SYLLABI
FOR
STANDARDS XI & XII

(For the Higher Secondary Certificate Examination)

VOCATIONAL COURSES

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Maharashtra State
Board of Secondary and Higher Secondary Education
Pune 411 005

HIGHER SECONDARY CERTIFICATE EXAMINATION

(Subject with their Code Numbers)

CODE NO. & NAME OF THE SUBJECT	CODE NO. & NAME OF THE SUBJECT	CODE NO. & NAME OF THE SUBJECT	CODE NO. & NAME OF THE SUBJECT
LANGUAGES :	52) Secretarial Practice	**COMMERCIAL GROUP**	Purchasing & Store Keeping (M7 / M8/ M9)
01) English (Compulsory)	53) Co-operation	A5) Banking	Inland Fisheries (N1/ N2/ N3)
02) Marathi	54) Physics	A7) Office Management	Fish Processing Technology (N4 / N5/ N6)
03) Gujarati	55) Chemistry	A8) Marketing & Salesmanship	Watershed Management (N7/N8/N9)
04) Hindi	56) Biology	A9) Small Industries & Self Employment	Medical Lab. Technician (P1 / P2/ P3)
05) Urdu	57) Drawing	**AGRICULTURAL GROUP**	X-Ray Technician (P4 / P5/ P6)
06) Kannada	58) Design & Colour	B2) Animal Science & Dairying	Opthalmic Technician (P7 / P8 / P9)
07) Sindhi	59) Composition	B4) Crop Science	Creche & Pre-School Management (Q1/ Q2/ Q3)
08) Malayalam	60) History and Appreciations of Art	B5) Horticulture	Cookery (R1 / R2 / R3)
09) Tamil	65) History & Development of Indian Music	**FISHERY GROUP**	Bakery & Confectionary (R7 / R8/ R9)
10) Telugu	66) Vocal Light Music	B9) Fish Processing Technology	Tourism & Travel Techniques (S1 / S2 / S3)
11) Punjabi	67) Vocal Classical Music	C1) Fresh Water Fish Culture	Repair, Maintenance & Rewinding of Electrical Moters (T1/ T2/ T3)
12) Bengali	68) Instrumental Music	**MINIMUM COMPETENCY VOCATIONAL SUBJECTS (MCVC)**	Insurance (U1 / U2 / U3)
13) French	69) Indian Music (Percussion)	90) General Foundation Course	Banking (U4 / U5 / U6)
14) German	73) European Music	Electronics Techonology (J1/ J2/ J3)	Office Management (U7 / U8/ U9)
16) Ardhamagadhi	75) Crop Production	Maintain & Repairs of Electrical Domestic Appliance (J4 / J5 / J6)	Seed Production Technology (V4/ V5 / V6)
20) Russian	76) Animal Science	Building Maintenance (J7/ J8/ J9)	Poultry Production (V7 / V8/ V9)
87) Avesta- Pahalvi	77) Defence Studies	Auto Engineering Technician (K1/ K2/ K3)	Dairy Technology (W1 / W2/ W3)
OPTIONAL SUBJECTS:	78) Education	Mechanical Technology (K4 / K5 / K6)	Computer Techniques (X-1, X-2, X-3)
33) Sanskrit	91) History & Developement of Indian Classical Dance	Horticulture (L1 / L2 / L3)	Multimedia & Internet Technology (Y1/Y2/Y3)
35) Pali	97) Information Tech.(Sci. Stream)	Crop Science (L4 / L5 / L6)	
36) Arabic	98) Information Tech.(Arts Stream)	Post-Harvest Technology (L7/L8/L9)	
37) Persian	99) InformationTech.(Comm. Stream)	Accounting & Auditing (M1/ M2 / M3)	
38) History	**OCCUPATIONAL ORIENTATION :**	Marketing & Salesmanship (M4 / M5 / M6)	
39) Geography	80) Stenography (English)		
40) Mathematics & Statistics (for Arts & Science Streams)	85) Library Science		
88) Mathematics & Statistics (for Commerce stream)	89) Stenography (Marathi)		
41) Geology	**VOCATIONAL SUBJECTS: TECHNICAL GROUP**		
42) Political Science	A1) Electrical Maintenance		
43) Child Development	A2) Mechanical Maintenance		
44) Textile Laundry & Clothing	A3) Scooter & Motor Cycle Servicing		
45) Sociology	A4) General Civil Engg.		
46) Philosophy	C2) Electronics		
47) Logic	D9) Computer Science		
48) Psychology			
49) Economics			
50) Book Keeping & Accountancy			
51) Organisation of Commerce			

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INTRODUCTION

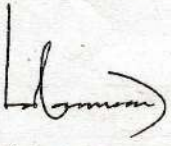
The Board introduced 19 Vocational courses at +2 stage from the Academic year 1978-79 in Std. XI. These courses are classified under Technical, Commerce, Agriculture, Catering & Food Technology and Fisheries Group. The first H.S.C. Examination of these Vocational Courses was conducted in March 1980.

In addition to the 19 Vocational Courses, two courses under Technical Group and two courses under the new sixth group, viz. Para-Medical were added and introduced from the academic year 1979-80 in Std. XI. Simultaneously three courses of Technical Group and three courses of Commerce Group which were introduced from the academic year 1978-79 were revised and the revised syllabi of these six courses were introduced from the academic year 1979-80. A supplement to syllabi of Vocational Courses cotaining ten courses (four newly added and six revised) was published in August 1979. The syllabus of General Civil Engineering was revised and published as the Second Supplement to Vocational Courses in June 1981. Thus, in all 23 vocational courses have been introduced under six groups from the academic year 1981-82.

Taking into consideration the need of time, twenty fourth Vocational Course,viz. Computer Science under Technical Group was also introduced from the academic year 1986-87 and the syllabus of Electronics was revised in the academic year from 1999-2000 for Std. XI and in 2000-2001 for Std. XII, Subsequent to this the syllabus of computer science was also revised in the academic year 2000-2001 for Std XI and in 2001-2002 for Std. XII

Meanwhile, due to lack of enough strength of students, three courses from Catering and Food Technology group, two courses from Para-Medical, two from Commercial group, one from Agricultural group and one from Technical group were terminated. As a result, now this booklet contains the syllabi of Vocational Courses under four groups. All these courses are designed in such a way that the expected practical skills and vocational abilities will be developed in students after the learning period of two years. It is hoped that these courses will fulfil the needs of our modern society and will encourage our students to seek self-employment or wage employment.

The Board is grateful to the experts in different fields for extending their expertise in framing and revising the syllabi of these courses.



(Mohan Awate)
Chairman.
Maharashtra State Board of
Secondary and Higher Sec. Education
Pune - 411 005.

CONTENTS

Technical Group

Course I

ELECTRICAL MAINTENANCE

Standard XI

PAPER I

THEORY (4 Periods/Week)

1. Basic Carpentry-Carpenter's tools, their uses, care and maintenance. Types of joints used in carpentry useful for electrician. Lap. Mitre, Tee, Cross, etc. Materials used for Joints-screws-nails-glue, etc.
2. Basic Fitters Tools - Hammers, Saws, Punches, Screw drivers, Rawal Punch; pliers, Tongs, Vices, Taps, Dies, Pipe-cutters, Pipe accessories G.I. and conduct solders.
3. Basic Engineering Drawing-Lines, lettering Projections-Orthographic and Isometric Projections-Sketching of hand tools, Elevations, Plan Endviews-Sketches of accessories of conduits.
4. Electric Circuit-Concept,of EMF, P.D., Ohm's Law, Resistance, Resistance in series and parallel, E. Power, E. Energy.
5. Elementary wiring-wiring accessories, General Information about LT and HT circuits, Bare Copper and Aluminium Copper wire joints.
6. Secondary Cells-Types charging care and maintenance of Battery.
7. Electrical Instruments -Ammeters, Voltmeters, Megers, Energy ,meters, (MC and MI) Wattmeters, Tong tester, multimeters.

PRACTICALS (4 Periods/Week)

1. Basic Carpentry-6 jobs
   Sawing (1), Chieseling (l), Joints (4)
2. Basic Fitting - 4 Jobs
   Plane filling, Sawing, Drilling, Tapping
3. Drawing Sheets - 10 to 8 numbers.
   Lines & lettering (2), Projections (4), Isometrics (3),
   Sketches of Electrician's tools (2).
4. Measurement of resistance by V & A.
5. Series & Parallel resistance

6. Measurements of insulation by Megger.
7. Jointing (3-4 Joints)
8. Study of Battery, Battery charging
9. Connection of accessories such as switches, holders, starters, tubes, pins, etc.

Term work will be the journals.

Practical Examination as above Experiments.

PAPER II

THEORY (4 Periods/Week)

1. Fundamental-Elementary Single phase alternator. A.C. Wave form frequency. Current, Voltage & Power relations-A.C. Circuits R.L.C. Occurrence of accidents due to electric current.
2. Safety Measures-Treatment against shocks. Safety Rules-Indian Electricity Rules-Earthing, Insulation-Classification of insulation. Effect of moisture on insulation resistance of wiring.
3. Methods of Generation of Electricity-Line Diagram of Generatig stations. General information about Power Houses in Maharashtra and their capacities.
4. D.C./A.C. - Difference in D.C. & A.C.
5. D.C. Geneators-Motors-Functions and various types.
6. Basic Pinciples in Alternators-Single phase and 3 phase system, (Descriptive only)
7. A.C. Motors-Single phase and 3 phase.
8. Starters I.C.T.P.'s-Types and its uses. Polyphase Circuits. Stardelta connections-Relations of Voltage, Current and Power in 3 phase.

PRACTICALS (4 Periods/Week)

1. Study and Practicals of shock treatments and first Aid, Practical explanation of how accident occurs.
2. Study of A.C.and its generation in laboratory Models.
3. Measurement of Power in single Phase A.C. Circuit containing R-L-C.

4. Study and starting of D.C. Motors-(3) Series, compound, Shunt.
5. Study and starting of D.C.Generators- (3) Series, Compound, Shunt.
6. Measurements of Insulation resistance of D.C. Machine windings.
7. Connections of A.C. Motor with switch starter and fuses Single phase.
8. Connection of 3 phase A. C. Motor with starter, Switch and fuses and running the Motor on load.
9. Reversal of rotation by Phase changing
10. Earthing and Earthing tests-by Megger and Lamp.
11. Practical Experiments on moistured motor to study the effect of moisture. Study of wet and dry insulation and also after Warnishing. Journal will consist of all Practical Examinations on above practicals.

Standard XII

PAPER I

THEORY (4 Periods/Week)

1 Electrical drawing - Electric Symbols for electrical equipment. Diagrams of Energy meters, Voltmeters, Ammeters. Panel wiring diagram of D.C. Motors with starter & switch. Stardelta, Auto transformer starter. Control of Power circuits.

2. Domestic wiring - Types of wires, and conductors-Bare Copper-Insulators, Conductors-Gauges of conductors -PVC, VIR, CTS wires-Types of wiring-CTS, cleat, Casing & Caping, Conduit wiring.
3. Fuses - Importance of fuses Connection & replacement of fuses.
4. House Wiring - Godown wiring - H.T. wiring
5. Wiring-Illumination Schemes for Houses, Godown, Workshop or Public Hall, Street Light wiring, Underground cable Laying, Cable jointing-connecting single phase, 3 phase motors with switches & starters, Study of Table Fans, Ceiling, Fans, Electric Iron and other electrical Gadgets. Its Connections for domestic uses. Flood Lighting, Neon signs and other lamps. Preventive maintenance in electrical connections- Programming.

PRACTICALS (4 Periods/Week)

1. Electrical Drawing Sheets-(6)

2. Study of various wiring Accessories, Switches,Holders, Brackets, Plugs, etc.
3. I.C. T. P.-Starters-Conductors-Insulators.
   Sketches of above accessories
   Connecting the above accessories
4. Types of wiring C.T.S., Conduit
5. Casing and Caping-for
   Controlling one lamp with one switch.
6. Lamps & Switches in Parallel.
7. Stair case wiring-Opening,refitting
   and connecting, table- fan, ceiling fan, electric appliances.
8. Connecting fluoroscent tube.
9. Preventive Maintenance Experiment Programming, Inspecting.
10. Street Wiring-In three Poles.
11. Cable laying and Jointing underground.

Journals on Practicals.

Practical tests on wiring and connections of accessories.

PAPER - II

THEORY (4 Periods/Week)

1. Principles of transformers -1 ph. & 3 ph. transformers - Main parts, common faults repairs & Maintenance- Auto transformer-study of stabilizer.
2. General Principles of single & 3 Phase Induction motor, Types, Schematic representation of these motors. Necessity of starters-Types of starters-Star-Delta starters. Reversal of rotation. Industrial application load test.
3. Calibration of repairs of Instruments-Ammeters, Voltmeters, Wattmeters, Energymeters - Frequency meters, P F meters. Synchroscope, Phase sequence indicator, Multimeter.
4. Synchronous Motor-Principle and starting method & application, common faults, care & maintenance.
5. Electric Heating Resistance Ovens-Arc furnaces.
6. Parallel Operation of 3 Phase alternators-Three phase starter . ISS-

4889-1968 and ISS-325-1970-descriptive treatment.

7. Study of H. T. Sub station .

   (a) Checking Proper Phase (b) Megger test for insulation (e) Earth Resistance Test. (This should be done at any of the MSEB Sub-station.)

8. Preventive maintenance in Electrical Machines checking electrical connections-maintaining it.

PRACTICALS (4 Periods/Week)

1. Starting after making connections of single phase & 3 phase Motors with starter, switch, in Circuit.
2. Study of circuit diagram of simple machine tool alongwith control panel.
3. Speed Control of Induction Motor.
4. Measurement of Power in 3 Phase Circuit by one Wattmeter.
5. Measurement of power by three Voltmeter Method.
6. Connections of Single Phase and 3 phase transformer Mains & to load.
7. Reduction of Voltage from 440 to low volts.
8. Opening, cleaning, repairing and refitting; motors, generators, tranformers- Fans (Table & Ceiling)
9. Calibrations of D.C. Voltmeter, Ammeter, Single Phase, A.C. Energymeter.
10. Study of stabilizer with variable input voltages.

Practical test on any one of the above Experiments.

List of Equipments for Electrical Laboratory
(Standrds XI & XII Vocational Course in Electrical Maintenance)

Sr. No.	Description	Quantity	Cost in Rs. (Approx)
1.	Motor Generator set comprising of one 230 volts, 1500 RPM, 3 KVA Generator coupled to D.C. shunt motor S.H.P. 230 Volts with control Panel & Starter.	1	5000=00
2.	230 Volts 3 H.P. D.C. shunt motor	1	3000=00

1.	2.	3.	4.
	with starter and field regulator and with test bed arrangments.		
3.	M.G. set comprising of A.C. three phase 50c/s 230 volts 1440 R.P.M.S. H.P. squirrel case induction motor coupled to 2.5 K.W., D.C., 230 Volts compound Generator with field regulator and starter for motor.	1	5000=00
4.	Slip ring induction motor 3 phase, 230 Volts, 3 H.P. with rotor resistance starter.	1	3000=00
5.	Working kit of three phase squirrel cage induction motor 3 H.P. 230 Volts with various coil terminals brought out for pole changing arrangement.	1	2000=00
6.	0.5 H.P. 230 Volts 1440 R.P.M. single phase capacitor start and shaded pole induction motor.	1	2000=00
7.	M.G. set 3 K.V.A. 230 Volts, three phase, 4 poles, synehronous alternator coupled to one 230 Volts, D.C. shunt motor to drive the above alternator with starter and field regulator.	1	5000=00.
8.	Transformer 1 K.V.A. 230/ 15 Volts with single phase, with different tapping points on both sides.	4	2000=00
9.	3 K.V.A. 440/230 .Volts 3 phase delta star-transformer.	2	3000=00
10.	Starters different types of D.C. and A.C. motor starters for demonstration and study purpose suitable for 5 H.P. motor.	5	2000=00
ll.	D.C.potentiometer 4 wires	1	100=00
12.	Accumulators, sulphuric acid and Nickel iron batteries 2 Volts, one each.	2	1000=00
13.	Stop clock	2	200=00

1.	2.	3.	4.
14.	Synchroscope	1	300=00
15.	Tachometer-with different accessories.	2	1000=00
16.	Ammeter (M.C.)		
	range 0 to 1:5 Amp	2	
	0 to 5 Amps	3	
	0 to 10 Amps	2	
17.	Ammeter (M.I.)		2000=00
	range 0 to 1 Amp	2	
	0 to 5 Amps	3	
	0 to 10 Amps	2	
18.	Voltmeter (M.C.)		
	range 0 to 150/300 Volts	3	
	0 to 500 Volts.	1	
	0 to 15/30 Volts.	1	
19.	Volt meter (M.I.)		1500=00
	range 0 to 150/300 Volts. 3		
	0 to 250/500 Volts. 2		
	0 to 5/10/60 Volts. 2		
20.	Wattmeter range 0 to 200/400 Volts 5/10 Amps.	3	1500=00
21.	Variable rheostat; resistance range 50 Ohms to 500 Ohms, current range 5 Amps to 1.5 Amps, different ranges.	10	1000=00
22.	Home appliances, Heater, Toaster, Geyser, Electric iron, mixer, etc. one each.	5	2000=00

Reference Books

Subject : Electrical Maintenance

Sr.No. Name of the Book with Author and Publisher

1. Examples in Electrical Calculations by - Admiralty " Standard Publisher"
   Delhi.
2. Elementary Electrical Engg.
   by Gupta, New Heights Publisher
   Delhi.

3. Electrical Wiring, Estimating & Costing
by Uppal Khanna, Publisher
Delhi

4. A Course in Electrical Power
by Soni- Bhatnagar-Gupta.
Krishna Kapoor
Delhi

5. Applied Electricity
by Hirst, Publishers - Blackie & Sons
London

6. Elect. Maintenance & Repairs
by J.L. Watts
Macmillan & Co.

Technical -Group

Course II

MECHANICAL MAINTENANCE

Standard XI

PAPER I

THEORY (4 Periods/Week)

1. Carpentry - Carpenter's tools, their uses, care and maintenance, joints in wood work and their uses. Timber-Selection of Timber, use of Timber for Various Purposes, Joinery Materials used in Joiner. Joinery-Screws, Nails, Nutbolts, Glues, etc.

2. Smithy-Tools used in Smithy their uses, care and maintenance Smithy Process-Bending, Setting, drawing-forge welding Hand & Machine forging Rolling- and wire drawing. Hardening Tempering-Normalising & Neating.

3. Fitting-Tools used in chipping, filing, drilling, taping. Marking and Measuring Tools. Precision Measuring, Instruments, Gauges, Surface plates-angle Plates Vee blocks dial & depth gauge. Sine-bar. Other gauges,Limits & Interchangeability. Hacksaw Blades Specifications, Classifications & types of files-Filing Processess-Fitters Tools.

4. Engg. Drawing-Drawing Equipments, Lines and lettering, Conventional Symbols, Curves, Ellipse, Parabola. Hyperbola-Helix Invocate Cycloid-Orthographic, Projections of Lines, Planes & Solids, Projections of Cones, Prisms, Cylinders, Pyramids in various positions. Orthographic and Isometric views-Isometric Projections-Scales-Ortho-graphic views 1st Angle & 3rd Angle-Drawing of missing, views of simple objects & sections of simple M/C Parts

PRACTICALS (4 Periods/Week)

1. Drawing Sheets-Engg. drawing. Ten sheets on the topics given in theory.

2. Carpentry-6 Jobs
Planninig; Chieselling, Joints (4) .

3. Smithy-4 Jobs
Bending, Setting down, Round square, Forging and grinding, Metal tools.

4. Fitting-6 Jobs- Filing, Sawing, drilling & tapping-Composite jobs of marking, sawing, drilling & tapping -reading of Precision tools such as micro-meter, vernier depth gauge & other gauges.

1. Journal for Practicals.
2. Practical Examination on above Practicals.

PAPER II

THEORY (4 Periods / Week)

1. Welding-study of Tools & equipments used in welding-Electric & gas-soldering, brazing, Welding Process-Electric Welding & gas welding, cutting. Types of Welds and welding adjustment of flames, striking arc-welding in all positions. Study of Welding machines, connections & precautions-Uses of fuels - fluxes, Soldering, Sweating Brazing, Soft and hard solder. Their composition and properties. Spelters.
2. Properties of Matrials-Metals used in Machines-Their uses- ISS Specifications.
3. Heat treatment of metal & Alloys-necessity-How it is done-Properties before and after Types of Heat treatment. Lubricants - Applications.
4. Engg. Drawing-Free Hand Sketching of nuts, bolts, washers, rivets, riveted joints, locking devices.
Threads - Types of threads - V,
Square and other types-keys-shafts, coupling- cotter pins & Joints - Flat belt, V- belts, pulleys, Sketches of machines parts, brackets, Plummer block, Bearing-Blue Print Reading.

Practicals (4 Periods / Week)

1. Engg. Drawing - 10 sheets on the various topics of Theory given in this paper.

2. Welding Jobs -
   Electric - 6
   Gas - 6
3. Jobs in Soldering - 2
4. Jobs in Brazing - 2
5. Head treatment of Jobs

   Annealing & Hardening
   Case Harding Preparing tools
   Tools Grinding for lathe & other machines
   (Water, Oil & Sand quenching methods)
   Practical Examination in Welding Jobs.

Standard XII

PAPER I

Theory (4 Periods/Week)

1. Lathe & its accessories-Chucks, Face plates, Gear Mechanism - driving Mechanism-Screw Cutting-tools, Tools, Holders-Grindinig of tools Lathe Operations-plane Taperstep torning Boring, Internal turning, screw cuttting, Form turning. Coolants-Use of coolants. Alignments and adjustments fo slides in Lathes.
2. Taps and Dies drilling Machines — Operation of drilling Machines taping, threading Drills S. S. & T.S. adopters, chucks Plates fixtures-types of drills portable drill Machines-Hand drills ratchet drills-use of coolant.
3. Scraping, Lapping, Honing, reaming operations
4. Grinding Machines — Pedastal & Portable. Grinders Grinding wheels-Use of surface grinders-Centre-less Grinder. Tool and cutting of Grinder. Use of grinding Machines (descriptive treatment only).

5. Milling, Planniig & Slotting Machines :
Shaping functions of these Machine-Operations and Care and maintenance of these machine.

6. Alignments of above Machines, installations of above machines. Maintenance of above machines.

7. Elementary knowledge of Electrical wiring to understand the safety precautions in Electrical Connections of these machines-safety Measures.

8. Mechanical preventive maintenance of machines, tools-regular programming, inspecting and recording.

PRACTICAL (4 Periods/Week)

1. Composite Jobs in Precision filing - Male Female fitting-drilling-tapping-reaming
Flat scraping. 6 jobs.

2. Jobs in Lathe Machines (10)
Plane Turning
Taper Turning Step Turning
Internal boring
Threading - V & Square.

3. Two jobs each on Shaping and Milling Machine (desirable).

Practical Test on Fitting and Turning only.
Term work as journal giving details of Practicals done.

PAPER II

THEORY (4 Periods / Week)

1. Petrol - Oil Engines

Engine their parts, Brief functional description-Maintenance and care (desirable).

2. Pumps - Types of Pumps.
Centrifugal, Mono, reciprocating, compressed air. Pumps Single stage and Multistage Pumps-sub mersible Pump-Air Compressors-Uses (Elementary descriptive treatment only).

3. Pipes, pipes fittings, tools in pipe fitting; Pipe Bending and fixtures

4. Lifting tackles, Jacks, Pulleys, Blocks-chain Winch-Crab, description, use and care.

5. Shafts and Shafting — Alignment of shaft, levelling shaft. Flaungs, Flexible and Universal coupling. Clutches, Description, and care of coupling Countershafting, Bearings and Couplings its fitting (Ball and Bush) and Failures of bearings.

6. Types of drives — Belt, Rope, Chain gear drives-Layout and alignments of drives-purpose and uses of drives, joining belts: Gear drives trains. Conveyors. Hydrantic drives and devices (elementary treatment).

7. Study of automatic sophisticated machine tools exposure to factories.

8. Friction and Lubrications-Lubricants. Failures of Lubrication.

9. Foundation of Machines. Types and specific purpose. Vibration Causes-Precautions in foundations.

10. Erection of Pumps and Motors-Foundation Bolts.

11. Overhauling - of Machines — Removing Parts, Cleaning, Repairing and Refitting, and testing of machines as per ISI.

12. Safety Rules and - Safety devices — Proper Handling of Materials. Trolleys First Aid.

PRACTICALS (4 Periods/Week)

1. Study of Petrol Engines (desirable)

2. Removing Parts of Engines and refitting the same duly cleaned and ment.

3. Study of Oil Engine (diesel)(desirable)

4. Removing Parts of Engine ,(Oil, diesel) cleaning and refitting. (removing major parts only).

5. Removing Pulleys from shaftings, cleaning:, lubricating and refitting.

6. Removing Bearing, (Ball and Bush) refitting on shaft.

7. Removing Parts of lathes, cleaning and refitting (Major Parts only).

8. Removing coupled Engine and Pump and again fitting and alignment.

9. Removing Parts of Shaper drilling Machine, Hacksaw Machine and refitting. (desirable)

10. Study of Hydraulic Jack & Mechanical Jack. Winchcrabs, removing parts and refitting. Students should do minimum 2 practicals each on above nine items and maintain Journal which will be term work. One of these practicals will be asked in the Practical Examination.

Equipment Necessary for Vocational Subject

Mechanical Maintenance

(For a batch of 30 students)

S. No.	Name and description of the equipment	Approx Cost in Rupees
1	2	3
1.	A set of carpenter's tools (plane, chisels, vice with table etc.)	5,000.00
2.	Smithy hearths (10)	15,000.00
3.	Anvils (10)	3,500.00
4.	Set of smith's tools (5 sets)(Hammers, pliers swage blocks etc.)	1,000.00
5.	Power hammer (One)	10,000.00
6.	Heat treatment equipment	5,000.00
7.	Set of filing tools (various types of files, vee blocks, marking plate, surface plate, hand saw, tables etc.) (3 tables)	3,000.00
8.	Various types of gauges	8,000.00
9.	Gas welding set	4,000.00
10.	Electric welding set	3,500.00
11.	Bench drills and portable drills (4)	8,000.00
12.	Centre lathes (15) with all accessories	1,50,000.00
13.	Set of cutting tools with tool holders (13)	500.00
14.	Pedestal grinders (2)	2,000.00
15.	A set of taps and dies	3,000.00
16.	Column drilling machine (25mm) with all accessories	4,000.00
17.	Radial drilling machine (25 mm capacity) with all accessories	9,000.00
18.	Milling machine (horizontal)	18,000.00

1.	2.	3.
19.	Shapers (2)	10,000.00
20.	Oil Engine (1)	4,000.00
21.	Petrol Engine (1)	15,000.00
22.	Centrifugal pump set	2,000.00
23.	Reciprocating pump set	2,000.00
24.	Ice plant	8,000.00
25.	Set of pneumatic tools	3,000.00
26.	Mechanical and hydraulic jack	2,000.00
27.	Pulley block	2,000.00
28.	Scrap machine parts and machines	5,000.00

Reference Books

Subject : Mechanical Maintenance

Sr. No. Name of the book with Author and publisher.

1. Elements of workshop Technology, by S.K. Hajra Choudhary Volume I, Published by Asia Publishing House, Bombay (Fourth Edition)
2. Workshop Technology, Part one W.A.J. Champman, Published by the English Language Book Society (Fourth Edition).
3. Workshop Technology Part Two W.A.J. Champman Published by the English Language Book Society (Third Edition).
4. Engineering Drawing, by N.D. Bhatt Published by Charotar Book Stall, Anand (Thirteenth Edition)
5. Machine Drawing, by N.D. Bhatt Published by Charotar Book stall, Anand (Thirteen edition)
6. Diesel Engine Operation and Maintenance, by Maker Published by Mc Graw Hill Book Company, London (Vol I).
7. Heat Engines Vol.I, By Ballaney Published by Khanna Publisher Delhi (fourth Edition).
8. Hydraulik Machinery by Dr. Jagdish Lala Published by

Metropolitan Co. Pvt. Ltd. Delhi (Third Edition)

9. Elements of Heat Engines by Patel, Karamchandani Published by Acharya Book Depot, Baroda.
10. Mechanical Engineer's Handbook Published by Mc Graw Hill Book Co. London.
11. Mechanical Technology and Engineering Primer by A.Deb published by Niraj Prakashan, New Delhi
12. Workshop Technology by W.A.J. Champman Part three.
13. Diesel Engine Operation and Maintenance by Maleev.

Technical Group

Course III

SCOOTER & MOTOR CYCLE SERVICING

STANDARD XI

PAPER I

THEORY (4 periods / Week)

1. Engineering Drawing - Lines - Lettering - drawing- equipments, Conventional symbols - Scales - constructions of curves - Orthographic Projection of lines Planes - Solids - Sections - Projection of Hollow objects. Development of lateral surfaces. Conversions of Pictorial view. First and third angle projection.

   Representation of nut bolts, rivelts. Joints. Wheels pulleys. Keys, Cotters, coupling, studs, bearing, springs - various types of springs. Bearings - Types of Bearings. Chain and Pulley drives.
   Blue-Print-Reading.

2. Basic Fitting tools - spanners - Hammers - Measuring and cutting tools - Gauges - Precision Measuring instruments - drilling - drilling machines - sawing - Hacksaw, portable drills. Tapping and Threading - filing.

Practical (4 Periods / Week)

1. Drawing Sheets - 10-12 on the theory portion.
2. Filing - sawing - drilling jobs - Male-female fitting Elementary & Composite jobs (8)
3. Use of Precision Instruments - gauges - etc.
   Journal on Drawing sheets and fitting Practicals.
   Examination on fitting practicals.

PAPER II

THEORY (4 Periods / Week)

1. Internal combustion Engines - System of Unit - Temperatures, Heat, dissipation of heat, transfer of heat.
   Power - Calculation on Power.
   IHP-BHP-Mechanical Efficiency, Mean Effective Pressure.
2. Properties of Fuel-Petrol, Diesel, HSD, Crude Oil, Kerosine, etc.

3. Types of Lubricants - solid - Liquid and other types. Suitability of Lubricant.
(More stress to Petrol and Diesel Engines).

4. Cycles - Two stroke - Four stroke Cycles. Single Cylinder and Multi-cylinder Engines - different parts of two stroke engines.

5. Carburation - Carburettors -its Function, Construction and Types.

6. Fundamental Electricity. Batteries-magnetos-LT and HT current-transformer, principle - cables - Types of cables - spark plugs, - Ignition system - Lighting system Induction Coil.

7. Metals and their properties used in Scooters and Motor-cycles.

8. Heat treatment - How it is done - function and necessity of Heat treatment.

PRACTICALS (4 Periods/Week)

1. Study of Engines - Petrol - Two stroke and four stroke.

2. Study of two stroke and four stroke Petrol Engines in details
Opening the engine and refitting it.

3. Study of wiring system - Fuse Switch, and Battery in Circuits. Connections of lamps.

4. Study of Magneto

5. Study of Inducticon Coils

6. Study of Spark Plug-Removing, cleaning and fitting spark plugs.

7. Study of Carburettor - Functions of different parts Removing, cleaning and refitting Carburettors Petrol Tanks - removing and refitting.

STANDARD XII

PAPER I

THEORY (3 Periods/Week)

1. Safety Precautions in workshop practice - Hand tools, etc.

2. Hand tools - more advance - Sockets - Ring - Ratchet - torque Wrenches, Pullers, Punches, Pipe wrenches, etc.

3. Special Garage tools, pressure Gagues - oil cans, grease guns, Compression tester, Ring Expander, etc.

4. Precision Instruemnts. Micrometer, Vernier, Cailipers, dial guages, depth gauges, feeler gauge, thread gauge, etc.
5. Soldering, brazing, Welding, Electric and Gas Welding - Equipment of electric and Gas Welding.
6. Fitting Processess, Chipping, filing and hacksawing, drilling tapping, Reaming, scrapping, taping and threading sleeving.

PRACTICALS (5 Periods / Week)

1. Sketches of hand tools used in Garages and study of the same.
2. Marking, cutting, and filing.
3. Precision filing
4. Drilling Reaming
5. Drilling, Reaming and tapping
6. Threading by die.
7. Electric Welding - (Four jobs) types of welding.
8. Welding Joints.
9. Gas welding - welding Joints. (Four jobs)
10. Jobs in fitting and 8 jobs in welding
Practical Examinations on Fitting and Welding.

PAPER II

THEORY (3 Periods/Week)

1. General description of - Scooters Motor Cycles Types, two stroke and four stroke -Models in market - Scooter, Luna, Moped - Yezdi etc.
2. Assembly of scooter and Motor Cycle-various Parts-functional use.
3. Suspension of M/C and Scooters-study of front wheel suspension.
4. Study of Brakes and Breaking System - Trouble spotting, repairs and care.
5. Clutch - Gear Box - Study of removing cleaning and refitting
6. Parts cleaning, valve cleaning, Cylinder Clening, etc.
7. Electrical systems - Lights, Horns - spark plugs - Magneto - Coil.

8. Carburettor and Carburation - Study of -
9. Wheels, tyres, tubes steering - Changing Wheels and tyres, valcanising. Pressure gauges and Measurements of Pressure.
10. Function of Engine Part.
11. Lubrication Systems, Cables - Cable jointing and fixing cables in sockets.
12. Overhauling, Servicing and Maintenance
13. Vehicle driving, Vehicle Acts and Rules.
14. Operation of clutch, Gear Box, Accelerator and Brakes.

PRACTICALS (5 Periods / Week)

1 Deassembling and assembling of (a) Engine (b) Carburettor (e) Clutch (d) Gear Box (e) Suspension (f) Braking system (g) Wheels.
2. Stripping down brake systems and Adjustments.
3. Decarb Engine, Changing Piston Rings. Checking Clearance.
4. Normal servicing of parts.
5. Changing Oil seals and Bearings.
6. Changing Points, Timing, C B Points. Magneto - Coil - Wiring.
7. Suspension - spring - Changing
8. Silencer cleaning and Refitting
9. Changing wheels
10. Report on Repairs, Fault Finding Remedies and reasons of Luna, Moped Scooter, Motor Cycle in about 2000 works. Term work of all Practical in Journals and Practical Test on any of the Practicals.

Scooter and Motor Cycle Servicing

LIST OF TOOLS & EQUIPMENTS

Sr. No.	Description	Quantity	Cost in Rs.
1	2	3	4
(A)	**Equipments**		
1.	Grinder with two 7" wheels with twist drill grinding, attachment	1 No	3500.00

1	2	3	4
2.	Arbor press hand operated	1 No	4000.00
3.	Welding plant oxy-acetylene : complete with accessories	1 No	7000.00
4.	Welding plant (Electric)	1 No	10000.00
5.	Motor cycle-single cylinder : old but in running condition	1 No	3000.00
6.	Motor cycle-multi cylinder : old but in running condition	1 No	3000.00
7.	Scooter New	1 No	6000.00
8.	'Luna' type motor cycle : old but in running condition	2 No	3300.00
(B)	**Shop outfit**		
1.	Work bench - 240 x 120 x 75 cm	1 No	500.00
2.	Bench vices - 12.5 cm jaw	6 No	600.00
3.	Drilling machine bench type - 12 cm	1 No	3000.00
4.	Grease Gun	2 No	150.00
5.	G.I. tray - 45 x 30 cm	15 No	130.00
6.	Oil Can	1 No	30.00
7.	Valve spring lifter	1 No	100.00
8.	Valve grinder suction type	1 No	400.00
9.	Stand extractor	1 No	70.00
10.	Ring expander and Remover	1 No	120.00
11.	Valve seat cutter	1 No	600.00
12.	Compression gauge	1 No	1000.00
13.	Torque wrench	1 No	500.00
14.	Steel cupboard (Standard size)	1 No	900.00
15.	Table & Chair	1 No	500.00
16.	Spark plug Tester	1 No	600.00
17.	Wall charts for various parts of the engine	1 set	150.00
18.	Micrometer - outside 0 to 25 mm	1 No	300.00
19.	Micrometer - outside 25 to 50 mm	1 No	350.00
20.	Micrometer - inside 50 to 100 mm	1 No	400.00
21.	Vernier calliper - 20 or 25 cm	1 No	300.00

1	2	3	4
22.	Soldering iron - 120 watts	1 No	100.00
23.	Screw driver - 15 cm to 25 cm	4 Nos	50.00
24.	Files - flat bastard & smooth - 25 cm	15 Nos each	200.00
25.	Files-triangular, half round, square safeedge.	1 each	150.00
26.	Hacksaw frame adjustable standard size	15 No	350.00
27.	'V' Block with clamps	1 No	80.00
28.	Surface plate - 25 x 25 cm	1 No	3000.00
29.	Chisels - various types	1 set	150.00
30.	Steel Rule - 25 cm	1 No	10.00
31.	Divider (spring) 15 cm	1 No	10.00
32.	'Punch - various types	1 set	20.00
33.	Marking out table	1 No	300.00
34.	Twist drills upto 12 cm	1 set	150.00
35.	Taps & dies with box	1 set	500.00
36.	H.S.S. Reamers - various types	1 set	700.00
37	Scrapers - various types	1 set	300.00
38.	Mallet	1 No	20.00
39.	Hand vice - 5 mm	1 No	10.00
40.	Spanner double ended - 9 to 25 mm	4 sets	250.00
41.	Spanner double ended various sizes	1 set	80.00
42.	Spanner (ring) - complete set	4 sets	320.00
43.	Double ended spanners - complete set	4 sets	200.00
44.	Spanner - adjustable 20 cm	2 No	70.00
45.	Spanner special types	4 sets	150.00
46.	Spanner adjustable big size	1 No	30.00
47.	Punch figures set	1 No	60.00
48.	Punch letters set	1 No	70.00

Traniee's Kit

1.	Hammer ball pane 5 kg	1 No	20.00
2.	Calliper inside spring	1 No	10.00
3.	Calliper out side spring	1 No	10.00
4.	Steel rule 15 cm	1 No	9.00

1	2	3	4
5.	Screw Driver 20 cm	1 No	7.00
6.	Screw Driver 15 cm	1 No	6.00
7.	Plier combination 15 cm	1 No	13.00
8.	Hand file second cut 20 cm	1 No	15.00
9.	Set of screw drivers in plastic pocket	1 No	35.00

Reference Books

Subject : Scooter and motor Cycle servicing

1. Machine Drawing, by N.D. Bhatt Charator Book Stall, Anand (W. Rly)
2. A First Year Engineering Drawing, By A.C. Parkinson, Sir Isac Pitman & Sons Ltd.
3. Intermediate Engineering Drawing, by A.G. Parkinson.
4. I.S.I. Code of Practice for General Engineering Drawing 696-1972
5. P.S.G. Mechanical Engineering Hand Book, P.S.G. Institute Coimbatore.
6. Heat Engines, by Patel Karamchandani. Vol. I & II Acharva Book Depot, Vadodara
7. Workshop Technology, by W.A.J. Champman Vol. I, The English Language Society and Edward Arnold (Publishers) Ltd. (ELBS)
8. Automotive Engines : Maintenance & Repairs, by Ernest venk & Walter Billiet D.B. Taraporewala & Sons & Co.Pvt.Ltd., Bombay.
9. Elements of Workshop Technology, By Hajra Choudary, Asia Publishing House, Bombay.
10. Scooter Maintenance Complete, by Jan Stevens, Constable & Co. London.
11. The Second Book of Vespa, by J. Thorpe, Pitman Publishing.
12. The Second Book of Lambretta, by R.H. Warring Pitman Publishing.
13. Service Manuals from different manufacturers of two wheel vehicles.

Technical Group

Course IV

GENERAL CIVIL ENGINEERING

STANDARD XI

PAPER I

BUILDING CONSTRUCTION AND MATERIALS

Theory - 2 Periods/week

Practical - (Drawing practice) 6 periods/week

THEORY

Foundations

1. Definition, Purpose of foundation, Bearing Capacity of soil and its testing, Spread footings, column footing, Examination of the soil (ground) by trial pits. Setting out for foundation, Excavation for foundation. Timbering of foundation. Timbering of foundation trenches. Types of Rocks and their properties. Underground Surveys and interpretation of results.

Masonry

2. Stone masonry and brick masonry Classification of stone masonry. Dressing of stone Joints in stone masonry. Various methods of lifting stones -precautions to be taken in stone masonry.

   Brick work : Bonds in brick work-English. Flemish, heading and stretching bonds -precautions to be taken in brick masonry. Methods of constructing brick work. Scaffolding-Mason's brick layers scaffolding. Plastering-Lime Plaster, cement plaster, application of plaster. Pointing methods, white washing, colour washing, Distempering.

Cement Concrete

3. Plain and Reinforced concrete, ingredients of concrete, placing and proportioning of concrete, water cement ratio, mixing and curing of concrete, form work in concrete removal of form work, centering for slabs.

4. Framed structure and load bearing structure - super structure and substructure.

5. Field tests for quality control and their frequeney for common items of works of civil Engineering.

Floors

6. Ground Floors Murum, Flagstone; cement conerete, Tiled and China Mosaic. Upper Floors-Timber Floors, R.C.C. Floors.

Staits

7. Location; Common dimensions for the components. Parts of Stair. Types of Stair, Straight, doglegged, open newel.

Doors and windows

8. Sizes and location - Fixing of Doors and windows in the wall. Types of Doors ledged, ledged & braced, framed, panelled, glazed, flush Doors.
(Glazed, Louvered and steel windows).

Roofs

9. Pitched Roofs, lean to roof, king, post and queen post and queen post roof truss. Hips, valleys, eaves, ridges, gawes, roof lights. Roof covering in G.I. and A.C. sheets. Flat root Water proofing. Drainage Gutters, Down take pipes.

10. Structural steel work, bolting, weldlng. Rivetting.

11. Drainage and water line in building, dewatering methods.

12. Materials of construction - Varieties, properties and uses of various engineering materials such as stones, quarrying operations, bricks, lime, cement, mortar, Concrete, timber, paints and varnishes, mild steel, copper, aluminium.

Term work in Building Drawing

1. Idea of orthographic projection isometric and pictorial views.
2. One sketch book containing Single stroke lettering, convertional (symbols and sketches of brick bonds, foundations, doors and windows,floors, roofs, stairs (about 40 sketches)
3. Working drawing of double storeyed building with pitched roof and all details.
4. Working drawing of double storeyed building (flat roof) with details
5. Tracing and ammonia print of the one sheet drawn above.

Practical work

1. Setting out (foundation plan) of a building.
2. Practice in constructing the wall in English and Flemish bond.
3. Construction of brick masonry at the corner and the T junction of two walls.
4. Construction of store wall.
5. Construction of column in brick work.
6. Exercrises in scaffolding.
7. Practice in plastering, pointing, white wash & colour washing. distempering and painting.
8. Exercise in making cement concrete, mixing, placing and curing of concrete.
9. Making cement concrete floor 1 m x 1 m.
10. Practice in making form work for R.C.C. beam, column and slab.

Paper II

SURVEYING AND GENERAL ENGINEERING

Theory -2 Periods /week

Practical - 6 periods /week (Drawing Practice)

Surveying

1. Definition - Principles, classification, scales, representative fraction.

Measurement of distances

2. Units of measurement, instruments used for chaining and ranging-construction and uses. Direct and indirect ranging, chaining on sloping ground.

Chain and tape survey

3. Principles, selection of stations, base line, check line, tie line, location sketches, booking field notes in field book. Instruments used for setting out right angles, cross staff, optional square, prism square, construction and uses, cross staff survey.

Chain and compass survey

4. Prismatic compass, construction and its use, Bearing of lines Fore-Back, whole circle and quadrantal bearings, local attraction,

meridians - magnetic, geographic. Arbitrary methods of traversing compass survey.

Levelling

5. Definition. Bench mark, line of collimation, axis of telescope, axis of bubble tube, vertical axis, Datum, Back sight, fore sight, Intermediate sight, change point. Dumpy level-construction, uses, temporary adjustment, use of tilting level, levelling staff and its reading, methods of levelling, methods of recording in levelling, methods of recording in levelling field book, profile levelling.

6. Plane table-use-and application
Study of Toposheets.
Plainmeter - finding out Areas.

7. Elementary Hydraulics : Elementary knowledge of pressal pressure head, discharge, energy, power and units of measurement, rainfall, run off, rain and river gauging.

8. Electrical Engineering and Pumps : General Knowledge of H.T. and L.T. electrical equipment such as motor and other machinery used on works. Precautions in handling and safety rules knowledge of centrifugal, deep turbine pumps and submersible-pumps.

Practical & Term Work - Practical (25 marks)

Practical (25 marks)

1. To study constructional details of varieties of chains and ranging rods, reading the chain, folding and unfolding the chain, testing the chain, use of various types of tapes.

2. Measurement of distances with chain, use of ranging rod in ranging, ranging by line ranger. Exercise on direct and indirect ranging.

3. Chaining on sloping ground.

4. Practice in taking off set; use of optional square, prism square and cross staff.

5. Cross staff survey.

6. To carry out exercise in obstacles in chaining and ranging.

7. Use of prismatic compass, measuring bearing of lines and calculating included angles.

8. Chain and compass survey of an extensive area, locating details, booking and plotting the same.
9. Practice in setting up Dumpy level, reading the levelling staff.
10. Practice in booking and finding reduced levels by collimation and rise and fall method.
11. Taking fly levels for a distance of 2 Km.
12. Profile levelling for a road project.
13. Plane Table survey - plotting.

Term Work (25 Marks)

1. One sheet on chain & compass survey project.
2. One sheet on profile levelling for a road.
3. Field books containing above listed practical exercises.

Standard XII

PAPER I

QUANTITY SURVEYING AND ESTIMATING

Theory - 5 Periods /week

Practical - 3 Periods / week (Drawing)

1. Taking out quantities by P.W.D. method, Different methods of executing work, P.W.D. procedure. Administrative approval, Technical sanction, Daily labour, day work, piece work, modes of measurement for different items of work. Piece work, modes of measurement for different items of work. Quantities of Engineering material required per cubic meter of items like masonary, concrete, etc.

Contract

2. Law of contract, documents of contract, kinds of contract Lumpsum, item rate, percentage rate, cost plus percentage, target, conditions of contract, security deposit, earnest money, time limit, termination of contract, extra items, tools and plants, compensation to the workmen, labour camps.

Tender

3. Invitation of tenders, tender notice, methods of preparing and submitting tenders, acceptance of tenders.

Specifications

4. Purpose, types of specifications, specifications for common items of work in civil engineering construction.

5. Estimating-purpose, types, approximate estimate, preliminary estimate, abstract estimate, plinth area estimate, Cube rate estimate, analysis of rates.

6. P.W.D. Accounts and procedure of work, Muster roll. Daily reports, measurement book, rate list, modes of payments to the contractor, materials at site account, tools and plants, prime cost, provisional sum.

Term Work (25 marks)

1. Quantity survey journal consisiting -
   - i) Estimate of a simple residential building.
   - ii) Estimate of slab or box culvert.
   - iii) Estimate of R.C.C. work
   - iv) Estimate of steel structure.

PAPER II

ROADS AND EARTHWORK

Theory - 5 Periods /week

Practical - 3 Periods / week (Drawing)

1. Road Alignment-Classification of roads, road structures, brief knowledge of camber, gradient, super-elevation, curves, sight structure, road junctions and crossings.
2. Road making materials, soils, gravel, murum, stones, tar & asphalt-varieties 2 uses only. Low cost roads, earth roads, gravel & murum roads, water bound macadam roads. Bituminous roads, surface dressing, macadam, bituminous concrete, cement concrete roads-constructional features, joints.
3. Hydrology-Rainfall, Run-off, Catchment area, Maximum-flood discharge.

   Road drainage, surface and sub surface drainage, cross drainage works, roadbridge, road bridge, road culvert, low level cause ways, high level causeways.
4. Road making Plant and Machinery, elementary information of scraper, grader, bulldozer, road Rollers, bitumen & concrete mixers.
5. Earth work, cutting and embankment, equipment required for earth work, computation of earth work volumes, borrow pits and spoil banks.
6. Fundamental concept and definition of stress and strain tension, compression and Shear Ultimate strength and safe strength, Bending and bending moment. Simple frames and trusses.

Term work (25 marks)

1. Plotting of simple and compound curves on drawing sheet.
2. A sheet showing cross sections of different types of roads showing materials used.
3. Working drawing of a road project showing calculations of earth work and quantities of other materials used for road.

List of equipment for General Civil engineering

Sr.	Name of the equipment	No. required for 25 students	Cost per Item	Total cost Rs.
1.	Metric Chains 20 m	8	60/-	480.00
	Metric Chains 30 m	8	100/-	800.00
2.	Metallic Tape 20 m	8	40/-	320.00
	(Metric) 30 m	8	50/-	400.00
3.	Prismatic Compass with stand	6	200/-	1200.00
4	Ranging Rods	30	6/-	180.00
5.	Dumpy Levels with stand	4	900/-	3600.00
6.	Mason's level or Hand levels	4	25/-	100.00
7.	Levelling staves (Metric)	10	100/-	1000.00
8.	Prism Square	6	25/-	150.00
9.	Indian optical square	6	20/-	120.00
10.	Peg Hammers	6	10/-	60.00
11.	Cross Staves-Aluminium, Wooden	6	10/-	60.00
		6	15/-	90.00
12.	Plane Tables 30" x 24" with all accessories & Stand	4	50/-	200.00
13.	Trough Compass	4	10/-	40.00
14.	Plainmeter (Metric Scale)	4	500/-	2000.00
15.	Vernier Theodolites	2	5000/-	10000.00

List of Books for General Civil Engineering

Standard XI

Paper I

BUILDING CONSTRUCTION & MATERIAL

1. A text book on Building Construction by R.S. Dephande
2. A text book on Building Construction by Rangavala
3. A text book on Building Construction by Sushilkumar
4. A text book on Building Materials by G.J. Kulkarni
5. Planning & Desiging of Buildings by Y.S.Sane
6. Civil Engineering Drawing by Shahane
7. Building Drawing by Shah, Kale and Patki (Tata Mc Graw Hill)
8. A text book on Building & Construction by Sharma and Kaul
9. Vastu Shilpa Yojna Va Abhikalpana (Marathi) by Maharashtra Vidyapeeth Grantha Nirmiti Mandal, Nagpur
10. Abhiyantriki Samagri (Marathi) by Orient Longmans, Bombay.

PAPER II
SURVEYING

1. Surveying & Levelling (Vol 1) by T.P. Kanetkar and S.V.Kulkarni
2. Text book of Surveying by Hussain & Nagraj
3. Sulabha Mojani Shastra (Marathi) by Mac Millan & Co, Bombay.

Standard XII
PAPER I
QUANTITY SURVEY & ESTIMATING

1. Text Book on Estimating & Costing by B.S. Patil
2. Text book on Estimating & Costing by Dutta
3. Text Book on Estimating & Costing by S.C. Rangawala
4. Text book on Estimating & Costing by D.L. Bhasin

PAPER II
ROADS & EARTH WORK

1. High-way Engineering by Sehgal & Bharot
2. High-Way Engineering by Krishna Murthy
3. Railway Engineering by Anita
4. Principles & Practice of Highway Engineerings by R.C. Sharma & S.K. Sharma
5. The Fundamental Principles of Highway Engineering by V.B.Priyani
6. A Text book of High-way Engineering by G.T. Kulkarni
7. A Text book of Road Engineering by Rangawala.

LIST OF EQUIPMENT

1. Surveying chains (Metric) 20m, 30 m
2. Metallic Tapes - 30 m
3. Steel Tapes 30 m
4. Ranging Rods
5. Cross Staff
6. Optical Square, Prism Square
7. Prismatic Compass
8. Hand levels
9. Dumpy levels with stand.
10. Levelling staves.
11. Hammers.

TECHNICAL GROUP
COURSE V
ELECTRONICS
(Std. XI & XII)

PREAMBLE

Electronics as a vocational subject was introduced in the year 1979. The syllabus was framed for Std. XI and Std. XII in 1979-80. After introduction of syllabus it was not revised till date. With advances in the Electronics technology during these years it was mandatory to revise the syllabus. The entire syllabus was reviewed and in the light of fast development and current scenario in Electronics, it was found necessary to include certain new topics like study of IC's, Modern Electronic Communication, advances in digital electronics, transducers, network analysis and exposure to new instruments.

In order to accomodate new topics in the allocated periods and marking scheme, certain topics were restructured. To define scope and limitation of the syllabus, detailed references are given at the end of each topic. Practical course has been reformulated in such a way that there is more direct bearing on the theory topics.

It was felt by all committee members that the syllabus should be reviewed and restructured after every five years.

SCHEME OF EXAMINATION

Sr. No.	Name of Paper	Paper	Theory		Practical		Term Work
			Marks	Time	Marks	Time	
	Standard - XI						
1.	Basic Electricity & Components	I	50	3 Hrs.	30	3 Hrs.	20
2.	Semi Conductor Devices & Circuits	II	50	3 Hrs.	30	3 Hrs.	20
	Standard - XII						
3.	Applied Electronics	I	50	3 Hrs.	30	3 Hrs.	20
4.	Digital Electronics	II	50	3 Hrs.	30	3 Hrs.	20

Student should submit the journals, jobs, at the time of the practical examination for assessment.

Standard XI
ELECTRONICS (C2)
PAPER I

(100 Marks) 4 Lectures / Week (80 Lectures)

THEORY

(1) Sources of Electrical Power, Internal impedance of Source, Concept of voltage and current source, power, kirchhoff's current and voltage law, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem. (Only with dc sources and simple resistive network with maximum two sources only)

(Ref. : Bhargava Sec. 2.1 to 2.4, Grob Sec. 9.1, 9.2, 10.1 to 10.6)

Review of Electromagnetism and electrostatics

(Ref. : Grob 13.1 to 13.4, 14.1 to 14.5, 15.1 to 15.7)

(20 Lectures) (25% Marks)

(2) **AC Fundamentals**

Generation of AC, the sine wave, alternating current, voltage and current values for a sine wave. Amplitude frequency, period, wavelength, phase angle, the time factor in frequency and phase. Non-sinosoidal AC waveforms, 50 HZ ac power time (Phase, neutral and ground), concept of impedance and reactance.

(Ref. : Grob Sec. 16.2 to 16.12, 16.14)

(10 Lectures) (15% Marks)

(3) **Instruments**

Permanent Magnet Moving Coil Mechanism (PMMC), DC ammeters, DC voltmeters, Voltmeter sensitivity, series type, shunt type ohmmeter (Loading Effect), multirange ammeter and voltmeter

(Ref. : Cooper 4.3 to 4.6, 4.8 and 4.9)

(12 Lectures) (15% Marks)

(4) **Study of Components**

Resistors - Fixed and movable (types, properties and their uses)

Capacitors - Concept of copacitance, different types of

dielectrics, electrolyric and non electrolyric types and their properties, series and parallel combination of capacitors. Study of charging and discharging of capacitor (Assuming final expression) concept of time constant.

Transformer : Transformer equation, turn ratio, types of transformer and its applications.

Relay : Construction and operation of electromagnetic relay, reed relay, specification of relays such as current voltage ratings, contact current ratings, number of contacts.

Switches : Study of different types of switches.

Batteries : Rechargable cells, NiCd & Li cells, solar cells.

Accessories for circuit construction.

Types of wires, Lug/Tag boards, PCB, Breadboard.

Knowledge of significant technical specifications of components expected.

(Ref. : Grob 6.1 to 6.8, 17.1, 17.5, 17.7, 17.8, 20.1 to 20.10, 17.6)

(38 Lectures) (45% Marks)

References :

(1) Basic Electronics (First Metric Edition)
Bernard Grob
MaGraw - Hill Book Company

(2) Basic Electronics and Lincar Circuits
N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta
Tata MaGraw - Hill Publishing Company Ltd., New Delhi.

(3) Electronic Instrumentation and Measuring Techniques (3rd Edition)
W.D.Cooper, A.D. Helfrick
Prentice Hall of India Pvt. Ltd., New Delhi.

Standard XI
ELECTRONICS (C2)
PAPER II

(100 Marks) **4 Lectures / Week (80 Lectures)**

THEORY

(1) Semiconductor

Atomic structure, Energy levels, crystals, concept of hole, Energy bands of materials. Intrinsic Semiconductors, Extrinsic Semiconductors, concept of doping, N Type, P Type Semiconductor. Formation of p-n junction, barrier potential, depletion region, Forward and reverse biasing of diode characteristics of a p-n juction.

(Ref. : Bhargava 3.1 to 3.6, 4.1 to 4.3 OR MALVINO 2.1 to 2.8)

(10 Lectures) (15% Marks)

(2) Study of Transistor

Bipolar transistor - Structure and working, Relation between different currents in a transistor, Sign conventions, transistors configuration - CE, CB and CC and their comparison, Characteristics of CE amplifier, DC load line, Transistor as switch.

JEET - Structure and operation of FET, Characteristics and parameters.

MOSFET - Depletion and enhancement type MOSFET

UJT - Structure and characteristics of UJT

(Ref. : Bhargava : 5.1 to 5.4, 5.6, 5.8, 5.7-2, to 5.10-1, 5.14-1 to 5.14-3. Malvino : 13.1, 13.4, 21.6, 12.1)

(20 Lectures) (25% Marks)

(3) Study of Semiconductor Components

Types of diodes - power, signal, Zener, Varactor, Schottky, photodiode, LED. (Symbols, feactures and applications) Types of transistors - power, switching and photo transistors. Study fo SCR, TRIAC and DIAC

(Ref. : Bhargava : 4.9. Malvino : 4.1 to 4.6, 5.8, 21.3, 21.5)

(15 Lectures) (20% Marks)

(4) Amplifiers

Concept of amplification, transistor biasing, collector self bias and potential divider bias its merits and demerits.

Function of emitter resistor in bias stabilization. It's advantages and disadvantages. Study of single stage CE amplifier. Frequency response, band - width, Gain band width product. (concept of negative feedback in amplifiers)

Types of couplings in multistage amplifiers (Merits and demerits)

Classification in amplifiers, study of differential amplifier.

(Ref. : Bhargava : 7.2 to 7.5, 7.6-2 to 7.6-3, 7.6-4, 9.1 to 9.4, 9.7 Malvino : 6.3, 6.4, 6.5, 15.2)

(25 Lectures) (30% Marks)

(5) Classification of Oscillators, Positive feedback amplifier as oscillator. Conditions for oscillation, LC Oscillators - Hartley and colpitts oscillators. RC oscillators phase shift, wien-bridge.

(Ref. : Bhargava : 13.1 to 13.4, 13.5-3, 13.6, 13.6-3)

(10 Lectures) (10% Marks)

References :

(1) Basic Electronics and Linear Circuits
N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta
Tata MaGraw - Hill Publishing Company Ltd., New Delhi.

(2) Electronic Principles (Third Edition)
A.P.Malvino
Tata MaGraw - Hill Publishing Company Ltd., New Delhi.

Standard XII
ELECTRONICS (C2)
PAPER I

(100 Marks) **4 Lectures / Week (80 Lectures)**

THEORY

(1) Instruments

Detailed study of CRT (Mathematical Part not expected). How a CRO displays waveform, block diagram of CRO, Front panel

controls, Application of CRO.

Function Generator - basic elements of function generator.

Digital Multimeter - block diagram

(Ref. : Bhargava 14.4 and Cooper)

(12 Lectures) (15% Marks)

(2) Power Supply

Half wave rectifier, full wave rectifier, Bridge Rectifier, filter circuit, load regulation, line regulation, zener as voltage regulator. Basic principle of voltage regulation using transistor circuit.

Three terminal regulator IC's

Basic Principle of SMPS and its advantages

(Ref. : Malvino 3.3 to 3.6, 19.1 to 19.4, 19.6)

(12 Lectures) (20% Marks)

(3) Transducers

Classification of transducers, Selection of transducers, types of transducers, working of following transducers - Thermistor, LDR, capacitive transducer, LVDT, Piezo electric crystal, loud speaker, gas sensor, Opto coupler.

(Ref. : Cooper)

(10 Lectures) (10% Marks)

(4) Operational Amplifiers

Necessity of Op Amp, block diagram of Op-Amp, Op-Amp parameters. Linear applications of Op-Amp : Inverting and Non-Inverting, Amplifier, Buffer amplifier, concept of virtual ground. Adder subtractor, Integrator and Differentiator circuits.

(Definition in each case expected)

Non-liner Applications - Comparator, Schmitt trigger

(Ref. : Gaikwad , Malvino : 15.5, 15.6, 17.1(Fig.17.1), 17.2(Fig.17.7), 17.4(Fig.17.17a only), 18.2(Fig.18.5), 18.4 (Fig18.13a), 18.9, 18.6 (Fig 18.20a)

(12 Lectures) (25% Marks)

(5) Modern Electronic Communication

The elements of communication system, types of electronic

communication, survey of communication applications, electronic spectrum, concept of bandwidth, AM principles, Modulation index and percentage of modulation, sidebands and frequency domain, Frequency modulator. (Principle), phase modulation (principle)

Types of communication satellites, satellite communication system, application overview of satellite communication.

Concept of digital communication.

Introduction to Modems

Introduction to computer networks

Use of fibre optics in communication

Review of some modern cc nmunication applications : concept of FACSIMILE, Cellular radio and Radar.

(Ref. Frenzel : 1.2 to 1.6, 2.1 to 2.3, 4.1, 4.2, 11.1, 11.2, 11.5, 12.1, 12.4, 13.1, 14.1 (P.No.376 to 378 exclude CCD (319,320) (P.No.382 to 383) 14.3 (P.No.388 to 393)

(24 Lectures) (20% Marks)

(6) Study of Integrated Circuits

Block diagram, pin functions and simple applications of the following IC's - 555, 741 and LM 317 use of IC-555 as astable and monostable.

(Ref. : Data book and application notes)

(10 Lectures) (10% Marks)

Standard XII

ELECTRONICS (C2)

PAPER I

(100 Marks) **4 Lectures / Week (80 Lectures)**

(1) Number system and Boolean Algebra

Decimal, Binary and Hexadecimal number system, BCD code, Binary to decimal and decimal to binary conversion, Hex to Binary and Binary to Hex conversion, Hex to Decimal and

Decimal to Hex Conversion, ASCII code, Binary Arithmetic.

(Ref, : Jain 2.2, to 2.3, 2.8, 2.5, 2.6, 2.9-7) or (M.B. 1.1 to 1.13 except 1.6)

(10 Lectures) (15% Marks)

(2) Basic Logic Gates

Study of NOT, OR, AND gates, Symbols and truth tables, boolean algebra, NAND, NOR as universal building blocks, DE Morga n's therems, EXOR gate, Half Adder, Full Adder.

(Ref. : Jain 1.3, 1.4, 1.5, 1.6, or M.B. : 2.1 to 2.4, 3.1 to 3.5)

(3) Logic families and IC specification

Introduction to logic families - bipolar logic families and unipolar logic families.

Characteristics of Digital IC's, TTL NAND gale, CMOS, NAND, NOT, NOR gales.

Open collector TTL NAND gate, tristate concept, tristate TTL NAND gate.

(Ref. : Jain 4.1.1, 4.1.2, 4.2, 4.8, 4.12, 4.13 or Malvino Ch.6 and Ch.7)

(12 Lectures) (10% Marks)

(4) Multiplexers - De Multiplexers, Encoder-Decoder

Multiplexers and their use in combinational logic design, Combinational logic design using multiplexers. DeMultiplexer and its use in combinational logic design.

Encoder - Priority encoders

Decoder - decoder, and drivers for display devices.

(Ref. : Jain 6.2.1 to 6.2.2, 6.3.1, 6.10 and 6.11)

(12 Lectures) (20% Marks)

(5) Flip Flops, Counters and Registers

S-R Flip Flop, clock, clocked S-R flip flop, D flip flop, T flip flop, JK flip flop, Edge triggered flip flop, master slave concept, Ripple or Asynchronous counters, Decade Counter, synchronous counters.

(6) A/D and D/A convertors

Introduction, Digital to Analog convertor - weighted resistor ladder, R-2R ladder.

Analog to digital convertor - counter type ADC, Successive approzimation A/D convertor.

(Ref. : Malvino Leach : 13.1, 13.2, 13.6 and 13.8)

(12 Lectures) (12% Marks)

(7) Computer

Block diagram of computer, concept of bus, study of Input Output devices like keyboard, mouse, light pen, digitizer, printer and its types, plotters.

Study of memory devices like hard disk, floppy drives, semiconductor memory, magnetic tape

Specifications of computer

(Ref. : Computer and Commonsense - Hunt and Shelly)

(10 Lectures) (8% Marks)

References :

(1) Modern Digital Electronics - R.P.Jain

Tata McGrow Hill Publishing Co. Ltd.,

(2) Digital Computer Electronics (Third Edition)

A.P.Malvino and J.A.Brown

Tata McGrow Hill Publishing Co. Ltd.,

ELECTRONICS

STD. XI, PAPER - I

PRACTICAL - I

(4 Periods week)

1. Study of Thevenin's thm. (to prove the theorem with equivalent circuits. Network with 4-5 resistors and one source)
2. To prove maximum power transfer theorem
3. Study of sinusoidal and non-sinusoidal waveform on CRO. (Demonstration of period, frequency, amplitude and phase for sine,

triangular, square waveforms)

4. Use of PMMC movement to construct voltmeter and multirange voltmeter.
5. Use of PMMC movement to construct ammeter and multirange ammeter.
6. Study of multimeter (analog and digital) to measure voltage, current and resistance.
7. Study of loading effect using analog meter, study of errors.
8. Study of various resistors. Study of potential divider arrangement using fixed and variable resistors.

   Balancing of simple wheatstone's bridge using two variable resisters in opposite arms (potentiometers)
9. Identification of capacitors. To study charging and discharging of capacitor and plot V-I curve.
10. Study of relay. Measure pull-in and drop-out voltage and current for relay. Study of reed relay.
11. Study of various types of switches.
12. To prepare a simple inductor using bobbin and copper wire, then study the effect of different cores.
13. Construction of a simple bridge rectifier using filter capacitor by soldering the components on tag/lug board.
14. Construction of a simple multivibrator circuit using IC 555 on PCB.
15. Construct a CE amplifier on breadboard.
16. To determine turns ratio of a given transformer. Study its regulation factor and power-rating.

Note : Student must perform 15 practicals in each Paper.

ELECTRONICS

STD. XI, PAPER - II

PRACTICAL - II

(4 Periods week)

1. Study of P type / n type semiconductor for resistive characteristics. Effect of Temperature. (using BFW10/2N 2666)

2. Forward and reverse characteristics of P-n junction Ge, Si & LED (all three)
3. Testing of different types of diode and transistors using multimeters.
4. Study of input and output characteristics of CE configaration. (Determine)
5. Study of FET characteristics
6. Study of UJT characteristics
7. Transistor as a switch, use of transistor to drive LED, buzzer and relay
8. Study of photodiode and phototransistor (Demo expt)
9. Study of amplification using simple amplifier
10. Study frequency response of given audio frequency amplifier.
11. To measure input and output resistance of a CE amplifier.
12. Study of half wave rectifier and full wave rectifier - load regulation (full wave using two diodes & centre tap transformer)
13. Study of full wave bridge rectifier - regulation
14. Study of given sinusoidal oscillator and measure its oscillating frequency.
15. Study of simple burglar alarm using SCR, piezo buzzer and LDR.
16. Demonstration experiment on negative and positive feedback concept.
17. Study of role of equalizer circuit in an amplifier (demo)

Note : Student must perform atleast 15 practicals from above experiments.

ELECTRONICS

STD. XII, PAPER - I

PRACTICAL - I

(4 Periods week)

1. Study of front pannel controls of CRO. Use of CRO for frequency and phase measurement.
2. Study of Zener diode as voltage regulator - load regulation.
3. Study of variable dc supply using IC 317 - load regulation and line regulation.

4. Study of temperature characteristics of thermistor. To measure melting point of wax using thermistor.
5. Study of photorelay using LDR.
6. Study of opto coupler, and its use in determination of RPM
7. Inverting amplifier using Op-Amp
8. Non-inverting amplifier using Op-Amp
9. Adder using Op-Amp
10. Subtractor circuit using Op-Amp
11. Use of Op-Amp as buffer and study its application using potential divider arrangement
12. Use of Op-Amp as comparator (use of input protection diode)
13. Use of Op-Amp as Schmitt trigger
14. Study of the waveforms in simple AM circuit
15. Study of FSK
16. Study of IC 555 in monostable mode
17. Study of IC 555 as astable multivibrator

Note : Student must perform atleast 15 practicals from above experiments.

ELECTRONICS

STD. XII, PAPER - II

PRACTICAL - II

Topics **(4 Periods week)**

1. Study of logic gates and verification of DeMorgan's theorems.
2. Implementation of logic using gates for a given equation
3. Study of Ex-OR gate and its use as controlled invertor
4. Determination of noise margin from actual voltage measurement in TTL gales.
5. Construction of RS flip flop using NAND gates
6. Study of Multiplexer IC 74153 (Dual 4 to 1 max)
7. Study of DeMultiplexer using IC 74139 (Dual 4 to 1 max)
8. Study of encoder using IC 74147 (Decimal to BCD)

9. Study of decoder using IC 7447/7448
10. Study of decade counter using IC 7490
11. Construction of half adder
12. Full adder using gales
13. Study of full adder using IC 7483
14. Square wave generator using Schmitt trigger invertor
15. D-A convertor using R-2R ladder and Op-Amp
16. Study of diode matrix ROM
17. Identification of different parts of computer. Format a floppy disc. Prepare an index of all experiments and take a printout.

Note : Student must perform atleast 15 practicals from above experiments.

BOOKS RECOMMENDED

1. Basic Electronics and Linear Circuits
   By : Bhargava, Gupta, Kulshreshtha

2. Basic Electronics
   By : Grob

3. Electronic Instrumentation and Measuring Techniques
   By : Cooper and Helfrick

4. Electronic Principles
   By : A. P. Malvino

5. Communication Electronics
   By : Frenzel

6. Modern Digital Electronics
   By : R. P. Jain

7. Digital Computer Electronics
   By : A. P. Malvino

8. Computer and Commonsense
   By : Hunt and Shelly

RECOMMENDED TOOLS & EQUIPMENTS FOR A BATCH OF 25 STUDENTS

1. **Hand Tools**

Nose-Plier	
Tweezer	
Diagonal Cutter	
Screw-driver	
Penknife	
Hacksaw	
Drill-bits	
Soldering Iron	
Centre Punch and Scriber	
Hand drill	

2. **Meters**

Voltmeter :	0-3000 V_{AC}	5 Nos.
	0-20 V_{DC}	10 Nos.
Ammeters :	0-100 $_{M}A$	2 Nos.
	0-500 $_{M}A$	2 Nos.
	0-100 $_{M}A$	5 Nos.
	0-1 A	5 Nos.
	(All are DC meters)	
Galvanometers : Centre Zero, 600 $_{M}A$ f.s.d.		5 Nos.

3. Multimeter : Sanwa P-3 / Simpson 260 — 25 Nos.
4. Signal Generator (Sine, Square, Tringular) 1 MHz — 2 Nos.
5. Cathode Ray Oscilloscope — 2 Nos.
6. FET V.O.M. — 2 Nos.
7. Drilling Machine (Electric)(Pillar type) — 1 No.
8. De-soldering pumps — 10 Nos.
9. Regulated power supply 0-30v, 1 A — 10 Nos.
10. (Dual) Regulated Power Supply0-30v, 1 A — 5 Nos.

11. DMM (e.g. LM 357 or Meko 9 A) — 5 Nos.

12. D.C.Motor (12 V) with speed variation circuit — 1 No.

13. Computer - P-II 300 MHz 64 MB RAM, 4 GB HDD, CD ROM Drive, Multimedia, Modem, Mouse, UPS, Desk-Jet Printer (Colour) — 1 No.

14. Heater

15. Mercury Thermameter 0 to 300^0

16. Dimmerstat (0 to 300 v) — 2 Nos.

17. Step down transformer (Multitap) 1.5 to 12 V, 2 A

TECHNICAL GROUP
COURSE VI
COMPUTER SCIENCE
(D-9)
(Std. XI & XII)

PREAMBLE

Recognising the rapid advances in the field of Information Technology in recent years, the Board felt the need to upgrade the existing Computer Science (D-9) syllabus for Std. XI & XII (Bifocal Stream).

Accordingly, the syllabus lays specific emphasis on contemporary topics such as:

* Object Oriented Programming (using C++)
* Visual / GUI based programming (using VB)
* The pervasive world of Networks and Internet

COMPUTER SCIENCE
(D-9)
STD. XI, PAPER - I

Sr.No.	Topic	No. of Lectures
1.	Number System and Binary Arithmetic	8
2.	Program Analysis	8
3.	Introduction to C++	40
4.	Visual Basic	40
5.	Introduction to Networking & Internet	24

STD. XI, PAPER - II

Sr.No.	Topic	No. of Lectures
1.	Study of Components and Circuits	15
2.	Circuits Logic Gates and Sequential	25
3.	Functional Hardware Parts of PC	35
4.	Peripheral Devices	45

PRACTICAL (D-9)

STD. XI, PAPER - I

1. Study of Win 98 Desktop (a) My Computer (b) Task Bar (c) Navigation with help of Mouse (d) Maximize, Minimize, Close, Restore Windows.
2. Study of Win 98 - Start Menu, Execution of a Package like Word, etc.
3. File operations using Explorer
4. C++ Program - Study of Structure of C++ Program involving different data types.
5. C++ Program - Using Operators.
6. C++ Program - Using control Structures
7. C++ Program - Using Functions
8. C++ Program - Using Unformatted I/O operations.
9. VB Programs - Study of Integrated Development Environment and navigation through various windows and menus.
10. VB Programs - Study of tool box and Property Editor.
11. VB Programs - use of buttons, labels, text windows, picture boxes, check boxes and option buttons
12. VB Programs - Program a simple Addition / Subtraction Calculator
13. Internet - Study how to write and send an email
14. Internet - Study of Browser and access sites on Hard Disk.
15. Internet - Use of Chat. (Optional)
16. Internet - Study of FTP.

STD. XI, PAPER - II

1. Study of BASIC GATES using TTL or CMOS Chips
2. Study of UNIVERSAL BLOCKS using IC's 7400, 7402
3. Study of Three State Buffer IC 74125
4. Study of Square wave Generator using IC 7414. (or IC 40106)
5. Study of Half Adder using Gates.
6. Study of FULL ADDER using IC 7483
7. Study of Concept of Addressing using Diode Matrix ROM.
8. Study of Decoder Chip BCD to Decimal using IC 7445
9. Study of Multiplexer using IC 74154
10. Study of Input Devices : Keyboard, Mouse.
11. Study of Scanner and Printer.
12. Study of Multimedia - recording a voice, playing AVI file, etc.

Note : Student should perform Minimum 12 Experiments from each Paper.

COMPUTER SCIENCE

(D-9)

STD. XII, PAPER - I

Sr.No.	Topic	No. of Lectures
1.	Operating Systems	30
2.	Data Structures	20
3.	C++	50
4.	HTML	20

STD. XII, PAPER - II

Sr.No.	Topic	No. of Lectures
1.	Introduction to Microprocessors and Organization of 8085	25
2.	Instruction Set and Programming of 8085	45
3.	Introduction to Intel X86 family	5
4.	Introduction to Microcontroller	15
5.	Networking Technology	30

PRACTICAL (D-9)

STD. XII, PAPER - I

1. C++ Program - Using Array and Pointers.
2. C++ Program - with CLASS implementation.
3. C++ Program - Using Arrays of Object.
4. C++ Program - based on constructors and destructors.
5. C++ Program - based on operator Overloading.
6. C++ Program - based on type conversions.
7. C++ Program - based on single inheritance.
8. C++ Program - Single file operation.
9. VB Program - use of various tools in tool box.

10. VB Program - Creating and customizing menus.
11. VB Program - Use of If.... Then.... Else, For.... Next
12. VB Program - Use of Do.... Loop, Case.... Else
13. VB Program - Designing A Table.
14. A simple Project using Visual Basic.
15. Designing A simple Web Page with Text.
16. Designing A simple Web Page with Text and Graphics.
17. Use of simple VB Script in Web page designing.

STD. XII, PAPER - II

1. Familiarization with 8085 Microprocessor Kit.
2. Simple addition and Subtraction Programs using 8085.
3. Multiplication and Division Using 8085.
4. Program for addition of decimal numbers.
5. Use of monitor routines of the 8085 kit.
6. Program to use microprocessor as two-digit addition calculator using monitor routine.
7. Program to display messages on display.
8. Copy of memory block from one location to another memory location.
9. Program to find minimum/maximum in a memory block.
10. Program for searching a given number.
11. Program using rotate instructions.
12. Program using Stack Operations.
13. Program to generate a square wave.
14. Study of Interrupts.
15. Study of Transmission media such as Co-axial, twisted pair, fiber optic cables and connectors
16. Study of modem, hub, repeaters and routers.
17. Case study of existing Network topology used in the LAB.
18. Setting up of LAN network in Laboratory (Demonstration Experiment)

Note : Student should perform Minimum 12 Experiments from each Paper.

Suggested References (STD. XI and XII)

1. Digital Principles and Applications - Albert Malvino, Donal Leach, 4th Ed, Tata McGraw Hill.
2. Modern Digital Electronics - R.P. Jain, 2nd Ed, Tata McGraw Hill.
3. Mastering Visual Basic - Evangelos Petroutsos, SYBEX / BPB
4. Networking Essentials MSCE Training Guide, Techmedia.
5. Basic Electronics and Linear Circuits - Bhargava, Kulshreshta, Gupta, Tata McGraw Hill.
6. PC Upgrade and Maintenance Guide - Mark Minasi, SYBEX / BPB
7. Operating Systems - Achyut Godbole, Tata McGraw Hill
8. Data Structures - S. Lipschutz, Schaum's Series, McGraw - Hill Book Co.
9. Programming with C++ - John Hubbard, Schaum's Series, McGraw Hill
10. Object - Oriented Programming with C++ - E Balagurusamy, Tata McGraw Hill
11. HTML in Easy Steps - Andy Holyer, Comdex, PUSTAK MAHAL
12. Microprocessor Fundamentals - Roger Tokheim, Schaum's Series, McGraw Hill Book Co.
13. Microprocessors and Programmed Logic - Kenneth Short, 2nd Ed, PHI
14. Microprocessors Principles and Applications - Charles Gilmore, 2nd Ed, Tata McGraw Hill
15. Microprocessor Architecture, Programming and Applications with 8085 - Ramesh Gaonkar, 3rd Ed, Penram International
16. How to Solve It by Computer - R. G. Dromey, Prentice Hall of India.

List of Equipment's for Batch of 25 Students :

A. Server (one) - Minimum Configuration

Pentium - II / CELERON with 350 MHz or Higher
512 KB Cache Memory
64 MB SDRAM
1.44 MB/FDD
4.3 GB HDD or Higher
CD ROM Drive (40 X or higher)
4 MB AGP Card
14" SVGA Digital Colour Monitor
25-IP Ports 2 USB Port

10 x 100 MBPS NIC Card, with RJ 45 connection
Windows Compatible keyboard with PS/2 Interface
PS/2 Mouse or Compatible

B. Nodes (Minimum 09) Minimum configuration expected

Pentium - II / CELERON with 350 MHz or Higher
512 KB Cache Memory
32 MB SDRAM / 1.44 MB FDD / 4.3 GB HDD
4 MB AGP Card
14" SVGA Digital Colour Monitor
25-IP Ports 1 USB Port
10 x 100 MBPS NIC Card (32 bit)
PS/2 Mouse Window Pre-loaded
Note above mentioned Hardware should be certified for Windows 98/NT

C. Nodes (03 Units)

Configuration same as above with 40 X Multimedia Kit.

D. Networking

1. 16 port Hub with RJ 45 Ports
2. UTP Cable with RJ 45 Plug for 10 Nodes and Server.
3. Modem (One) 56.6 KBPS
4. Telephone Connection (Independent)
5. TCP / IP Connectivity with Internet Browsing Facility.

E. Accessories (one unit)

1. Scanner (A-4 Flat Bed)
2. 132 Column Dot Matrix Printer (24 Pin)
3. Des Jet Printer / Laser Printer

F. Software Required (for Server)

1. Windows NT O/S with 12 User license
2. ISM - Officer under Windows NT for 12 User
3. MS - Office (Professional) / Lotus Smart Suite
4. C++ Package
5. Visual Basic Ver. 5 or Higher
6. Anti Virus Software.

Space Requirement - (For Laboratory)

Minimum 500 Sq.Ft. area with necessary Civil and Electrical Work.

* Vinyl Flooring for Dust free environment.
* 1.5 ton 2 A/C units (optional)
* Necessary furniture to house 12 systems.
* Seating arrangement for about 25 persons.