CERTIFICATE

OF

# VOCATIONAL EDUCATION

# EXAMINATION (YEAR 12)

## SYLLABUS FOR

# TELECOMMUNICATION ENGINEERING TECHNICIAN

*Correspondence should be addressed to*

**THE CHIEF EXECUTIVE & SECRETARY**
**COUNCIL FOR THE INDIAN SCHOOL CERTIFICATE EXAMINATIONS**
P-35,36 Sector VI
Pushp Vihar
Saket
New Delhi – 110017

The certificate course in **TELECOMMUNICATION ENGINEERING TECHNICIAN (TET)** is equivalent to Class XII, having the added advantage of acquiring a knowledge of the basic concepts of Telecommunication Engineering.

A successful candidate has the following two options:

1. To become a small-scale entrepreneur and execute Telecommunication Engineering Contracts.
2. To find suitable employment in the Electronics & Electrical Industry.

A successful candidate, if interested, has a third option of taking up higher studies in Telecommunication Engineering by joining the Institution of Engineers (India) as a student member.

## Eligibility Criteria:

The eligibility criteria for taking admission in CVE 12 Examination are as follows:

1. Age: 16 to 25 years
2. Must have passed Class X Examination from a recognised board with English, Science and Mathematics as compulsory subjects.

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## CLASS XI – SUBJECT STRUCTURE & MARKING SCHEME

| S. No. | NAME OF THE SUBJECT | Internal Assessment | External Assessment | Total Marks | Pass Criteria (%) |
|---|---|---|---|---|---|
| 1 | English | 30 | 70 | 100 | 35 |
| 2 | General Foundation, Industrial Sociology & Entrepreneurship | 30 | 70 | 100 | 35 |
| 3 | Engineering Physics | 30 | 70 | 100 | 35 |
| 4 | Engineering Chemistry | 30 | 70 | 100 | 35 |
| 5 | Applied Mathematics | 30 | 70 | 100 | 35 |
| 6 | Principles of Electricity & Electronics | 30 | 70 | 100 | 35 |
| 7 | Fundamentals of Computer | 30 | 30 + 40 | 100 | 35 |
| 8 | Telecommunication Technology Paper I | 30 | 70 | 100 | 35 |
| 9 | Telecommunication Technology Paper II | 30 | 70 | 100 | 50 |

**Note:**

**FUNDAMENTALS OF COMPUTER -There will a project of 30 marks and an examination of 40 marks to be conducted by the Council.**

## CLASS XII – SUBJECT STRUCTURE & MARKING SCHEME

| S. No. | NAME OF THE SUBJECT | Internal Assessment | External Assessment | Total Marks | Pass Criteria(%) |
|---|---|---|---|---|---|
| 1 | English | 30 | 70 | 100 | 35 |
| 2 | General Foundation, Industrial Sociology & Entrepreneurship | 30 | 70 | 100 | 35 |
| 3 | Principles of Electricity & Electronics | 30 | 70 | 100 | 35 |
| 4 | Engineering Science | 30 | 70 | 100 | 35 |
| 5 | Electronics & Computer Mathematics | 30 | 70 | 100 | 35 |
| 6 | Telecommunication Technology - Paper I | 30 | 70 | 100 | 35 |
| 7 | Telecommunication Technology - Paper II | 30 | 70 | 100 | 50 |

# TELECOMMUNICATION ENGINEERING TECHNICIAN

**AIMS:** On successful completion of the course, the technician should:

**1.** Be aware of safety precautions to be taken in an Electronics Laboratory.

**2.** Be able to select common hand tools and equipment for specific use.

**3.** Know different testing & measuring equipment.

**4.** Identify, test & measure the values of different electronic components.

**5.** Know the importance of interchanging electronic components as per circuit requirements & design structure.

**6.** Know the different types of cables for communication purposes.

**7.** Identify the different types of antennae & their parameters through calculations.

**8.** Be familiar with the different types of tools & equipment used in the field of communication.

**9.** Be able to identify and tackle trouble shooting of different consumer goods.

**10.** Be able to operate, check and control different types of power supply.

# TELECOMMUNICATION ENGINEERING

# TECHNICIAN

# SYLLABUS FOR CLASS XI

# English
# Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| | **GRAMMAR** | |
| 1 | Sentences | 6 |
| 2 | Subject & Predicate | 6 |
| 3 | Parts of Speech | 20 |
| 4 | Phrases & Clauses | 9 |
| 5 | Simple, Compound & Complex Sentences | 10 |
| 6 | Tenses | 12 |
| 7 | Formal Letter Writing | 12 |
| | **LITERATURE** | |
| 1 | The Eyes Have It | 6 |
| 2 | Job Hunting | 6 |
| 3 | Benjamin Franklin | 6 |
| 4 | The Martyr's Corner | 6 |
| 5 | Life History of Abdul Kalam | 6 |
| **TOTAL NUMBER OF HOURS** | | **105** |

## General Foundation, Industrial Sociology and Entrepreneurship
## Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | **Personality Development** | 13 |
| 2 | **Human and Industrial Relationship** | 15 |
| 3 | **Developing Coping Mechanisms** | 15 |
| 4 | **Motivation** | 10 |
| 5 | **Professional Ethics** | 12 |
| 6 | **Developing Fitness for a Job** | 15 |
| **TOTAL NUMBER OF HOURS** | | 80 |

1. **Personality Development:**
   - **1.1** Self -esteem
   - **1.2** Self-concept
   - **1.3** Self-acceptance

2. **Human and Industrial Relations:**
   - **2.1** Human relations and performance in organisation
   - **2.2** Understand self and others for effective behaviour
   - **2.3** Behaviour modification techniques
   - **2.4** Industrial relations and disputes
   - **2.5** Relations with subordinates, peers & superiors
   - **2.6** Characteristics of group behaviour and trade unions

3. **Developing Coping Mechanisms:**
   - **3.1** Coping with loneliness
   - **3.2** Coping with depression
   - **3.3** Coping with fear
   - **3.4** Coping with shyness
   - **3.5** Coping with anger
   - **3.6** Coping with failure
   - **3.7** Coping with criticism
   - **3.8** Coping with conflicts
   - **3.9** Coping with change
   - **3.10** Coping with study

- **3.11** Substance abuse
- **3.12** Mass media

4. **Motivation:**
   - **4.1** Factors determining motivation
   - **4.2** Characteristics of motivation
   - **4.3** Methods of improving motivation

5. **Professional Ethics:**
   - **5.1** Concept of ethics
   - **5.2** Concept of professionalism
   - **5.3** Need for professional ethics

6. **Developing fitness for a job:**
   - **6.1** Leadership
   - **6.2** Team work
   - **6.3** Career guidance
   - **6.4** Work environment

# Engineering Physics
## Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No of Hours |
|---|---|---|
| 1 | **Units** | 5 |
| 2 | **Mass, Weight & Density** | 15 |
| 3 | **Rest & Motion** | 20 |
| 4 | **Work, Power & Energy** | 18 |
| 5 | **Moments, Lever and Centre of Gravity** | 18 |
| 6 | **Heat & Temperature** | 24 |
| 7 | **Friction** | 15 |
| **TOTAL NUMBER OF HOURS** | | **115** |

1. **Units:**
   - **1.1** Introduction
   - **1.2** Definition of Unit
   - **1.3** System of Units (CGS, MKS & FPS)
   - **1.4** Physical Quantity
   - **1.5** Fundamental Units
   - **1.6** SI Derived units
   - **1.7** Inter relation between Metric & British System of Units

2. **Mass, Weight & Density:**
   - **2.1** Mass
   - **2.2** Weight
   - **2.3** Differences between mass & weight of substances
   - **2.4** Density
   - **2.5** Relative Density
   - **2.6** Differences between Density & Relative Density
   - **2.7** Archimedes' s Principle
   - **2.8** Finding out the relative density of the substances using Archimedes' Principle
   - **2.9** Buoyancy, Law of Floatation & Centre of Floatation
   - **2.10** Hydrometer, Nicholson's Hydrometer and related numerical

3. **Rest & Motion:**
   - **3.1** Rest & Motion
   - **3.2** Laws of Inertia
   - **3.3** First Law of Motion

**3.4** Momentum
**3.5** Second Law of Motion
**3.6** Third Law of Motion
**3.7** Vector Quantity
**3.8** Scalar Quantity
**3.9** Speed &Velocity
**3.10** Differences between speed & velocity
**3.11** Acceleration
**3.12** Equation of motion
**3.13** Motion under the force of gravity

**4. Work, Power & Energy:**

**4.1** Work
**4.2** Work represented by an area or diagram of force
**4.3** Work done by an oblique force
**4.4** Torque
**4.5** Power
**4.6** Horse power of engines
**4.7** Power required for rotation & determination of the output power of a machine by means of a brake system
**4.8** Efficiency of a machine
**4.9** Energy – Its uses & application
**4.10** Types of energy – Potential & Kinetic with their applications
**4.11** Principle of conservation of energy
**4.12** Other forms of energy
**4.13** Transmission of power by belt pulley drive
**4.14** IHP of steam and petrol engine
**4.15** Electrical Power & Energy

**5. Moments, Lever and Centre of Gravity:**

**5.1** Moments – Its definition
**5.2** Arm of Couple
**5.3** Moment of Couple
**5.4** Lever – Its definition, types, application and order
**5.5** Bell Crank Lever
**5.6** Application of the principle of moments
**5.7** Centre of Gravity
**5.8** Stable, Unstable and Neutral Equilibrium

**6. Heat & Temperature:**

- **6.1** Heat – Its definition
- **6.2** Temperature – Its definition
- **6.3** Difference between heat and temperature
- **6.4** Temperature scale (Celsius, Fahrenheit & Kelvin)
- **6.5** Relationship between Celsius, Fahrenheit & Kelvin Scales
- **6.6** Boiling point, Melting point and Specific heat
- **6.7** Transmission of heat, conduction, convection and radiation
- **6.8** Heat transfer in mixture, Calorimeter and latent heat of fusion, vapour
- **6.9** Thermos flask, Pyrometer, Thermocouple, thermoelectric pyrometer
- **6.10** Calorific values of fuel

**7. Friction:**

- **7.1** Definition
- **7.2** Advantages and Disadvantages of Friction
- **7.3** Normal Reaction, Limiting Friction and Laws of limiting friction
- **7.4** Co-efficient of Friction
- **7.5** Angle of Friction & Angle of Repose and its relationship
- **7.6** Force of Friction when the force is horizontal and when the force is inclined
- **7.7** Lubrication for the control of friction

# Engineering Chemistry
# Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No of Hours |
|---|---|---|
| 1 | **Introduction to Periodic Table** | 14 |
| 2 | **States of matter** | 10 |
| 3 | **Physical and Chemical changes** | 14 |
| 4 | **Air** | 6 |
| 5 | **Water** | 10 |
| 6 | **Acid, Base & Salt** | 18 |
| 7 | **Metals & Non-metals** | 8 |
| **TOTAL NUMBER OF HOURS** | | **80** |

**1. Introduction to Periodic Table:**

- **1.1** General Symbols, Atomic Numbers and Atomic Structure
- **1.2** Introduction to the different elements
- **1.3** General Plan for Periodic Table
- **1.4** Modern Periodic Table
- **1.5** Periodic trend in physical properties
- **1.6** Valence Electron, Valency, Variation of Atomic Size

**2. States of matter:**

- **2.1** Detailed study of substance
- **2.2** Molecular, atoms, solids- liquids- gases
- **2.3** Inter- conversion
- **2.4** Elements, compounds, mixture - separation, boiling, freezing, melting, condensation, evaporation, chromatography, distillation and uses

**3. Physical and Chemical changes:**

- **3.1** Different types of reactions- (exothermic, endothermic, combination, decomposition, displacement, oxidation and reduction)
- **3.2** Temporary and Permanent changes
- **3.3** Illustration & examples

**4. Air:**

- **4.1** Composition & Properties
- **4.2** Uses of components & its separation
- **4.3** Pollution& preventive measures

**5. Water:**

- **5.1** Pure & Impure water
- **5.2** Natural and Potable water
- **5.3** Distilled water
- **5.4** Soft and Hard water
- **5.5** Techniques of removing hardness
- **5.6** Uses of Water
- **5.7** Pollution
- **5.8** Contract measure & conservation

**6. Acid, Base & Salt:**

- **6.1** Introduction
- **6.2** Acids – Classification depending on different factors like source and chemical compound
- **6.3** General properties of an acid
- **6.4** Bases – Classification depending on different factors like acidity of bases and concentration
- **6.5** General properties of bases
- **6.6** Neutralisation
- **6.7** Some basic uses of acid and bases
- **6.8** Salts – Classification depending on different factors
- **6.9** Solubility of salts
- **6.10** Properties of Salts

**7. Metals & Non-metals:**

- **7.1** Introduction to the topic
- **7.2** Physical Properties of Metals and Non-metals
- **7.3** Chemical Properties of Metals & Non- metals
- **7.4** Occurrence of metals
- **7.5** Activity Series of metals
- **7.6** Extraction of metals
- **7.7** Iron & Steel – Introduction, Occurrence & Properties
- **7.8** Product from the Blast Furnace – Pig Iron
- **7.9** Cast iron and its occurrence
- **7.10** Alloy Steel
- **7.11** Different types of metals (Ferrous & Non-Ferrous) and its properties and household applications

**7.12** Other Alloys – Composition & Uses

**7.13** Some properties and uses of non-metals

# Applied Mathematics
## Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Units | 4 |
| 2 | General Simplification | 6 |
| 3 | Ratio & Proportion | 4 |
| 4 | Percentage | 5 |
| 5 | Algebra | 12 |
| 6 | Logarithm | 6 |
| 7 | Indices | 8 |
| 8 | Equations | 14 |
| 9 | Factorization | 10 |
| 10 | Properties of Triangle, Circle & Polygons | 6 |
| 11 | Mensuration | 20 |
| 12 | Trigonometry (Ratio & Identities) | 10 |
| TOTAL NUMBER OF HOURS | | 105 |

1. **Units:**
   - **1.1** Introduction
   - **1.2** Definitions
   - **1.3** Classification of units
   - **1.4** Conversion of the basic mechanical units

2. **General Simplification:**
   - **2.1** Introduction
   - **2.2** Fractions & Decimal Fractions
   - **2.3** LCM & HCF
   - **2.4** Multiplication and division of decimals
   - **2.5** Conversion of fraction from one to another
   - **2.6** Multiplication of fraction with numbers like 10, 100, 1000
   - **2.7** Some more methods of converting fractions

3. **Ratio & Proportion:**
   - **3.1** Ratio

**3.2** Proportion

**3.3** Relationship between Ratio & Proportion

**4. Percentage:**

**4.1** Introduction

**4.2** Conversion of decimal to percentage and vice versa

**4.3** Profit & Loss

**5. Algebra:**

**5.1** Introduction

**5.2** Careful consideration of subject items

**5.3** Addition and Subtraction

**5.4** Multiplication and Division

**5.5** Algebraic formulae

**5.6** Proofs

**6. Logarithm:**

**6.1** Introduction

**6.2** Definition of different terms used in logarithms

**6.3** Laws of Logarithm

**6.4** How to refer to a log table

**6.5** Negative characteristic

**6.6** Relationship between log and antilog

**6.7** How to refer to Antilog table

**6.8** Rules while using logarithms

**6.9** Addition, subtraction, multiplication & division using indices

**7. Indices:**

**7.1** Exponent and multiplication

**7.2** The laws of indices

**7.3** Zero and negative integral indices

**7.4** Fractional Indices

**7.5** Exponential Equations

**8. Equations:**

**8.1** Equations & Root

**8.2** Solving linear equation with one variable

**8.3** Solving problems using equations

**8.4** Number Problems, Age Problems, Mensuration Problems

**8.5** Solving simultaneous linear equation

**8.6** Method of elimination by addition and subtraction

**8.7** Word problem involving simultaneous equation

**8.8** Quadratic Equations – Problems on Quadratic Equation

**9. Factorization:**

**9.1** Factorizing polynomials

**9.2** Factorization of a perfect square trinomial – e.g. $(4x^4 + 12x^2 + 9)$

**9.3** Factorizing the difference of two squares

**9.4** Trinomials

**9.5** Factorization using the middle term factor

**9.6** Problem solving based on factorization

**10. Properties of Angle, Triangle, Circle and Polygons:**

**10.1** Introduction

**10.2** Different properties related to the angular properties of the triangle

**10.3** Different types of triangles

**10.4** Median and Altitudes

**10.5** Mid-Point theorem of the triangle

**10.6** Circle - Elements

**10.7** Properties of the circle – Arc, Sector, Segment, Chord, Tangent

**10.8** Polygons – Types and Features

**10.9** Method of finding the internal and external angle of polygons

**11. Mensuration:**

**11.1** Introduction to the topic

**11.2** Formulae for various Plane and irregular figures (Area, perimeter and volume)

**11.3** Area and Perimeter of Plane Figures like Rectangle, Square, Area of four walls, Triangle, Parallelograms, Rhombus, Trapezium, Circle

**11.4** Surface area of different solid figures

**11.5** Volume of different Solid figures

**11.6** Volume of the metal that is removed from different machining process

**12. Trigonometry:**

**12.1** Introduction to Trigonometry

**12.2** Notation for angle

**12.3** Trigonometrical Ratio

**12.4** Reciprocal ratios

**12.5** Understanding of the different sides of the triangle based on the given angle

**12.6** Understanding the use of Trigonometrical table for finding different angles

## Principles of Electricity and Electronics
## Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Introduction to Electricity | 4 |
| 2 | Basic Electric Circuit | 8 |
| 3 | Electrical Heat, Work, Power & Energy (Joule's law) | 10 |
| 4 | Chemical effect of an Electric Current | 8 |
| 5 | Magnetism & Electromagnets (Solenoids, mmf, Flux, Flux density, Field Intensity, Reluctance &Retentivity) | 12 |
| 6 | Electromagnetic Induction | 10 |
| 7 | Simple AC Circuits (Peak value, Average value, RMS value, Form Factor & Crest factor) | 10 |
| 8 | Transformers | 15 |
| 9 | Series & Parallel R - L - C Circuits (Impedance, PF, Phase Angle, Current & Reactance) | 20 |
| 10 | Illumination | 8 |
| TOTAL NUMBER OF HOURS | | 105 |

1. **Introduction to Electricity:**
   - **1.1** Current
   - **1.2** Voltage
   - **1.3** Power
   - **1.4** Basic Electric Circuit Calculations

2. **Basic Electric Circuit:**
   - **2.1** Ohm's Law
   - **2.2** Resistance connections in series & parallel

3. **Electrical Heat, Work, Power & Energy (Joule's law):**
   - **3.1** Joule's law
   - **3.2** Effect
   - **3.3** Thermal efficiency
   - **3.4** Electric power
   - **3.5** Energy
   - **3.6** Units & Problems

4. **Chemical effect of an Electric Current:**
    - **4.1** Electrolysis
    - **4.2** Electrode Reactions
    - **4.3** Some definitions
    - **4.4** Faraday's Laws of Electrolysis
    - **4.5** EMF & Back EMF
    - **4.6** Electro chemical equivalent
    - **4.7** Storage cells & Lead Acid Cell
    - **4.8** Chemical changes

5. **Magnetism & Electromagnets:**
    - **5.1** Magnetic Field
    - **5.2** Pole Strength
    - **5.3** Field Intensity
    - **5.4** Flux, Flux density and mmf
    - **5.5** Reluctance, Retentivity, Permeability &Susceptibility
    - **5.6** Relation between B, H, I & K
    - **5.7** Solenoid

6. **Electromagnetic Induction:**
    - **6.1** Faraday's Law of Electromagnetic Induction
    - **6.2** Fleming's Right-Hand Rule
    - **6.3** Lenz's Law
    - **6.4** Induced EMF
    - **6.5** Self-Inductance, Mutual Inductance, Co-efficient of Coupling

7. **AC Circuits:**
    - **7.1** Single Phase
    - **7.2** Three Phase
    - **7.3** Generation of Three Phase voltage
    - **7.4** Star or Y Connection
    - **7.5** Delta or Mesh Connections
    - **7.6** Peak value, Average value, RMS value, Form Factor & Crest factor
    - **7.7** Cycles & Time periods
    - **7.8** Calculations

8. **Transformers:**
    - **8.1** Working Principle
    - **8.2** Core Type& Shell Type
    - **8.3** Ideal transformer
    - **8.4** EMF equation of Transformer
    - **8.5** Voltage Transformation Ratio 'K'
    - **8.6** Transformer with losses but no magnetic leakage

9. **Series & Parallel R – L-C Circuits:**
    - **9.1** Calculations of Impedance
    - **9.2** Power factor
    - **9.3** Phase Angle
    - **9.4** Current
    - **9.5** Reactance & Frequencies
    - **9.6** Wavelengths of different RLC Circuits

10. **Illumination:**
    - **10.1** Production of Light
    - **10.2** Laws of Illuminance for point sources
    - **10.3** Common types of Lamps, Candela, Lumen &Lux
    - **10.4** Fluorescent lamp circuits

# Fundamentals of Computer
## Class XI

**Examination Duration**: 2 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | **Introduction to Computer** | 5 |
| 2 | **Number System** | 8 |
| 3 | **Operating System** | 4 |
| 4 | **Introduction to MS Office** | 2 |
| 5 | **Microsoft Word** | 10 |
| 6 | **Microsoft Excel** | 16 |
| 7 | **Microsoft Power Point** | 4 |
| 8 | **Internet & Security** | 8 |
| 9 | **Project Work** | 8 |
| **TOTAL NUMBER OF HOURS** | | 65 |

**1. Introduction to Computer:**

- **1.1** Introduction & application of computers
- **1.2** History of the Computer – Evolution and generation of computers
- **1.3** Hardware & Software
- **1.4** Different Hardware devices with physical demonstration
- **1.5** Different types of software used with its areas of application
- **1.6** Storage devices – Evolution and its application in modern technology
- **1.7** Characteristics of the computer
- **1.8** Organization of the computer
- **1.9** Basic operation carried out by the computer
- **1.10** Understanding the day to day applications of the computer

**2. Number System:**

- **2.1** Introduction to the number system
- **2.2** Types of number systems used – Decimal, Binary, Octal and Hexadecimal
- **2.3** Conversion from Decimal to Binary and vice-versa
- **2.4** Conversion of Decimal to Octal and Vice-Versa
- **2.5** Conversion of Decimal to Hexadecimal and Vice-Versa
- **2.6** Conversion of Fractional Decimal to Binary, Octal and Hexadecimal
- **2.7** Logic Gate – Not, Or, And

**3. Operating System:**

- **3.1** Introduction about Operating System and its uses
- **3.2** Types of Operating System used
- **3.3** Application of Operating System in our computer
- **3.4** Method of Installing the Operating System
- **3.5** Method of partitioning the hard disk during the installation of the Operating System
- **3.6** Advantages and comparisons of different types of Operating Systems

**4. Introduction to MS Office:**

- **4.1** Introduction to Microsoft Office Package
- **4.2** Different applications available in the package
- **4.3** Advantages and application of different applications available
- **4.4** An overview on the available applications – MS Word, Excel, PowerPoint, Access, Outlook
- **4.5** Process of Opening the Microsoft Office Package from the START BUTTON

**5. Microsoft Word:**

- **5.1** Introduction
- **5.2** Procedure of opening the Microsoft word Application
- **5.3** Introduction to the Microsoft Word Screen/Page
- **5.4** Understanding different options available
- **5.5** Understanding different context menus available on the page with their application
- **5.6** Understanding the **OFFICE BUTTON** – New, Open, Save, Save As, Print, Prepare, Publish, Close, Word Options and Recent Documents
- **5.7** Understanding the **HOME** Menu – Clipboard Option, Font Options, Paragraph, Styles
- **5.8** Understanding the **INSERT** Menu – Pages, Tables, different methods of inserting pictures, Links, Header& Footer, Text Formatting, Symbols
- **5.9** Understanding the **PAGE LAYOUT** Menu – Different themes, Page Setup, Page Background, Paragraph Indentation, Alignment
- **5.10** Understanding the complete process of Mail Merge (Letter)
- **5.11** Understanding the Concept of viewing the pages in different styles, New windows, Split page option
- **5.12** Practical work on the above content

**6. Microsoft Excel:**

- **6.1** Introduction
- **6.2** Procedure of opening the Microsoft Excel Application
- **6.3** Introduction to the Microsoft Excel Screen/Page
- **6.4** Understanding different options available
- **6.5** Understanding the method of renaming, adding and removing the sheet

**6.6** Understanding the method of copying and moving the sheet

**6.7** Understanding different short cuts used on the application

**6.8** Understanding the **HOME** menu – Clipboard Options, Font Options, Paragraphs, Styles,

**6.9** Understanding the **INSERT** Menu – Table Creation, different methods of inserting pictures & shapes, Charts, Links and Method of formatting the text

**6.10** Understanding the **PAGE LAYOUT** Menu – Themes, Page setup, Scale, Sheet Options, Alignment

**6.11** Understanding the **FORMULAS** Menu – Insert function, Function Library (Auto Sum, Logical, Text, Lookup, Date & time)

**6.12** Conditional Formatting

**6.13** Basic Menu options like View, Data and Review

**6.14** Practical work on the above content

**7. Microsoft PowerPoint:**

**7.1** Introduction

**7.2** Procedure of opening the Microsoft Power Point Application

**7.3** Introduction to the Microsoft Power Point Screen/Page

**7.4** Understanding different options available

**7.5** Understanding different shortcuts used for the application

**7.6** Understanding the **HOME** Menu – Clipboard, Slides, Font, Paragraph indentation, drawing tools, find & replace

**7.7** Understanding the **INSERT** Menu – - Table Creation, different methods of inserting pictures & shapes, charts, link, method of formatting the text & methods of inserting movie clip & audio in the slide

**7.8** Understanding the **DESIGN** Menu – Page Setup, different themes to be used as the background of the slides, colours, fonts, effects, background styles

**7.9** Understanding the **ANIMATION** Menu – Custom Animation, different transition options for the slides, background music, transition speed, slideshow option (on mouse click or after time interval that is set)

**7.10** Understanding the **SLIDE SHOW** Menu – Start & End of the slide show, slide show setup, monitoring the resolution and other factors

**7.11** Understanding various options like Review and View

**7.12** A presentation to understand the working of different options available in the application

**8. Internet & Security:**

**8.1** Introduction to Internet & Security

**8.2** Different types of connections that can be established in the system

**8.3** Uses, advantages and disadvantages of the Internet

**8.4** Security – Definition & Goals

**8.5** Basic ISP (Internet Service Providers) Infrastructure

**8.6** Virus – Definition and its different types

**8.7** Firewall – Definition and applications

**8.8** Understanding the basic security measures

## 9. Project Work:

The students will prepare a project work using the concepts taught in the 'Fundamentals of Computer'.

# Telecommunication Technology – Paper I
## Class XI

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Continuous Wave Modulation (AM &FM) | 10 |
| 2 | FM generation principles & PM | 8 |
| 3 | FM Transmitters | 8 |
| 4 | FM Receivers | 8 |
| 5 | Process of Converting Analog Signals to Digital Signals | 8 |
| 6 | Digital Modulation & Pulse modulation (PCM, DM, ADM& DPCM) | 15 |
| 7 | Digital Multiplexing (ASK, FSK, PSK) with Waveforms | 11 |
| 8 | Cellular Communications/Mobile Communications (Cells, Frequency Reuse, Hands Off, BS, MS, GSM/CDMA, GPRS) | 15 |
| 9 | Advanced Wireless Communications with 4G,5G, 6G along with equipment (Wi-Fi & HOTSPOT) | 15 |
| 10 | Different types of Electrical wires, Connectors & Sockets | 12 |
| TOTAL NUMBER OF HOURS | | 110 |

**1. Continuous Wave Modulation (AM &FM):**

- **1.1** Need of Modulation
- **1.2** Low- Level & High-Level AM Modulation
- **1.3** De-Modulation
- **1.4** Square law Detector
- **1.5** Envelope Detector
- **1.6** Angle Modulation FM & PM Definitions
- **1.7** Waveforms, Equations & Generation

**2. FM generation principles & PM:**

- **2.1** NBFM
- **2.2** WBFM
- **2.3** Direct Methods
- **2.4** Indirect or Armstrong Methods
- **2.5** Drawbacks, advantages and disadvantages
- **2.6** Relation between FM & PM

**3. FM Transmitters:**

- **3.1** Block Diagram of FM
- **3.2** Transmitter, Carrier oscillator
- **3.3** Power Amplifier

**4. FM Receivers:**

- **4.1** RF Amplifier
- **4.2** IF Amplifier
- **4.3** Local Oscillator & Mixer
- **4.4** Super Heterodyne Receiver
- **4.5** Selectivity & Sensitivity
- **4.6** Image Frequency
- **4.7** FM Detectors
- **4.8** Balanced Slope Detector
- **4.9** Foster Seeley Discriminator, Ratio Detector & PLL FM Detector

**5. Process of Converting Analog Signals to Digital Signals:**

- **5.1** Sampling & Quantization
- **5.2** Quantizer &Encoding
- **5.3** Different Line Coding, Unipolar RZ, NRZ, Bipolar RZ, NRZ, AMI RZ, NRZ, Manchester and its waveforms
- **5.4** Sampling theorem
- **5.5** Nyquist Criteria
- **5.6** Examples by Waveforms

**6. Digital Modulation & Pulse modulation (PCM, DM, ADM & DPCM):**

- **6.1** PCM Transmitter & Receiver
- **6.2** DM, ADM &DPCM
- **6.3** Advantages & Disadvantages
- **6.4** Comparisons
- **6.5** Comparisons PAM, PPM &PWM waveforms

**7. Digital Multiplexing:**

- **7.1** Need for multiplexing
- **7.2** Techniques
- **7.3** ASK, FSK& PSK comparisons with Waveforms

**8. Cellular Communications/Mobile Communications:**

- **8.1** Cells
- **8.2** Structures & Clusters
- **8.3** Frequency Reuse
- **8.4** Hands Off
- **8.5** BS, MS & System architecture
- **8.6** GSM/CDMA Protocols
- **8.7** GPRS

**9. Advanced Wireless Communications:**

- **9.1** 4G, 5G & 6G Technology with Equipment
- **9.2** Wi-Fi & HOTSPOT Technology

**10. Different types of Electrical wires, Connectors & Sockets**:

- **10.1** Flexible cables
- **10.2** PVC cables
- **10.3** Communication Cable /LAN Cables (STP, UTP, Fiber Optics)
- **10.4** Metallic & Non-metallic Sheathed Cable
- **10.5** RCA–Male/Female Connectors
- **10.6** XLA Connectors Plug & Socket
- **10.7** BNC Connectors Plug & Socket
- **10.8** HDMI Connectors Plug & Socket

## Telecommunication Technology – Paper II
## Class XI

**Examination Duration**: 6 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Identifying all sections of NOKIA 3310 through block diagram | 15 |
| 2 | Peripherals of all Mobile Phones | 5 |
| 3 | Block Diagram of Nokia 1110 | 10 |
| 4 | Block Diagram of NOKIA 6600 or multimedia set & descriptions | 20 |
| 5 | Block Diagram of NOKIA advanced multimedia set & descriptions | 20 |
| 6 | PCB designing - Power supply, voltage regulator & basic circuits | 40 |
| 7 | Description of software – EAGLE & PROTEUS | 10 |
| 8 | Testing of different components | 10 |
| 9 | Assemble Battery Chargers, Power Supply, Oscillator, Signal Injector & Amplifiers | 20 |
| 10 | Design of Multivibrators using IC-555 & Calculating Duty Cycle | 20 |
| 11 | Design Comparator, Integrator, Differentiator & Schmitt Trigger by IC-741 | 30 |
| TOTAL NUMBER OF HOURS | | 200 |

# TELECOMMUNICATION ENGINEERING

# TECHNICIAN

# SYLLABUS FOR CLASS XII

# English
# Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| | **GRAMMAR** | |
| 1 | Direct & Indirect Speech | 18 |
| 2 | Phrases & Idioms | 8 |
| 3 | Letter Writing (Informal) | 11 |
| 4 | Report Writing, Essay Writing & Precis Writing | 15 |
| 5 | Comprehension & Story Writing | 13 |
| | **LITERATURE** | |
| 1 | Wright Brothers | 8 |
| 2 | Jamshedji Tata | 8 |
| 3 | Solar Energy | 8 |
| 4 | Thomas Edison | 8 |
| 5 | Henry Ford | 8 |
| **TOTAL NUMBER OF HOURS** | | 105 |

## General Foundation, Industrial Sociology and Entrepreneurship
## Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | **The Constitution of India** | **5** |
| 2 | **An Ideal Supervisor** | **5** |
| 3 | **Industrial Safety, First Aid and Hygiene** | **10** |
| 4 | **Entrepreneurship** | **10** |
| 5 | **Labour Laws** | **16** |
| 6 | **Environmental Science** | **10** |
| 7 | **Estimation & Costing** | **12** |
| 8 | **Project Plan** | **12** |
| **TOTAL NUMBER OF HOURS** | | **80** |

**1.The Constitution of India:**

- **1.1.** Salient Features
- **1.2.** Preamble to the Constitution
- **1.3.** Fundamental Duties
- **1.4.** Directive Principles of State Policy
- **1.5.** Difference between Fundamental Rights and Directive Principles

**2.An Ideal Supervisor:**

- **2.1** Qualities of an ideal supervisor

**3. Industrial Safety, First Aid and Hygiene:**

- **3.1.** Concept of Safety
- **3.2.** Safety Consciousness
- **3.3.** Necessity of safety
- **3.4.** Safety Measures

**4. Entrepreneurship:**

- **4.1.** Introduction
- **4.2.** Definition of Entrepreneurship
- **4.3.** Need for Self-Employment
- **4.4.** Advantages of Entrepreneurship
- **4.5.** Roles and responsibilities of an Entrepreneur
- **4.6.** Qualities of a good Entrepreneur

**5. Labour Laws:**

- **5.1.** Factories Act 1948
- **5.2.** Apprentices Act
- **5.3.** Employees State Insurance (ESI) Act
- **5.4.** Payment of Wage Act 1936
- **5.5.** Minimum Wages Act & Rules
- **5.6.** Employees Provident Fund Act (EPF)
- **5.7.** Workmen's Compensation Act

**6. Environmental Science:**

- **6.1** Effect of pollution on Human Health
- **6.2** Impact of technology on Environment
- **6.3** Impact of pollution on Environment
- **6.4** Waste Management

**7. Estimation & Costing:**

- **7.1** Introduction to Estimation and Costing
- **7.2** Importance and Aims of Estimation & Costing
- **7.3** Functions of Estimating Department
- **7.4** Qualities of an Estimator
- **7.5** Estimating Procedures and Errors in Estimation
- **7.6** Constituents of Estimation
- **7.7** Advantages of Standard Costing
- **7.8** Differences between Estimation and Costing
- **7.9** Procedures of Costing & Costing methods
- **7.10** Cost Control and Advantages of Efficient Costing
- **7.11** Elements of Cost
- **7.12** Components of Cost and the process of calculating material cost & labour cost
- **7.13** Block diagram of Components of Cost
- **7.14** Methods of calculating indirect expenses and depreciation cost
- **7.15** Repairs and Maintenance Costing
- **7.16** Basic numerical on Estimation and Costing

**8. Project Plan:**

- **8.1** Introduction
- **8.2** Definitions of Working Capital, Fixed Capital Budget
- **8.3** Market Survey
- **8.4** Project Planning
- **8.5** Project Capacity
- **8.6** Selection of Site and Plant Layout
- **8.7** Product design and development
- **8.8** Factors considered while designing a product
- **8.9** Product drawings and designs specification
- **8.10** Product Development
- **8.11** Material Requirement
- **8.12** Operation Planning
- **8.13** Equipment Requirement
- **8.14** Material Handling
- **8.15** Break-Even Point
- **8.16** Preparation of Project

# Principles of Electricity and Electronics
## Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | DC Generator & Motor | 15 |
| 2 | The AC Motor | 12 |
| 3 | Wires, Cables & Electrical wiring | 8 |
| 4 | Electrical Accessories | 8 |
| 5 | Basic Electronics Devices (Capacitor, Inductor, Resistors & Units) | 8 |
| 6 | Diodes & Triodes | 10 |
| 7 | Different types of Transistors | 11 |
| 8 | Power Electronics (SCR, JEFT, MOSFET & GTO) | 20 |
| 9 | Different types of Transistor Amplifiers | 10 |
| 10 | Sinusoidal Oscillators | 5 |
| 11 | Electronic Measuring Instruments | 8 |
| TOTAL NUMBER OF HOURS | | 115 |

1. **DC Generator & Motor:**
   - **1.1.** Generator Principle
   - **1.2.** Types
   - **1.3.** Generated EMF equation
   - **1.4.** Loss
   - **1.5.** Condition for Maximum Efficiency & Commutation
   - **1.6.** Motor Principle, EMF & Back EMF
   - **1.7.** Voltage equation of the motor
   - **1.8.** Torque, Armature Torque &Shaft Torque
   - **1.9.** Speed of a DC motor
   - **1.10.** Speed regulation

2. **The AC Motor:**
   - **2.1.** Ideas of single Phase
   - **2.2.** Three Phase Induction Motor
   - **2.3.** Stator, Rotor & Slip
   - **2.4.** Squirrel Cage, Slip Ring & Double Cage Induction Motor

3. **Wires, Cables & Electrical wiring:**
    - **3.1.** Construction of various types in domestic & industrial use
    - **3.2.** Brief description in wiring systems
    - **3.3.** Switch in phase line & dual switching of lamps
    - **3.4.** Effects of over loading
    - **3.5.** Protection of circuits by fuses
    - **3.6.** Earthing of metal & mechanical protection of cables
    - **3.7.** Regulations for wiring in bathrooms & avoiding dangerous practices (simple testing)

4. **Electrical Accessories:**
    - **4.1.** Structure & uses of various types of switches
    - **4.2.** Power outlets & Lamp holders
    - **4.3.** Ceiling Roses & Junction Boxes
    - **4.4.** MCBs, ELCBs, DOL starter &S tar-Delta Starter

5. **Basic Electronics Devices:**
    - **5.1.** Capacitor, Inductor &Resistors
    - **5.2.** Functions, Uses &Units

6. **Diodes, Triode:**
    - **6.1.** Semiconductor diode
    - **6.2.** Diode Characteristics
    - **6.3.** Half Wave &Full wave Rectifier
    - **6.4.** Structure of Triode, the Control grid &Triode Parameters
    - **6.5.** Voltage amplifier & Anode Resistance
    - **6.6.** Mutual conductance & Amplification factors
    - **6.7.** Bias Voltage
    - **6.8.** Cathode Resistor & Cathode Bypass capacitor

7. **Different types of Transistors:**
    - **7.1.** Construction
    - **7.2.** PNP & NPN
    - **7.3.** CE, CB, CC Modes & Characteristics
    - **7.4.** $\alpha$, $\beta$ Relationship/ Gains
    - **7.5.** Need of Biasing
    - **7.6.** Different biasing circuits & uses

8. **Power Electronics:**
    - **8.1.** Thyristors
    - **8.2.** SCR
    - **8.3.** Construction
    - **8.4.** Latching Current & Holding Current
    - **8.5.** SCR Characteristics
    - **8.6.** Half Wave Power Control
    - **8.7.** Commutation
    - **8.8.** FET & its operations
    - **8.9.** Characteristics of JEFT, MOSFET, GTO & Applications

**9. Different types of Transistor Amplifier:**

- **9.1.** CB, CE &CC amplifier
- **9.2.** Phase Relationship
- **9.3.** Comparison between Voltage & Current
- **9.4.** Power gain
- **9.5.** Negative Feedback

**10. Sinusoidal Oscillator:**

- **10.1.** Idea of oscillator
- **10.2.** Feedback
- **10.3.** Barkhausen Criterion
- **10.4.** Tuned, Hartley, Collpitt's Oscillator & Phase shift oscillator
- **10.5.** Wein bridge oscillator

**11. Electronic measuring Instruments:**

- **11.1.** Analog & digital multi meter
- **11.2.** Voltmeter
- **11.3.** Ammeter
- **11.4.** Signal Generator
- **11.5.** CRO
- **11.6.** Clamp Meter Use & Care

# Engineering Science
# Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | **Expansion of Solid, Liquid & Gases** | 15 |
| 2 | **Magnetism** | 15 |
| 3 | **Simple Stress & Strain** | 22 |
| 4 | **Angular Motion** | 10 |
| 5 | **Pressure** | 16 |
| 6 | **Simple Machine** | 18 |
| 7 | **Electricity** | 24 |
| **TOTAL NUMBER OF HOURS** | | 120 |

1. **Expansion of Solid, Liquid & Gases:**
   - **1.1** Expansion of Solid
   - **1.2** Coefficient of Linear Expansion
   - **1.3** Superficial expansion of solid
   - **1.4** Cubic expansion of solid and liquid
   - **1.5** Cubic expansion of gases
   - **1.1** Ideal Gases

2. **Magnetism:**
   - **2.1** Magnetic Properties & Parameters
   - **2.2** Magnetic Properties of Iron & Steel
   - **2.3** Magnetic Field
   - **2.4** Flux Density
   - **2.5** Magnetic Moment, mmf, Reluctance, Permeability & Susceptibility
   - **2.6** Magnetic Circuits
   - **2.7** Electromagnet
   - **2.8** Solenoid & its Application

3. **Simple Stress & Strain:**
   - **3.1** Introduction – Stress & Strain with application and units
   - **3.2** Different types of stresses
   - **3.3** Hooke's Law

**3.4** Young's Modulus or Modulus of Elasticity

**3.5** Tensile strength, Yield Point, Ultimate Stress and Working Stress

**3.6** Factor of safety and its application

**3.7** Stress-Strain Graph, Modulus of Rigidity, Poisson's Ratio, Proof Stress and Bulk Modulus

**3.8** Relationship between three moduli of a given material

**4. Angular Motion:**

**4.1** Angular Displacement

**4.2** Angular Velocity

**4.3** Angular acceleration

**4.4** Relationship between linear and angular motion

**4.5** Equations of angular motion

**4.6** Torque & Angular motion

**4.7** Moment of inertia

**5. Pressure:**

**5.1** Atmosphere

**5.2** Atmospheric pressure

**5.3** Pressure - its definition

**5.4** Pressure in liquid

**5.5** Absolute pressure

**5.6** Gauge Pressure and Vacuum pressure

**5.7** Measurement of atmospheric pressure and pressure inside the boiler

**5.8** Simple Barometer

**5.9** Different Laws and its applications

**6. Simple Machine:**

**6.1** Machines – Definition and its types

**6.2** Effort and Load

**6.3** Mechanical Advantage & Velocity Ratio – its definition and unit

**6.4** Efficiency of machine

**6.5** Relationship between Efficiency, Mechanical Advantage and Velocity Ratio

**6.6** The lever

**6.7** Pulley Block

**6.8** Wheel & Axle

**6.9** The Screw and Screw jack

**6.10** Belt and chain drive

**6.11** Gear Wheel

**7. Electricity:**

- **7.1** Introduction and its uses
- **7.2** Molecule, Atom and Particles in Atoms
- **7.3** How to produce electricity
- **7.4** Electric Current – Ampere
- **7.5** Ohm's Law - Resistance, Voltage and Current
- **7.6** Electromotive forces
- **7.7** Potential Difference
- **7.8** Conductor, Insulator and Switch Fuse
- **7.9** Electrical Circuits
- **7.10** Electromotive Forces (EMF)
- **7.11** Types of connection – Series and parallel
- **7.12** Electrical Power & Horse Power
- **7.13** Types of current – AC & DC
- **7.14** Electrical Energy

# Electronics and Computer Mathematics
## Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | **Statistics & Histogram** | **15** |
| 2 | **Number Systems - Calculations & Conversions including 1's & 2's complements (Binary, Octal & Hexadecimal)** | **5+5** |
| 3 | **Boolean Algebra & Logic Gates** | **14** |
| 4 | **Limits** | **12** |
| 5 | **Introduction to Calculus** | **14** |
| 6 | **Differential Equations (1st Order & 2nd Order)** | **20** |
| **TOTAL NUMBER OF HOURS** | | **85** |

**1 Statistics & Histogram:**

- **1.1.** Measure of locations for ungrouped data & grouped data in equal interval classes
- **1.2.** Find arithmetic MEAN, MEDIAN, MODE & explain central tendency
- **1.3.** Arithmetic MEAN for ungrouped Data & Grouped Data
- **1.4.** Estimate the mode of grouped data using HISTOGRAM in Graph
- **1.5.** Determine the Median, Quartiles ($1^{st}$, $2^{nd}$& $3^{rd}$) from Cumulative frequency data
- **1.6.** Problems based on content

**2. Number Systems:**

- **2.1** Binary Addition, Subtraction, Multiplication & Division
- **2.2** Conversion of Binary & Decimals from HEX, Octal & vice-versa
- **2.3** Use a sign bit to denote a negative number
- **2.4** Find 1's & 2's Complement of binary number
- **2.5** Define 8421 BCD system & derive the BCD equivalents of binary numbers
- **2.6** Convert between binary numbers & their BCD equivalents
- **2.7** Perform simple addition & subtraction using BCD & Hexadecimal integer numbers
- **2.8** Problems based on content

**3 Boolean Algebra & Logic Gates:**

- **3.1** Details of Boolean Laws
- **3.2** Basic Boolean Operations, Simplifications & Complements
- **3.3** Using logic gates, design different logical expressions & showing the output with Truth Table

**3.4** De-Morgan's Theorem with proofs
**3.5** All proofs of Boolean Laws

**4 Limits:**

**4.1** Limit Properties & Laws
**4.2** Problems based on content

**5 Calculus:**

**5.1** Gradient of Curves
**5.2** Meaning of dy/dx
**5.3** Use of Derivates on functions--- (A$x^n$, Sin ax, Cos ax, tan ax, log$e^{ax}$)
**5.4** Differential property of the exponential function
**5.5** Basic Rules of Differential Calculus (Sum, Product, Quotient & function of a function)
**5.6** Determining the derivatives of various combinations of any function

**6 Differential Equations:**

**6.1** State the notation for second derivatives ($d^2$y/$dx^2$ or $d^2$x/d$y^2$)
**6.2** State that ds/dt & $d^2$s/d$t^2$ expresses velocity &acceleration
**6.3** Calculate Velocity & Acceleration at a given time from an equation for displacement
**6.4** Solve problems &evaluate Y (Dependent variable)
**6.5** Introduction to Integral Calculus
**6.6** Determine gradient of chord & tangent to a simple curve
**6.7** Determine the ratio y/x as tends to Zero & define it as dy/dx
**6.8** Derive the limit of y/x as y tends to Zero & define it as y/x
**6.9** Determine indefinite integrals of functions involving sin ax, cos ax&$e^{ax}$
**6.10** Determine definite integrals of functions involving sin ax, cos ax&$e^{ax}$
**6.11** Define Boundary condition
**6.12** Solve differential equation of the type dy/dx=f(x), given a boundary condition
**6.13** Differentiate Y=A$e^{kx}$ (where A & K is constant)
**6.14** Verify that Y=A$e^{kx}$satisfies dy / dx = ky by substitution
**6.15** Derive equations of the form dy/dx from problems arising in technology

# Telecommunication Technology – Paper I
## Class XII

**Examination Duration**: 3 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Transmission Lines (VSWR, Characteristics Impedance, Propagation Constant, Matching Transformer &Losses) | 15 |
| 2 | Network Theorems (Thevenin's Theorem, Norton's Theorem, Max Power Transfer theorem & Milliman's theorem) | 12 |
| 3 | Antennas (Different types, Equations, Radiation Patterns, Calculations &Reciprocity Theorem) | 20 |
| 4 | Fiber optic communications (Optical Fiber Construction, NA, Dispersion, Single/Multi mode, Step Index, Graded Index, Optical Connector, EDFA &Fiber Optic Amplifier) | 16 |
| 5 | Microwaves Systems & Devices (Klystron, Magnetron & TWT) | 12 |
| 6 | Microwaves Diode/ RF Diodes | 10 |
| 7 | Satellite Communication Systems (Orbits, Uplink, Down Link, Cross Link, Geo-synchronous, Geo-Stationary, GEO, MEO & LEO Satellites) | 15 |
| 8 | Television | 15 |
| TOTAL NUMBER OF HOURS | | 115 |

1. **Transmission Lines:**
   - **1.1** Characteristic Impedance
   - **1.2** Load Impedance
   - **1.3** Reflection Constant (K)
   - **1.4** VSWR & Propagation Constant
   - **1.5** Matching Transformer
   - **1.6** Relation between VSWR &K
   - **1.7** Distortions in Transmission Line

2. **Network Theorems:**
   - **2.1** Thevenin's Theorem
   - **2.2** Norton's Theorem
   - **2.3** Max Power Transfer theorem & Milliman's theorem
   - **2.4** Calculations

3. **Antenna:**
    - **3.1** Dipole
    - **3.2** Folded Dipole
    - **3.3** Monopole, Turnstile, Horn
    - **3.4** Yagi Uda / Parasitic Array
    - **3.5** LPDA and Dish
    - **3.6** Antenna parameters like Beam Width, Resolution, Radiation Resistance, Effective Aperture, Effective Height, Gain, Directivity and Efficiency
    - **3.7** Relations between Gain, Directivity & Efficiency
    - **3.8** Equations & Radiation patterns
    - **3.9** Calculations & Reciprocity Theorem

4. **Fiber optic communications:**
    - **4.1** Optical Fiber Construction
    - **4.2** Advantages
    - **4.3** NA, Intra modal & Inter modal dispersion
    - **4.4** Single/Multi mode
    - **4.5** Step Index and Graded Index
    - **4.6** Optical Connector, EDFA & Fiber Optic Amplifier

5. **Microwaves Systems & Devices:**
    - **5.1** Microwaves
    - **5.2** Klystron, Magnetron & TWT cavities
    - **5.3** Transit Time, Electron Bunching &Parametric Amplifier

6. **Microwaves Diode/ RF Diodes:**
    - **6.1** GUNN Diode
    - **6.2** Tunnel Diode
    - **6.3** Schottky Diode
    - **6.4** RF diode characteristics

7. **Satellite Communication Systems:**
    - **7.1** Orbits
    - **7.2** Uplink, Down Link & Cross Link
    - **7.3** Geo-synchronous & Geo-Stationary Satellite
    - **7.4** Orbital Period & Velocity
    - **7.5** Kepler's' Law of Motion
    - **7.6** GEO, MEO & LEO satellites

8. **Television:**
    - **8.1** Scanning Principles
    - **8.2** Deflection Systems
    - **8.3** Video Pictures
    - **8.4** Blanking & Synchronizing pulses

**8.5** VSB Transmission
**8.6** Receiver Block Diagram
**8.7** Tuner & IF amplifier
**8.8** Automatic Gain Control, the Video Amplifier & Sound Carrier
**8.9** Synchronizing Circuit
**8.10** Colour Sub Carrier Modulation & MTS
**8.11** TV stereo
**8.12** LED & LCD TV

## Telecommunication Technology - Paper II
## Class XII

**Examination Duration**: 6 Hours

| S. No. | Name of the Topic | No. of Hours |
|---|---|---|
| 1 | Identifying mobile sets | 10 |
| 2 | Chinese make & other sets | 8 |
| 3 | Software IOS, Windows & Android | 8 |
| 4 | Flashing | 7 |
| 5 | Trouble shooting of Mobile (Insert SIM, Network Problems, Camera, Memory IC) | 40 |
| 6 | Set Top Box | 12 |
| 7 | Cable TV | 15 |
| 8 | Trouble shooting of Television | 80 |
| 9 | 10 Individual Projects + 1 Final Group Project | 100 |
| TOTAL NUMBER OF HOURS | | 280 |

## LIST OF KITS, TOOLS & EQUIPMENT

### KITS

| | |
|---|---|
| **1.** Combination Pliers 15 cm | 1 set per trainee |
| **2.** Long Nose Pliers 15 cm | 1 set per trainee |
| **3.** Diagonal Cutting Pliers 15 cm | 1 set per trainee |
| **4.** End Cutting Nipper 15 cm | 1 set per trainee |
| **5.** Tweezers 10 cm | 1 set per trainee |
| **6.** Heat Sink Pliers | 1 set per trainee |
| **7.** Neon Tester | 1 set per trainee |
| **8.** Knob screw driver | 1 set per trainee |
| **9.** Screw Driver set | 1 set per trainee |
| **10.** Alignment Kit | 1 set per trainee |
| **11.** Wire stripper | 1 set per trainee |
| **12.** Soldering Iron 25W | 1 set per trainee |
| **13.** De-Soldering Pump | 1 set per trainee |
| **14.** Battery Eliminator | 1 set per trainee |
| **15.** Digital Multimeters | 1 set per trainee |
| **16.** Radio Receivers | 1 set per trainee |

### TOOLS

| | |
|---|---|
| **1.** Fire Extinguisher | 2 Nos |
| **2.** First Aid Kit | 1 No |
| **3.** Rubber Gloves Pairs | 8 Nos |
| **4.** Steel Rule | 8 Nos |
| **5.** Work Bench | 2 Nos |
| **6.** Scriber | 8 Nos |
| **7.** Centre Punch | 4 Nos |
| **8.** Hammer Ball Pein | 4 Nos |

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| **9.** Tongs | 1 No |
| **10.** Spanner set | 4 Nos |
| **11.** Allen key Set | 4 Nos |
| **12.** Hand shear Metal Cutting | 2 Nos |
| **13.** Bradwal | 2 Nos |
| **14.** Instrument Files Set L 12 | 1 No |
| **15.** Electric Drill 10mm | 1 No |
| **16.** Hack Saw | 8 Nos |
| **17.** File Set | 4 Nos |
| **18.** Bench Vice | 6 Nos |
| **19.** Grinder Bench Electric | 1 No |
| **20.** Taps & Dies Set | 5 Nos |

## EQUIPMENT

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|---|---|
| **1.** Bread Board, Vero Board | 1 Set Per Trainee |
| **2.** SMD Rework Station | 2 Nos |
| **3.** Liquid Flux | 1 Container Per Trainee |
| **4.** Ball maker kit | 2 Boxes |
| **5.** PCB Holder /PCBs | 15 Nos |
| **6.** Vibrator Cleaner | 1 No |
| **7.** NOKIA -3310, NOKIA-1110, NOKIA-6600 Mobile Handsets | 2 Nos Each |
| **8.** Samsung Hand Sets, China Mobile sets | 2 Nos |
| **9.** Smart Phone | 2 Nos |
| **10.** Circuit Maker Software (EAGLE, PROTEUS, etc.) | 1 Set Per Trainee |
| **11.** IC-555, IC-741, IC-810 | 1 Set Per Trainee |
| **12.** USB-4 | 2 Nos |
| **13.** Dongle (UFS-3) | 1 No |
| **14.** USB cable | 1 Set Per Trainee |
| **15.** Dragon(Dongle) | 1No |
| **16.** Wire Gauge Set | 2 Nos |
| **17.** Soldering Iron 250W | 2 Nos |
| **18.** Soldering Iron 60W | 15 Nos |
| **19.** Soldering Iron 10W | 15 Nos |

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| **20.** Feeler Gauge Set | 2 Nos |
| **21.** Electric Cells DC 15 To 30V | 4 Nos |
| **22.** Battery Storage 6V | 2 Nos |
| **23.** Hydrometer | 2 Nos |
| **24.** Battery Charger | 1 No |
| **25.** Electric Belts | 8 Nos |
| **26.** Rheostats | 8 Nos |
| **27.** Potentiometer | 20 Nos |
| **28.** Coil winding Machine | 1 No |
| **29.** Micro-Ammeter/50,100, 500 &1000 | 1 No |
| **30.** Milli - Ammeter/10,50, 100 & 1000 | 3 Nos |
| **31.** Power Meter | 2 Nos |
| **32.** Amplifier 20W or Above | 2 Nos |
| **33.** Radio Receivers | 2 Nos |
| **34.** Loud Speaker | 30 Nos |
| **35.**Micro Phone | 6 Nos |
| **36.** Insulation Tester | 2 Nos |
| **37.** Head & Ear Phones | 10 Nos |
| **38.** Service Oscillator | 2 Nos |
| **39.** Signal Tracer | 2 Nos |
| **40.** Function Generator | 2 Nos |
| **41.** Output Meter | 2 Nos |
| **42.** Regulated Power Supply | 2 Nos |
| **43.** Pattern Generator B/W | 2 Nos |
| **44.** Pattern Generator Colour | 2 Nos |
| **45.**TV Camera (Colour) | 1 No |
| **46.** LED TV (Black & White/ Colour) | 1 No Each |
| **47.** LCD TV | 1 No |
| **48.** TV Receivers B/W | 2 Nos |
| **49.** CR Oscilloscope | 2 Nos |
| **50.**TV Receivers Colour | 2 Nos |
| **51.** AM/FM Signal Generator | 2 Nos |
| **52.** Distortion Meter | 2 Nos |