

ENGLISH LANGUAGE PAPER – I

For Class XI & XII

Objective : To provide experience of the structure and vocabulary of English to enable students to:-

1. Study other subjects in the curriculum
2. Develop communication skills for vocational purposes.

There will be two papers as follows:

Paper 1 (1½ hours)

Question One **Either**

(a) Candidate will be required to write a report in about three hundred words based on information provided.

OR

(b) Candidates will be required to write a passage of about three hundred words in the form of a description of events, or of a process, directions or instructions.
[Both types – (a) and (b) – will be set]

Question Two

Candidates will be required to write a letter from a choice of two subjects. Suggestions will be given. The lay-out of the letter with address, introduction, conclusion, etc., will form part of the assessment.

Question Three

An unseen passage of prose of about three hundred words will be given. Questions based on the passage will be of the objective type and will include multiple-choice answers, which may be verbal or diagrammatic. All questions will have to be answered. Questions will test the candidate's understanding of ideas expressed in the passage as well as the meaning of words and the function of structures.

Question Four

An unseen passage of about two hundred and fifty words will be given. A question or questions will be asked to test the candidate's ability to extract information from a passage. Candidates will be directed to provide the required information in the form of enumerated notes, not in connected prose.

English – Paper II

1½ Hr

50 Marks

OBJECTIVE: To provide experience of a variety of English Prose, Poetry, Play, Addressing issues of human interest and concern.

Candidates are requested to answer five questions from the selected pieces. The question will be set to test the candidates ability to recall and respond to the information contained therein.

Question 1 will be compulsory, which will be set from the stories selected from Twelve Contemporary Short Stories. Another five questions will be set, one from each of the parts. i.e from twelve Contemporary Short Stories, Poems, Essays, Excerpts of plays and from Great Modern Lives. Candidates are to answer any four out of the five questions. Total five questions to be answered.

Q1. Compulsory + Any four.

I. Twelve Contemporary Short Stories. (OUP)

- | | | |
|--------------------|---|-------------------------------|
| 1. Ruskin Bond | : | The Eyes Have it. |
| 2. Roald Dahl | : | Parson's Pleasure |
| 3. Jug Suraiya | : | Badger |
| 4. R.K. Narayan | : | Martyr's Corner |
| 5. Bernard Malamud | : | The First Seven Years. |
| 6. Allen Seally | : | How Raj Kapoor Saved my Life. |

II. Poems

- | | | |
|---------------------------|---|----------------------|
| 1. Wystan Hugh Auden | : | The Unknown Citizen |
| 2. David Herbert Lawrence | : | The Best Of School |
| 3. Robert Frost | : | The Road Not Taken |
| 4. Edgar A Guest | : | It couldn't be done. |
- (The Art of Dynamic Thinking – Melvin Powers. Better Yourself Books)

III. Essays

1. J.B. Priestley : Too many people
2. E.R. Braithwaite : Job Hunting

IV. Excerpts from plays (Shakespeare)

1. Merchant of Venice
Prince of Arragon's Speech : "..... Who chooseth me shall get as much as he deserves"
2. Julius Caesar:
Mark Anthony's Speech : "Friends, Romans, Countrymen....."

V. 100 Great Modern Lives – Ed. John Canning (Rupa & Co.)

1. Douglas Collier : Jamshedji Tata
2. Andrew Ewart : Henry Ford.

**GENERAL FOUNDATION
AND
INDUSTRIAL SOCIOLOGY ENTERPRENEURSHIP**

Class XI (1st. Year) Theory 3hrs. 50 Marks Total 40 Hrs.

Paper I – Sociology

1.	Constitution of India	2 Hrs.
2.	Industrialization through five years plans.	2 Hrs.
3.	Industrial safety, First Aid and Hygiene & Safety Management.	2 Hrs.
4.	Population Education	3 Hrs.
5.	Unemployment and Automation	3 Hrs.
6.	Qualities of an Ideal Supervisor	1 Hr.
7.	Environmental Education	2 Hrs
8.	Rural Development	2 Hrs

Paper II – Environment Education & Rural Development. 3 Hrs. 50 marks

1.	1. Environmental Resources, Human Resources and Natural Resources.	2 Hrs.
	2. Population its impact.	1 Hr.
	3. Impact of industrialization on environment.	1 Hr.
	4. Effect of modern agriculture on environment.	2 Hr.
	5. Occupational Hazards.	2 Hr.
2.	Rural Development	5 Hrs
3.	Globalization	6 Hrs.
4.	Concerns Today	8 Hrs.

2nd. Year (XII) Paper I 50 marks 3 Hrs. Total 43 Hrs.

Paper I.

1.	1. Trade Union Act – 1926	
	2. Factories Act – 1948	
	3. Minimum Wages Act – 1946	
	4. Workmen's Compensation Act – 1923.	
	5. Employees State Insurance Act – 1948.	
	6. Payment of wages Act – 1936.	
	7. Maternity Benefit Act – 1961.	
	8. Contract Labour Act – 1971.	
	9. Industrial Disputes Act – 1947.	
	10. Employees Provident Fund Act – 1952.	13 Hrs.

- b. Types of injuries and appropriate first aid
 - i. Severe bleeding
 - ii. Cessation of breathing
 - iii. Shock
 - iv. Poisoning
 - v. Drowning
 - vi. Fractures
 - vii. Burns
 - viii. Fainting
- c. Safety Management.

4. POPULATION EDUCATION.

- a. Family Planning, small family norms, gender equality, female infanticide, Abortion laws /Euthanasia.
- b. Worker and his family – Love and Sex – Qualities of an ideal husband – Qualities of an ideal wife. Setting up a home.

5. UNEMPLOYMENT AND AUTOMATION

- i. Definition of unemployment
- ii. Types of unemployment
 - a. Casual, seasonal, cyclical.
 - b. Technological, frictional.

Automation and Computerization

- i. Tools that substitute hand.
- ii. Machine that substitute muscles.
- iii. Computers that substitute brains.

6. QUALITIES OF AN IDEAL SUPERVISOR

- 6.1 Be a part of the management
- 6.2 Be a leader of the workmen under you.
- 6.3 Be a policeman when needed
- 6.4 Knowledge of technical job.
- 6.5 Quality control and waste control.
- 6.6 Planning and scheduling.
- 6.7 Method of improvement.
- 6.8 Cost control.
- 6.9 Training your men.
- 6.10 Safety and first aid.
- 6.11 Working conditions of your men.
- 6.12 Problems in supervising women.
- 6.13 Wage payment.
- 6.14 Job evaluation
- 6.15 Merit rating
- 6.16 Labour laws.
- 6.17 Economics
- 6.18 Use of psychological tools.
- 6.19 Common sense
- 6.20 Cool and collective.

7. ENVIRONMENTAL EDUCATION

1. Environmental resources (energy, air, water, soil, minerals, plants, animals), carrying capacity, effects of exploitation.
2. Population explosion and incompatibility between resources and number, demands on environment to meet 'basic human needs' and 'aspiration of more ambitious goals, its effect on environment'.
3. Impact of industrialization on environment:
 - 3.1 Irreversible changes in landscape.
 - 3.2 Encroachment / degradation of environment and its effects.
4. Effects of modern agriculture on environment:
 - 4.1 Use of high-yielding varieties and deprivation of genetic resources.
 - 4.2 Canal irrigation and water logging.
 - 4.3 Use of fertilizers and pesticides and its effects on environment.
 - 4.4 The dangers in manufacturing, storing, transporting, disposing of insecticides.
5. Land use, soil degradation, population pressure and depletion of forests, grassland and cropland.
6. Environment pollution of air, water and soil and its effects on the living world.
7. Hazardous industrial and agricultural products
 - 7.1 Safety and health risks connected with their use,
 - 7.2 Impact on environment when used.
8. Misuse of medical technology: the drug menace.
9. Properties of materials (bio-degradable & non-degradable)
10. Typical environmental problems
 - 10.1 Deforestation
 - 10.2 Desertification
 - 10.3 Landslides
 - 10.4 Silting and drying of water resources.
 - 10.5 Pollution of lakes and waterways.
 - 10.6 Toxic substances
11. Occupational hazards
 - 11.1 Organizational risks.
 - 11.2 Equipment related risks.
 - 11.3 Process related risks.
 - 11.4 Product related risks.

- 12. Environmental action
- 12.1 Environmental protection and conservation of resources.
- 12.2 Pollution control, environmental pollution laws and regulations.
- 12.3 Waste disposal.
- 12.4 Desirable nutrition and sanitation practices.
- 12.5 Recuperation, recycling and substitution.
- 12.6 Community action for ecological restoration, social and agro forestry.
- 12.7 Economic use for resources (material, energy, money, time)
- 12.8 Living in harmony with nature, the environmental ethics.

- 13. Occupational safety
- 13.1. Fire safety
- 13.2 Safe handling of equipment and materials.
- 13.3 Safety precautions in lab/workshop/work site.
- 13.4 First aid.
- 13.5 Safety management.

8. RURAL DEVELOPMENT.

- a. Land use profile in India
- b. Causes of economic backwardness: the ‘poverty trap’
- c. Measures to increase agriculture productivity by improving the inputs.
- d. Afforestation – social and farm forestry (environmental, social and economic enhancement).
- e. Rural waste re cycling-biogas plant, compost making.
- f. Provision of basic health services for the community – provision of medical care, improvement of environmental sanitation, control of communicable diseases, mother and child health care, school health services. Development of desirable health, nutrition and environmental sanitation practices in the community.
- g. Activization of agencies responsible for rural development.
(Integrated Rural Development Programme. Small Farmers Development Agency, etc.)
- h. Innovations and Development of Rural Industries.

ENVIRONMENTAL EDUCATION AND RURAL DEVELOPMENT

Class XI

Theory 3 Hrs.

Marks – 50

Sociology – Paper – II

1.
 - i. Environmental Resources (energy, air, water, soil, minerals, plants & animals)
 - ii. Population – Human resources and Natural resource. Exploitation and Exploration of natural resources. Conservation of natural resources waste products management. Respect for laws regulating Community living. Respect for others freedom. Concern for public property.
 - iii. Impact of industrialization on environment.
 - a. Irreversible change in landscape.
 - b. Encroachment / degradation of environment and its effects.
 - iv. Effect of modern agriculture on environment.
 - i. Effect of high-yielding varieties and deprivation of genetic resources.
 - ii. Canal irrigation and water logging.
 - iii. Use of fertilizers and pesticides and effect.
 - iv. The dangers in manufacturing, storing, transporting, disposing of insecticides.
 - v.
 - i. Land use, soil degradation , population pressure and depletion of forest grasslands and cropland.
 - ii. Environment pollution of air water and soil and its effect on the living world.
 - vi. Measure of medical technology the drug abuse.
 - vii. Biodegradable and non-degradable materials.
 - viii. Typical environmental problems. Deforestation, Desertification, Landslides, silting and drying of water resources, pollution of lakes and resources, toxic substances.
 - ix. Occupational Hazards
 - a. Organizational risks.
 - b. Equipment related risks.
 - c. Process related risks.
 - d. Product related risks.

2. Rural development (with reference to the 20-point programme, 1986)
 - a. Land use profile in India.
 - b. Causes of economic backwardness, the poverty trap.
 - c. Measures to increase agriculture productivity by improving the inputs.
 - d. Afforestation – social and farm forestry. (environmental, social and economic enhancement)
 - e. Rural waste recycling – bio gas plant, compost making.
 - f. Provision for basic health service for the community – medical care, environmental sanitation, communicable diseases, mother and child health care, school health service. Development of desirable health, nutrition and environmental sanitation practices in the community.
 - g. Activisation of agencies responsible for rural development. (Integrated rural development programme IRDP, small farmers development agency, marginal farmer’s development agency.
 - h. Innovation and development of rural industry.

- 3 Globalization.
 - a. Globalization as a worldwide aspiration linking human values.
 - b.. Modernism and Internationalism.
 - c. Global broadcasting and journalism, role of news agencies, effects of the global reach of broadcasting, risk to cultural values due to bombardment of foreign base media.

4. Concerns Today.
 - a. Nuclear disarmament - CTBT
 - b. Human rights, Gia hypothesis, Malthusian theory, Darwinism & Francis Galton and the Eugenists.
 - c. Consumer and the competitive market.
 - d. Dehumanization due to technological advances.
 - e. Advertising and its impact.
 - f. Impact of society moving towards quick fix solutions leading to corrupt practices.
 - g. Underemployment and unemployment.
 - h. The ethical and the moral impact of the Internet.
 - i. Reaching out : Types of communication networks and their utilities –e-mail, facsimile, video conferencing, understanding of the internet as a global knowledge base and communication network.

4. Minimum wages Act, 1948.
 - i. Living wage, Fair wage, Minimum wage & subsistence wage.
 - ii. Scope
 - iii. Salient features
 - a. Minimum time rate of wages
 - b. Minimum piece rate
 - c. A guarantee time rate
 - d. Overtime rate.
 - iv. Provisions
 - a. Payment in cash
 - b. Cost of living
 - c. Maintaining records
 - d. Violation and enforcements.
 - v. Workmen's compensation Act – 1923
 - a. Objectives – imposition of compensation.
 - b. Scope – Certain category of railway men
 - c. To all wage earners earning up to Rs.1000/- per month in certain notified establishments.
 - d. For death, permanent total disablement, permanent partial disablement, Temporary disablement.

5. Employees State Insurance Act 1948.
 - i. Objectives - Benefits to employees in case of sickness, maternity, disablement, dependents, employment injury.
 - ii. Scope – Applies to all non-seasonal factories, shops, hotels, restaurants. Not applicable to men of armed forces and those drawing above Rs.5,000/- per month.
 - iii. Finance - Employees contribution – 2½ %
- Employer's contribution – 5 %
Those drawing less than Rs.6/- per day are exempt from contribution.

6. Payment of Wages Act – 1936.
 - i. Objectives – To ensure wages for employees drawing less than Rs.1600/- per month.
 - ii. Provisions :
 - i. State Government to enforce.
 - ii. Fixation of wages periods
 - iii. Deductions :
 - iv. Fines
 - v. Absence from duty
 - vi. Damages, Loss
 - vii. House / Accommodation
 - viii. Advances or over payment
 - ix. Income Tax societies.
 - x. Co-operative
 - xi. Insurance premium
 - xii. Levy on mines.

7. Maternity Benefit Act - 1961
 - i. Objective – To regulate employment of women in certain establishment for certain period before and after child birth.
 - ii. Scope – Applies to factories, mines, circus, industries, plantations and Government establishment.
 - iii. Provisions – Eligibility conditions, period for benefit paid, rate of benefit.

8. Contract labour Act – 1970.
 - i. Object – To regulate the employment of contract labour.
 - ii. Scope – Applies to establishment in which twenty or more workers are employed or were employed on any day of the preceding 12 months as contract labour to every contractor who employs or who employed on any day of the preceding twelve months, twenty or more workers.
 - iii. Terms – Contractor, Establishment
 - iv. Main provisions.
 - a. Setting up of advisory Boards
 - b. Registration of establishments
 - c. Welfare and health of contract labour.
 - d. Penalties and Procedures.

9. Industrial Disputes Act – 1947.
 - i. Definition of industrial disputes.
 - ii. Machinery set up by the Act.
 - iii. Labour court, Board of enquiry, Industrial tribunal, Conciliation
 - iv. Adjudication

10. Employees Provident Fund Act – 1952.

Object & Scope – Applied to all factories and establishments and notified industries employing 20 or more people.

 - i. Rate of contribution
 - ii. Protection from attachment
 - iii. Membership
 - iv. Family pension scheme
 - v. Benefit of the scheme.

(The latest amendments to the Act must be taken into consideration, especially Amendment of 1995)

11. Entrepreneurship

12. All about small business.
- i. Small Business
 - ii. Need for small business
 - iii. Economic Contribution
 - iv. Possible types of business
 - v. Employer and labour relation
 - vi. Buyer and seller relation
 - vii. Incentives in certain areas
 - viii. Assistance from District Industries Center.
 - ix. Assistance from small scale industries.
 - x. Service industries.
- Managerial Qualities of an Entrepreneur
- i. Should be confident
 - ii. Should be dynamic
 - iii. Should be creative
 - iv. Should be able to take initiative
 - v. Should be flexible
 - vi. Should be result oriented
 - vii. Should be energetic and hard working
 - viii. Should be far sighted
 - ix. Should accept challenges
 - x. Should be able to communicate effectively.
 - xi. Should be aware of ancillary development.
13. Estimating and costing.
14. Project planning & project report making.
- Indian Contract Act – 1872.
- i. Definition of contract, offer, acceptance, performance of contract.
 - ii. Indemnity and Guarantee.
 - iii. Different kinds of agents.
- The sale of Goods Act – 1930
- i. Definition of Buyer, Seller, Delivery Goods.
 - ii. Price
 - iii. Formation of the contract sale.
 - iv. Difference between sale & hire purchase.
15. Building People.
- i. Privatization v/s Nationalization
 - ii. The need for governments to govern and leave economic activities to the people, Role of NGOs.
 - iii. Generation of financial resources to meet governmental expenses.
 - iv. Impact of privatization on economic development with specific reference to Insurance, Telecommunications, Railways and Electricity.

16. Science & Technology.
- i. Animal and human aggression
 - a. Human and non-human signals of aggression.
 - b. Weapons devised by man for offence and defence.
 - c. Nuclear weapons, control on weapons manufacture, sale of foreign power.
 - d. Technology – does it make war more or less likely?

 - ii. Science and Technology as change agents
 - a. Affect of scientific developments on our lives – at work and at home.
 - b. Business on net – e- commerce, its feasibility and implications.

 - iii. Cosmology and space research
 - a. Current theories about the origins of the universe.
 - b. Probability of existence of Extra Terrestrial Intelligence.

 - iv. Emergence of new technologies their appreciation
 - a. Non-Digital and Digital technology.
 - b. Communication technology.
 - c. Information technology.

ENTREPRENEURSHIP PROJECT PLAN

PAPER – II 3 Hrs.

CURRICULUM IN ENTREPRENEURSHIP DEVELOPMENT

Entrepreneurship curriculum is divided into five major modules:

1. Entrepreneurial career orientation.
2. Entrepreneurial spirit (values and attitudes) and behavioural competencies.
3. Entrepreneurial motivation.
4. Enterprise launching competency.
5. Enterprise management competencies.

1. ENTREPRENEURIAL CAREER ORIENTATION

Today, most prevalent and commonly pursued career after education is that of a wage earner. The great potential of self-employment and the incentives thereof are not well known. This information, orientation and necessity related to future career option will orient students to entrepreneurial career.

2. ENTREPRENEURIAL SPIRIT AND BEHAVIOURAL COMPETENCIES.

Entrepreneurial spirit consists of values and attitude. Since value provides the direction and attitude decides the tendency to act in a given situation, certain competencies are needed to actually take action governed by values and attitudes. These competencies will help students in entrepreneurial career.

3. ENTREPRENEURIAL MOTIVATION

Force, drive and energy are needed to pursue the path of entrepreneurial career. Since forces are provided by creating an urge in the individual for efficiency that reflects through competition with other or with one's standards of performance, the total process is termed as entrepreneurial motivation.

4. ENTERPRISE LAUNCHING COMPETENCY

This includes competencies related to sensing opportunities; project/product; project formulation availing incentives; resource mobilization and finally launching the enterprise.

5. ENTERPRISE MANAGEMENT COMPETENCIES

The enterprise may be small or big but it demands management abilities in its own/manager. The various management functions such as production, marketing, finance, etc., are crucial functions for entrepreneurs. This module will help students in developing enterprise management competencies.

TELECOMMUNICATION TECHNOLOGY

Class XI

There will be two papers as follows :

PAPER I : Telecommunication Theory (3 hours) written paper.

This paper will consist of EIGHT questions, and the candidates are expected to answer any FIVE QUESTIONS 40 marks

(Detailed Syllabus)

1. AMPLITUDE MODULATION PRINCIPLES

1.1 Modulation :

The need to modulate, forms of modulation, visual concepts, side frequencies modulation factor and the present of modulation, the mathematics of the AM wave, recap, moulding voltage ratios.

1.2 Power Relationships

1.3 Component phasors of the AM wave

1.4 Assignable frequency Spectrum

1.5 Band selection Commercial AM broadcast band, channel interference, definitions, effective radiated power, emission code.

2. AM TRANSMITTERS

2.1 The circuits Forming the modulated signal, the exciter, the power amplifier, the driver amplifier , the modulator, the audio processor.

2.2 High-level modulation Class C power amplifiers, applying the modulating signal, the modulator amplifier, Heising modulation, modulated driver amplifiers, parallel output, heat sinking, progressive , series modulating

2.3 Low-level modulation, Base modulation

2.4 Vacuum Tubes

2.5 Class B Amplifiers Neutralization

2.6 Transmitter adjustments Adjusting neutralization, Intermediate RF stages, Loading and output power.

2.7 Antenna current

3. SIDEBAND TRANSMISSION

3.1 Sideband transmission advantages, Types of single-sideband signals. disadvantages

3.2 Separation of sidebands. Generating the sidebands only (the filter method) the phase shift method, after the modulators, independent sidebands.

3.3 Balanced modulators

3.4 Ring modulators

3.5 Filters Octaves and Decades, surface Acoustic wave (SAW) filters, crystal filters, mechanical filters, RLC filters, active filters.

4. AM RADIO RECEIVERS

- 4.1 The Super Heterodyne Receiver The RF Amplifier, The mixer/oscillator, the intermediate frequency (IF) amplifiers, the detector, automatic gain control (AGC), output reproducer.
- 4.2 Double-conversion Image frequency rejection, signal-to-noise ratios. Ratio (S/N), Sensitivity. Selectively dynamic range.
- 4.3 Receiver Circuits:The front end. The RF amplifier, the mixer, the local Oscillator, tuning capacitors, High or low frequency oscillator, front-end circuits.
- 4.4 Intermediate-frequency amplifiers
- 4.5 AM detectors
- 4.6 Automatic gain control(AGC)
- 4.7 Audio amplifiers
- 4.8 Receiver schematics
- 4.9 Loudspeakers
- 4.10 Pilot carrier receivers (Squelch)
- 4.11 Independent sideband receivers, Frequency , synthesis, product detectors,
- 4.12 AM stereo
- 4.1.3 A M receiver testing Test setup, alignment, noise measurements, receiver sensitivity measurements, selectivity measurements, dynamic range measurements.

5. FREQUENCY MODULATION PRINCIPLES

- 5.1 The modulated wave Frequency deviation, percentage of modulation
- 5.2 The FM radio frequency band Radiation standards
- 5.3 Direct frequency modulation Deviation sensitivity, carrier frequency tolerances, the effects and limits of the audio frequency, modulation index, the FM wave equation, the bandwidth of the FM wave, deviation ratio, the voltage distribution in the FM wave, Narrowband FM, Pre-emphasis De-emphasis
- 5.4 Indirect frequency modulation (phase modulation)
- 5.5 The carrier phase in the Frequency-modulated wave.

6. FREQUENCY-MODULATED TRANSMITTERS

- 6.1 The carrier oscillator ,The reactance modulator
- 6.2 Frequency changers The mixers, modulators, converters or translators, dividers, multipliers.
- 6.3 Power amplifiers
- 6.4 Feedback frequency control
- 6.5 The phase modulator
- 6.6 Carrier null
- 6.7 Transmitter adjustments

7. FM RECEIVERS

7.1 The RF amplifier Noise in RF Amplifiers.

7.2 The local oscillator

7.3 The mixer amplifier

7.4 IF amplifier

7.5 Limiters

7.6 FM detectors The slope detector, Dual slope detector, the discriminator, the ratio detector, the phase-locked loop.

7.7 Stereo FM

7.8 FM receiver alignment, FM receiver selectivity, FM Receiver sensitivity.

PRACTICAL

PAPER II: (6 – 8 HOURS) Full Marks-60 marks
Practical related to theory prescribed in the syllabus

TELECOMMUNICATION TECHNOLOGY

Paper I – Theory

(3hrs)

Class XII- (Detailed Syllabus)

1. TRANSMISSION LINES

- 1.1 Cable Types
- 1.2 Electrical Properties of the line (Constant Impedance,) Cable impedance from line constants, Time Delay, Cable connectors, Determining line constants R.L.C. and G, Dielectric constants, Wire Resistance.
- 1.3 Impedance from cable geometry Two-wire parallel lines, Coaxial cables.
- 1.4 Wavelengths Velocity of Propagation along the line, the line length in wavelengths.
- 1.5 Propagation coefficient
- 1.6 Total line Parameters, Parallel Lines.
- 1.7 Maximum power transfers ,Non-resonant lines, Resonant lines, Standing wave ratio.
- 1.8 Limits of the load impedance Open-circuit load impedance, Short-circuit load impedance, input impedance of the line.
- 1.9 Transmission line as circuit components .Capacitance, Inductance, Impedance -matching Transformers.

2. ANTENNAS

- 2.1 The reciprocity theorem
- 2.2 The half-wave dipole antenna ,The radiated wave, Polarization, Radiation patterns, Antenna Impedance, Antenna Size.
- 2.3 The Folded dipole
- 2.4 The Conical antenna.
- 2.5 The Turnstile antenna
- 2.6 Parasitic array ,The driven arrays, log-periodic array.
- 2.7 Antenna stacking
- 2.8 Multi band antennas
- 2.9 Quad antennas
- 2.10 Helical beam antennas

- 2.11 The Marconi antenna
- 2.12 Impedance matching to antennas, Transformer matching, matching stubs, The 'T' match and delta match. The gamma match.
- 2.13 Circular polarization
- 2.14 Model antennas.

3. MICROWAVE SYSTEMS AND DEVICES

- 3.1 The microwave system
- 3.2 The wave guide, Attenuation, Wave guide selection, Coupling methods, Models, Slots in wave guides, working factors of wave guide, Input Impedance to the Guide, Power limits of wave guide, Corners, Bends, and tees, Directional couplers, Planned wave guide obstructions.
- 3.3 Horn antennas
- 3.4 Parabolic reflectors
- 3.5 The Dielectric rod antenna
- 3.6 Resonant Cavities Transit time, Electron bunching, the Klystron, Magnetrons, the traveling wave tube. (TWT)
- 3.7 Parametric amplifiers
- 3.8 Circulators, Magic tees, and Hybrid Rings.
- 3.9 Gas discharge tubes.
- 3.10 Microwave diodes.
- 3.11 Microwave field effect transistors.
- 3.12 Stripline and Microstrip circuits.
- 3.13 Industrial electronics Application of SCR/ UJT/ Diac/ Triac

4. WAVE PROPAGATION

- 4.1 Ground waves
- 4.2 Sky waves The radio horizon, the lonospheric layers, Power density, Electric field strength, The skip wave.
- 4.3 Space waves

5. DIGITAL MODULATION

- 5.1 Codes
- 5.2 Foundations

- 5.3 Analog to digital conversion Pulse Amplitude modulation (PAM), Time division multiplexing (TDM) Pulse width modulation (PWM), Pulse position modulation (PPM)
- 5.4 Modes of operation Station interconnections, data networks.
- 5.5 Frequency shift keying(FSK) FSK Demodulation
- 5.6 Modems
- 5.7 Frequency Division Multiplexing(FDM)Decoding of the FDM Signals.
- 5.8 Pulse code modulation (PCM) UARTs and USARTs.
- 5.9 Delta modulation
- 5.10 Quadrature Phase Modulation(QPSK),Recovery of the QPSK Signals.
- 5.11 8-PSK
- 5.12 Local Area Networks (LANs)
- 5.13 Cellular communications Hand off mechanism. Frequency re-use system. Cell splitting Network diagram.
Identify typical examples of users of private mobile radio (PMR) ,eg. Emergency services, public utilities, taxis.
State the frequency bands used for PMR .Identify a diagram of a simple PMR system including one base station and a number of mobiles.
State that a conventional PMR system, the mobiles cannot hear each other's transmission. Recognize a diagram showing that in a cellular radio system, the coverage area is divided

6. FIBER OPTICS

- 6.1 Modulation Techniques
- 6.2 Frequencies
- 6.3 Fiber Optic Cables Refraction, Numerical Aperture ,Grade index Cables, Single-mode Versus Multimode, Pulse, Dispersion, cable construction, cable losses.
- 6.4 Light Sources
- 6.5 Light Detectors, Pin Diodes, Avalanche Diodes.
- 6.6 Connectors
- 6.7 Advantages/Disadvantages
- 6.8 Bit Error rate Minimum Input Signal
- 6.9 Flux Budget
- 6.10 Lasers
- 6.11 System components.

6. TELEVISION

7.

- 7.1 The Scanning Principles
- 7.2 The deflection Systems, The High voltage.
- 7.3 The video picture, Blanking and synchronizing pulses, Positive/ Negative picture phase.
- 7.4 Vestigial sideband transmission (The sound carrier)
Channel Assignments
- 7.5 The receiver block diagram The tuner, The IF amplifier, Automatic Gain Control, The video amplifiers, the sound carrier, the synchronizing circuit.
- 7.6 Color Subcarrier modulation
- 7.7 Multi channel television sound (MTS) : TV stereo

8. THE COMMUNICATIONS SATELLITE

- 8.1 The satellite orbit
- 8.2 The satellite position
- 8.2.1 Linkages, The Up-Link, The Down-link, The Cross-link.
- 8.3 Assignable satellite frequencies
- 8.4 Inside the satellite, The transponder, the antenna system, the power package, station keeping.
- 8.5 Forms of modulation
- 8.6 Free-path space losses
- 8.7 The ground station Aligning the satellite dish
- 8.8 Some future trends.

PRACTICAL

Paper 2 : (6-8 hrs)

Students will be given practical training on electrical circuits, Industrial electrical controls, basic electronics circuits, Repair maintenance and assembly of amplifiers, record players, radios, tape recorders, televisions, VCR and use of video cameras and transmitters. VCD.

The practical examination will consist of the actual practical test and a written paper which shows the procedure as to how the practical test was done and the result obtained. The practical test will consist of a minimum of FIVE QUESTIONS:-

- (1) To test an electrical equipment or perform an electrical measurement experiment.
- (2) To assemble a simple electronic device like a power supply, oscillator signal injector, battery charger, etc.
 - a. To test a set of given components like transformers, transistors, diodes, capacitors, resistors and state whether good or bad, if bad why?
 - b Trace the circuit to detect the defect in a T.V. receiver or an amplifier and rectify the defect.

The written procedure will have 15% of the marks, the practical test will have 70%, and the practical work done during the year will have 15 % of the marks.

PRINCIPLES OF ELECTRICITY AND ELECTRONICS

CLASS XI

DETAILED SYLLABUS -THEORY

Paper – I

3 Hrs.

100 Marks

1. **Introduction of electricity.** Structure of atoms; the model atom, nucleus, electrons, Unit of charge; coulomb. Potential difference and electromotive force. Production of electricity by friction, magnetism and chemical action.
2. **Electric circuit.** $I = Qt$. Ampere as rate of flow of charge. Ohm's law as applied to a single resistance ($V/I = R$). and to a whole circuit ($E/I = \text{total } R$).
3. **Equivalence.** Cell groupings. Resistances in series and parallel. Resistivity; $R = \rho l/A$. Calculation of resistance of wire. Temperature coefficient of resistance. Ammeter shunts, Voltmeter multipliers; series ohmmeter.
4. **Work power and energy.** Work and energy. The joule $E = VIt(QV)$. Unit of power and energy; the watt, the kilowatt the watt-hour and kilowatt-hour. Use of watt-meter. Calculation of electrical energy and power. Local tariff system.
5. **Heating effect of an electric current.** Application of heating effect, e.g. heating appliances, filament lamps, electric welding, electric carbon arc, and use of fuses.
6. **Chemical effect of an electric current.** Electrolytes and nonelectrolytes. Elementary phenomena of electrolysis, including the electrolysis of acidifier water, and of copper (II) sulphate solution using copper or platinum electrodes. The factors affecting the mass of substance liberated in electrolysis and the measurement of current by voltmeter (coulometer). Primary cells; Leclanche cell; polarization, local action. Accumulators; construction and characteristics of lead-acid cell; techniques of testing and charging batteries; care and maintenance.
7. **Electromagnetism.** Simple phenomenon of magnetism. Ferromagnetic properties of iron and steel. Magnetic effect of an electric current. The magnetic field associated with a current flowing in a straight wire, a circular coil, and a solenoid. Force on a current-carrying conductor in a magnetic field, the right-hand and corkscrew rules. Magnetic flux density. Permeability.
8. **Electromagnetic induction.** Phenomenon of electromagnetic induction. Faraday's law : Lenz's law. Induced e.m.f.; a straight conductor cutting flux; $E = - \frac{d\Phi}{dt} = BLv$. Self-inductance; $E = - L \frac{di}{dt}$. Mutual inductance; the induction coil.

9. **Elementary electrostatics.** Electric field; $E = V/d$. Capacitance and the factors affecting capacitance. Electric flux density; $D = Q/A$. Permittivity; $u=D/E$. Energy of charged capacitors in series and in parallel.
10. **Alternating current.** Generation of an a.c. with a single loop coil. Sinusoidal wave form. Peak values; r.m.s. values (only ratios will be expected). Simple a.c. circuits.
11. **Transformer.** Principle of the single-phase transformer, and iron loss (hysteresis and eddy current).
12. **Lighting.** Common types of lamps; candela, lumen, lux, lux meter (light-meter). Illumination and photometry. Gas-filled lamps and fluorescent lamp circuits; preheat, instant and rapid starts.
13. **Series A.C. circuits.** A.C. through resistance and inductance, power in a purely inductive circuit, power in a circuit having resistance inductance and capacitance in series, power factor (P.F.), Active and reactive components of circuit current, A.C. through resistance and capacitors, Resistance, inductance and capacitance in series, resonance in R.L.C. Circuit.

PRINCIPLES OF ELECTRICITY AND ELECTRONICS

CLASS XII	DETAILED SYLLABUS	THEORY
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- There will be ONE PAPER of 3 Hours duration.
100 Marks
- The paper will be divided into two parts

Part I : Will consists of short answer questions. This part will be compulsory.

Part II : Will consist of ten essay type questions. Candidates will be required to answer FIVE QUESTIONS.

1. **Distribution of electric power.** Idea of a simple distribution system. Mention of the local power system should be made.
2. **The d.c. generator and motor.** Use of split-ring commutators; constructional features. Shunt series and compound field connections and their characteristics. Starting of d.c. motors. Ideas on back e.m.f.
2. **The a.c. motor.** Ideas on a.c. motors (single phase only). The rotating field. Methods of shunting: capacitance start, split phase start. Single-phase induction motor types.
3. **Wires, cables and electrical wiring.** Construction of various types in domestic and industrial use. (Solid and stranded cables how insulated and protected. Flexes). Selection of cable sizes, voltage drop and simple calculation on current-carrying capacity. (Linking of size of cables and flexes with maximum current flow particularly in relation to the circuits below. Regulation B 23 (voltage drop). Brief description of the wiring systems. Simple circuitry. Switch in phase line. Dual switching of lamps. Layout of power circuits-ring and spur types-limitations). Introduction to Rules and Regulations, both local and that of I.E.E. (Sequence of equipment. Effects of overloading. Protection of circuits and individuals by (a) fuses and trips, (b) earthing of metal, (c) mechanical protection of cables. Regulations for bathrooms, Commonsense appreciation of dangerous practices. (Simple testing)
4. **Electrical accessories.** Structure and uses of various types of switches, power outlets. Lamp holders, ceiling roses and junction boxes. [Of MS Familiarity with these is expected (but no questions will be set needing detailed knowledge of structure)]
6. **Introduction to electronics.** Concept of electron flow. Common components employed in electronic circuits; resistors, capacitors and inductors; their structure, types and uses.

7. **Diodes.** Thermionic diode; semiconductor diode, structure of vacuum diode and semiconductor diode.
8. **Power supply for electronic apparatus.** Mains transformer. The diode; half wave, RC filters, chokes, bleeder resistance and its functions.
9. **Vacuum triode.** Structure of the vacuum triode valve. The control grid. Triode valve characteristics. Triode parameters; anode resistance, mutual conductance and amplification factors; relationship between the above parameters. Triode as a voltage amplifier. Bias voltage, cathode resistor and cathode bypass capacitor.
10. **Transistor.** The junction transistor : P-N-P and N-P-N types. Introduction to various methods of construction; their characteristics including handling procedures and precautions.
11. **Transistor amplifier.** Introduction to the common-base, common-emitter and common collector amplifiers. Comparison of the voltage, current and power gains and input and output resistances (elementary approach only). Phase relationship. Bias stabilization, Negative feedback.
12. **The amplifier.** A typical amplifier voltage and power amplification. Matching of the power output stage to a speaker.
13. **Apparatus for reproducing and recording sounds.** Range of hearing, recording and reproducing. Characteristics of microphones; carbon, crystal, moving-coil and ribbon types. The common types of gramophone pick-ups. The earphone, crystal and magnetic tapes. The moving-coil loudspeakers; permanent magnet. Electrostatic speaker.
14. **Common types of electronic measuring instruments.** Valve voltmeters, transistorized voltmeter, signal generator, oscilloscope, use and care of the above instruments.
15. **Sinusoidal oscillators.** Oscillatory circuit, tuned oscillators, Hartley oscillators, Collpitt's oscillators phase shift oscillators, Wein Bridge oscillators crystal oscillator.

1.2 **Indicial Equations**

- 1.2.1 Change the base of numbers using the law of powers, e.g. $16 = 4^2$, $27 = 3^3$.
- 1.2.2 Change the base of numbers where the index may be in algebraic form such as $8^x = 2^{3x}$.
- 1.2.3 Solve indicial equations where the indices are linear in one unknown.
- 1.2.4 Solve indicial equations where the indices are quadratic in form in one unknown.

1.3 **Mensuration**

- 1.3.1 Areas and perimeters of common plane figures.
- 1.3.2 Surface areas, volumes and masses of common regular solids of prismatic and cylindrical shapes.
- 1.3.3 Surface area, volumes and masses of common regular solids of pyramidal, conical and spherical shapes.
- 1.3.4 Areas of irregular figures using the mid-ordinate rule.

2. **ALGEBRA**

- 2.1 Formulae and laws.
The evaluation of formulae and expressions, with or without the use of a calculator.
- 2.1.1 Determine a logical sequence of steps to evaluate an expression containing at least two variables / constants e.g. $Ax^b, ab^x, (a+x)^n$, with and without the use of a calculator.
- 2.1.2 Draw up a table of values by carrying out repeated calculation from an equation or formula for different values of the variables.
- 2.1.3 Transpose formulae which contain a root or power, e.g. $T = 2\pi\sqrt{l/g}$ for l , $a = \pi r^2$ for r .

- 2.1.4 Transpose formulae in which the subject is contained in more than one term, e.g.

$$I = \frac{IR}{R + r} \text{ for } R$$

- 2.1.5 Check computed values, e.g. by an alternative sequence or by backward substitution.
2.1.6 Demonstrate the effects of rounding and truncation errors.

2.2 Simple quadratic equations

- 2.2.1 Recognise factors of quadratic expressions, including $(a+b)^2$, $(a-b)^2$ and (a^2-b^2)
2.2.2 Factorise factors of quadratic expressions, including perfect squares and the difference of two squares.
2.2.3 Recognise that some simple quadratic expressions do not factorise e.g. (a^2+b^2)
2.2.4 Define the roots of an equation.
2.2.5 Determine the equation which is satisfied by a given pair of roots.
2.2.6 Recognise; a quadratic expression, a quadratic equation.
2.2.7 Solve quadratic equations with real roots by factorisation.
2.2.8 Solve quadratic equations which provide real roots by the use of the formula

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 2.2.9 Form and solve quadratic equation which are mathematical models of practical problems e.g. linear accelerated motion, second order chemical reaction.
2.2.10 Check a solution of the equation by substitution disregarding irrelevant roots.
2.2.11 Solve algebraically simultaneous quadratic and linear equations.

2.3 Points of intersection of two graphs and their significance.

- 2.3.1 Solve a pair of simultaneous equations in two unknowns graphically.
2.3.2 Determine the roots of a quadratic equation by the intersection of their graphs with the x-axis.
2.3.3 Solve a simultaneous linear and quadratic equation by the intersection of their graphs.
2.3.4 Plot the graph of a cubic equation with specified interval range.
2.3.5 Solve a cubic equation using 2.3.4

- 2.4 Graphs of exponential growth and decay.
 - 2.4.1 Plot and graphs of $y=e^{ax}$ and $y = -ax$ with the aid of tables and with the aid of a calculator.
 - 2.4.2 Draw graphs of experimental data of growths and decays which are exponential functions.
 - 2.4.3 Define the gradient of any curve at a point as the tangent at that point.
 - 2.4.4 Determine gradients of the curves in 2.4.1 and 2.4.2 and verify that these gradients are proportional to the relevant ordinates.
- 2.5 Complex numbers
 - 2.5.1 Definitions
 - 2.5.2 Power of j
 - 2.5.3 Addition and subtraction of complex numbers in algebraic form.
 - 2.5.4 Multiplication of complex numbers in algebraic form.
 - 2.5.5 Conjugate complex numbers.
 - 2.5.6 Division of complex numbers in algebraic form.
 - 2.5.7 The Argand Diagram.
 - 2.5.8 The j-operator.
 - 2.5.9 Addition of phasors.
 - 2.5.10 Subtraction of phasors.
 - 2.5.11 The polar form of a complex number.
 - 2.5.12 Multiplying numbers in polar form.
 - 2.5.13 Square root of a complex number.
 - 2.5.14 Dividing numbers in polar form.

3. TRIGONOMETRY

- 3.1 Some properties of trigonometric functions.
 - 3.1.1 Sketch a sine wave over one complete cycle by relating the angle of a rotating unit radius to the vertical projection.
 - 3.1.2 Sketch a cosine wave over one complete cycle by relating the angle of a rotating unit radius to the horizontal projection.
 - 3.1.3 Determine values of the trigonometric ratios for angles between 0° and 360° .
 - 3.1.4 Define $\tan A = \frac{\sin A}{\cos A}$ and sketch the graph of $\tan A$ as A varies from 0° to 360° .
 - 3.1.5 Derive the relationship $(\sin^2 A + \cos^2 A) = 1$.
 - 3.1.6 Describe the periodic properties of the trigonometric functions.

- 3.1.7 State and use the sine rule for a labeled triangle in the form of $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.
- 3.1.8 Apply the sine rule to the solution of practical problems.
- 3.2 Formulate for cosine rule and area of a triangle.
- 3.2.1 State the cosine rule for a labeled triangle in the form $a^2 = b^2 + c^2 - 2bc \cos A$.
- 3.2.2 Recognise the conditions under which the cosine rule can be used.
- 3.2.3 Apply the cosine rule to the solution of practical problems.
- 3.2.4 Calculate the area of any triangle using the formulae $\frac{1}{2} ab \sin C$ and $\sqrt{s(s-a)(s-b)(s-c)}$
- 3.2.5 Solve problems on triangle and quadrilaterals involving the use of the sine rule, cosine rule and formulae for areas of triangles.
- 3.3 Compound angle formulae for the addition of sine and cosine functions.
- 3.3.1 State the formulae (i) $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
(ii) $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
- 3.3.2 Apply the relationships in 3.3.1 to obtain the result $2 \sin A \sin B = \cos(A-B) - \cos(A+B)$.
- 3.3.3 Solve numerical problems involving the relationships in 3.3.1 and 3.3.2

COMPUTER/TECHNICAL MATHEMATICS

CLASS – XII DETAILED SYLLABUS THEORY

PAPER 2 : (3Hrs)

Full Marks-100 marks.

Practical Mathematics consisting of TEN QUESTIONS on:

- (1) Statistics
- (2) Binary Arithmetic
- (3) Boolean Algebra
- (4) Basic Integral and differential calculus.

Candidates will be required to answer SIX QUESTIONS ON:

1. STATISTICS

- 1.1 Measure of location for ungrouped data and for data grouped in equal interval classes.
 - 1.1.1 Define the arithmetic mean, median and mode and explain where each is an appropriate measure of central tendency.
 - 1.1.2 Calculate the arithmetic mean for ungrouped data.
 - 1.1.3 Place ungrouped data in rank order and determine the median and modal values.
 - 1.1.4 Calculate the arithmetic mean for grouped data.
 - 1.1.5 Estimate the mode of grouped data using a histogram.
 - 1.1.6 Determine the median, quartiles and percentiles from cumulative frequency data.

2. BINARY ARITHMETIC: NON-DECIMAL NUMBERS

- 2.1 Non-decimal numbers.
 - 2.1.1 Convert a compound denary number with fractions limited to $1/32$'s to its binary equivalent and vice versa.
 - 2.1.2 Use a sign bit to denote a negative quality.
 - 2.1.3 Define the modulus, 1's and 2's complement of a binary number, using numerical examples to illustrate the definitions.

- 2.1.4 Add two compound binary numbers.
- 2.1.5 Subtract one binary number from another using complementary addition.
- 2.1.6 Multiply one binary number by another.
- 2.1.7 Divide one binary number by another.
- 2.1.8 Show, using numerical examples, that all the process (2.1.4 to 2.1.7) may be carried out using the 'add' method.
- 2.1.9 Define the octal and hexadecimal of numbers and derive the octal and hexadecimal equivalents of binary numbers.
- 2.1.10 Express octal and hexadecimal equivalents of binary numbers.
- 2.1.11 Define the 8421 binary coded decimal (BCD) system and derive the BCD equivalents of denary numbers.
- 2.1.12 Convert between denary numbers and their BCD equivalents.
- 2.1.13 Perform simple addition and subtraction using BCD and hexadecimal integer numbers.

3. BOOLEAN ALGEBRA

- 3.1 The basic principles of Boolean algebra.
 - 3.1.1 State that Boolean Algebra is a mathematical method for dealing with logical process.
 - 3.1.2 Define the basic Boolean operations of NOT, and OR.
 - 3.1.3 Demonstrate, using simple examples, that logical process may be plotted in the form of a truth table.
 - 3.1.4 Demonstrate, using simple switch circuits, the following laws of Boolean Algebra.
 - (i) $A.B = B.A.$
 - (ii) $A.1 = A$
 - (iii) $A.0 = 0$
 - (iv) $A.A = A$
 - (v) $A.A = 0$
 - (vi) $A = A$
 - 3.1.5 Demonstrate the following further laws of Boolean Algebra.
 - (i) $A + B = B + A$
 - (ii) $A + 1 = 1$
 - (iii) $A + 0 = A$
 - (iv) $A + A = A$
 - (v) $A.B.C = A.(B.C) = (A.B).C$
 - (vi) $A + B + C = (A+B) + C = A + (B+C)$
 - (vii) $A.(B+C) = A.B + A.C$
 - (viii) $A + B.C = (A+B).(A+C)$

4. DIFFERENTIAL CALCULUS

- 4.1.1 Gradient of curves
- 4.1.2 The meaning of $d y/dx$
- 4.1.3 Use the derivatives of the functions:
 Ax^n , $\sin ax$, $\cos ax$, $\tan x$, $\log_e d$ and e^{ax} .
- 4.1.4 Define the differential property of the exponential function.
- 4.1.5 Calculate the derivatives at a point of the functions in (4.1.3)
- 4.1.6 State the basic rules of differential calculus for the derivatives of sum, product, quotient, and function of a function.
- 4.1.7 Determine the derivatives of various combinations of any two of the functions in (4.1.3) using 4.1.6).
- 4.1.8 Evaluate the derivatives in 5 at a given point.
- 4.1.9 State the notation for second derivatives as d^2y/dx^2 and similar from e.g d^2x/dt^2 .
- 4.1.10 Determine a second derivative, by applying the basic rules of differential calculus, to the simplified result of a first differentiation.
- 4.1.11 Evaluate a second derivative determine determined in (4.1.10) at a given point.
- 4.1.12 State that $d s/d t$ and d^2s /dt^2 express velocity and acceleration.
- 4.1.13 Calculate the velocity and acceleration at a given time from an equation for displacement expressed in terms of time using (4.1.11)
- 4.1.14 Define the turning point of a graph.
- 4.1.15 Determine the derivative of the function of the graph concerned.
- 4.1.16 Determine the value of x (the independent variable) at the turning points using (4.1.14 and 4.1.15)
- 4.1.17 Evaluate y (the dependent variable) corresponding to the values in (4.1.16)
- 4.1.18 Determine the nature of the turning points by consideration of the gradient on either side of the point.
- 4.1.19 Determine and evaluate the second derivative of the function at the turning points.
- 4.1.20 Determine the nature of the turning points by the sign of the second derivative.
- 4.1.21 Solve problems involving maxima and minima relevant to technology.

4.2 Integral Calculus

- 4.2.1 Determine gradient of chord and tangent to a simple curve.
- 4.2.2 Deduce that the process of moving a point on a curve towards a fixed point on the curve causes the gradient of the chord joining the points to approach that of the tangent of the curve at the fixed point.
- 4.2.3 Identify incremental changes in x, y directions as Δx , Δy .
- 4.2.4 Determine the ratio $\Delta y/\Delta x$ as Δx tends to zero and defines it as dy/dx .
- 4.2.5 Derive the limit of $\Delta y/\Delta x$ as Δx tends to zero and defines it as dy/dx .
- 4.2.6 State that the rate of change at a maximum or minimum point of a curve is zero.
- 4.2.7 Determine indefinite integrals of functions involving $\sin ax$, $\cos ax$ and e^{ax} .
- 4.2.8 Evaluate the definite integrals involving $\sin ax$, $\cos ax$ and e^{ax} .
- 4.2.9 Define the mean and root mean square values of functions over a given range.
- 4.2.10 Evaluate the mean and root mean square values of simple periodic functions.
- 4.2.11 Determine and sketch a family of curves given their derivative, for a simple function.
- 4.2.12 Determine a particular curve of the family by specifying a point on it.
- 4.2.13 Define a boundary condition.
- 4.2.14 Solve differential equation of the type $dy/dx = f(x)$ given a boundary condition.
- 4.2.15 Differentiate $y = Ae^{kx}$.
- 4.2.16 Verify that $y = Ae^{kx}$ satisfies $dy/dx = ky$ by substitution.
- 4.2.17 Derive equations of the form $dy/dx = ky$ from problems arising in technology.
- 4.2.18 Solve the derived equation in (4.2.17) using (4.2.15) and (4.2.16) and boundary conditions.

**List Of Kits, Tools & Equipments
For The Trade Of "Telecommunication Engineering Technician"
For A Batch Or Unit Of 25 Trainees.**

Sl. No	Particulars	Qty
1.	Combination Pliers 15 Cm	One Set Per Trainee
2.	Long Nose Pliers 15 Cm	-Do-
3.	Diagonal Cutting Pliers 15 Cm	-Do-
4.	End Cutting Nipper 15 Cm	-Do-
5.	Tweezers 10 Cm	-Do-
6.	Heat Sink Pliers	-Do-
7.	Neon Tester"	-Do-
8.	Knob Screwdriver To Cm	-Do-
9.	Screw Driver Set Of 6	-Do-
10.	Alignment Kit	-Do-
11.	Wire Stripper	-Do-
12.	De Soldering Pump	-Do-
13.	Soldering Iron 25 W	-Do-
14.	Battery Eliminator	-Do-
15.	Multi Meters (Small)	-Do-
16.	Radio Receivers	-Do-
TOOLS		
1.	Fire Extinguisher	2 Nos
2.	First Aid Kit	1 No
3.	Rubber Gloves Pairs	1 No
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
9.	Tongs	1 No
10.	Spanner Set	4 Nos
11.	Allen Key Set	4 Nos
12.	Hand Shear Metal Cutting	2 Nos
13.	Bradawl	2 Nos
14.	Instrument Files Set L 12	2 Nos
15.	Electric Drill 10 Mm	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 And Dies Set	5 Nos

1 Wire Gauge Set	2 Nos
2. Soldering Iron 250 W	2 Nos
3. Soldering Iron 60 W	10 Nos
4. Soldering Iron 10 W	10 Nos
5. Feeler Gauge Set	2 Nos
6. Electric Cells Dc 1.5 To 30 V.	4 Nos
7. Battery Storage 6 V	2 Nos
8. Hydrometer	2 Nos
9. Battery Charger	1 No
10. Permanent Magnets 15 Cm	2 Nos
11. Electric Bells	8 Nos
12. Rheostats	8 Nos
13. Potentiometer	20 Nos
14. Coil Winding Machine	1 No
15. Micro-Ammeter/50, 100, 500, 1000	1 No
16. Milli-Ammeter/10, 50, 100, 500	3 Nos
17. Power meter	2 Nos
18. Amplifier 20 W Or Above	2 Nos
19. Radio Receivers	1 No
20. Loud Speaker	30 Nos
21. Microphone	6 Nos
22. Insulation Tester	2 Nos
23. Head & Ear Phones	10 Nos
24. Service Oscillator	2 Nos
25. Signal Tracer	2 Nos
26. Function Generator	2 Nos
27. Output Meter	2 Nos
28. Regulated Power Supply	2 Nos
29. Pattern Generator B/W	2 Nos
30. Pattern Generator Colour	2 Nos
31. TV Camera (Colour)	1 No
32. L.C.R. Bridge	2 Nos
33. Record Players	2 Nos
34. Tape Recorders Mono	5 Nos
35. T.R. Auto Reverse	2 Nos
36. T.V. Receivers B/W	2 Nos
37. C.R. Oscilloscope	2 Nos
38. T. V. Receivers Colour	2 Nos
39. Am/Fm Signal Generator	2 Nos
40. Distortion Meter	2 Nos
41. V.C.P./ V.C.R's	2 Nos
42. Pulse Generators	2 Nos
43. Video Cassette Recorder	1 Nos