

**CERTIFICATE
OF
VOCATIONAL EDUCATION
EXAMINATION (YEAR-12)
SYLLABUS
COMPUTER THEORY
&
SYSTEM ANALYST**

Correspondence should be addressed to

**THE CHIEF EXECUTIVE & SECRETARY
COUNCIL FOR THE INDIAN SCHOOL CERTIFICATE
EXAMINATIONS
PRAGATI HOUSE, 3RD FLOOR
47- 48 NEHRU PLACE
NEW DELHI- 110019**

CONTENTS

I. Compulsory Subjects:

English	4
General Foundation : Industrial Sociology & Entrepreneurship	7

II. Elective subjects:

1. Computer Theory	20
2. Operating System & application Software	25
3. Programming Languages	29
4. Principles of Electronics/Computer Mathematics	34
5. List of Tools & Equipments	43

4. COMPUTER PROGRAMMER & SYSTEM ANALYST

S. No	SUBJECT	CLASS XI	HOURS	MARKS	CLASS XII	HOURS	MARKS
1	English (COMPULSORY)	Paper I Paper II	1½ 1½	50 50	Paper I Paper II	1½ 1½	50 50
2	General Foundation Industrial Sociology & Entrepreneurship (COMPULSORY)	Paper I - Sociology Paper II - Environmental Education & Rural Development	3 3	50 50	Paper I - Complete Course-Paper II - Entrepreneurship Project & Plan	3 3	50 50
3	Computer Theory	Paper I - Theory	3	100	Paper I - Theory	3	100
4	Operating System & application Software	Paper I - Theory Paper II - Practical	3 3	40 60	Paper I - Theory Paper II - Practical	3 3	40 60
5	Programming Languages	Paper I - Theory Paper II - Practical	3 3	40 60	Paper I - Theory Paper II - Practical	3 3	40 60
6	Principles of Electronics/Comput er Mathematics	General Mathematics	3	100	Electronic/ Computer Mathematics	3	100

ENGLISH LANGUAGE PAPER – I

CLASS XI AND XII

DETAILED SYLLABUS

Paper – I

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
&
INDUSTRIAL SOCIOLOGY
ENTERPRENEURSHIP**

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

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. \

Paper I.

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.

- | | | |
|----|----------------------------------------------------------------------------------------------------|--------|
| 2. | a. Entrepreneurship. | 2 Hrs. |
| | b. All about small business including Indian Contract Act – 1872.
The sale of Goods Act – 1930. | 5 Hrs. |
| 3. | Estimating and Costing | 6 Hrs. |
| 4. | Project Planning and Project Report Making. | 4 Hrs. |
| 5. | Building people | 5 Hrs. |
| 6. | Science & Technology | 7 Hrs. |

Paper II 50 Marks 3 Hrs.

Entrepreneurship Project Plan

GENERAL FOUNDATION AND INDUSTRIAL SOCIOLOGY ENTERPRENEURSHIP

Class XI Theory 3 Hrs. Marks – 50

Sociology – Paper – I

1. CONSTITUTION OF INDIA.

Features of The Constitution & Preamble.

1. Fundamental rights
2. Fundamental duties
3. Directive principles of state policy
4. Differences between fundamental Rights and Directive principles – citizen's role in nation building
5. Role of taxes direct, indirect.

2. INDUSTRIALISATION THROUGH FIVE YEAR PLANS

1. VIII five year plan
2. IX five year plan (A critical appraisal)
3. Discuss – critically the industrial achievement during the plan period 1st. to 7th. Five year plan.
4. Importance of public sector.

3. INDUSTRIAL SAFETY, FIRST AID AND HYGIENE

Efficient Worker Safe Worker.

a. Causes of work Injuries.

- i. Bad house keeping
- ii. Hand tools
- iii. Portable electric tools
- iv. Working around machines
- v. Safety equipments
- vi. Lifting weight
- vii. Padders
- viii. Fire

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 ethic.

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.

- 1. Land use profile in India
- 2. Causes of economic backwardness: the 'poverty trap'
- 3. Measures to increase agriculture productivity by improving the inputs.
- 4. Afforestation – social and farm forestry (environmental, social and economic enhancement).
- 5. Rural waste re -cycling-biogas plant, compost making.
- 6. 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.
- 7. Activization of agencies responsible for rural development. (Integrated Rural Development Programme. Small Farmers Development Agency, etc.)
- 8. Innovations and Development of Rural Industries.

ENVIROMENTAL 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.
 - a. Effect of high-yielding varieties and deprivation of genetic resources.
 - b. Canal irrigation and water logging.
 - c. Use of fertilizers and pesticides and effect
 - d. The dangers in manufacturing, storing, transporting, disposing of insecticides
 - v. Land use, soil degradation , population pressure and depletion of forest grasslands and crop land. 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. Activation 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.

**GENERAL FOUNDATION
&
INDUSTRIAL SOCIOLOGY
ENTREPRENEURSHIP**

Class XII

Paper – I

Part – A Compulsory objective type of questions covering the entire syllabus of class XI and class XII carrying 20 marks.

Part – B Will have 8 questions covering labour legislation and entrepreneurship, Building people & Science Technology of which candidates will have to answer 6 questions carrying 5 marks each = 30 marks.

Paper – II Will be of 3 hours consisting of a complete project plan, preparations of a feasibility certificate and registration – 50 marks.

Paper I 3 Hrs. Marks - 50.

1. **The Trade Union Act - 1926**

- a. Trade union
- b. Registration
- c. Various rules and regulations.
- d. Cancellation of Registration.
- e. Rights and duties of Trade union.

2. **Factories Act – 1948.**

- i. Definitions of adult, adolescent, young person, manufacturing process worker, factory, occupier.
- ii. Scope :- applicable to
 - a. Establishment with 10 or more workers – work with the aid of power.
 - b. 20 or more workers without the aid of power.
 - c. Establishment not in accordance with the above two cases but notified by the Government.

Main provisions

- i. Health, safety, welfare
- ii. Hours of work
- iii. Employment of young persons and women
- iv. Annual leave with wages
- v. Occupational diseases
- vi. Administration
- vii. Enforcement
- viii. Penalties for offences.

3. **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.

4. 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

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)

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 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

Full Marks -50 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.

COMPUTER THEORY

Class – XI

Detailed Syllabus

3 Hrs.

Full Marks- 100 Marks

MODULE 1 – COMPUTER THEORY

1. INTRODUCTION

- 1.1 General thinking, misconceptions & limitations.
- 1.2 Information concepts and processing:
Definition of information – Difference between data & information. Need for computer.
- 1.3 Types of processing:
Batch processing – Transaction processing – on-line processing.
- 1.4 Office automation:
Document distribution – Facsimile transmission – Message passing
Public data service.

2. COMPUTER

- 2.1 Definition – History and development of computers – Classification of computers – computers generations.
- 2.2 Language generation – computer languages – categories of software system and application software.

3. HARDWARE AND SOFTWARE CONCEPTS

3.1 COMPUTER THEORY (Hardware)

Computer layout – Processing unit – CPU, Introduction to CPU, CPU chip – Generation and classification – Control unit layout. Instruction execution – Fetch and execution cycles – Microprogramming concept – Role as main controlling unit – Decision making, Device interface Supervisory functions – Multitasking & Multiprogramming.

3.2 STORAGE (Temporary)

Primary storage – characteristics – Volatile, non-volatile – Main memory-RAM, ROM, PROM, EPROM – Memory capacity, addressing – word. Register concept – Bit-Bites – Character representation in memory – use of binary system – BCD, BCD – 7 (ASCII), BCD-8 (EBCDIC) Buffer memory, High speed buffers.Cache memory, Virtual memory.

3.3 STORAGE (Permanent)

Secondary storage devices, purpose, characteristics – non-volatile – massive volumes – cost efficient – modular in expendability. Magnetic tape systems – coding data on magnetic tape – density of recording – fixed and variable length records – header and trailer labels – blocking of records – advantages and disadvantages of magnetic tapes.

Magnetic disks – Hard disks – removable and fixed disk packs – Winchester disks – coding data on magnetic disk – addressing records on disks – sectors – access time – Floppy disks – types of floppy disks – storage capacity – advantages and disadvantages of floppy disks and hard disks – Video or optical disks (CD-ROM).

3.4 INPUT

Input concepts and purposes – source document & process input relation – data capture – on line & off-line data input. Data input methods – concept of text and image capture – card punch system (reader and sorter)

VDU – dumb, smart and intelligent terminals – console – keyboard unit – mouse – joystick – light-pen – image capture – digitizer – optical character reader – magnetic codes reader – MICR – OCR.

3.5 OUTPUT

Internal and external output concepts – printed output – display output – Printed output devices: character printers: Impact – Daisy – wheel – dot matrix – inkjet. Page printers: Laser printers – High-speed line printers – drum printers – plotter. Display output: LCD – CRT display – monochrome – colour display – CGA – EGA – MCGA – VGA.

4. COMPUTER ARITHMETIC AND NUMBER SYSTEM

4.1 Arithmetic system – characteristics of number systems – position of digit and base/radix system.

4.2 Roman system – Decimal system – Binary system – Octal & Hexadecimal representation of numbers – conversion from binary to octal/hexadecimal and vice-versa – use of octal and hexa-decimal numbers in memory addressing.

5. COMPUTER AND COMMUNICATION

5.1 Computer communication – Methods of data transmission – Communication channels – Twisted pair wire – coaxial cable – Micro wave – radio wave – optical fiber.

5.2 Digital and analog transmission – serial data transmission – parallel data transmission – modems.

5.3 Data Networks : Introduction – circuit switching – packet switching – Topology – Types of Topology

5.4 Network Protocols : Introduction – Protocol – OSI Model – Data link Protocols.

5.5 Networking of computers – LAN – need and advantages of networking. Types of

- LAN-s.
5.6 Data Communication Systems: Facsimile (FAX) – Satellite communication – Multiple Access Techniques (FDMA, TDMA, CDMA) – Digital exchange.

COMPUTER THEORY

Class – XII Detailed Syllabus 3 Hrs. Full Marks- 100 Marks

MODULE 1 – SYSTEM ANALYSIS AND DESIGN

Paper I

- 1.1 Type of business problems – Need for computers to solve business problems.
 - 1.1.1 Business organization – business information – nature of business requirements.
 - 1.1.2 Data management functions in business – need for improved methods of data processing – computer based data processing system –examples of business requiring computer processing.
- 1.2 Identification of problems and objectives – Analyzing current procedures and methods.
 - 1.2.1 Identify problem areas like speed of processing, volume of workload, cost of processing, accuracy / reliability of output reports generated security of processing.
 - 1.2.2 Fact-finding techniques – questionnaires – personal interviews – observation – background analysis.
- 1.3 System study cycle – Analysis of problems – Determination of alternative solutions.
 - 1.3.1 The life-cycle concept–life cycle phases and activities– review of lifecycle activities – documentation.
 - 1.3.2 Activities in a system study cycle – preliminary investigation – classification of requirements – feasibility study – feasibility report.
 - 1.3.3 System development constraints – administrative problems – technological problems – communications problems– inadequate user involvement – inadequate quality control – un-system approach.
 - 1.3.4 Documentating existing system – identifying current deficiencies – establishing new goals.
 - 1.3.5 Identifying alternate types of solutions – organizational solutions – people solutions – hardware solutions – software solutions – procedural solutions – forms solutions – combined solutions.

- 1.4 Design of a new system – Design tools and techniques – Design specifications – Design report.
 - 1.4.1 System design considerations – objectives of the design – constraints – processing techniques.
 - 1.4.2 Designing the over-all process – segmenting the system into workable modules – organization of the database – design of input forms – design of output reports – design of files – design of controls for the system – documentation and review.
 - 1.4.3 Definition of a system tool – decision trees – decision tables – tools for analysis of data flow – data flow diagram – data structure diagram – flow-charts.
 - 1.4.4 System design specification– design phase report – system manual – user manual – operational manual.

- 1.5 Selection of configuration based on workload needs.
 - 1.5.1 Determination of size and capacity requirement for the system designed –memory and auxiliary storage requirements – system software requirements.
 - 1.5.2 Vendor specifications relating to memory size, speed of processing– characteristics of display, input, output and communication peripherals – auxiliary storage devices.
 - 1.5.3 Financial factors – purchase or rental – maintenance support and service.

- 1.6 Data processing Methods.
 - 1.6.1 Types of data processing applications system purpose – processing mode – processing location.
 - 1.6.2 Batch processing – remote batch – off-line data transmission – division of work into runs – timing and processing runs – recovery techniques – typical applications.
 - 1.6.3 On-line processing – interactive systems – time-sharing – on-line with batch updating – data logging.
 - 1.6.4 Distributed processing – hierarchical distribution – lateral or star distribution – advantages and disadvantages of distributed processing systems.

- 1.7 File organization – Sequential, Relative & Indexed.
 - 1.7.1 Characteristics of business computer applications – classification of computer files based on processing function like master file, transaction file, work file, etc.
 - 1.7.2 File process – sorting – merging – matching – summarizing – searching updating – activity of file records – processing modes – reconstruction – overlay.
 - 1.7.3 Magnetic tape files – serial and sequential files – difference between them – advantage of back up creation automatically while processing.
 - 1.7.4 Disk files – sequential for law activity files – characteristics of indexed and relative files – addressing techniques.

- 1.8 Security Aspects.
 - 1.8.1 Basic system controls – block or trap faulty data – ensure complete processing of all data – reconstruction of files in case of disaster – prohibit tampering by unauthorized access – prevent fraud, virus problem.
 - 1.8.2 Methods of ensuring security – physical security – password protection – message logging – dumping.

OPERATING SYSTEM & APPLICATION SOFTWARE

Class – XI Detailed Syllabus Full Marks-60

MODULE I1 – OPERATING SYSTEM Paper I

1. SYSTEM SOFTWARE – OPERATING SYSTEMS

- 1.1 Computer Hardware as different from complete computer system – Function of software in a computer system – system software – application software.
- 1.2 Operating system as the main component of system software – Boot strap program – other components that are now considered as part of system software – Role and purpose of operating system software – Device controlling and interfacing capabilities – introduction as start up program – memory management and application program interface.
- 1.3 Development of operating system as a set of programs that standardize the way a computer's resources are made available to the user and to the application software.
- 1.4 Concept of shell – transient and non-transient parts of OS – OS functions concepts of multi-tasking – overlapping – time sharing – multiprocessing.

2. INTRODUCTION TO DOS

- 2.1 What is DOS? Booting – date –time – resetting the computer – preparing diskettes – DOS prompt – DOS files – DIR – wildcards – DOS file naming – conventions – DOS file specifications – copy – write project – internal and external commands.
- 2.2 Basic DOS commands : CLS – VER – TYPE – COPY CON – REN – DEL – ERASE – CHKDSK - LABEL – VOL – COMP – DISKCOMP – PROMPT – FORMAT – DISKCOPY.
- 2.3 DOS files management with subdirectories : mkdir – chkdir – rmdir – tree – path
- 2.4 Pipes – filters and redirection – more – sort – find. Batch files –creating a batch file – commands of batch file – Autoexec.bat
- 2.5 Advanced DOS: append – assign – attrib – recover – join – exit – set- share – subst – sys – verify - ctty – xcopy –DOS editing keys – Backup – restore – Edlin.

3. INTRODUCTION TO WINDOWS

- 3.1 Windows Basics
- 3.2 Working with windows and windows accessories.
- 3.3 Internet and web features: Internet – Web Browsers – E-Mail – Active Desktop – Channels – Net Meeting.

Paper II - Full Marks –40

Practical related to theory prescribed in syllabus in MODULE – II.

MODULE 11 – APPLICATION SOFTWARE

Class – XI Detailed Syllabus Paper I Full marks 60

1. Text Manipulation –

Word Processing with Reference to MS-WORD.

- 1.1 Introduction to Word.
- 1.2 Editing a document.
- 1.3 Move and copy text and help system.
- 1.4 Formatting text and paragraph.
- 1.5 Finding and replacing text and checking spelling.
- 1.6 Using tabs.
- 1.7 Enhancing a document
 - Page setup
 - Page breaks, headers & footers
 - Print preview
 - Changing case
 - Print options
- 1.8 Columns, Tables and other features.
- 1.9 Using Graphics, Templates and wizards.
- 1.10 Using mail merge.
- 1.11 Miscellaneous features of word.

2. Data Analysis Software – Spreadsheet software like MS-EXCEL.

- 2.1 Introduction to worksheet and Excel.
- 2.2 Getting started with Excel.
 - Entering information in a worksheet.
 - Entering values and formula.
- 2.3 Editing cells and using commands and functions.
- 2.4 Moving and copying, inserting and deleting rows and columns and using help.
- 2.5 Printing the worksheet.
- 2.6 Creating charts.
 - Using chart wizards
 - Re-sizing and moving the chart.
 - Controlling , updating, modifying and deleting a chart.

- 2.7 Using date and time and addressing modes.
- 2.8 Naming ranges and using statistical, Math and Financial function.
- 2.9 Database in worksheet.
- 2.10 Additional formatting commands and drawing toolbars.
- 2.11 Miscellaneous commands and functions.

3. Storage and Retrieval of data – Database Management – Data manipulation with software like FOXPRO

- 3.1 Introduction to FOXPRO.
Foxpro under windows.
What is database?
What is relational database?
Phase of database design
Foxpro :
Data types, creating database, positioning database, saving,
editing database, deleting records & files, modify database structure,
open and close database file, quit foxpro.
- 3.2 Sorting and indexing :
Sort, index, types of index.
Indexing commands :
Set index, set order, re-index, close index.
Sorting vs indexing
- 3.3 Querying :
Query with menu
Go to, locate, continue, seek.
Query with commands : locate, find, seek,
Set filter commands
View files.
- 3.4 Queries and reports :
Creating query with RQBE.
Add sort order to query result.
Select fields for query result.
Select fields for query result.
Change output of query.
Execute and modify query.
Report generation.

- 3.5 Advantage reports :
 - Report generating commands
 - Using functions – if, pageno, date, time, cmonth, day, year.
 - Adding pictures
 - Create and print mailing labels.
 - Modify labels.

- 3.6 Window objects in database, file management commands, macros.
 - Linking, Embedding
 - Add picture & OLE data to database
 - Edit OLE data
 - Run & copy file command
 - Define work areas.
 - Closing database, copying database structure
 - Combining files.
 - Create & save macro, macro menu option

- 3.7 Foxpro programming
 - Create command file, memory variable
 - Operator: mathematical, relational, logical, string
 - Functions : eof, bof, date and time, upper, lower, dtos,ctod and dtoc, space, trim, ltrim, str.
 - Commands: set, talk, skip, return, accept and input, count, sum, average, @, ?, ??, text.
 - Loops: Scan and end scan, Do-while, if-else endif, nested if, case, exit, cancel, wait, zap.
 - Macro, light bar menu, program codetor data entry, deleting records, generating reports and send report to printer.

PROGRAMMING LANGUAGES

Class – XI

Detailed Syllabus

Full Marks:

60 Marks

MODULE I1I – PROGRAMMING LANGUAGES

Paper – I

1. ‘C’ PROGRAMMING LANGUAGE

1.1 Getting started with ‘C’

‘C’ character set
Constants, Variables and keywords.

1.2 The decision control structure, loop control structure and case control structure. if statement, if-else statement, Logical operators. while loop, for loop, do-while loop, break statement, continue statement. switch case, go to statement.

1.3 Functions : Introduction and use of function Scope rule of functions Function declaration and prototypes Call by value and call by reference Pointers in ‘C’

1.4 Data types revisited Integers: long & short, signed and unsigned Chars: signed and unsigned Floats and Doubles Storage classes in ‘C’

1.5 ‘C’ Preprocessor

1.6 Arrays Array initialization Pointers and Arrays Arrays and pointers.

- 1.7 Puppeting on strings
 - What are strings
 - Standard Library string Functions
 - Strlen ()
 - Strcpy ()
 - Strcat ()
 - Strcmp ()
 - Two Dimensional Array of characters
 - Array of pointers to strings

- 1.8 Structures
 - Uses of structures.
 - Declaration, Accessing and storing of structure elements.
 - Array of structures.
 - Additional feature of structure.
 - Unions, Unions of structures.

- 1.9 Input / Output in 'C'
 - Types of I / O.
 - Console input / output functions.
 - Sprintf () and scanf () functions.
 - Disk I / O Functions.
 - File opening Modes.
 - Fclose ().
 - Using argv and argc.
 - String (line) I / O in files.

- 1.10 The leftovers.
 - Enumerated data type.
 - Renaming data types with typedef.
 - Type casting.
 - Pointers to functions.
 - Functions Returning pointers.
 - Functions with variable number of Arguments.

Paper II : Practicals related to theory prescribed in syllabus in
MODULE III.

MODULE 111 – PROGRAMMING LANGUAGE C++

Class – XII Detailed Syllabus Full Marks- 60

1. Principles of Object .
Oriented Programming.
2. Beginning with C++
What is C++, Its application?
Structure of C++ program.
Creating the source file.
Compiling and linking.
3. Tokens, Expressions and control structures.
Introduction, Tokens, Keywords, Identifiers, Data types,
variable declarations, operators in C++, Manipulators, Type
cast operator.
4. Function in C++ :
Introduction.
Main function.
Function prototyping.
Call by reference , Return by Reference.
Inline functions.
Default arguments, Const argument.
Function overloading, friend and virtual functions.
5. Arrays
Array Notation.
Array Declaration.
Array Initialization.
Processing with Array.
Arrays and functions , Multidimensional Arrays.
Character Array.
6. Pointers
Pointer declaration: Pointer operator, Address operator,
Pointer expressions.
Pointer Arithmetic.
Pointers and functions: call by value, call by reference,
pointers to functions, passing a function to another function.
Pointers and Arrays: One dimensional & multidimensional
arrays. Pointers and string ,Arrays of pointers ,Pointers to
pointers.

7. Classes and objects
 - Introduction, structures and classes
 - Declaration of class, member function
 - Arrays within a class
 - Memory allocation for objects
 - Static data members and member functions.
 - Arrays of objects, objects as function Arguments.
 - Pointers to members.
8. Constructors and Destructors
 - Introduction, Constructors:
 - Copy constructors, Default constructors.
 - Destructors.
9. Operator overloading and type conversions.
10. Inheritance: Extending classes
 - Derived classes
 - Types of inheritance
 - Virtual Base classes
 - Abstract classes
 - Use of constructor
11. Pointers, Virtual functions and Polymorphism
 - Introduction
 - Pointers to objects and derived classes
 - This pointer
 - Virtual function
12. Working with files
 - Classes for file stream operations
 - Opening & closing of file.
 - File pointers
 - Updating files
 - Command – Line Arguments
13. Templates.
 - Function template
 - Class template
 - Exception handling.

COMPUTER/TECHNICAL MATHEMATICS

CLASS X1

DETAILED SYLLABUS

Paper – I General Mathematics (3 Hrs.) 100
Marks

General Mathematics, consisting of **TEN QUESTIONS** on:

- (1) Arithmetic
- (2) Algebra
- (3) Trigonometry

Candidates will be required to answer **SIX QUESTIONS ONLY**.

1. **ARITHMETIC**

1.1 Logarithms and Logarithmic expressions: Common and Natural.

1.1.1 Define a logarithm to any base.

1.1.2 Convert a simple indicial relationship to a logarithmic relationship and vice versa.

1.1.3 Deduce the laws of logarithms in the following terms where b in any base.

$$\log_b (MN) = \log_b M + \log_b N$$

$$\log_b (M/N) = \log_b M - \log_b N$$

$$\log_b (N^a) = a \log_b N$$

1.1.4 State that $\log_b 1 = 0$, $\log_b b = 1$.

1.1.5 State that as $x \rightarrow 0$, $\log_b x \rightarrow (-)$

1.1.6 Apply the laws of logarithms to simplify expressions.

1.1.7 Apply the laws of logarithms to solve equations.

1.1.8 Define the natural base e as approximately 2.718.

1.1.9 Define natural (Napierian) logarithms ($\log_e M$ or $\ln M$)

1.1.10 Determine natural logarithms from tables and calculator.

1.1.11 Evaluate expressions and solve equations involving natural logarithms.

1.1.12 Deduce the relationship between natural and common logarithms.

1.2 Indicical Equations

- 1.2.4 Change the base of numbers using the law of powers, e.g. $16 = 4^2$, $27 = 3^3$.
- 1.2.5 Change the base of numbers where the index may be in algebraic form such as $8^x = 2^3x$.
- 1.2.6 Solve indicial equations where the indices are line in one unknown.
- 1.2.7 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 primoidal 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 and 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 formulat e 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 i 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

2.2.2 Recognise factors of quadratic expressions, including $(a+b)^2$, $(a-b)^2$ and (a^2-b^2)

2.2.3 Factorise factors of quadratic expressions, including perfect squares and the difference of two squares.

2.2.4 Recognise that some simple quadratic expressions do not factorise e.g. (a^2+b^2)

2.2.5 Define the roots of an equations.

2.2.6 Determine the equation which is satisfied by a given pair of roots.

2.2.7 Recognise; a quadratic expression, a quadratic equations.

2.2.8 Solve quadratic equations with real roots by factorisation.

2.2.9 Solve quadratic equations which provide real roots by the use of the formula

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

2.2.10 Form and solve quadratic equation which are mathematical models of practical problems e.g. linear accelerated motion, second order chemical reaction.

2.2.11 Check a solution of the equation by substitution disregarding irrelevant roots.

2.2.12 Solve algebraically simultaneous quadratic and linear equations.

2.3 Points of intersection of two graphs and their significance.

2.3.2 Solve a pair of simultaneous equations in two unknowns graphically.

2.3.3 Determine the roots of a quadratic equation by the intersection of their graphs with the x-axis.

2.3.4 Solve a simultaneous linear and quadratic equation by the intersection of their graphs.

2.3.5 Plot the graph of a cubic equation with specified interval range.

2.3.6 Solve a cubic equation using 2.3.4

- 2.4 Graphs of exponential growth and decay.
- 2.4.2 Plot and graphs of $y=e^{ax}$ and $y = -ax$ with the aid of tables and with the aid of a calculator.
- 2.4.3 Draw graphs of experimental data of growths and decays which are exponential functions.
- 2.4.4 Define the gradient of any curve at a point as the tangent at that point.
- 2.4.5 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
- 2.5.2 Definitions
- 2.5.3 Power of j
- 2.5.4 Addition and subtraction of complex numbers in algebraic form.
- 2.5.5 Multiplication of complex numbers in algebraic form.
- 2.5.6 Conjugate complex numbers.
- 2.5.7 Division of complex numbers in algebraic form.
- 2.5.8 The Argand Diagram.
- 2.5.9 The j-operator.
- 2.5.10 Addition of phasors.
- 2.5.11 Subtraction of phasors.
- 2.5.12 The polar form of a complex number.
- 2.5.13 Multiplying numbers in polar form.
- 2.5.14 Square root of a complex number.
- 2.5.15 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) $\cos(A \pm B) = \cos A \cos B \pm \sin A \sin B$
- 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

**PRINCIPLES OF ELECTRONICS/
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 $d y/d x$
- 4.1.3 Use the derivatives of the functions:
 ax^n , $\sin ax$, $\cos ax$, $\tan ax$, $\log_e d$ 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 $d^2 y/d x^2$ 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 $d^2s / d t^2$ 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 ox,oy.**
- 4.2.4 Determine the ratio y/x as x tends to zero and defines it as dy/dx .
- 4.2.5 Derive the limit of y/x as y tends to zero and defines it as y/x .
- 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 $d y / d x = f (x)$ given a boundary condition.
- 4.2.15 Differentiate $y = Ae^{kx}$.
- 4.2.16 Verify that $y = Ae^{kx}$ satisfies $d y / d x = ky$ by substitution.
- 4.2.17 Derive equations of the form $d y / d x = ky$ 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 Hardware & Software in
COMPUTER PROGRAMMER & SYSTEM ANALYST.**

There should be enough computer systems to provide for a teaching schedule where at least two thirds of the time available is used for programming and practical work. Schools are advised to consider the following minimum specifications while installing the computer systems.

HARDWARE:

32-bit IBM compatible or Macintosh - equivalent microprocessors:

4 MB RAM 16 MB RAM

14" SVGA Monitor

1 x 1.44 MB FDD

1 x 2.1 GB HDD or higher

Key board

Mouse

Printer (with Graphics & NLQ capabilities)

Multimedia kit with CD-ROM drive (at least on every one of five systems)

SOFTWARE:

- I. Operating Systems :
 - i. Disk based, e.g. MS – DOS
 - ii. GUI, e.g. MS -Windows
2. Compilers / Interpreters for
 - I) C
 - ii) C + +
3. Application Software:
 - i. Word processor with WYSIWYG facility
 - ii. Spreadsheet
 - iii. DBMS
 - iv Graphics ,
 - v. Communication utilities and Internet
4. Systems Analysis Software:
 - i. Financial Accounting
 - ii. Project Management