2 Define absolute and relative permittivity.

6.3 Solve problems on the above

6.4 Explain electrostatic field.

6.5 Plot electrostatic field due to

1. Isolated positive charges
2. Isolated negative charge
3. Unlike charges side by side
4. Like charges side by side

6.6 State electric flux, electric flux density and field intensity.

6.7 Compare electrostatic and magnetic circuits.

6.8 State Gauss theorem.

6.9 Explain electric potential and potential difference.

6.10 Explain di-electric strength and di-electric constant

6.11 Define capacitance and state its unit.

6.12 Derive the formula for capacitance of a capacitor.

6.13 State different types of capacitors

6.14 Give uses of different capacitors

6.15 Explain equivalent capacitance of

1. Capacitors connected in series;
2. Capacitors connected in parallel

6.16 Derive an expression for energy stored in a capacitor

6.17 Solve problems on the above

**COURSE CONTENT**

1. **Electric Current - Ohm’s Law - Resistance**

Conductor, Insulator , semi-Conductor - Electric Potential – Ohm’s law – Resistance – Specific Resistance – Conductivity – Temperature coefficient of Resistance – Resistance in series, parallel and series - parallel combinations

1. **Work, Power & Energy**

Units of work, power and energy. – Conversion of Units-Efficiency

1. **Heating Effects of Electrical Current**

Mechanical Equivalent of Heat - Heat produced due to flow of current in resistance- applications

1. **Magnetic Effects of Electric Current**

Lines of force - Field pattern due to long straight current carrying conductor-Field pattern of solenoid and Toroid -Work Law and its applications -Biot Savart Law(Laplace Law) -Field strength at centre and any point on the axis of a circular current carrying conductor- Field Strength around a straight current carrying conductor- Field strength on the axis of a solenoid-Mechanical force on a current carrying conductor in magnetic field - Direction of force - Fleming’s left hand rule -Force between two parallel current carrying conductors – Ampere - Magnetic circuit- Magnetising force – permeability - flux - reluctance - Comparison of Magnetic circuit with electric circuit - Magnetic leakage.

1. **Electro Magnetic Induction**

Faraday’s laws - Dynamically and statically induced E.M.F -Lenz’s Law & Fleming’s right hand rule -Self and mutual inductance - Co-efficient of coupling - Inductances in series -Energy stored in a magnetic field - Energy stored per unit volume - Lifting power of magnet

1. **Electrostatics**

Atom, Ion, positive and Negative charges -Laws of Electrostatics – coulomb - Permittivity - Electrostatic induction -Electrostatic field - lines of force -Comparison of electrostatic and magnetic lines of force - Strength of electric field- Flux density -Gauss theorem - Electric potential - potential difference –Dielectric strength - Dielectric constant - Capacitance -Capacitor - types - Capacitors in series and parallel- Energy stored in a capacitor.

# REFERENCES

1. B.L.Theraja -Electrical Technology Vol.I- S.Chand &co.

 2. T.K.Nagsarkar & M.S.Sukhija -Basic Electrical Engineering– Oxford.

3. Hughes-Electrical Technology

4. J.B.Gupta -Electrical Techology Vol.I

5. G.B.Bharadhwajan & A. Subba Rao -Elements of Electrical Engineering.

6. D C Kulshreshtha.-Basic Electrical Engineering .

7. Engineering D.P.Kothari & I.J.Nagarath -Theory and Problems of Basic Electrical -PHI

8. Abhijit Chakrabarthi,Sudipta nath, Chandan Kumar Chada -Basic Electrical Engineering.

## ENGINEERING DRAWING

**Subject Title : Engineering Drawing**

##### Subject Code : EE–107 ( Common to all Branches)

**Periods/Week : 06**

**Periods Per Year : 180**

## TIME SCHEDULE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No** | Major Topics | **No. of Drawing plates** |  Periods | WeightageofMarks | Short**Answer Questions** | Essay typeQuestions |
| 1 | Importance of Engineering Drawing | -- | 01 | - | - | - |
| 2 | Engineering Drawing Instruments | 01 | 05 | - | - | - |
| 3 | Free hand lettering & Numbering | 01 | 06 | 5 | 1 | - |
| 4 | Dimensioning Practice | 01 | 09 | 5 | 1 | - |
| 5 | Geometrical Constructions | 03 | 21 | 15 | 1 | 1 |
| 6 | Projection of points, Lines, Planes & Solids | 03 | 21 | 10 | - | 1 |
| 7 | Auxiliary views | 01 | 06 | 5 | 1 | - |
| 8 | Sectional views | 04 | 27 | 10 | - | 1 |
| 9 | Orthographic Projection | 04 | 33 | 10 | - | 1 |
| 10 | Pictorial drawing | 04 | 30 | 10 | - | 1 |
| 11 | Development of surfaces | 03 | 21 | 10 | - | 1 |
|  **Total**  | **25** | **180** | **80** | **04** | **06** |

The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

**Pre-Requisite:** Clear visualization and sound pictorial intelligence

**OBJECTIVES**

###### Upon completion of the subject the student shall be able to

**1.0 Understand the basic concepts of Engineering Drawing**

1.1 State the importance of drawing as an engineering communication

 medium

1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.

1.3 Explain the linkages between Engineering drawing and other subjects of

 study in diploma course.

**2.0 Use of Engineering Drawing Instruments**

2.1 Select the correct instruments and draw lines of different orientation.

2.2 Select the correct instruments and draw small and large Circles.

2.3 Select the correct instruments for measuring distances on the drawing.

 2.4 Use correct grade of pencil for different types of lines, thickness and

given function.

2.5 Select and use appropriate scales for a given application.

 2.6 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.

2.7 Prepare Title block as per B.I.S. Specifications.

 2.8 Identify the steps to be taken to keep the drawing clean and tidy.

Drawing Plate 1: (Having two exercises)

**3.0 Write Free Hand Lettering and Numbers**

3.1 Write titles using slanting letters and numerals of 7mm, 10mm and 14mm height

3.2 Write titles using vertical letters and numerals of 7mm, 10mm and 14mm height

3.3 Select suitable sizes of lettering for different layouts and applications

3.4 Practice the use of lettering stencils.

Drawing plate 2: (Having 5 to 6 exercises)

**4.0 Understand Dimensioning Practice**

4.1 Define “Dimensioning.

4.2 State the need of dimensioning the drawing according to accepted standards.

4.3 Identify notations of Dimensioning used in dimensioned drawing.

4.4 Identify the system of placement of dimensions in the given

 dimensioned drawing.

4.5 Dimension a given drawing using standard notations and desired

 system of dimensioning.

4.6 Dimension standard features applying necessary rules.

4.7 Arrange dimensions in a desired method given in the drawing.

4.8 Identify the departures if any made in the given dimensioned drawing

 with reference to SP-46-1988, and dimension the same correctly.

Drawing Plate 3: (Having 08 to10 exercises)

**5.0 Apply Principles of Geometric Constructions**

5.1 Divide a given line into desired number of equal parts internally.

5.2 Draw tangent lines and arcs.

5.3 Use General method to construct any polygon.

5.4 Explain the importance of conics

5.5 Construct conics (ellipse, parabola and hyperbola) by general method

5.6 Construct ellipse by concentric circles method

5.7 Construct parabola by rectangle method

5.8 Construct rectangular hyperbola from the given data.

5.9 Construct involute from the given data.

5.10 Construct cycloid and helix from the given data.

5.11 State the applications of the above constructions in engineering practice.

Drawing Plate -4: Having problems up to construction of polygon

Drawing Plate -5: Having problems of construction of conics

Drawing Plate -6: Having problems of construction of involute, cycloid and helix

**6.0 Apply Principles of Projection of points, lines, planes & solids**

6.1 Visualize the objects

 6.2 Explain the I-angle and III-angle projections

6.3 Practice the I-angle projections

6.4 Draw the projection of a point with respect to reference planes (HP&VP)

6.5 Draw the projections of straight lines with respect to two reference

 Planes (up to lines parallel to one plane and inclined to other plane)

6.6 Draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)

6.7 Draw the projections of solids (up to axis of solids parallel to one plane and inclined to other plane)

Drawing Plate -7: Having problems up to projection of points and Lines (15 exercises)

Drawing Plate -8: Having problems of projection of planes (6 exercises)

Drawing Plate -9: Having problems of projection of solids (10 exercises)

**7.0 Understand the need of auxiliary views**

7.1 State the need of Auxiliary views for a given engineering drawing.

7.2 Draw the auxiliary views of a given engineering component

7.3 Differentiate between auxiliary view and apparent view

Drawing plate No.10: (Having 4 exercises)

**8.0 Appreciate the need of Sectional Views**

8.1 Explain the need to draw sectional views.

8.2 Select the section plane for a given component to reveal maximum

 information.

8.3 Explain the positions of section plane with respect to reference planes

8.4 Differentiate between true shape and apparent shape of section

8.5 Draw sectional views and true sections of regular solids discussed in **6.0**

8.6 Apply principles of hatching.

Drawing Plate–11: Having problems of section of solids (6 exercises)

 **9.0 Apply principles of orthographic projection**

9.1 Explain the principles of orthographic projection with simple

 sketches.

9.2 Draw the orthographic view of an object from its pictorial drawing.

9.3 Draw the minimum number of views needed to represent a given

 object fully.

Drawing Plate 12 : (Having 10 to 12 exercises)

**10.0 Prepare pictorial drawings**

10.1 State the need of pictorial drawings.

10.2 Differentiate between isometric scale and true scale.

10.3 Prepare Isometric views for the given orthographic drawings.

Drawing plate 13: (Having 10 to 12 exercises)

**11.0 Interpret Development of surfaces of different solids**

11.1 State the need for preparing development drawing.

11.2 Prepare development of simple engineering objects (cubes, prisms, cylinders, cones, pyramids) using parallel line and radial line methods.

11.3 Prepare development of surface of engineering components like trays,

 funnels, 900 elbows & rectangular ducts.

Drawing plate No. 14: (Having 05 exercises)

**KEY competencies to be achieved by the student**

|  |  |  |
| --- | --- | --- |
| **S.No** | **List of Practical** | **Key Competency** |
| 1. | Importance of Engineering Drawing | * Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
 |
| 2. | Engineering Drawing Instruments | * Select the correct instrument to draw various entities in different orientation
 |
| 3. | Free hand lettering & Numbering | * Write titles using slanting and vertical letters and numerals as per B.I.S (Bureau of Indian standards)
 |
| 4. | Dimensioning Practice | * Dimension a given drawing using standard notations and desired system of dimensioning.
 |
| 5. | Geometrical constructions | * Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
 |
| 6. | Projection of Points, Lines, Planes & Solids | * Draw the projection of a point, straight lines, planes & solids with respect to reference planes (HP& VP)
 |
| 7. | Auxiliary views | * Draw the auxiliary views of a given Engineering component
* Differentiate between Auxiliary view and apparent view
 |
| 8. | Sectional views | * Differentiate between true shape and apparent shape of a section.
* Use conventional representation of Engineering materials as per B.I.S. Code.
* Apply principles of hatching.
* Draw simple sections of regular solids.
 |
| 9. | Orthographic Projection | * Draw the minimum number of views needed to represent a given object fully.
 |
| 10. | Pictorial drawing | * Differentiate between isometric scale and true scale.
* Draw the isometric views of given object.
 |
| 11. | Development of surfaces | * Prepare development of Surface of

 Engineering components like trays, funnels, 900 elbows & rectangular ducts. |

 **COURSE CONTENT**

NOTE

**1. B.I.S Specifications should invariably be followed in all the topics.**

**2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**

**1.0 The importance of Engineering Drawing**

 Explanation of the scope and objectives of the subject of Engineering Drawing, Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46–1988 – Mention B.I.S - Role of drawing in engineering education – Link between Engineering drawing and other subjects of study.

**2.0 Engineering drawing Instruments**

 Classification: Basic tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mention the names under each classification and their brief description -Scales: Recommended scales reduced & enlarged scales-Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet, Drawing plate:

 Lay out of sheet – as per SP-46-1988 to a suitable scale.

 Simple Exercises on the use of Drawing Instruments. Importance of Title Block.

**3.0 Free hand lettering & numbering**

Importance of lettering – Types of lettering -Guide Lines for Lettering-

Practicing letters & numbers of given sizes (7mm, 10mm and 14mm)

Advantages of single stroke or simple style of lettering - Use of lettering stencils

**4.0 Dimensioning practice**

 Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape

 description of an Engineering object -Definition of Dimensioning size

 description -Location of features, surface finish, fully dimensioned Drawing -

 Notations or tools of dimensioning, dimension line, extension line, leader line,

 arrows, symbols, number and notes, rules to be observed in the use of above

 tools -Placing dimensions: Aligned system and unidirectional system ( SP-46-

 1988)-Arrangement of dimensions Chain, parallel, combined, progressive, and

 dimensioning by co-ordinate methods-The rules for dimensioning standard

 features “Circles (holes) arcs, angles, tapers, chamfers, and dimensioning of

 narrow spaces.

**5.0 Geometric Constructions**

Division of a line: to divide a straight line into given number of equal parts

Internally and it’s examples in engineering applications.

Construction of tangent lines: to draw tangent lines touching circles

internally and externally.

Construction of tangent arcs

i) To draw tangent arc of given radius to touch two lines inclined at given

 angle (acute, right and obtuse angles).

ii)Tangent arc of given radius touching a circle or an arc and a given line.

iii)Tangent arcs of radius R, touching two given circles internally and

 externally.

Construction of polygon: Construction of any regular polygon of given side length using general method.

Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a

double cone and loci of a moving point, Eccentricity of above curves – Their

Engg. applications viz. Projectiles, reflectors, P-V Diagram of a

Hyperbolic process,

Construction of any conic section of given eccentricity by general method

Construction of ellipse by concentric circles method

Construction of parabola by rectangle method

Construction of rectangular hyperbola

General Curves: Involute, Cycloid and Helix, explanations as locus of a

moving point, their engineering applications, viz, Gear tooth profile, screw

threads, springs etc. - their construction.

**6.0 Projection of points, lines, planes & solids.**

Projecting a point on two planes of projection -Projecting a point on three

planes of projection -Projection of straight line

1. Parallel to both the planes.
2. Perpendicular to one of the planes.
3. inclined to one plane and parallel to other planes

Projection of regular planes

(a) Plane perpendicular to HP and parallel to VP and vice versa.

(c) Plane perpendicular to HP and inclined to VP and vice versa.

Projection of regular solids

1. Axis perpendicular to one of the planes
2. Axis parallel to VP and inclined to HP and vice versa.

**7.0 Auxiliary views**

Need for drawing auxiliary views -Explanation of the basic principles of

drawing auxiliary views, explanation of reference plane and auxiliary plane -

Partial auxiliary view.

**8.0** **Sectional views**

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane.

**9.0 Orthographic Projections**

Meaning of orthographic projection -Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object -Concept of front view, top view, and side view, sketching these views for number of engg objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

**10.0 Pictorial Drawings**

Brief description of different types of pictorial drawing viz., Isometric, oblique,

and perspective and their use - Isometric drawings: Iso axis, angle between

them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary scale- difference between Isometric view and Isometric projection - Isometric and Non-isometric lines -Isometric drawing of common features like rectangles, circular shapes, non-isometric lines - Use of box and offset methods.

**11.0 Development of Surfaces**

Need for preparing development of surface with reference to sheet metal work

 -Concept of true length of a line with reference to its orthographic

projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramids (sketches only) -Types of development: Parallel line and radial line development -Procedure of drawing development, drawings of trays, funnels, 900 elbow pipes and rectangular ducts.

**REFERENCE BOOKS**

Engineering Graphics by P I Varghese – ( McGraw-hill)

Engineering Drawing by Basant Agarwal & C.M Agarwal - ( McGraw-hill)

Engineering Drawing by N.D.Bhatt.

T.S.M. & S.S.M on “ Technical Drawing” prepared by T.T.T.I., Madras.

SP-46-1998 – Bureau of Indian Standards.

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## BASIC ELECTRICAL & ELECTRONICS LABORATORY PRACTICE

**Subject Title : Basic** **Electrical Work shop Practice**

**Subject Code : EE-108**

**Periods/Week : 06**

##### Periods/Year : 180

## TIME SCHEDULE

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Major Topics** | **No. of Periods** |
| 1. | Wiring tools and Accessories | 15 |
| 2. | Electrical Wiring Joints | 15 |
| 3. | Lamp Circuits | 33 |
| 4. | Soldering Practice | 21 |
| 5. | Special Lamp Connections | 15 |
| 6. | Resistance Measurement & Capacitance Measurement | 21 |
| 7. | Wiring Practice for Power Loads  | 21 |
| 8. | Battery voltage measurement & Earthing | 18 |
| 9. | Piping and Thread cutting skills | 21 |
|  | Total | 180 |

**OBJECTIVES**

Upon completion of the practice the student shall be able to

1. **Handle the Wiring Tools and Accessories**

1.1 Identify the following electrical wiring tools with respect to

 i) Size ii)shape iii)purpose iv)speed and v) use .

1. Screw drivers
2. Pliers
3. Drilling machines & Drilling Bits.
4. Rawl plug jumper, and poker
5. Voltage/line tester
6. Splicers (insulation remover)
7. Standard Wire gauge

1.2 Identify different types of Electrical Wiring accessories with respect to

i) size ii)shape iii)purpose and iv) Use.

1. Switches
2. Ceiling roses
3. Lamp holders and adopters
4. Sockets
5. Plug
6. Fuses

1.3 Identify different types of main switches with respect to

 i)rating ii) Purpose and iii) Use.

SP,DP mains, TP,ICDP, ICTP, SPDT, DPDT, TPDT, Changeover-Knife type/globular, Rotary, micro, modular switches.

1.4 Study of 2-pole and 3-pole MCB’s with respect to rating, purpose, And Use etc.

1.5 Study different types of wires and cables (1/18,3/20,7/20) with respect to sizes ,rating,

 Purpose and Use etc

 **2.0 Prepare Electrical Wiring Joints**

2.1 Prepare straight joint/ Married joint

2.2 Prepare T joint

2.3 Prepare Western union joint

* 1. Prepare pigtail joint

**3.0 Practice Lamp Circuits**

3.1 Make a circuit with One lamp controlled by one switch with PVC surface conduit system

3.2 Make a circuit with Two lamps controlled by two switches with PVC surface conduit system

3.3 Make a circuit with One lamp controlled by one switch and provision of 2/3-pin socket.

3.4 Make a circuit for Stair case wiring

3.5 Make a circuit for Godown wiring

3.6 Make a circuit for Electrical bell connection.

3.7 Make a circuit for ceiling fan with regulator

.

**4.0 Practice Soldering**

4.1 Get familiarized to use of various soldering tools and components

4.2 Solder simple electronic circuits with P.C.B

**5.0 Practice on special lamp connections**

5.1 Control and practice the wiring for Fluorescent Lamp

5.2 Control and practice the wiring for Mercury Vapour Lamp

* 1. **Practice Resistance measurement & Capacitor measurement**

6.1Identify different types of resistors

6.2 Calculate Resistance by its colour code

6.3 Measuring the resistance using multimeter

6.4 Connecting resistors in series and parallel and measuring the resistance using multimeter

6.5 Practice Rheostat connections

6.6 Identify different types of capacitors

6.7 Find the value/specifications of capacitor from Value printed and Color code

6.8 Demonstrate that capacitor can hold charge ,charging and discharging require a specific time.

6.9 Investigate the effect of connecting capacitors in series and parallel

6.10 Testing the capacitor Using multimeter,

**7.0 Practice On Power Loads**

7.1 Control two sub- circuits through Energy meter, MCB’s and two 1-way switches.

7.2 Control 1.5 ton capacity A/C equipment by MCB and stabilizer.

7.3 Connect the Inverter to power supply through 2/3 pin socket and 1-way switch (Back up)

7.4 Connect Computer by main switch board with a miniature circuit breaker.

7.5 Connect and test the given Public Address System

**8.0 Practice Battery voltage measurement & Earthing**

8.1 Measurement of Battery Voltage using Voltmeter and Multimeter

8.2 Connecting batteries in series and parallel and observing the output voltage using Voltmeter and DMM

8.3 Measurement of current supplied by Battery using ammeter and Multimeter with rheostat as load

8.4 Demonstration on Pipe Earthing and Plate Earthing

**9.0 Develop Piping and Thread cutting skills**

9.1 Cut a metal conduit,G.I.pipe and solid using hack saw

9.2 Practice Thread cutting G.I.pipe metal conduit and solid rod using Die set

9.3 Practice Internal thread cutting using Tap set reamers

9.4 Practice Thread Cleaning

9.5 Make a hexagonal nut from a round rod

9.6 Practice Thread cutting PVC pipe metal conduit using Die set.

9.7 Practice Internal thread cutting using Tap set reamers

**Competencies to be achieved by the Student**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Experiment title** | **Competencies** |
| 1.1 | Handle the different wiring a) tools and accessories b) select switches, and MCB’s c) Identify wires and cables as per the requirements of the load. | * Identify the size and specifications of various tools used for electrical wiring.
* Understand the usage of the standard wire gauge.
* Identify the type, size and specifications of DP mains,
 |
| 2.1 | To prepare a Straight joint/Married joint using a 7/20 Al. Cable | * Identify the size of the cable
* Perform splicing of Insulation properly.
* Perform Straight joint/Married joint
 |
| 2.2 | To prepare a T joint using a 7/20 Al. Cable | * Insert the leads of the wires properly as per the sketches.
* Twist the wires properly.
 |
| 2.3 | To prepare a Western union joint using a single strand Al. Cable | * Overlap the two wires properly
* Twist the binding wires properly
 |
| 2.4 | To prepare a pig tail joint using a single strand Copper Cable | * Place the wires in V-shape.
* Twist the wires in clock wise direction.
 |
| 3.1 | To control one lamp by one 1-way switch with PVC surface conduit wiring system  | * Draw wiring diagram
* Identify the size of cable, PVC pipe, type of1-way switch and lamp holder.
* Make Connections as per Wiring Diagram
 |
| 3.2 | To control two lamps by two 1-way switches with PVC surface conduit wiring system  | * Draw wiring diagram
* Handle the screw driver, electrician Knife, line tester to fix the PVC pipe using saddles and junction boxes.
* Select colour and length of wire for phase and neutral
* Switch on the supply after making of the connections
* Disconnect the circuit after testing.
 |
| 3.3 | To control one lamp and 2/3 pin socket by two1-way switches with PVC surface conduit wiring system | * + Connect 2/3 pin socket properly with respect to phase, neutral and earth.
* Connect phase wire through switches.
 |
| 3.4 | Stair-case wiring | * Select two 2-way switches
* Connect 2- way switches as per circuit diagram.
* Test with 1-phase, 230V, 50 Hz supply to the circuit connected through ICDP switch.
 |
| 3.5 | Godown wiring scheme | * Draw wiring diagram
* Connect the circuit as per the diagram.
* Observe sequence of operation of switches
* Test with 1-phase,230 V,50 Hz supply to the circuit, neutral wire to the bottom point of the 1-way switch and phase to the first point of lamp holder
 |
| 3.6 | To control Electrical Bell | * + Connect the bell through ceiling rose properly.
	+ Make ceiling rose connections properly
 |
| 3.7 | To connect the Ceiling fan | * + Draw the wiring diagram showing the switch and regulator
	+ Connect the circuit through the regulator
 |
| 4.0 | Soldering Practice Of Simple Electronic Circuit | * Proper use of Lead and Flux
* Maintain proper temperature of soldering iron.
 |
| 5.1 | Wiring practice of fluorescent lamp | * Make connections as per wiring diagram.
* Connect top point and bottom point of the choke to tube light properly.
* Note the importance and working of starter.
 |
| 5.2 | Wiring practice of Mercury Vapour lamp | * Identify the size of cable, type of1-way switch, choke, and M.V. lamp holder.
* Read the specifications of Choke and M.V. lamp holder.
* Note the importance of choke
* Measure the power across the choke.
 |
| 6.1 | Practice Resistance measurement | * Identifying resistor based on the colour code.
* Measuring resistance using multi meter.
 |
| 6.2 | Practice Capacitor measurement | * Identifying capacitor based on the colour code.
* Handling multimeter.
 |
| 7.1 | Control two sub circuits through Energy meter, MCB’s and two 1-way switches  | * Draw wiring diagram.
* Identify the size of cable,1-way switch, PVC pipe, MCB, capacity of Inverter and Socket
* Read the specifications of MCB, capacity of Inverter and Socket
* Make connections as per wiring diagram.
* Draw wire through PVC pipe properly.
* Connect supply to Inverter through MCB properly.
	+ - Select appropriate socket with switch control.
		- Make earth wire connections for required points.
 |
| 7.2 | Control 1.5 ton capacity window type A/C equipment by MCB and stabilizer | * Draw wiring diagram.
* Identify the size of cable, PVC pipe, MCB, stabilizer, capacity of A/C and Socket
* Read the specifications of MCB, stabilizer, capacity of A/C and Socket
* Make connections as per wiring diagram.
	+ - Connect supply to stabilizer through MCB
		- Select appropriate socket.
		- Make earth wire connections
		- Test with 1-phase, 230 V, 50 Hz supply.
 |
| 7.3 | Connect the inverter to power supply through 2/3 pin socket and 1-way switch | * Draw wiring diagram.
* Select the size of cable,1-way switch, PVC pipe, MCB, capacity of Inverter and Socket as per specifications.
* Make connections as per wiring diagram.
* Draw wire through PVC pipe properly.
* Connect supply to Inverter through MCB properly.
	+ - Select appropriate socket with switch control.
* Make earth wire connections for require points
 |
| 7.4 | Connect computer by main switch board with a miniature circuit breaker. | * Draw wiring diagram.
* Identify the size of cable, 1-way switch, PVC pipe, MCB and Sockets
* Read the specifications of MCB and Sockets
* Make connections as per wiring diagram.
* Connect supply to Computer through MCB properly.
* Select appropriate sockets with 1-way switch control.
* Make earth wire connections for require points.
 |
| 7.5 | Connect and test the given public address system | * Draw wiring diagram.
* Identify the size of cable, 1-way switch, PVC pipe, amplifier, MCB, mouth piece and Speakers
* Read the specifications of MCB, Amplifier, speakers and Socket
* Select colour and length of wire for phase and neutral.
	+ - Make connections as per wiring diagram.
		- Connect supply to amplifier through MCB properly.
		- Connect mouth piece to amplifier properly.
		- Connect speakers to amplifier properly.
		- Make earth wire connections for require points.
 |
|  |  |  |
| 8.1 | Practice Battery voltage measurement & Earthing | * Handling multimeter
* Handling Rheostats
 |
| 8.2 |  Pipe Earthing | * Draw earthing diagram with specifications.
* Understand the Pipe Earthing
 |
| 8.3 |  Plate Earthing | * Draw Earthing diagram with specifications
* Understand the Plate Earthing
 |
| 9.1 | Develop Piping and Thread cutting skills | * + Identify the size of the rods to be joined.
* Perform thread cutting as per the order
	+ Perform thread Cleaning
 |

 **Reference**

1. Electrical work shop By R.P.Singh
2. Experiments in Basic Electrical Engineering by S.K.Bhattacharya , Rastogi- NAI.
3. Electrical Design Estimating And Costing By K.B. RAINA & S.K.BHATTA CHARYA
4. Residential and Commercial Industrial Electrical systems Vol.2 by Joshi-TMH
5. Residential and Commercial Industrial Electrical systems Vol.3 by Joshi-TMH
6. Industrial Safety management by Deshmukh –TMH

**PHYSICS LAB PRACTICE**

**(Common for all branches)**

**Subject Title : Physics Lab Practice**

**Subject Code : EE -109 A**

**Periods per week : 03**

**Total periods per year : 45**

**TIME SCHEDULE**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Name of the Experiment** | **No. of****Periods** |
| 1. | Hands on practice on Vernier Calipers  | 03 |
| 2. | Hands on practice on Screw gauge | 03 |
| 3. | Verification of Parallelogram law of forces and Triangle law of forces | 03 |
| 4. | Simple pendulum | 03 |
| 5. | Velocity of sound in air – (Resonance method) | 03 |
| 6. | Focal length and Focal power of convex lens (Separate & Combination) | 03 |
| 7. | Refractive index of solid using traveling microscope | 03 |
| 8. | Surface tension of liquid using traveling microscope | 03 |
| 9. | Coefficient of viscosity by capillary method  | 03 |
| 10. | Boyle’s law verification | 03 |
| 11. | Meter bridge  | 03 |
| 12. | Mapping of magnet lines of force  | 03 |
|  | Revision | 06 |
|  | Test | 03 |
|  | **Total:** | **45** |

**Objectives:**

 **Upon completion of the course the student shall be able to**

1.0 Practice the Vernier caliper to determine the volume of a cylinder and sphere

2.0 Practice the Screw gauge to determine thickness of a glass plate and cross section of a wire

3.0 Verify the parallelogram law and Triangle law of forces.

4.0 Determine the value of acceleration due to gravity using Simple Pendulum and verify with L-T2 graph.

5.0 Determine the velocity of sound in air at room temperature

6.0 Determine the Focal length and focal power of convex lenses using U-V and graphical method

7.0 Determine the refractive index of a solid using travelling microscope

8.0 Determine the surface tension of a liquid using travelling microscope

9.0 Determine the viscosity of a liquid using capillary method

10.0 Verify the Boyle’s law employing a Quill tube

11.0 Determine the specific resistance of wire material using Meter Bridge

12.0 Practice the mapping of magnetic lines of force

 **Competencies and Key competencies to be achieved by the student**

|  |  |  |
| --- | --- | --- |
| **Name of the Experiment****(No of Periods)** | **Competencies** | **Key competencies** |
| 1. Hands on practice on Vernier Calipers(03) | * Find the Least count
* Fix the specimen in posit
* Read the scales
* Calculate the volume of given object
 | * Read the scales
* Calculate the volume of given object
 |
| 2. Hands on practice on Screw gauge(03) | * Find the Least count
* Fix the specimen in posit
* Read the scales
* Calculate thickness of glass place and cross section of wire
 | * Read the scales
* Calculate thickness of given glass plate
* Calculate cross section of wire
 |
| 3. Verification of Parallelogram law of forces and Triangle law of forces(03) | * Fix suitable weights
* Note the positions of threads on drawing sheet
* Find the angle at equilibrium point
* Construct parallelogram
* Compare the measured diagonal
* Construct triangle
* Find the length of sides
* Compare the ratios
 | * Find the angle at equilibrium point
* Constructing

 parallelogram* Construct triangle
* Compare the ratios of force and length
 |
| 4. Simple pendulum(03) | * Fix the simple pendulum to the stand
* Adjust the length of pendulum
* Find the time for number of oscillations
* Find the time period
* Calculate the acceleration due to gravity
* Draw l-T and l-T2 graph
 | * Find the time for number of oscillations
* Find the time period
* Calculate the acceleration due to gravity
* Draw l-T and l-T2 graph
 |
| 5. Velocity of sound in air –Resonance method (03) | * Arrange the resonance apparatus
* Adjust the reservoir level for booming sound
* Find the first and second resonanting lengths
* Calculate velocity of sound
 | * Adjust the reservoir level
* Find the first and second resonanting lengths
* Calculate velocity of sound
* Calculate velocity of sound at 00 C
 |
| 6. Focal length and Focal power of  convex lens (Separate &  Combination) (03) | * Fix the object distance
* Find the Image distance
* Calculate the focal length and power of convex lens and combination of convex lenses
* Draw u-v and 1/u – 1/v curves
 | * Calculate the focal length and power of convex lens
* Draw u-v and 1/u – 1/v graph
 |
| 7. Refractive index of solid using traveling microscope(03) | * Find the least count of vernier on microscope
* Place the graph paper below microscope
* Read the scale
* Calculate the refractive index of glass slab
 | * Read the scale
* Calculate the refractive index of glass slab
 |
| 8. Surface tension of liquid using traveling microscope(03) | * Find the least count of vernier on microscope
* Focus the microscope to the lower meniscus & bent pin
* Read the scale
* Calculate height of liquid rise
* Calculate the surface tension of water
 | * Read the scale
* Calculate height of liquid rise
* Calculate the surface tension of water
 |
| 9. Coefficient of viscosity by capillary method(03) | * Find the least count of vernier
* Fix the capillary tube to aspiratory bottle
* Find the mass of collected water
* Find the pressure head
* Calculate rate of volume of liquid collected
* Find the radius of capillary tube
* Calculate the viscosity of water using capillary method
 | * Find the pressure head
* Calculate rate of volume of liquid collected
* Find the radius of capillary tube
* Calculate the viscosity of water
 |

|  |  |  |
| --- | --- | --- |
| **Name of the Experiment** | **Competencies** | **Key competencies** |
| 10. Boyle’s law verification (03)  | * Note the atmospheric pressure
* Fix the quill tube to retort stand
* Find the length of air column
* Find the pressure of enclosed air
* Find and compare the calculated value P x l
 | * Find the length of air column
* Find the pressure of enclosed air
* Find the value P x l
 |
| 11. Meter bridge(03) | * Make the circuit connections
* Find the balancing length
* Calculate unknown resistance
* Find the radius of wire
* Calculate the specific resistance
 | * Find the balancing length
* Calculate unknown resistance
* Calculate the specific resistance
 |
| 12. Mapping of magnet lines of force(03) | * Draw magnetic meridian
* Placed the bar magnet in NN and NS directions
* Draw magnetic lines of force
* Locate the neutral points along equatorial and axial lines
 | * Draw magnetic lines of

 force* Locate the neutral points

 along equatorial and axial lines |

**Chemistry LAB PRACTICE**

**Subject Title : Chemistry Lab Practice**

**Subject Code : EE -109 B**

**Periods per week : 03**

**Total periods per year : 45**

**Curriculum : C-16**

**TIME SCHEDULE**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Name of the Experiment** | **No. of Periods** |
| 1. |  Familiarization of methods for Volumetric analysis | 03 |
| 2. |  Preparation of Std Na2 CO3 solution and making solutions of different dilution  | 03 |
| 3. | Estimation of HCl solution using Std. Na2 CO3 solution | 03 |
| 4. | Estimation of NaOH using Std. HCl solution | 03 |
| 5. | Estimation of H2SO4 using Std. NaOH solution | 03 |
| 6. |  Estimation of Mohr’s Salt using Std. KMnO4 | 03 |
| 7. |  Determination of acidity of water sample4 | 03 |
| 8. |  Determination of alkalinity of water sample | 03 |
| 9. |  Determination of total hardness of water using Std. EDTA solution | 03 |
| 10. |  Estimation of Chlorides present in water sample | 03 |
| 11. |  Estimation of Dissolved Oxygen (D.O) in water sample | 03 |
| 12. |  Determination of pH using pH meter | 03 |
| 13. |  Revision | 06 |
| 14 | Practice Test | 03 |
|  | **Total:** | **45** |

**Objectives:**

 **Upon completion of the course the student shall be able to**

1.0 Practice volumetric measurements (using pipetts, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc.

2.0 Practice making standard solutions with pre weighted salts and to make desired dilutions using appropriate techniques.

3.0 Conduct titrations adopting standard procedures and using Std. Na2 CO3 solution for estimation of HCl

4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH

5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H2SO4

6.0 Conduct titrations adopting standard procedures and using Std. KMnO4 solution for estimation of Mohr’s Salt

7.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available)

8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution

10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)

11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 Revision

14.0 To conduct Test.

**Competencies and Key competencies to be achieved by the student**

|  |  |  |
| --- | --- | --- |
| **Name of the Experiment** **(No of Periods)** | **Competencies** | **Key competencies** |
|  Familiarization of methods for Volumetric analysis (03) | -- | -- |
|  Preparation of Std Na2 CO3 and making different diluted solution (03) | * Weighting the salt to the accuracy of 0.001g
* Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette
* Making appropriate dilutions
 | * Weighting the salt to the accuracy of 0.001g
* Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette
* Making appropriate dilutions
 |
| **Name of the Experiment** **(No of Periods)** | **Competencies** | **Key competencies** |
| Estimation of HCl solution using Std. Na2 CO3 solution (03) | * Cleaning the glassware and rinsing with appropriate solutions
* Making standard solutions
* Measuring accurately the standard solutions and titrants
* Filling the burette with titrant
* Fixing the burette to the stand
* Effectively Controlling the flow of the titrant
* Identifying the end point
* Making accurate observations
* Calculating the results

  | * Making standard solutions
* Measuring accurately the standard solutions and titrants
* Effectively Controlling the flow of the titrant
* Identifying the end point
* Making accurate observations
 |
| Estimation of NaOH using Std. HCl solution (03) |
| Estimation of H2SO4 using Std. NaOH solution (03) |
|  Estimation of Mohr’s Salt using Std. KMnO4  (03) |
|  Determination of acidity of water sample (03)4 |
|  Determination of alkalinity of water sample (03) |
|  Determination of total hardness of water using Std. EDTA solution (03) |
|  Estimation of Chlorides present in water sample (03) |
|  Estimation of Dissolved Oxygen (D.O) in water sample (By titration method) (03) |
| Estimation of Dissolved Oxygen (D.O) in water sample (By electrometric method) (03) | * Familiarize with instrument
* Choose appropriate ‘Mode’ / ‘Unit’
* Prepare standard solutions / buffers, etc.
* Standardize the instrument with appropriate standard solutions
* Plot the standard curve
* Make measurements accurately
* Follow Safety precautions

  | * Prepare standard solutions / buffers, etc.
* Standardize the instrument with appropriate standard solutions
* Plot the standard curve
* Make measurements accurately
 |
|  Determination of pH using pH meter (03) |
|  |
|  |
| **Name of the Experiment** **(No of Periods)** | **Competencies** | **Key competencies** |
| Revision (06)Practice Test (03) |  | * To prepare the student for practical examination
 |

##### COMPUTER FUNDAMENTALS LAB PRACTICE

**(Common to all Branches )**

**Subject Title : Computer Fundamentals Lab Practice**

**Subject Code : EE -110**

**Periods/Week : 03**

**Periods/Year : 90**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Major Topics** | **No. of sessions** **each of 3 periods duration**  | **No. of Periods** |
| **I.** | **Computer hardware Basics** | **01** | **03** |
| **II.** | **Windows Operating System** | **02** | **06** |
| **III.** | **MS Word** | **09** | **27** |
| **IV.** | **MS Excel** | **09** | **27** |
| **V.** | **MS PowerPoint** | **09** | **27** |
| **Total** | **30** | **90** |

**List of Experiments:**

**Rationale:** The knowledge of Computer usage has become a must for everyone, due to widespread computer usage and related applications in all fields. This laboratory is designed to give the students hands on practice of Windows Operating System and MS Office to enable the students to use these skills in future courses.

**I. Computer Hardware Basics (Not for end examination)**

1. a) To Familiarize with Computer system and hardware connections

b) To start and Shut down Computer correctly

c) To check the software details of the computer

2. To check the hardware present in your computer

**II. Windows’s operating system (Not for end examination)**

3. To Explore Windows Desktop

4. Working with Files and Folders

5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

**III. Practice with MS-WORD**

6. To familiarize with Ribbon layout of MS Word

Home - Insert - Page layout – References – Review - View

7. To practice Word Processing Basics

8. To practice Formatting techniques

9. To insert a table of required number of rows and columns

10. To insert Objects, Clipart and Hyperlinks

11. To use Mail Merge feature of MS Word

12. To use Equations and symbols features

IV. Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout

14. To access and Enter data in the cells

15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells

16. To use built in functions and Formatting Data

17. To create Excel Functions, Filling Cells

18. To enter a Formula for automatic calculations

19. To practice Excel Graphs and Charts

20. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

21. To familiarize with Ribbon layout features of PowerPoint 2007.

22. To create a simple PowerPoint Presentation

23. To set up a Master Slide in PowerPoint

24. To insert Text and Objects

25. To insert a Flow Charts

26. To insert a Table

27. To insert a Charts/Graphs

28. To insert video and audio

29. To practice Animating text and objects

30. To Review presentation

|  |  |  |  |
| --- | --- | --- | --- |
| Exp No. | Name of the Experiment | Competencies | Key Competencies |
| 1 (a). | To familiarize with Computer system and hardware connections | 1. Identify the Parts of a Computer system a). CPU b) Monitor c) CD/DVD Drive d) Power Switch e) Start Button f) Reset Button
2. Identify and connect various peripherals
3. Identify and connect the cables used with computer system
4. Identify various ports on CPU and connect Keyboard & Mouse
 | Connect cables to external hardware and operate the computer |
| 1 (b). | To Start and Shut down Computer correctly | 1. Log in using the password
2. Start and shut down the computer
3. Use Mouse and Key Board
 | 1. Login and logout as per the standard procedure
2. Operate mouse &Key Board
 |
| 1 (c). | To Explore Windows Desktop | 1. Familiarize with Start Menu, Taskbar, Icons and Shortcuts
2. Access application programs using Start menu, Task manager
3. Use Help support
 | 1. Access application programs using Start menu
2. Use taskbar and Task manager
 |
| 2. | To check the software details of the computer | 1. Find the details of Operating System being used
2. Find the details of Service Pack installed
 | Access the properties of computer and find the details |
| 3. | To check the hardware present in your computer | 1. Find the CPU name and clock speed
2. Find the details of RAM and Hard disk present
3. Access Device manager using Control Panel and check the status of devices like mouse and key board
4. Use My Computer to check the details of Hard drives and partitions
5. Use the Taskbar
 | 1. Access device manager and find the details
2. Type /Navigate the correct path and Select icon related to the details required
 |
| 4. | Working with Files and Folders | 1. Create folders and organizing files in different folders
2. Use copy / paste move commands to organize files and folders
 | 1. Create files and folders Rename , arrange and search for the required folder/file
 |

**Competencies and Key Competencies to be achieved by the students**

|  |  |  |  |
| --- | --- | --- | --- |
| Exp No. | Name of the Experiment | Competencies | Key Competencies |
|  | Working with Files and FoldersContinued.... | 1. Arrange icons – name wise, size, type, Modified
2. Search a file or folder and find its path
3. Create shortcut to files and folders (in other folders) on Desktop
4. Familiarize with the use of My Documents
5. Familiarize with the use of Recycle Bin
 | 1. Restore deleted files from Recycle bin
 |
| 5. | To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint | 1. Familiarize with the use of Calculator
2. Access Calculator using Run command
3. Create Text Files using Notepad and WordPad and observe the difference in file size
4. Use MS paint and create .jpeg, .bmp files using MS Paint
 | 1. Use windows accessories and select correct text editor based on the situation.
2. Use MS pain to create /Edit pictures and save in the required format.
 |
| 6. | To familiarize with Ribbon layout of MS word. – Home – Insert- page layout- References-Review-View | 1. Create/Open a document
2. Use Save and Save as features
3. Work on two documents simultaneously
4. Choose correct Paper size and Printing options
 | 1. Create a Document and name appropriately and save
2. Set paper size and print options
 |
| 7. | To practice Word Processing Basics | 1. Typing text
2. Keyboard usage
3. Use mouse (Left click / Right click / Scroll)
4. Use Keyboard shortcuts
5. Use Find and Replace features in MS- word
6. Use Undo and Redo Features
7. Use spell check to correct Spellings and Grammar
 | 1. Use key board and mouse to enter/edit text in the document.
2. Use shortcuts
3. Use spell check/ Grammar features for auto corrections.
 |
| 8. | To practice Formatting techniques | 1. Formatting Text
2. Formatting Paragraphs
3. Setting Tabs
4. Formatting Pages
5. The Styles of Word
6. Insert bullets and numbers
7. Themes and Templates
8. Insert page numbers, header and footer
 | 1. Format Text and paragraphs and use various text styles.
2. Use bullets and numbers to create lists
3. Use Templates /Themes
4. Insert page numbers date, headers and footers
 |

|  |  |  |  |
| --- | --- | --- | --- |
| Exp No. | Name of the Experiment | Competencies | Key Competencies |
| 9. | To insert a table of required number of rows and columns | 1. Edit the table by adding the fields – Deleting rows and columns –inserting sub table –marking borders. Merging and splitting of cells in a Table
2. Changing the background colour of the table
3. Use table design tools
4. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features
5. Convert Text to table and Table to Text
6. Use Sort feature of the Table to arrange data in ascending/descending order
 | 1. Insert table in the word document and edit
2. Use sort option for arranging data.
 |
| 10. | To Insert objects, clipart and Hyperlinks | 1. Create a 2-page document. &Insert hyperlinks and t Bookmarks.
2. Create an organization chart
3. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.
 | 1. Insert hyperlinks &Bookmarks
2. Create organization charts/flow charts
 |
| 11. | To Use Mail merge feature of MS Word | 1. Use mail merge to prepare individually addressed letters
2. Use mail merge to print envelopes.
 | Use Mail merge feature  |
| 12. | To use Equations and symbols features. | 1. Explore various symbols available in MS Word
2. Insert a symbol in the text
3. Insert mathematical equations in the document
 | Enter Mathematical symbols and Equations in the word document |
| 13. | To Practice with MS-EXCEL | 1. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button-
2. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar-Status Bar
 | 1. Familiarize with excel layout and use
2. Use various features available in toolbar
 |
| 14. | To access and Enter data in the cells  | 1. Move Around a Worksheets-Quick access -Select Cells
2. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel
 | 1. Access and select the required cells by various addressing methods
2. Enter data and edit
 |

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| Exp No. | Name of the Experiment | Competencies | Key Competencies |
| 15. | To edit spread sheet Copy, Cut, Paste, and selecting cells | 1. Insert and Delete Columns and Rows-Create Borders-Merge and Center
2. Add Background Color-Change the Font, Font Size, and Font Color
3. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width
 | Format the excel sheet |
| 16. | To use built in functions and Formatting Data | 1. Sort and filter data in a worksheet
2. Perform Mathematical Calculations verify -AutoSum
3. Perform Automatic Calculations-Align Cell Entries
 |  Use built in functions in Excel  |
| 17. | To enter a Formula for automatic calculations  | 1. Enter formula
2. Use Cell References in Formulae
3. Use Automatic updating function of Excel Formulae
4. Use Mathematical Operators in Formulae
5. Use Excel Error Message and Help
 | Enter formula for automatic calculations |
| 18. | To Create Excel Functions, Filling Cells | 1. Use Reference Operators
2. Work with sum, Sum if , Count and Count If Functions
3. Fill Cells Automatically
 | 1. Create Excel sheets involving cross references and equations
2. Use the advanced functions for conditional calculations
 |
| 19. | To Practice Excel Graphs and Charts | 1. Produce an Excel Pie Chart
2. Produce Excel Column Chart
 | 1. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph
2. Produce a Pictograph in Excel
 |
| 20. | To format a Worksheet in Excel, page setup and print | 1. Shade alternate rows of data
2. Add currency and percent symbols
3. Change height of a row and width of a column
4. Change data alignment
5. Insert Headers and Footers
6. Set Print Options and Print
 | 1. Format Excel sheet
2. Insert headers &footers and print
 |
| 21. | To familiarize with Ribbon layout &features of PowerPoint 2007. | Use various options in Home, insert , design, animation , slideshow, Review &View in the PowerPoint | Access required options in the tool bar |

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| Exp No. | Name of the Experiment | Competencies | Key Competencies |
| 22. | To create a simple PowerPoint Presentation  | 1. Insert a New Slide into PowerPoint
2. Change the Title of a PowerPoint Slide
3. PowerPoint Bullets
4. Add an Image to a PowerPoint Slide
5. Add a Textbox to a PowerPoint slide
 | 1. Create simple PowerPoint presentation with photographs/ClipArt and text boxes
2. Use bullets option
 |
| 23. | To Set up a Master Slide in PowerPoint and add notes | 1. Create a PowerPoint Design Template
2. Modify themes
3. Switch between Slide master view and Normal view
4. Format a Design Template Master Slide
5. Add a Title Slide to a Design Template
6. The Slide Show Footer in PowerPoint
7. Add Notes to a PowerPoint Presentation
 | 1. Setup Masterslide and format
2. Add notes
 |
| 24. | To Insert Text and Objects | 1. Insert Text and objects
2. Set Indents and line spacing
3. Insert pictures/ clipart
4. Format pictures
5. Insert shapes and word art
6. Use 3d features
7. Arrange objects
 | Inset Text and Objects Use 3d features |
| 25. | To insert a Flow Chart / Organizational Charts | 1. Create a Flow Chart in PowerPoint
2. Group and Ungroup Shapes
3. Use smart art
 | Create organizational charts and flow charts using smart art |
| 26. | To insert a Table | 1. PowerPoint Tables
2. Format the Table Data
3. Change Table Background
4. Format Series Legend
 | Insert tables and format |
| 27. | To insert a Charts/Graphs | 1. Create 3D Bar Graphs in PowerPoint
2. Work with the PowerPoint Datasheet
3. Format a PowerPoint Chart Axis
4. Format the Bars of a Chart
5. Create PowerPoint Pie Charts
6. Use Pie Chart Segments
7. Create 2D Bar Charts in PowerPoint
8. Format the 2D Chart
9. Format a Chart Background
 | Create charts and Bar graphs, Pie Charts and format. |

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| Exp No. | Name of the Experiment | Competencies | Key Competencies |
| 28. | To Insert audio &video, Hyper links in a slideAdd narration to the slide | 1. Insert sounds in the slide and hide the audio symbol
2. Adjust the volume in the settings
3. Insert video file in the format supported by PowerPoint in a slide
4. Use automatic and on click options
5. Add narration to the slide
6. Insert Hyperlinks
 | 1. Insert Sounds and Video in appropriate format.
2. Add narration to the slide
3. Use hyperlinks to switch to different slides and files
 |
| 29. | To Practice Animation effects  | 1. Apply transitions to slides
2. To explore and practice special animation effects like *Entrance, Emphasis, Motion Paths &Exit*
 | Add animation effects |
| 30. | Reviewing presentation | 1. Checking spelling and grammar
2. Previewing presentation
3. Set up slide show
4. Set up resolution
5. Exercise with Rehearse Timings feature in PowerPoint
6. Use PowerPoint Pen Tool during slide show
7. Saving
8. Printing presentation

(a) Slides(b) Handout | 1. Use Spell check and Grammar feature
2. Setup slide show
3. Add timing to the slides
4. Setup automatic slide show
 |