

**COURSE TITLE** : ENGLISH FOR COMMUNICATION - II  
**COURSE CODE** : 2001  
**COURSE CATEGORY** : F  
**PERIODS/WEEK** : 4  
**PERIODS/SEMESTER** : 60  
**CREDITS** : 3

MODULE	TOPICS	PERIODS
1	Relationships	15
2	Inspirations	15
3	Mysteries	15
4	Innovations	15
<b>TOTAL</b>		<b>60</b>

**COURSE OUTCOME:** To develop the four basic skills in English and use them effectively in day-to-day life.

**SPECIFIC OUTCOME:**

After completing the course the student will be able to:

- Read articles, essays and technical writings of various kinds and develop comprehension about the message, images, thoughts and ideas contained in these articles.
- Read short stories, poems, conversations and develop aesthetic sense and humanitarian ethos.
- Read various prose passages and develop skills in skimming and scanning.
- Understand the meaning of words used in passages by guessing meaning from the context.
- Develop curiosity about the different topics of current interest and express points of view.
- Familiarise themselves with different techniques of writing and use them effectively in business correspondences.
- Group and sequence ideas and exploit the potentials of cohesion and coherence.
- Acquire proficiency in correct usage of English words.
- Internalise correct pronunciation and use them in daily conversation.
- Develop communication skills by taking part in group discussions and present their views in a logical and convincing way.
- Learn different language functions like agreeing, permitting, apologizing, negating and the like and use them effectively in daily communication.
- Identify the different study skills and use them to improve their academic performance.

## **CONTENT DETAILS**

### **MODULE - I**

1. Reading passage - Relationships.
2. Vocabulary – Vocabulary acquisition through dictionaries.
3. Grammar – Connectors.
4. Writing – Letter Writing.
5. Language Function – Expressing one’s opinion/Expressing likes & dislikes.
6. Speaking – Seminar Presentations.

### **MODULE - II**

1. Reading passage - Inspirations.
2. Vocabulary – Vocabulary acquisition through developing reading skills.
3. Grammar – Using relative clauses.
4. Writing – Notices, Memos, Short Messages.
5. Language Function – Granting leave, Interrupting
6. Speaking – Attending Interviews.

### **MODULE - III**

1. Reading passage - Mysteries.
2. Vocabulary – Learning words by association.
3. Grammar – Passive Voice.
4. Writing – Process Writing.
5. Language Function – Asserting/Making Suggestions.
6. Speaking – Conducting Meetings – Short Speeches.

### **MODULE - IV**

1. Reading passage - Innovations.
2. Vocabulary – Confusing Words, Homophones.
3. Grammar – Reported Speech.
4. Writing – E-mails.
5. Language Function – Saying goodbye, Offering help.
6. Speaking – Describing the working of a machine.

### **PRACTICAL**

Two hours are set apart for practical training in the use of English language. Here, stress is given to skills of listening and speaking. Accuracy and fluency are the two factors which are needed for our students. Practical sessions are intended to equip the learner to meet the everyday demand of the industry. Activities that can be used in the practical sessions are enlisted:

Speaking activities – Speaking with a friend, speaking to an audience, role play, group discussion, Just a Minute (JAM), Sharing of experience and ideas, Impromptu speeches.

**REFERENCE:** - G (A Coursebook in English for Polytechnic College  
Students – Semester II)

**COURSE TITLE** : **ENGINEERING MATHEMATICS – II**  
**COURSE CODE** : **2002**  
**COURSE CATEGORY** : **F**  
**PERIODS/WEEK** : **6**  
**PERIODS/SEMESTER** : **90**  
**CREDITS** : **6**

**TIME SCHEDULE**

<b>MODULE</b>	<b>TOPICS</b>	<b>PERIODS</b>
1	VECTOR ALGEBRA	14
	BINOMIAL SERIES	10
2	DETERMINANTS	8
	MATRICES	14
3	INDEFINITE INTEGRALS	10
	DEFINITE INTEGRALS	8
4	APPLICATIONS OF INTEGRATION - AREA & VOLUME	6
	DIFFERENTIAL EQUATIONS	10
5	TESTS, ASSIGNMENTS AND TUTORIALS (4 Periods per Unit)	10
<b>TOTAL</b>		<b>90</b>

**SPECIFIC OUTCOME**

**MODULE - I VECTOR ALGEBRA AND BINOMIAL THEOREM.**

**1.1.0 Vector Algebra**

- 1.1.1 Scalar and vector quantities.
- 1.1.2 Definition of a vector.
- 1.1.3 Representation of vectors.
- 1.1.4 Name a directed line segment as a vector.
- 1.1.5 Different types of vectors.
- 1.1.6 Addition and subtraction of vectors in terms of the segment.
- 1.1.7 Position vector of a point with reference to a point.
- 1.1.8 Difference of two vectors with same initial point as position vector of a point.
- 1.1.9 Orthogonal Cartesian axes ,the unit vectors  $i, j$  and  $k$  .
- 1.1.10 Types of vector product (a) scalar product (b) vector product
- 1.1.11 Scalar (dot) product and vector (cross) product.
- 1.1.12 Properties of dot product and cross product (no proof)
- 1.1.13 Simple problems to find
  - (i) Work done by a force (application of scalar product)
  - (ii) Moment of a force (application of vector product)

### 1.2.0 Binomial Theorem.

- 1.2.1 Concept of factorial
- 1.2.2 Meaning of  ${}^n C_r$  and value of  ${}^n C_r$  (No proof and no problems)
- 1.2.3 Use of  ${}^n C_r$  in the expansion  $(x + a)^n$ , where n is positive integer.
- 1.2.4 State binomial theorem for a positive integer.
- 1.2.5 Expansion of  $(x + a)^n$ , and  $(x - a)^n$  where n is positive integer. (Statement only).
- 1.2.6 General term of the expansion of  $(x + a)^n$ , and  $(x - a)^n$
- 1.2.7 Properties of binomial expansion
- 1.2.8 Problems of the following types
  - 1.2.8.1 Expand using Binomial theorem
  - 1.2.8.2 Find a particular term in the expansion
  - 1.2.8.3 Find middle term(s)
  - 1.2.8.4 Find the coefficient of  $x^n$
  - 1.2.8.5 Find constant terms in  $(x + a)^n$ , and  $(x - a)^n$

## MODULE - II DETERMINANTS AND MATRICES.

### 2.1.0 DETERMINANTS.

- 2.1.1 Definition of determinant by means of algebraic expression
- 2.1.2 Order of a determinant
- 2.1.3 Evaluation of determinants of 2<sup>nd</sup> & 3<sup>rd</sup> order --- problems.
- 2.1.4 Solution of a system of simultaneous linear equations in two unknowns
- 2.1.5 Solution of a system of simultaneous linear equations in three unknowns

### 2.2.0 MATRICES.

- 2.2.1 Definition of matrices
- 2.2.2 Order of matrices
- 2.2.3 Different types of matrices
- 2.2.4 Algebra of matrices such as
  - Equality of matrices
  - Addition of matrices
  - Subtraction of matrices
  - Scalar multiplication and Multiplication
- 2.2.5 Problems on algebra of matrices
- 2.2.6 Transpose of a matrix
- 2.2.7 Symmetric and skew-symmetric matrices
- 2.2.8 Determinant associated with a square matrix
- 2.2.9 Singular and non singular matrices
- 2.2.10 Minors and cofactors
- 2.2.11 Cofactor matrix
- 2.2.12 Adjoint of a matrix
- 2.2.13 Inverse of a matrix

- 2.2.14 Solution of a system of three linear equations in two unknowns using the inverse of the coefficient matrix.

### **MODULE - III INTEGRAL CALCULUS.**

#### **3.1.0 INTEGRAL CALCULUS.**

- 3.1.1 Integration as reverse process of differentiation  
 3.1.2 List standard integrals.  
 3.1.3 Rules of integration.

$$1. \int kf(x)dx = k \int f(x)dx. \quad 2. \int \{f(x) \pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$$

- 3.1.4 Simple problems using standard results and rules of integration.  
 3.1.5 Simple problems using algebraic simplification and trigonometric results.  
 3.1.6 Integration by substitution method.  
 3.1.7 Solve simple problems on substitution method  
 3.1.8 Evaluation of integrals of the form

$$(1) \int x^{n-1} f(x^n) dx \quad 2) \int \phi[f(x)] f(x) dx$$

$$3) \int f(x^n) f(x) dx \quad 4) \int \frac{f(x)}{f'(x)} dx \quad 5) \int f(ax + b) dx$$

- 3.1.9 Integration by parts.  
 3.1.10 Solutions of problems of the type  $x \sin x, x^2 \cos x, (ax + b) e^x, x \sin^2 x, \log x, e^x \sin x, x \log x$  etc.,

#### **3.2.0 DEFINITE INTEGRALS.**

- 3.2.1 Meaning of  $\int_a^b f(x) dx$  and definition of definite integral.(Correct notation)  
 3.2.2 Properties of definite integrals.  
 3.2.3 Problems of the same type as in indefinite integral using limits of integration.

### **MODULE – IV APPLICATIONS OF INTEGRATION**

#### **4.1.0 AREA AND VOLUME**

- 4.1.1 Formulae for finding area bounded by a curve and volume of a solid of revolution (no proof)  
 4.1.2 Estimation of the area bounded by the curve  $y = f(x)$ , the x-axis and the ordinates at  $x=a$  and  $x=b$   
 4.1.3 Estimation of the area bounded by the curve  $y = f(x)$ , and the x-axis  
 4.1.4 Estimation of the area enclosed between two curves  $y_1 = f_1(x)$ , and  $y_2 = f_2(x)$   
 4.1.5 Simple problems to find the volume of solid of revolution.

## 4.2.0 DIFFERENTIAL EQUATIONS.

- 4.2.1 Definition of differential equation with examples
- 4.2.2 Order and Degree of D E with examples.
- 4.2.3 Solution of D E by variable separable method.
- 4.2.4 Problems on variable separable method.
- 4.2.5 Solution of a linear D E of the type  $\frac{dy}{dx} + Py = Q$
- 4.2.6 Simple problems
- 4.2.7 Solution of D E of the type  $\frac{d^2y}{dx^2} = f(x)$
- 4.2.8 Simple problems

## CONTENT DETAILS

### MODULE - I

#### 1.1 Vector Algebra

Scalar and vector quantities, Definition of a vector, Representation of vectors, Name a directed line segment as a vector, Different types of vectors, Addition and subtraction of vectors in terms of the segment, Position vector of a point with reference to a point, Difference of two vectors with same initial point as position vector of a point, Orthogonal Cartesian axes, the unit vectors  $i, j$  and  $k$ , Types of vector product (a) scalar product (b) vector product, Scalar (dot) product and vector (cross) product, Properties of dot product and cross product (no proof), Simple problems to find (i) work done by a force (application of scalar product) (ii) moment of a force (application of vector product).

#### 1.2 Binomial Theorem

Concept of factorial, Meaning of  ${}^n C_r$  and value of  ${}^n C_r$  (No proof and no problems), Use of  ${}^n C_r$  in the expansion  $(x + a)^n$ , where  $n$  is positive integer, State binomial theorem for a positive integer, Expansion of  $(x + a)^n$ , and  $(x - a)^n$  where  $n$  is positive integer (statement only), General term of the expansion of  $(x + a)^n$ , and  $(x - a)^n$ , Properties of binomial expansion, Problems of the following types (a) expand using Binomial theorem, (b) to find a particular term in the expansion, (c) to find middle term(s), (d) to find the coefficient of  $x^n$ , to find constant terms in  $(x + a)^n$ , and  $(x - a)^n$ ,

## **MODULE - II Determinants and Matrices**

### **2.1 Determinants**

Definition of determinant by means of algebraic expression, Order of a determinant, Evaluation of determinants of 2<sup>nd</sup> & 3<sup>rd</sup> order --- problems, Solution of a system of simultaneous linear equations in two unknowns, Solution of a system of simultaneous linear equations in three unknowns

### **2.2 Matrices**

Definition of matrices, Order of matrices, Different types of matrices, Algebra of matrices such as Equality of matrices, Addition of matrices, Subtraction of matrices, Scalar multiplication and Multiplication, Problems on algebra of matrices, Transpose of a matrix, Symmetric and skew-symmetric matrices, Determinant associated with a square matrix, Singular and non singular matrices, Minors and cofactors, Cofactor matrix, Adjoint of a matrix, Inverse of a matrix, Solution of a system of three linear equations in two unknowns, Using the inverse of the coefficient matrix.

## **MODULE - III**

### **3.1 Integral Calculus**

Integration as reverse process of differentiation, List standard integrals, Rules of integration,

$$1. \int kf(x)dx = k \int f(x)dx. \quad 2. \int \{f(x) \pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$$

Simple problems using standard results and rules of integration, Simple problems using algebraic simplification and trigonometric results, Integration by substitution method, Solve simple problems on substitution method, Evaluation of integrals of the form,

$$(1) \int x^{n-1} f(x^n) dx \quad 2) \int \phi[f(x)] f'(x) dx \quad 3) \int f(x^n) f'(x) dx \quad 4) \int \frac{f'(x)}{f(x)} dx$$

$$5) \int f(ax + b) dx$$

Integration by parts, Solutions of problems of the type  $x \sin x$ ,  $x^2 \cos x$ ,  $(ax + b) e^x$ ,  $x \sin^2 x$ ,  $\log x$ ,  $e^x \sin x$ ,  $x \log x$  etc.

### **3.2 Definite Integrals**

Meaning of  $\int_a^b f(x) dx$  and definition of definite integral.(Correct notation), Properties of definite integrals, Problems of the same type as in indefinite integral using limits of integration.

## **MODULE - IV**

### **4.1 Area and Volume**

Formulae for finding area bounded by a curve and volume of a solid of revolution (no proof), estimation of the area bounded by the curve  $y = f(x)$ , the x- axis and the ordinates at  $x=a$  and  $x=b$ , Estimation of the area bounded by the curve  $y = f(x)$ , and the x- axis , Estimation of the area enclosed between two curves  $y_1 = f_1(x)$ , and  $y_2=f_2(x)$ , Simple problems to find the volume of solid of revolution.

### **4.2 Differential Equations**

Definition of differential equation with examples, Order and Degree of D E with examples,

Solution of D E by variable separable method, Problems on variable separable method,

Solution of a linear D E of the type  $\frac{dy}{dx} + Py = Q$  , Simple problems, Solution of D E of the type

$\frac{d^2y}{dx^2} = f(x)$  , Simple problems

**NB: Emphasis is mainly placed in application oriented problems and hence proofs and derivations are not expected.**

#### **TEXT BOOK:**

Engineering Mathematics-II for polytechnic colleges by different authors.

#### **REFERENCE BOOK:**

1. W.R Neelakanta - Applied Mathematics – Sapna Publications.
2. Dr. D S Prakash - Applied Mathematics – S Chand Publications
3. Calculus : One-Variable calculus Vol-I, 2edn. - Apostol,WILEY



**COURSE TITLE** : ENGINEERING PHYSICS II  
**COURSE CODE** : 2003  
**COURSE CATEGORY** : F  
**PERIODS PER WEEK** : 3  
**PERIODS /SEMESTER** : 45  
**CREDITS** : 3

**TIME SCHEDULE**

Module	Name of Module	Course Objective Number	Total periods per Semester		
			Instructional	Test	Total
I	Circular Motion and Rotational Dynamics.	1.1 - 1.4	12	1	13
II	Gravitation and Satellites.	2.1 - 2.6	8	1	9
III	Electromagnetism	3.1 - 3.3	12	1	13
IV	Modern Physics	4.1 - 4.9	9	1	10
	<b>TOTAL</b>		<b>41</b>	<b>4</b>	<b>45</b>

**COURSE OUTCOME**

**After the completion of the course student will be able to:**

- Create a clear cut understanding of various aspects of circular motion which is relevant to Engineering Science.
- Explain the Banking of roads and rails.
- Know the idea of a rigid body and its motion. It will impart the meaning of technical terms such as Moment of Inertia, Radius of gyration, axis of rotation, angular momentum and torque. He can also estimate various energies associated with rotation.
- Apply Equations of Translational and rotational motion in analysing rolling without slipping.
- Gather detailed ideas of Gravitational force and Acceleration due to gravity.
- Conceive introductory knowledge of different types of satellites.

- Derive technical terms such as Orbital velocity, Period, escape velocity of Satellites.
- Study orbital features of geostationary Satellites and its uses in everyday life.
- Study the orbital features of Polar Satellites and the uses of polar satellites.
- Get an overview of other types of satellites.
- Apply basic laws of Electricity and magnetism to solve simple problems concerning the motion and distribution of charges.
- Analyse complicated electrical circuits and find out currents through different branches and resistances in the circuit.
- Design simple electrical instruments using magnetic effect of electric current and understand how those devices can be used as multi range ammeters and voltmeters.
- Get basic ideas of the nature of light with special reference to quantum theory.
- Study quantitatively as well as qualitatively photoelectric effect.
- Derive Einstein's photoelectric equation.
- Get an overview of applications of photoelectric effect in various fields
- Understand the working of a Laser with special reference to Ruby laser, He-Ne gas laser and solid state laser with their merits and demerits.
- Introduction to various applications of Laser including communication.
- Create an awareness of nuclear fission and the working of nuclear reactors.
- Gather an introductory knowledge of nuclear fusion with special reference to energy production in stars.
- Impart an idea of alternative forms of energy sources.

## **SPECIFIC OUTCOME**

### **MODULE - I 2.1 CIRCULAR MOTION AND ROTATIONAL DYNAMICS**

- 2.1.1. Understand the concept of circular motion.
- 2.1.2. Define angular displacement and angular velocity.
- 2.1.3. Derive the relation between linear velocity and angular velocity.
- 2.1.4. Mention the expression for centripetal acceleration.
- 2.1.5. Apply the Principle of centripetal force in the case of banking of roads and rails.
- 2.1.6. Solve the problems related to centripetal force.
- 2.1.7. Understand the dynamics of rotating body.
- 2.1.8. Define the moment of inertia of a rigid body.
- 2.1.9. Define radius of gyration.
- 2.1.10. State theorems of parallel and perpendicular axes.
- 2.1.11. Define torque.
- 2.1.12. Mention the relation between torque and angular momentum.
- 2.1.13. Mention the expression for kinetic energy of rotation.

- 2.1.14. Derive the expression for moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane.
- 2.1.15. Derive expression for kinetic energy of a disc rotating on a horizontal plane.
- 2.1.16. Solve problems using above expressions.

#### **MODULE – II 2.2 GRAVITATION AND SATELLITES**

- 2.2.1. State Newton's law of gravitation.
- 2.2.2. Derive expression for orbital velocity, Period of satellite.
- 2.2.3. Define gravitational potential.
- 2.2.4. Mention expression for escape velocity.
- 2.2.5. Understand the idea of satellites.
- 2.2.6. Explain geostationary satellites and polar satellites.
- 2.2.7. Mention applications of geostationary and polar satellites.

#### **MODULE - III 2.3 ELECTROMAGNETISM**

- 2.3.1. Understand the terms electric charge and potential difference.
- 2.3.2. State Ohm's law
- 2.3.3. Explain the terms resistivity and conductivity.
- 2.3.4. Understand the law of resistances.
- 2.3.5. Understand the fundamentals of electricity and its magnetic effect .
- 2.3.6. State Kirchoff's laws.
- 2.3.7. Derive expression for balancing condition of wheatstone's Bridge.
- 2.3.8. State Biots and Savart's law.
- 2.3.9. Mention the expression for magnetic field due to current through a circular coil.
- 2.3.10. State Fleming's left hand rule.
- 2.3.11. Describe the principle and construction of a moving coil galvanometer.
- 2.3.12. Explain the conversion of galvanometer into ammeter and voltmeter
- 2.3.13. Solves problems based on the above laws.

#### **MODULE - IV 2.4 MODERN PHYSICS**

- 2.4.1. Understand laser action and its applications.  
Explain population inversion, spontaneous emission, stimulated emission and optical pumping.
- 2.4.2. Write down the characteristics of Laser.
- 2.4.3. Describe various applications of Laser.
- 2.4.4. Explain the working of Ruby Laser, He –Ne laser.
- 2.4.5. Understand the advantage of gas laser over solid state laser.
- 2.4.6. Comprehend the theories of photoelectric effect
- 2.4.7. Describe Max plank's quantum theory.
- 2.4.8. Explain Photoelectric effect and application(photoelectric cell)

- 2.4.9. State Laws of Photoelectric emission.
- 2.4.10. Derive Einstein's photoelectric equation.
- 2.4.11. Solve problems using the above equation.
- 2.4.12. Understand nuclear fission and explain the working of nuclear reactors.
- 2.4.13. Understand nuclear fusion and explain the energy production in stars.

## **CONTENT DETAILS**

### **MODULE – I CIRCULAR MOTION AND ROTATIONAL DYNAMICS (13Hrs)**

Angular displacement – angular velocity – angular acceleration – relation between linear velocity and angular velocity in circular motion – centripetal acceleration – centripetal force – banking of roads and rails – problems.

Rigid body – centre of mass - moment of inertia – radius of gyration – statement of parallel and perpendicular axes theorems – derivation of moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane – angular momentum and torque – relation between torque and angular momentum (only expression) – rotational kinetic energy – kinetic energy of a disc rolling on a horizontal surface – problems.

### **MODULE- II GRAVITATION AND SATELLITES (9Hrs)**

Newton's law of gravitation- Expression for acceleration due to gravity- Factors affecting the value of g- variation of acceleration due to gravity- satellites- Artificial satellites- orbital velocity and period of a satellite-gravitational potential –escape velocity- geostationary satellites and it's uses- polar satellites and it's uses - uses of artificial satellites

### **MODULE - III ELECTROMAGNETISM (13Hrs)**

Electric charge – potential difference – Ohm's law – verification of Ohm's law – resistivity – conductivity – law of resistances – Kirchhoff's laws – Wheatstone's Bridge – Metre Bridge- magnetic effect of electric current—Biot-savart law-magnetic field due to a current carrying conductor- force on a current carrying conductor placed in a magnetic field- Moving Coil Galvanometer and its working – shunt- conversion of a galvanometer into an ammeter - conversion of a galvanometer into a voltmeter – problems.

### **MODULE - IV MODERN PHYSICS (10Hrs)**

Quantum theory – photoelectric effect – experiment to illustrate photoelectric effect – laws of photoelectric effect – Einstein's photoelectric equation – applications of photoelectric effect – problems.

Laser – principle of laser – characteristics – Ruby laser and its working–gas laser – Helium Neon gas laser and its working – advantages of gas laser over solid state laser – applications of laser.

Nuclear fission – chain reaction – nuclear reactor and its working – uses – nuclear fusion.- alternative forms of energy sources.

#### **REFERENCE BOOKS**

- |                         |   |  |
|-------------------------|---|--|
| 1. Resnick and Halliday | - | Physics  |
| 2. D.S.Mathur           | - | Mechanics  |
| 3. Narayana Kurup       | - | Mechanics  |
| 4. Murukesan            | - | Modern Physics                                     |
| 5. A.Marikani           | - | Engineering Physics                                |
| 6. M N Avadhanulu       | - | An Introduction to Lasers- Theory and Applications |
| 7. H D Young            | - | University Physics                                 |

**COURSE TITLE** : **ENGINEERING CHEMISTRY - II**  
**COURSE CODE** : **2004**  
**COURSE CATEGORY** : **F**  
**PERIODS PER WEEK** : **3**  
**PERIODS /SEMESTER** : **45**  
**CREDITS** : **3**

**TIME SCHEDULE**

Module	Topic	Periods
1	Atomic Structure II and Chemical bonding	11
2	Electrochemistry and Corrosion	12
3	Basic Organic Chemistry and Polymers	9
4	Fuels and Environmental Chemistry	9
Theory		41
Test		4
<b>Total</b>		<b>45</b>

**COURSE OUTCOME**

**Student will be able to**

- Enable the students to understand the latest concepts of atom model.
- Develop the basic theoretical concepts of orbitals and facts related to it. Develop the skill of writing electronics configuration of atoms.
- Introduce the concept of Chemical bonding and distinguish different types of chemical bond.
- Distinguish and justify different materials based on conductivity in Science and Technology
- Illustrate the mechanism of electrolysis with examples and to solve the problems related to electrolysis. Apply the concept of fuel cell in modern technology.
- Summarise the concept of corrosion and its after effects, solve the practical Problems related to it.
- Distinguish different types of refractories and glasses and apply this in industrial field.
- Compare, differentiate, explain, relate and extend the concept of polymers and polymerisation with examples.
- Understand, list and differentiate the concept of fuels, Identify and relate the impact of environmental pollution in daily life and to point out the remedial steps for it.

## **SPECIFIC OUTCOME**

### **MODULE - I:**

#### **1.1.0 ATOMIC STRUCTURE – II AND CHEMICAL BONDING**

- 1.1.1 Explain Bohr model of atom with merits and demerits
- 1.1.2 Explain dual nature of atom, deBroglie relation and Uncertainty Principle
- 1.1.3 Introduce the concept of orbit, orbital and quantum numbers with shapes of s and p – orbitals
- 1.1.4 Explain Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity
- 1.1.5 Illustrate Electronic configuration of atoms of elements up to atomic number 20
- 1.1.6 Understand the idea of chemical bonding using octet rule
- 1.1.7 Explain different types of chemical bonds – Ionic bond, Covalent bond, Coordinate bond and Hydrogen bonding with examples.

### **MODULE - II**

#### **2.1.0 : ELECTROCHEMISTRY AND CORROSION**

- 2.1.1. Distinguish between
  - a) Conductors and Insulators
  - b) Metallic and electrolytic Conductors
  - c) Strong and Weak Electrolytes
- 2.1.2 Illustrate electrolysis taking molten NaCl and aqueous NaCl solution as examples
- 2.1.3 Explain qualitative and quantitative statement of Faradays laws of electrolysis.
- 2.1.4 Explain the applications of electrolysis (electroplating and anodizing)
- 2.1.5 Outline schematic representation of galvanic cell
- 2.1.6 Explain the classification of galvanic cell as primary, secondary and fuel cells
- 2.1.7 Illustrate primary cell with Daniel Cell as example
- 2.1.8 Explain the concept of fuel cell taking H<sub>2</sub>-O<sub>2</sub> fuel cell with advantages and applications
- 2.1.9 Introduce the concept of electrode potential and EMF of cell
- 2.1.10 Explain Electrochemical Series with applications
- 2.1.11 Define Corrosion
- 2.1.12 Explain rusting of Iron and mention the conditions of rusting
- 2.1.13 Explain electrochemical theory of corrosion
- 2.1.14 Describe the methods of prevention of corrosion ( Barrier Protection, Sacrificial Protection, Cathodic Protection and Antirust Solutions.)

## **MODULE - III :**

### **3.1.0 CHEMISTRY OF MATERIALS AND POLYMERS**

- 3.1.1 Understand the fundamental ideas of Organic Chemistry
- 3.1.2 List the differences between Organic and Inorganic Compounds
- 3.1.3 Describe Uniqueness of Carbon atom
- 3.1.4 Distinguish between Saturated and Unsaturated Compounds and introduce Concept of functional group
- 3.1.5 Understand the reactivities with the classification and properties
- 3.1.6 Explain general properties and types of glasses – soda glass, Borosilicate glass, safety glass and Insulating glass with their Contents and Uses
- 3.1.7 List the uses and advantages of optical fibres
- 3.1.8 Understand the term polymers, and polymerization
- 3.1.9 Explain the Various Classification of polymers
- 3.1.10 Distinguish between Natural and Synthetic rubber
- 3.1.11 Explain Vulcanisation and its merits
- 3.1.12 Introduce Common polymers- Poly ethene, polypropene, polystyrene, PVC, Neoprene, Teflon, Buna-s, Buna-N, Nylon-6 ,Nylon-66 and Bakelite with their monomers and uses.

## **MODULE- IV**

### **4.1.0: FUELS AND ENVIRONMENTAL CHEMISTRY**

- 4.1.1 Understand the term fuel
- 4.1.2 Define Caloric Value
- 4.1.3 List the qualities of a good fuel
- 4.1.4 Explain the Classification into solid, liquid, gaseous and nuclear fuels with examples.
- 4.1.5 Explain preparation and properties of water gas and producer gas
- 4.1.6 Define cracking and distinguish between thermal and catalytic cracking
- 4.1.7 Introduce different regions of atmosphere
- 4.1.8 Recollect the terms Pollutant and Pollution
- 4.1.9 Understand different types of pollution – Air Pollution, Water Pollution and Soil Pollution
- 4.1.10 Understand the terms – ozone depletion, green house effect and acid rain
- 4.1.11 Explain different types of smog
- 4.1.12 Understand the relevance of Green Chemistry ( Principle and scope in the present scenario)



## **CONTENT DETAILS**

### **MODULE - I :**

#### **Atomic Structure II and Chemical Bonding (11+1=12 hours)**

Bohr Model of atom – Postulates, Merits and Demerits - Dual nature of matter – de Broglie relation – Uncertainty Principle – Concept of Orbit and Orbital – Quantum numbers – Sub energy levels (s,p,d,f) - shape of s and p orbitals.

Electronic Configuration of atom – Aufbau principle, Pauli's exclusion principle, Hund's rule of maximum multiplicity – electronic configuration of elements upto atomic number 20.

Chemical bonding – Octet rule – Electro negativity- Types of Chemical bonds - Ionic (Electrovalent) bond – Covalent bond, Coordinate bond and hydrogen bonding – Definition with two examples for each.

### **MODULE - II:**

#### **Electrochemistry and Corrosion (12+1=13 hours)**

Classification of materials based on conduction – conductors, Semiconductors and Insulators – Definition with two examples each – Types of Conductors – Metallic and electrolytic conductors – Any four differences.

Electrolytes and Non - electrolytes – Definition with two examples – Strong and Weak Electrolytes – Definition with two examples -

Electrolysis – Definition – Electrolysis of molten NaCl and aqueous NaCl solution using Pt electrodes – Faraday's laws of electrolysis (Qualitative and Quantitative Statements only). Applications of electrolysis – Electroplating and Anodising – Any two differences – Electroplating of Nickel on mild steel – Anode, Cathode, electrolyte and half cell reactions – Electrochemical cell – Daniel cell – Representation of the cell – half cell and over all cell reactions – Primary and Secondary cells – definition and examples only – fuel cell – H<sub>2</sub>-O<sub>2</sub> fuel cell – Cell reactions, advantages and applications – Electrode potential – standard electrode potential – EMF of cell – Electrochemical Series and its applications.

Corrosion – Definition and examples – rusting of iron Factors affecting rusting - conditions of rusting – Mechanism of rusting – Electrochemical theory – Types of Corrosion – Chemical and Electro chemical Corrosion – Prevention of Corrosion – Barrier Protection, Sacrificial Protection, Cathodic protection and Anti rust solutions.

### **MODULE - III:**

#### **Chemistry of Materials and Polymers ( 9+1=10 hours)**

Introduction to organic chemistry – Differences between organic and inorganic compounds – Uniqueness of Carbon – Saturated and Unsaturated hydrocarbons –concept of functional group.

Refractories – Classification and properties – Glasses – General properties and types of glasses – Soda glass, Borosilicate glass, Safety glass and Insulating glass – Content and uses – Uses and advantages of Optical Fibres.

Polymers – definition – Classification of Polymers based on nature of monomers origin(source), structure, mode of synthesis and magnitude of intermolecular forces with two examples each – Natural rubber – Vulcanisation – Properties and merits – Common Polymers - monomers and uses – Polythene, Polypropene, Polystyrene, PVC, Neoprene, Teflon, Buna – S, Buna – N, Nylon-6, Nylon-66 and Bakelite.

### **MODULE - IV:**

#### **Fuels and Environmental Chemistry (9+1=10 hour)**

Fuel - Definition – Calorific value – Qualities of a good fuel – classification of fuels – solid, Liquid, gaseous and nuclear fuels with three examples each – water gas and Producer gas – Preparation and Properties –Cracking – Thermal and Catalytic Cracking.

Environmental Chemistry - Regions of atmosphere – Pollutant and Pollution – Definition – Types of pollution – Air pollution, water pollution and Soil Pollution – Mention only major pollutants – Impact of Air Pollution – Ozone depletion, green house effect, acid rain and smog – Types of smog – Elementary ideas of green Chemistry.

### **REFERENCE :**

Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry	S. Chand Publication
B. K Sharma	Industrial Chemistry	Geol Publication
S. S. Dara	Environmental Chemistry and Pollution Control	S. Chand Publication
	Wiley "All in One"	Wiley India Pvt. Ltd 2012 Editon.

**COURSE TITLE : ENGINEERING GRAPHICS**  
**COURSE CODE : 2005**  
**COURSE CATEGORY : F**  
**PERIODS/WEEK : 4**  
**PERIODS/SEMESTER : 60**  
**CREDITS : 5**

#### TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Orthographic Projection	15
2	Sectional views and auxiliary views	15
3	Pictorial drawing	15
4	Visualisation and Development of surfaces	15
<b>TOTAL</b>		<b>60</b>

#### COURSE OUTCOME

**After the completion of the course student will be able to**

- Understand the orthographic projections of various objects
- Appreciate the sectional views of objects
- Appreciate the auxiliary views of objects
- Identify the pictorial drawings of various objects
- Understand the visualisation
- Understand the development of surfaces

#### SPECIFIC OUTCOME

##### MODULE - I

##### **1.1.0 Understand the orthographic projections of various objects**

- 1.1.1 Apply principles of orthographic projection
- 1.1.2 Explain the principle of orthographic projection with simple sketches
- 1.1.3 Prepare an engineering drawing of a given simple engineering part in first angle projection only.
- 1.1.4 Sketch (free hand) the orthographic views of simple objects
- 1.1.5 Draw the orthographic views of an object, given its pictorial drawing
- 1.1.6 Select the minimum number of views needed to represent a given object fully
- 1.1.7 Identify the engineering part correctly from a number of orthographic drawings

## **MODULE - II**

### **2.1.0 Appreciate the sectional views of objects**

- 2.1.1 Recognize the need of sectional views
- 2.1.2 Explain the need to draw sectional views
- 2.1.3 Select the section place for a given component to reveal maximum information
- 2.1.4 Free hand sectional views of simple objects
- 2.1.5 Draw the sectional views of simple engineering components
- 2.1.6 Sketch simple sections (Full and half) for a range of simple engineering objects
- 2.1.7 Select the component from a given sectional view
- 2.1.8 Auxiliary views

### **2.2.0 Recognize the need of auxiliary views**

- 2.2.1 State whether the auxiliary view is needed, given an engineering drawing
- 2.2.2 Draw the auxiliary views of a given engineering drawing

## **MODULE - III**

### **3.1.0 Identify the pictorial drawing of various objects**

- 3.1.1 Prepare pictorial drawing
- 3.1.2 Explain the need for and types of commonly used pictorial drawing
- 3.1.3 Prepare isometric drawing of simple objects using appropriate construction procedure, given their appropriate drawing
- 3.1.4 Sketch the isometric views of simple engineering objects given either<sup>1</sup> orthographic drawing or actual components
- 3.1.5 Prepare oblique drawing –Cavalier and cabinet –of simple engineering objects given either orthographic drawing or actual drawing
- 3.1.6 Understand the visualisation
- 3.1.7 Visualise and object in 3D, given its orthographic drawing
- 3.1.8 Compare an engineering part with its drawing
- 3.1.9 Identify surfaces with reference to orthographic drawing
- 3.1.10 Prepare a model of the part, given its orthographic drawing

## **MODULE - IV**

### **4.1.0 Understand the development of surfaces**

- 4.1.1 Prepare development of surfaces
  - 4.1.2 State the need for preparing the development drawing
  - 4.1.3 Prepare development of surfaces of simple engineering components
-

like tray, funnel, bucket and ducts(rectangular and squarehooper)

4.1.4 Prepare development of surfaces of surfaces of 90° elbow

#### **4.2.0 Computer Aided Drafting**

4.2.1 Introduction to CAD

4.2.3 Compare conventional drawing and CAD

4.2.4 Familiarisation of different CAD software

4.2.5 Application of CAD in engineering drawing

4.2.6 Opening of CAD

4.2.7 Setting of units and limits

4.2.8 Saving of drawing

4.2.9 Commands-draw commands- line, circle, arc, ellipse, polygon (2D primitives) hatch, modify, erase, move, rotate, copy, mirror, break ,trim, extent, scale, stretch, array fillet, chamfer, offset etc.

4.2.10 Dimensioning and text commands

4.2.11 Practice- Different methods of drawing lines

4.2.12 Absolute coordinate system

4.2.13 Relative coordinate system

4.2.14 Polar coordinate system

4.2.15 Direct distance entry

4.2.16 Rectangle, circle, ellipse,

4.2.17 Practice to draw orthographic views of simple objects and

4.2.18 familiarise with the above commands

### **CONTENT DETAILS**

#### **MODULE - I**

##### **1.1.0 Orthographic projection of objects**

Explanation of the meaning of orthographic projection using a viewing box and a model- number views obtained need of only three views for displaying the object.

Concept front view - top view and side view-sketching these views for a number of engineering objects- explanation of the meaning of first angle and third angle projection – symbol of projection

#### **MODULE - II**

##### **2.1.0 Sectional views of objects**

Need for sectional drawing of an engineering object- selection of the section plane to reveal the maximum information – sectional views (full and half section) of simple engineering objects.

### **2.1.1 Auxiliary views**

Need of auxiliary views – auxiliary views given engineering drawings

## **MODULE - III**

### **3.1.0 Pictorial Drawing**

Isometric projections-construction of isometric scale-isometric projection of simple engineering object Oblique-cavalier-and cabinet projections of simple engineering Object

### **3.1.1 Visualization**

Preparation of pictorial view from a group of orthographic Drawing

## **MODULE - IV**

### **4.1.0 Development of surfaces**

Development of surfaces of simple engineering components tray, funnel, bucket, duct (rectangular, square hooper) and 90<sup>0</sup> elbow

### **4.1.1 Computer Aided Drafting –**

Introduction to CAD, Importance of CAD in engineering drawing- Applications

### **4.1.2 Opening CAD- setting and saving of drawing- CAD commands**

### **4.1.3 Visualization Drawing with CAD- method of drawing straight line and simple figures.**

## **TEXT BOOKS**

1. Engineering Graphics - K. C Jon, PHI Learning Private Limited
2. Engineering Graphics - P. I. Varghese, VIP Publishers

## **REFERENCE BOOKS**

1. Engineering Drawing - N D Bhatt
2. Engineering Graphics - Sageer & Abu
- 3 Engineering Drawing - M. B. Shah and B.C.Rana, Pearson Publications
4. Engineering Drawing & Graphics using Autocad – T.Jayapoovan,Vikas publications

**COURSE TITLE** : ENGINEERING SCIENCE LAB (For Semester I & II)  
 [Engineering Physics & Engineering Chemistry Lab]  
**COURSE CODE** : 2007  
**COURSE CATEGORY** : F  
**PERIODS PER WEEK** : 3  
**PERIODS /SEMESTER (I & II):** 90  
**CREDITS** : 3

### ENGINEERING PHYSICS LAB

#### TIME SCHEDULE

SL.No	Name of module	Course objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Measurement and calculation of different physical quantities	1:1 1:2 1:3	Practical: 42	3	45
<b>Total periods 1 and 2 semester 45</b>					

On completion of the course the student will be able to:

1. To measure volume of a cylinder using vernier calipers.
2. To measure volume of a wire using screw gauge.
3. To determine focal length of a convex lens by displacement method.
4. To determine the velocity of sound in air at room temperature using resonance column.
5. To determine spring constant using Hooke's law..
6. To determine acceleration due to gravity using simple pendulum.
7. To verify law of resistances.
8. To determine specific resistance of material using Meter Bridge.
9. To determine Internal Resistance of a Primary Cell using Potentiometer.
10. To plot characteristics of photoelectric cell (photoelectric current vs intensity of light and voltage applied)
11. To determine the mass of the given body using moment bar.
12. To determine the mass of a body by parallelogram method and by Lami's theorem.
13. To verify Ohm's law and to determine the resistance of the given wire.

14. To determine the coefficient of viscosity of a highly viscous liquid.
15. To determine the relative density using U- tube apparatus.

**LIST OF PRACTICAL EXPERIMENTS – PHYSICS**

1. Vernier calipers
2. Screw gauge
3. Convex lens
4. Resonance column
5. Hooke's law
6. Simple pendulum
7. Law of resistances
8. Meter bridge
9. Potentiometer
10. Photoelectric cell
11. Moment bar
12. Concurrent forces( mass of the body)
13. Ohm's law
14. Stoke's method for viscosity
15. U tube



## ENGINEERING CHEMISTRY LAB

SL.No	Name of module	Course objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Quantitative analysis(Volumetric analysis)	1:1 1:2 1:3	Theory:  Practical: 39	-  6	45
<b>Total periods 1 and 2 semester 45</b>					

### TIME SCHEDULE

On completion of the course the student will be able to:

#### **Practical Volumetric Analysis**

##### Single Titration

1. Standardisation of HCL
2. Standardisation of NaOH Double Titrations
3. Estimation of NaOH
4. Estimation of KOH
5. Estimation of Na<sub>2</sub> CO<sub>3</sub>
6. Estimation of K<sub>2</sub> CO<sub>3</sub>
7. Estimation of HCl
8. Estimation of HNO<sub>3</sub>
9. Estimation of H<sub>2</sub> SO<sub>4</sub>
10. Estimation of Oxalic acid
11. Standardisation of KMnO<sub>4</sub>
12. Estimation of Oxalic acid
13. Estimation of Fe<sup>2+</sup> ion
14. Estimation of Mohr's Salt
15. Determination of PH of Solution
16. Estimation of Zinc using EDTA
17. Estimation of Magnesium Using EDTA

#### **Reference:**

Prof. A. O. THOMAS – PRACTICAL CHEMISTRY – Eight Edition 2000

**COURSE TITLE** : **WORKSHOP PRACTICE**  
**COURSE CODE** : **2008**  
**COURSE CATEGORY** : **F**  
**PERIODS/ WEEK** : **3**  
**PERIODS/ SEMESTER (I & II):** **90**  
**CREDIT** : **3**

**TIME SCHEDULE**

MODULE	TOPICS	PERIODS
1	Carpentry, Foundry & Casting	27
2	Smithy, Forging & Fitting	27
3	Sheet metal	18
4	welding	18
<b>TOTAL</b>		<b>90</b>

**Course outcomes:**

**STUDENT WILL BE ABLE TO:**

- Perform various exercises on given drawing and specifications in Carpentry shop, Foundry & Casting shop.
- Perform various exercises on given drawing and specifications in Smithy, Forging & Fitting shop.
- Perform various exercises on given drawing and specifications in Sheet metal shop.
- Perform various exercise on given drawing and specifications in Welding shop.

**CONTENT DETAILS**

**MODULE I**

**Introduction, objectives, safety in the Carpentry shop, Foundry & Casting shop.**

**Familiarization of tools**

**Marking and measuring tools** such as straight edge- meter square- try square- bevel square- combination square- marking knife- marking gauge- mortise gauge- cutting gauge- wing compares- trammel- divider- outside and inside calipers- spirit level and plumb bob.

**Cutting tools** such as Rip saw- Cross cut saw- panel saw- tenon saw- bow saw- compass saw- key hole saw- firmer chisel- bevel edge firmer chisel- parting chisel- mortise chisel- jack plane- wooden and metal- trying plane- smoothing plane- rebate plane- plough plane- router plate- spoke shave.

**Boring tools** such as Bradawl ratchet brace- wheel brace- shell bit- fostries bit- counter sunk bit.

**Striking tools** such as mallet etc

**Holding devices** – **Bench vice- bench stop- sash clamp- G-clamp- hard screw.**

**Miscellaneous tools** – Rasp cut file- scraper- glass paper- pincers- ratchet and cabinet type screw drivers.

Carpentry Practice

Marking- sawing- planning- chiseling- grooving- rebating exercises Preparation of carpentry joints.

#### **Familiarization of Foundry tools**

Hand tools – shovel- riddle- hammers- trowels- relic- lifters- strike off bar spruce- balloons- swab- gate cutter- mallet- vent rod- draw spike- lifting plate- pouring weight- gagers- clamps, core & chaplets.

Moulding practice & casting

Preparation of moulding sand- Prepare moulds of different types using different patterns( single, double & three piece patterns)- ferrous & Non- ferrous metal casting using simple patterns.

## **MODULE II**

#### **Familiarization of Smithy tools**

Hand tools – anvil- swage block- hammers such as ball peen- straight peen- cross peen and sledge hammers. Tongs such as flat- hallow- cold and hot chisels- swages- fullers- flatters- set hammers- pinch and drift.

Equipment: Open and closed hearth- heating furnaces- hand and power driven blowers- open and stock fire fuels such as charcoal- coal- oil and gas

#### **Smithy & Forging Practice**

Building fire in the furnace- Upsetting- bending- drawing- setting down- pinching- cutting and welding exercises

#### **Familiarization of fitting tools**

**Hand tools & Marking tools** – scribe- compass- dividers- outside and inside calliper- jenny calliper- ordinary scribing block- universal scribing block- angle plate- V-block- center punch- prick punch- try square- bevel square- surface plate- straight edge.

**Cutting tools** – chisels – flat- crosscut- half round- diamond point- side chisel. Files – single cut and double cut files rough- bastard- second cut- smooth Dead smooth files – flat- square- pillar- round triangular- half round- knife- safe edge and needle files.

Scribers – Neck saw – solid and adjustable frames – blades – cutting with point rack saw

**Striking tools:** Ball peen- straight peen- cross peen and double-faced hammers

**Holding devices**-vice-bench- leg- pipe- hand- pin and tool makers vice

**Marking tools** – scribe – ordinary and universal scribing block- center and prick punch.

**Angle plate**- v-block- Try Square- surface plate

#### **Fitting Practice**

Cutting - filing- scribing and simple joints exercises

## **MODULE III**

#### **Familiarization of Sheet metal tools**

Understand safety precautions.

Familiarization of sheet metal tools – scribes- dividers- trammel points- set square- punches – prick Punches- centre punches – hand Grover- rivet- set- chisels hammers- riveting hammers- ball peen hammers – mallet- snip- shears- pliers- hand reamers (tongs) files- stakes. Measuring instruments in sheet metal folding rule- common rule- steel circumference rule- vernier calipers- micrometer- calipers- thickness gauges (SWG) sheet metal gauge.

#### **Practice work**

Sheet cutting- development- folding- bending and pipe bending- making right angle joints.

## **MODULE IV**

### **Familiarization of welding tools & safety**

Safety precautions- Study of various tools and equipments used in the welding shop for both arc welding and gas welding.

#### **Practice work**

- 1.D.C. arc welding**
- 2.A.C. arc welding
- 3.Gas welding
4. Edge preparation of welded joint such as V and double V.
- 5.Horizontal -flat and vertical joints

General Information:

Examination in the Second Semester

## **TEXT BOOKS**

- 1. Mechanical Workshop Practice By K. C Jon, PHI Learning Private Limited**
- 2. Mechanical Workshop & Laboratory Manual By K. C. John**

## **REFERENCE BOOKS**

- 1. S K Hajra Choudhary - Workshop Technology Vol. I**
- 2. S K Hajra Choudhary - Workshop Technology Vol. II**

<b>TITLE</b>	<b>: LIFE SKILL</b>
<b>COURSE CODE</b>	<b>: 2009</b>
<b>COURSE CATEGORY</b>	<b>: C</b>
<b>PERIODS/ WEEK</b>	<b>: 2</b>
<b>PERIODS/ SEMESTER</b>	<b>: 30</b>
<b>CREDIT</b>	<b>: 2</b>

**COURSE OUTCOME:-**

Providing direction for the next generation and equipping them for successful living.

**Specific Outcome:**

- \* To make students aware of their thinking styles and to enable them to convert thinking into performance
- \* To make students learn and practice the steps involved in time management
- \* To give training for positive thinking which will keep the students in a good stead at the time of crisis.
- \* To translate performance of skills into efficient habits
- \* To make students understand the concept and components of personality, thereby to apply the acquired knowledge to themselves and to march towards excellence in their respective academic careers.
- \* To bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced.
- \* To train students in order to ground concepts/ideas in their own experience
- \* To give inputs on some of the important interpersonal skills such as group decision-making, negotiation and leadership skills.
- Introduce the basic concepts of body language for conflict management.
- \* To enable students to convert the conceptual understanding of communication into everyday practice.
- \* To help students understand the mechanism of stress particularly negative emotions such as anxiety, anger and depression for effective management.

### TIME SCHEDULE

MODULE	TOPIC	PERIODS
I	Self Awareness and Empathy Logical Thinking and Creative Thinking	8
II	Decision Making And Problem Solving	6
III	Effective Communication	8
IV	Inter Personal Relations Coping with Stress and Emotion	8
<b>TOTAL</b>		<b>30</b>

#### **MODULE - I - Self Awareness and Empathy**

##### **Logical Thinking and Creative Thinking**

Self Concept – SWOT Analysis – Self Growth – Goal Setting – Time Management - Personal Well Being – Empathy – Understanding –Empathy Acknowledgement – Psychological Hug – Empathetic Language – Thinking – Process, types and components – Learning – creativity – Creative Problem Solving Right and left Brain thinking – Generative thinking techniques – Synthesis – Thinking outside the box – Lateral thinking – Risk taking

#### **MODULE - II Decision Making and Problem Solving**

Factors influencing Decision making – Values and Ethics – Emotional and physical considerations – Role conflict – Decision Making methods – Problem Solving – Process – Steps – Establishing frameworks, Analysing, evaluating options, and implementing solutions – Problem solving techniques

#### **MODULE - III Effective Communication**

Importance – Benefits – Levels/Dimensions - Barriers – Types – LRSW – Oral Communication – Non verbal communication, Body Language – Written Communication

#### **MODULE - IV Interpersonal Relationship - Coping with Stress and Coping with Emotion**

Nature - Factors influencing IPR – Trust – Strategies – Johari Window – Transactional Analysis – Team work – Assertive communication

Stress – Nature, types – Personality and stress – Managing stress – Relaxation techniques – Improving attitudes – Emotions - Emotional competence – Components – Promoting EI – Anger Management

#### **Text Books:**

1. Barun K Mitra (Oxford) - Personality Development and Soft Skills
2. Gopalaswamy Ramesh & Mahadevan Ramesh (Pearson) - The ACE of Soft Skills Attitude, Communication and Etiquette for Success

**COURSE TITLE** : BASIC ELECTRONICS  
**COURSE CODE** : 2041  
**COURSE CATEGORY** : B  
**PERIODS/WEEK** : 4  
**PERIODS/SEMESTER** : 60  
**CREDITS** : 4

**TIME SCHEDULE**

MODULE	TOPICS	PERIODS
1	Introduction to Electronics, Passive Components.	15
2	Semiconductors and PN junction.	15
3	Diode Circuits - Rectifiers and Wave Shaping Circuits.	15
4	Bipolar Junction Transistor.	15
<b>Total</b>		<b>60</b>

**Course Outcome:**

MODULE	GO	On completion of this course the student will be able:
1	1	To Know about Electronics.
	2	To understand passive components.
2	3	To comprehend semiconductor physics and semiconductor diodes.
3	4	To understand the working of rectifiers and filter circuits.
	5	To understand voltage multipliers and wave shaping circuits.
4	6	To analyse Transistors.

*GO - General Outcome*

**Specific outcome:**

**MODULE I Introduction to Electronics, Passive Components.**

**1.1.0 Introduction to Electronics.**

- 1.1.1 To distinguish principles behind Electrical and Electronic Systems.
- 1.1.2 To identify areas of application of electronics.
- 1.1.3 To compare active and passive components.

**1.2.0 To understand the passive component.**

- 1.2.1 To define resistance.
- 1.2.2 To list the specifications of resistor and their importance.
- 1.2.3 To explain colour coding of resistors.
- 1.2.4 To explain three and four digit coding of chip resistors.

- 1.2.5 To list the types of resistors.
- 1.2.6 To list the applications of fixed resistors and variable resistors in electronic circuits.
- 1.2.7 To find the effective resistance of series and parallel combination of resistors.
- 1.2.8 To define capacitance.
- 1.2.9 To describe the charging and discharging of capacitors.
- 1.2.10 To list types of capacitors - polarized (electrolytic, tantalum) and non polarized (paper, ceramic, polyester).
- 1.2.11 To describe ultra capacitor and chip capacitor.
- 1.2.12 To list the specifications of a capacitor and their importance.
- 1.2.13 To explain the standard representation of capacitor using numerical coding.
- 1.2.14 To list the uses of capacitors.
- 1.2.15 To find the effective capacitance of series and parallel combination of capacitors.
- 1.2.16 To define self and mutual inductance.
- 1.2.17 To list the different types of inductors and their applications.
- 1.2.18 To list the specification of an inductor.
- 1.2.19 To explain the working principle of transformers.
- 1.2.20 To list the types and applications of transformers.

## **MODULE II Semiconductors.**

### **2.1.0 To comprehend semiconductor physics and semiconductor diodes**

- 2.1.1 To draw the Energy Band diagrams of conductors, insulators and semiconductors.
- 2.1.2 To describe intrinsic and extrinsic semiconductors.
- 2.1.3 To mention the majority and minority carriers in P and N type materials.
- 2.1.4 To explain doping.
- 2.1.5 To explain the formation of PN junction and depletion region.
- 2.1.6 To define drift and diffusion currents.
- 2.1.7 To define potential barrier.
- 2.1.8 To explain the principle of operation of PN junction diode.
- 2.1.9 To draw the V - I characteristics of diode.
- 2.1.10 To identify diode as a switch.
- 2.1.11 To state knee voltage, static and dynamic resistances of a PN junction diode.
- 2.1.12 To describe zener and avalanche breakdown
- 2.1.13 To list different types of diodes.
- 2.1.14 To explain the working of Zener diode.
- 2.1.15 To draw the V - I characteristics of Zener diode.
- 2.1.16 To explain the application of Zener diode as voltage regulator.
- 2.1.17 To explain the working of Varactor diode and Tunnel diode.
- 2.1.18 To list the applications of Varactor and Tunnel diodes.

## **MODULE III Diode Circuits - Rectifiers, Wave Shaping Circuits.**

### **3.1.0 To understand the working of rectifier and filter circuits.**

- 3.1.1 To define rectification.
- 3.1.2 To explain the working of half wave rectifier with waveforms.
- 3.1.3 To explain the working of full wave centre tapped rectifier with waveforms.
- 3.1.4 To explain the working of full wave bridge rectifier with wave forms.



- 3.1.5 To compute average and r.m.s values of voltages and currents for various rectifiers.
- 3.1.6 To define the terms TUF, rectification efficiency and ripple factor.
- 3.1.7 To compare half wave, centre tapped and bridge rectifiers.
- 3.1.8 To list different types of filter circuits.
- 3.1.9 To explain the working of shunt capacitor filter.
- 3.1.10 To explain the working of series inductor filter.
- 3.1.11 To explain the working of  $\pi$  section filter.

### **3.2.0 To understand voltage multipliers and wave shaping circuit.**

- 3.2.1 To explain the working of half wave and full wave voltage doublers.
- 3.2.2 To explain the working of voltage tripler.
- 3.2.3 To explain the working of positive, negative, biased and combinational clipper / slicer circuits.
- 3.2.4 To explain the working of positive and negative diode clamper (voltage level shifting) Circuits.

## **MODULE IV Bipolar Junction Transistors.**

### **4.1.0 To understand transistors**

- 4.1.1 To describe the physical structure of BJT.
- 4.1.2 To explain the working principle of PNP and NPN transistor with symbols.
- 4.1.3 To explain the mechanism of current flow in transistors.
- 4.1.4 To identify transistor configurations.
- 4.1.5 To state the transistor current equation.
- 4.1.6 To state the effect of temperature in leakage current.
- 4.1.7 To explain input and output characteristics of BJT in CE and CB configurations.
- 4.1.8 To identify Cut off, Active and Saturation Regions in characteristic curve of CE configuration.
- 4.1.9 To define input and output resistances in different configurations and their comparison.
- 4.1.10 To define current gain in different configurations and its comparison.
- 4.1.11 To derive relation between  $\alpha$ ,  $\beta$  and  $\gamma$ .

## **CONTENT DETAILS**

### **Module I - Introduction to Electronics , Passive Components**

Introduction to electronics - applications of electronics - types of electronic components - active and passive - types of passive components - resistors, capacitors and inductors - resistors - definition of resistance, symbol, specifications - classification of resistors - fixed, variable - resistor colour coding - capacitors – definition of capacitance, symbol, specifications, classification - fixed and variable - inductors – definition of inductance, symbol, specifications, classification - fixed and variable inductors - transformers - working principle and application.

### **Module II - Semiconductors & PN junction**

Semiconductor diode P-N junction - concept of hole, majority and minority charge carriers - formation of depletion layer in P-N junction - barrier voltage - biasing the P-N junction - forward bias, reverse bias, P-N junction diode - symbol V-I characteristics - forward and reverse

characteristics - ideal characteristics - static and dynamic resistance of a diode - knee voltage - diode specifications - forward voltage, peak inverse voltage, maximum forward current, reverse saturation current - types of diodes - zener diode - symbol, operating principle, V-I characteristics - zener breakdown voltage - zener as a voltage regulator - tunnel diode - symbol, operating principle, V-I characteristics, applications - varactor diode - symbol, operating principle, V-I characteristics, applications.

### **Module III - Diode Circuits - Rectifiers and Wave shaping Circuits.**

Rectifier - definition - need for rectification types of rectifiers - half wave rectifier, full wave rectifier - centre tapped and bridge - circuit diagram, operation - input / output waveforms (no derivations) - definition of ripple factor, efficiency, PIV - comparison of rectifiers - filters - definition - need for filters - types of filters - capacitor, inductor,  $\pi$  section - circuit diagram, principle of working, input - output waveform - comparison of filters - half wave and full wave voltage doublers, tripler - circuit diagram, operation and input - output waveforms (no derivations), clipper circuits - positive, negative, biased and combinational - circuit diagram, operation - input / output waveforms - diode clamper circuits - positive and negative clambers - working principles – waveforms.

### **Module IV - Bipolar Junction Transistor.**

Bipolar junction transistors - concept, physical structure, types -pnp and npn - symbol, working principle - types of transistor configuration CE,CB,CC (only circuit diagrams) - transistor current equation - leakage current - characteristics of CE and CB configuration - input / output characteristics - identification of cut off, active and saturation regions - input and output resistance - current gain in different configurations -  $\alpha$ ,  $\beta$  and  $\gamma$  - relation between  $\alpha$ ,  $\beta$  and  $\gamma$ .

#### **Text Books:**

1. R S Sedha - A Textbook of Applied Electronics - S Chand.
2. N N Bhargava, D C Kulshreshtha, S C Gupta -Basic Electronics and Linear Circuits - Tata McGraw Hill Education Private Limited.

#### **Reference:**

1. K Venkata Ramanan - Functional Electronics - Mc-Graw Hill Inc.
2. A K Maini - Electronics Projects for Beginners - Pusthak Mahal
3. Bernard Grob - Basic Electronics - Mc-Graw Hill Inc. - 8<sup>th</sup> Edition
4. Robert Boylestad, L Nashelsky – Electronic Devices and Circuit Theory - Prentice Hall
5. Basics of Electronics Engineering Publisher WILEY

<b>COURSE TITLE</b>	<b>: BASIC ELECTRONICS LAB</b>
<b>COURSE CODE</b>	<b>: 2049</b>
<b>COURSE CATEGORY</b>	<b>: B</b>
<b>PERIODS/WEEK</b>	<b>: 3</b>
<b>PERIODS/YEAR</b>	<b>: 45</b>
<b>CREDITS</b>	<b>: 2</b>

### LIST OF EXPERIMENTS

Upon completion the students will be able:

1. To identify passive components - resistors, capacitors, inductors, transformers and LED and familiarize breadboards
2. To identify various types of electronic instruments - ammeters, voltmeters, multimeters (analog and digital), function generators, power supply and CRO
3. To measure the amplitude, time period and frequency values of a sine wave using CRO
4. To measure voltage at various settings (low and high voltage) of regulated Power supply by using analog and digital multimeters
5. To measure resistance of resistors using multimeters and compare it with colour code value
6. To test an electrolytic capacitor using a multimeter
7. To identify the package type, terminals and characteristic ratings of various types of diodes using data sheet
8. To test a diode using a multimeter
9. To plot VI characteristics of a silicon diode (forward and reverse) and determine the static and dynamic resistances and knee voltage
10. To plot VI characteristics of a germanium diode (forward) and determine the static and dynamic resistances and knee voltage
11. To plot VI characteristics of a zener diode (reverse) and determine the breakdown voltage
12. To setup of a half wave rectifier with and without filter and plot the input / output voltages and calculate the ripple factor
13. To setup of a centre tapped rectifier with and without filter and plot the input / output voltages and calculate the ripple factor
14. To setup of a bridge rectifier with and without filter and plot the input / output voltages and calculate the ripple factor
15. To setup a voltage regulator using zener diode and plot the regulation characteristics
16. To construct a voltage doubler (half-wave and full wave) and measure the output
17. To construct a voltage tripler and measure the output
18. To setup different slicer circuits (clipper) and plot the output
19. To setup different level shifting circuits (clamper) and plot the output
20. To identify the package type, terminals and characteristic ratings of various types of transistors using data sheet
21. To test transistors using multimeter
22. To plot the input and output characteristics for a transistor in common emitter configuration and determine current gain, input and output resistance