

Maharashtra State Board of Vocational Examination, Mumbai 400 051

1	Name of Course	Certificate Course in Mechanic Computer Hardware																																																																																																				
2	Course code	301417																																																																																																				
3	Max no. of Students	25																																																																																																				
4	Duration	2 year																																																																																																				
5	Course Type	Full Time																																																																																																				
6	No. of Days per week	6 days																																																																																																				
7	No. of hours per day	7 Hrs																																																																																																				
8	Space require	Theory Class Room – 240 sqft Practical Lab – 540 sqft																																																																																																				
9	Entry qualification	S.S.C. Pass																																																																																																				
10	Objective of syllabus	1. Repair and maintain electrical and electronic subsystems associated with PCs and Peripherals. 2. Assemble a new PC to given specifications. 3. Upgrade, repair and maintain standalone PCs and PC connected in networking environment. 4. Install Operating systems and Application packages. 5. Repair and maintain common peripherals used with PCs. 6. Carryout cabling and install small network environment. 7. Set up Laptop computer with multimedia projectors and related devices.																																																																																																				
11	Employment opportunities	Work as Computer Hardware Mechanic in large business, govt organizations, computer institute, other computer based business organizations.																																																																																																				
12	Teachers Qualification	For Vocational Subject -B. E. Computer or Equivalent and For Non Vocational Subject - Master Degree in concern Subject.																																																																																																				
13	Teaching Scheme – <table><tr><th rowspan="2">Sr.</th><th rowspan="2">Subject</th><th rowspan="2">Subject Code</th><th colspan="2">Clock Hours / Week</th><th rowspan="2">Total</th></tr><tr><th>Theory</th><th>Practical</th></tr><tr><td>1</td><td>English (Communi- cation Skill)</td><td>90000001</td><td>2 Hrs</td><td>1 Hrs</td><td>3 Hrs</td></tr><tr><td>2</td><td>Elective – I</td><td>--</td><td>2 Hrs</td><td>1 Hrs</td><td>3 Hrs</td></tr><tr><td>3</td><td>Elective – II</td><td>--</td><td>2 Hrs</td><td>1 Hrs</td><td>3 Hrs</td></tr><tr><td>4</td><td>Basic Electricity and Measurement</td><td>30140018</td><td>3 Hrs</td><td>8 Hrs</td><td>11 Hrs</td></tr><tr><td>5</td><td>Electronics for Computer Hardware</td><td>30140021</td><td>3 Hrs</td><td>8 Hrs</td><td>11 Hrs</td></tr><tr><td>6</td><td>Computer Hardware Theory and Practice</td><td>30140022</td><td>3 Hrs</td><td>8 Hrs</td><td>11 Hrs</td></tr><tr><td colspan="5">Total</td><td>42 Hrs</td></tr></table>						Sr.	Subject	Subject Code	Clock Hours / Week		Total	Theory	Practical	1	English (Communi- cation Skill)	90000001	2 Hrs	1 Hrs	3 Hrs	2	Elective – I	--	2 Hrs	1 Hrs	3 Hrs	3	Elective – II	--	2 Hrs	1 Hrs	3 Hrs	4	Basic Electricity and Measurement	30140018	3 Hrs	8 Hrs	11 Hrs	5	Electronics for Computer Hardware	30140021	3 Hrs	8 Hrs	11 Hrs	6	Computer Hardware Theory and Practice	30140022	3 Hrs	8 Hrs	11 Hrs	Total					42 Hrs																																														
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14	Internship	Two Month Summer Internship from 1 st May to 30 th June is Compulsory.																																																																																																				
15	Examination Scheme – Final Examination will be based on syllabus of both years. <table><tr><th rowspan="2">Paper</th><th rowspan="2">Subject</th><th rowspan="2">Subject Code</th><th colspan="3">Theory</th><th colspan="3">Practical</th><th colspan="2">Total</th></tr><tr><th>Duration</th><th>Max</th><th>Min</th><th>Duration</th><th>Max</th><th>Min</th><th>Max</th><th>Min</th></tr><tr><td>1</td><td>English (Communi- cation Skill)</td><td>90000001</td><td>3 Hrs</td><td>70</td><td>25</td><td>3 Hrs</td><td>30</td><td>15</td><td>100</td><td>40</td></tr><tr><td>2</td><td>Elective – I</td><td>--</td><td>3 Hrs</td><td>70</td><td>25</td><td>3 Hrs</td><td>30</td><td>15</td><td>100</td><td>40</td></tr><tr><td>3</td><td>Elective – II</td><td>--</td><td>3 Hrs</td><td>70</td><td>25</td><td>3 Hrs</td><td>30</td><td>15</td><td>100</td><td>40</td></tr><tr><td>4</td><td>Basic Electricity and Measurement</td><td>30140018</td><td>3 Hrs</td><td>100</td><td>35</td><td>3 Hrs</td><td>100</td><td>50</td><td>200</td><td>85</td></tr><tr><td>5</td><td>Electronics for Computer Hardware</td><td>30140021</td><td>3 Hrs</td><td>100</td><td>35</td><td>3 Hrs</td><td>100</td><td>50</td><td>200</td><td>85</td></tr><tr><td>6</td><td>Computer Hardware Theory and Practice</td><td>30140022</td><td>3 Hrs</td><td>100</td><td>35</td><td>3 Hrs</td><td>100</td><td>50</td><td>200</td><td>85</td></tr><tr><td colspan="9">Total</td><td>900</td><td>375</td></tr></table>						Paper	Subject	Subject Code	Theory			Practical			Total		Duration	Max	Min	Duration	Max	Min	Max	Min	1	English (Communi- cation Skill)	90000001	3 Hrs	70	25	3 Hrs	30	15	100	40	2	Elective – I	--	3 Hrs	70	25	3 Hrs	30	15	100	40	3	Elective – II	--	3 Hrs	70	25	3 Hrs	30	15	100	40	4	Basic Electricity and Measurement	30140018	3 Hrs	100	35	3 Hrs	100	50	200	85	5	Electronics for Computer Hardware	30140021	3 Hrs	100	35	3 Hrs	100	50	200	85	6	Computer Hardware Theory and Practice	30140022	3 Hrs	100	35	3 Hrs	100	50	200	85	Total									900	375
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16	Teachers – Three Teachers per batch for vocational component. For English, Elective-I & II guest faculty on clock hour basis.																																																																																																					
17	a) For Elective I – Student can choose any one subject Code Subject Name 90000011 Applied Mathematics 90000012 Business Economics 90000013 Physical Biology (Botany & Zoology) 90000014 Entrepreneurship 90000015 Psychology b) For Elective II – Student can choose any one subject Code Subject Name 90000021 Applied Sciences (Physics & Chemistry) 90000022 Computer Application 90000023 Business Mathematics																																																																																																					

Subject Name : English (Communication Skill) - 1st Year

(Subject code : 90000001)

1) PROSE

	TOPIC	AUTHOR	
1	SPOKEN ENGLISH AND BROKEN ENGLISH	GEORGE BERNARD SHAW	
2	THE HOMECOMING	RABINDRANATH TAGORE	
3	WHAT WE MUST LEARN FROM THE WEST	N.R. NARAYAN MURTHY	
4	AFTER 20 YEARS	O .HENRY	
5	THE HAPPY PRINCE	OSCAR WILDE	

2) POETRY

1	IF	RUDYAR KIPLING	
2	BABY'S WORLD	RABINDRANATH TAGORE	
3	POISON TREE	WILLIAM BLAKE	
4	PSALM OF LIFE	H.W.LONGFELLOW	
5	HOPE	SIDDHARTH ANAND	

3) GRAMMER

		EXCERCISES
PARTS OF SPEECH NOUNS : KINDS OF NOUNS AND USAGES PRONOUNS PREPOSITIONS ADJECTIVES CONJUNCTION VERB ADVERB INTERJECTION	INTRODUCTION AND EXPLANATION	SENTENCE CORRECTIONS

ARTICLES / APOSTROPHES		
DIRECT /INDIRECT SPEECH		
HOMONYMS/HOMOPHONES		
FIGURES OF SPEECH		
LETTER WRITING – FORMAL AND INFORMAL		
COMPREHENSIONS		
EMAIL AND BUSINESS LETTERS (FORMAT TO BE TAUGHT WHICH IS USED IN WORKPLACE)		
COMPOSITIONS		

4) NON DETAIL

My experiments with truth – M.K.GANDHI

(an autobiography)

5) PRACTICAL

PRACTICALS – 30 MARKS

(BASED ON PERSONAL ENHANCEMENT)(THROUGH SKITS/CHARTS/FLASH CARDS/SKITS/PRACTICAL PROJECT)

OBJECTIVE : GROOMING THE STUDENT TOWARDS HIS CAREER.

AT THE END OF EACH TOPIC, THE STUDENT HAS TO HAVE BENEFITTED FROM IT.

KNOW THYSELF

GOAL SETTING HELP STUDENTS IDENTIFY THEIR OWN GOALS AND THUS LINK TO THEIR CAREERS AS PART OF CURRICULUM

TIME MANAGEMENT

TEAM WORK

INTERPERSONAL COMMUNICATION

GENERAL KNOWLEDGE/ QUIZ BASED ON THEIR SUBJECT

SPOKEN ENGLISH

English (Communication Skill) – 2nd year.

1) PROSE

	TOPIC	AUTHOR	
1	SPEECH AT CHICAGO	SWAMI VIVEKANANDA	
2	THE CASE FOR THE DEFENCE	GRAHAM GREENE	
3	WAITING FOR THE BUDDHA		
4	WATER – THE ELIXIR OF LIFE	C.V.RAMAN	
5	A HORSE AND TWO GOATS	R.K.NARAYAN	

2) POETRY

1	ROAD NOT TAKEN	ROBERT FROST	
2	Even this shall pass		
3	TO INDIA	SAROJINI NAIDU	
4	ALL THE WORLDS A STAGE	WILLIAM SHAKESPEARE	
5	A PRAYER FOR MY MOTHERS BIRTHDAY	HENRY VAN DYKE	

3) GRAMMER

		EXCERCISES
PARTS OF SPEECH NOUNS : KINDS OF NOUNS AND USAGES PRONOUNS PREPOSITIONS ADJECTIVES CONJUNCTION VERB ADVERB INTERJECTION	Different usages on the lines of competitive exams	SENTENCE CORRECTIONS

ARTICLES / APOSTROPHES		
DIRECT /INDIRECT SPEECH		
HOMONYMS/HOMOPHONES		
FIGURES OF SPEECH		
LETTER WRITING – FORMAL AND INFORMAL		
COMPREHENSIONS		
EMAIL AND BUSINESS LETTERS (FORMAT TO BE TAUGHT WHICH IS USED IN WORKPLACE)		
COMPOSITIONS		

4) NON DETAIL

MY EXPERIMENTS WITH TRUTH – M.K.GANDHI

5) PRACTICALS

CAREER CHART.(DEPENDING ON THE STREAM CHOSEN BY THE STUDENT)

ETIQUETTE FOR INTERVIEWS

BODY LANGUAGE

BUSINESS LETTERS

PRESENTATIONS

MARKING SCHEME :

PROSE : 20

POETRY : 15

GRAMMAR : 25

NON DETAIL : 10

PRACTICALS : 30

Elective 1 : Applied Mathematics - 1st Year

(Subject code : 90000011)

Theory	Practical
Detailed Syllabus: 1.0. Trigonometric ratios 1.1. Angles & its measurements 1.2. Trigonometric ratios 1.3. Relation between degree and radian. 1.4. Fundamental identities. 1.5. Examples based on Fundamental Identities 1.6. Trigonometric ratios of compound angles 1.7. Factorization formulae 1.8. Inverse trigonometric functions 1.9. Properties of a Triangle	Detailed Syllabus: Solve problems on: 1) Conversion of radian to degree 2) Conversion of degree to radian
2.0. Plane co-ordinate geometry 2.1. Locus 2.2. Line	
3.0 Vectors and Linear Equalities 3.1. Definition of vector, position vector 3.2. Algebra of vectors (Equality, addition, subtraction and scalar multiplication) 3.3. Dot (Scalar) product with properties. 3.4. Vector (Cross) product with properties. 3.5. Solutions of Linear inequalities in one variable and two variables	
4.0. Determinants and Matrices 4.1. Definition and expansion of determinants of order 2 and 3. 4.2. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns 4.3. Definition of a matrix of order $m \times n$. 4.4. Types of matrices. 4.5. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. 4.6. Transpose of a matrix. 4.7. Minor, cofactor of an element of a matrix, adjoint Of matrix and inverse of matrix by adjoint method. 4.8. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.	Solve problems on Cramer's rule
5.0 Statistics and Probability 5.1. Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. 5.2. Analysis of frequency distributions with equal means but different variances. 5.3. Random experiments: outcomes, sample spaces (set representation). 5.4. Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events 5.5. Probability of an event, probability of 'not', 'and' & 'or' events.	State and prove Baye's theorem

6.0. Set Relations & Functions 6.1. Types of functions 6.2. Domain, Co – domain, Range of a function 6.3. Composite and Inverse functions 6.4. Graphs of functions	Solve problems on Graphs
7.0. Logarithms 7.1. Introduction and Definition 7.2. Laws of logarithms 7.3. Numerical problems based on multiplication, division and power.	Solve problems on power law
8.0. Complex Numbers and Quadratic equations 8.1. Complex Numbers in the form of $a+ib$ 8.2. Modulus, Complex conjugate, Argument of complex numbers 8.3. Algebra of complex numbers 8.4. Square root of complex numbers 8.5. Argand diagram 8.6. Nature of roots 8.7. Sum and product of roots 8.8. Formation of quadratic equation 8.9. Symmetric functions of roots 8.10. Cube roots of unity	
9.0. Sequences and Series 9.1. Definition of a sequence 9.2. Geometric Progression and Arithmetic Progression 9.3. Arithmetic mean, Geometric mean, harmonic mean 9.4. Special Series	1) Proof of arithmetic progression and geometric progression 2) Proof of arithmetic mean and geometric mean
10.0 Permutations and Combinations 10.1. Factorial notation 10.2. Fundamental principle of counting 10.3. Permutation 10.4. Combinations	
11.0 Mathematical Induction and binomial theorem 11.1. History, statement, Proof of Binomial theorem for positive integral indices, Pascal's triangle, general and middle term in binomial expansion 11.2. Principle of mathematical induction and it's application 11.3. Simple applications	Proof of Binomial theorem

Elective 1 : Applied Mathematics - 2 nd Year

(Subject code : 90000011)

Theory	Practical
Detailed Syllabus : 1.0. CALCULUS: Limits and Continuity 1.1. Definition of a limit 1.2. Algebra of limits 1.3. Standard limits 1.4. Limit at infinity and infinite limits 1.5. Continuity of a function at a point 1.6. Algebra of continuous functions 1.7. Continuity in interval 1.8. Continuity of some standard functions	Detailed Syllabus 1) Theorem on a limit of a sequence 2) Theorem on continuity in interval

2.0. Differentiation 2.1. Derivative using first principle 2.2. Rules of Differentiation 2.3. Derivatives of standard functions 2.4. Derivatives of logarithmic and exponential functions 2.5. Derivative of composite functions 2.6. Derivative of Inverse functions 2.7. Derivative of implicit and parametric functions 2.8. Second order derivatives	Proof of derivative using the first principle with the help of an example
3.0. Applications of Derivatives 3.1. Geometrical applications 3.2. Derivative as a rate of change measure 3.3. Approximations 3.4. Maxima and Minima	
4.0. Integration 4.1. Definition of an integral of a function 4.2. Integrals of some standard functions 4.3. Rules of integration 4.4. Indefinite Integration 4.5. Definite Integration	Solve problems on definite integration
5.0 Application of Definite Integrals 5.1. Area under the curve 5.2. Volume of solid of revolution	
6.0. Differential equations 6.1. Definition 6.2. Formation of differential equations 6.3. Solution of first order and first degree differential equations 6.4. Applications of differential equations	Solve problems on first order and first degree differential equations
7.0 Numerical Methods 7.1. Definition of various operators and relation between the operators 7.2. Interpolation methods 7.3. Numerical integration	
8.0. Mathematical Logic 8.1. Statements and logical connectives 8.2. Statement Pattern and Logical equivalence 8.3. Application of logic	
9.0. Geometry 9.1. Pair of straight lines passing & not passing through origin 9.2. Circle: definition, Tangent and Normal 9.3. Conic: Equation of Conics 9.4. Three Dimensional Geometry: Direction Cosines and ratios, Line, Plane	
10.0. Linear Programming Problems 10.1. Linear Programming Problems 10.2. Simplex Method	Solve problems on simplex method
11.0. Boolean Algebra 11.1. Boolean Algebra as an algebraic structure 11.2. Principle of Duality 11.3. Boolean function & switching circuits 11.4. Application of Boolean Algebra to switching circuits	State and explain the principle of duality

Elective - I - Business Economics – 1st year

(Subject Code – 90000012)

Theory	Practical
<p>Detailed Syllabus :</p> <p>1. Introduction to Economics –</p> <p>1.1 Meaning & Scope -</p> <p>1.2 Relevance of Economics to different disciplines - Economics & Management, Economics & Law- Economics and Humanities –</p> <p>1.3 Micro Economics and Macro economics</p>	<p>1) Prepare a project on usefulness of micro – economics.</p> <p>2) Prepare a project on usefulness of micro – economics.</p> <p>3) Conduct a GD on the importance of Micro Economics and Macro Economics</p>
<p>2. Macro Economics –</p> <p>2.1 Meaning, Definition and Features.</p> <p>2.2 Aggregates-Nature of Aggregates , problems of Aggregation.</p> <p>2.3 National Income, Meaning, Definition of National Income Different National Income Concepts</p> <p>2.4. Estimation of National Income – Methods and Difficulties</p>	<p>1) Prepare a PPT presentation on macro-economics, National Income and how it is computed and the difficulties in measuring National Income.</p> <p>2) Prepare a chart on the circular flow of National Income.</p> <p>3) Make a comparative study of closed economy and open economy.</p> <p>4) Conduct a case study of 5 individual families and find out the Disposable income to the individuals.</p>
<p>3. Determinants of Aggregates</p> <p>3.1. Aggregate Demand and their components</p> <p>3.2 Aggregate Supply and their components</p>	<p>Prepare a chart on the components of aggregate demand.</p> <p>Conduct a GD on Keynes theory of employment and principles of effective demand.</p> <p>Take 2 or 3 case studies on entrepreneurship and discuss to what extent they provide employment to people.</p>
<p>4. Money and Banking</p> <p>4.1 Meaning, definitions and functions of Money</p> <p>4.2 Commercial Banks: Meaning and Functions.</p> <p>4.3 Central Banks: Meaning and Functions.</p>	<p>Find out RBIs concept of money supply.</p> <p>A visit to various financial institutions.</p> <p>A visit to a rural bank, cooperative bank, commercial bank.</p> <p>A visit to the RBI Training college, NABARD OR IDBI</p> <p>Further For the first year the practical will consist developing familiarity with banking functions and will comprise Of what are different types of banking services, facilities, available to individuals/organizations? (to increase the financial literacy)</p> <p>how to open a bank account?</p> <p>different investments like – FD,MF</p> <p>facilities for financial inclusion</p>

5 Public Economics 5.1 Government Budget and the Economy Government Budget – Meaning and its components 5.2 Types of Government Budget – Balanced, Surplus and Deficit.	Prepare a report on sources of revenue in the budget of local Government. Comment. Conduct a GD on last year's government budget. Find out how a private budget/ finance differs from public budget/ finance Prepare hypothetical master budget for an imaginary company and discuss how you have allocated the funds for each department. Prepare a separate budget for production, personnel and administration, finance, marketing, advertising, etc.
6. International Trade 6.1 Comparative cost principal of International Trade. 6.2 Free trade Advantages, Disadvantages 6.3 Protectionist trade advantages, Disadvantages	1) Collect data on India's direction of trade 2) Collect data on India's trade Composition
Theory	Practical
Detailed Syllabus : 7.1. Concepts of Economic Growth and Economic Development 7.2 Indicators of Economic Development Monetary indicators 7.3 Human Development indicators	1) To make a project on discrepancies in India's economic growth and development. 2) Discuss the patterns of education among women in the post independence period. 3) Collect information on Human Development Index for different Indian states.
8.0. Structural Changes in the Indian Economy since 1991. 8.1 Economic reforms since 1991: Need and main features, Liberalization, privatization and Globalization. Their impact on Indian Agriculture, Industries and Service Sector. 8.2 Economic Planning – Meaning and Objectives 8.3 Achievements and Failures of 10th Five – Year Plan	1) Conduct a GD on the New Economic Policy, 19991 and its impact on the various sectors. 2) Visit to Agricultural Produce Market Committee to study the price Fixation of agricultural commodities. 3) Collection of market intelligence of agricultural commodities from newspaper and journals. 4) A visit to a cottage industry, small scale industry, large scale industry. 5) A visit to a MNC. Prepare an assignment on the WTO.
9.0. Current Challenges of Indian Economy 9.1 Problem of Population Explosion in India Causes, Effects and Remedial Measures to remove these problems 9.2 Problem of Poverty in India Causes, Effects and Remedial Measures to remove these problems 9.3 Problem of Unemployment in India Causes, Effects and Remedial Measures to remove these problems	Conduct a GD on population explosion and its impact. Prepare a comparative chart on employment in India during the five year plans. Conduct a GD to find out measures for poverty alleviation. Make ppt presentation on population explosion, poverty, unemployment.

10.0. Infrastructural Development in India 10.1 Transport and Communication, 10.2 Energy, 10.3 Health and Education	Prepare a project report on recent trends in communication. Prepare transport documents of trade namely goods forwarding note, lorry receipt, delivery challan, railway receipt, mates receipt, Bill of lading, airway bill, etc. Conduct case studies on different energy companies like Carin India, Power Corporation of India, Reliance Energy, Coal India Ltd. Collect secondary data on health and education.
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Elective - I - Business Economics – 2 nd year

(Subject Code – 90000012)

Theory	Practical
Introduction Micro Economics – 1.1 Meaning, Definition, Nature 1.2 Tools of Analysis, 1.3 Role of Assumptions	1) Conduct a GD on the usefulness of Micro economics 2) Prepare a PPT on the role of assumptions in Economics
Consumer Behaviour and Demand Analysis 2.1 Concept of Utility, Total and Marginal Utility, Law of Diminishing Marginal Utility. Law of Equi – marginal Utility. 2.2 Concept of demand, Types of demand, Determinants of Market demand, Law of demand. 2.3 Price elasticity of demand – Concept and Importance	1) Make a ppt presentation on U, TU, MU, Law of diminishing marginal utility and law of equi – marginal utility. 2) Conduct a GD to substantiate the point that consumer behaviour mainly depends on economic theories. 3) Conduct a case discussion on elasticity of demand. 4) A visit to a mall/ departmental store to study consumer behaviour.
Producer Behaviour and Supply Analysis. 3.1 Meaning of Supply 3.2 Market Supply 3.3 Determinants of Market Supply and Law of Supply.	1) Make a PPT differentiating total output, Stock and Supply concepts. 2) Make chart on law of supply with schedules and supply curve. 3) Prepare a project report on the Law of supply. 4) Conduct a case discussion on the elasticity of supply.
Forms of Market and Price Determination, 4.1 Perfect competition 4.2 Monopoly and Monopolistic Competition – Meaning and Features 4.3 Price Determination under Perfect Competition	1) Conduct a discussion on 'prevalence of one price is the best test of perfect competition' 2) A visit to various markets to study the competition. 3) Write a report on the features of buyers market and sellers market.

Factors of Production 5.1 Meaning and Features of Land as a factor of production, 5.2 Labour as a factor of production, 5.3 Capital as a factor of production, 5.4 Entrepreneur, Qualities and functions of entrepreneur.	1) A visit to SISI, DIC to study about entrepreneurship. practical will consist of: <ul style="list-style-type: none"> • Preparing a project report • How to start a business • Collecting information about Permission/ Licenses required from various government agencies/ authorities • Conducting proto type market surveys using the above statistical tools • Preparing questionnaires for different types of market surveys 2) Prepare a project report on how to start an industry with financial details. 3) Conduct an interview with successful entrepreneurs. 4) Prepare a questionnaire for entrepreneurs. 5) Find out the problems faced by informal sector labour and prepare a report.
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Section II	
6.1 Meaning, Scope and Importance of Statistics in Economics	1) Analyze the charts and diagram various statistical reports. 2) Collect secondary data from journals, magazines and newspapers.
Collection and organization of data 7.1 Collection of data – primary and secondary 7.2 Methods of data collection – primary methods – Observation, Interview, Methods of secondary data – Census and sampling, Random sampling. 7.3 Organization of data – Census and sampling, Random sampling.	1) Preparation of questionnaire for personal survey method, telephone interview and mail survey. 2) Select sample respondents and conduct socio – economic survey, marketing survey, etc. 3) Choose suitable sampling method to conduct the survey. 4) Classification of collected data, tabulation of data and analysis and interpretation of data.
Graphical presentation of Data 8.1 Tables – Components and Types 8.2 Graphs – Curves, Bar diagrams, 8.3 Pie – diagrams.	1) Prepare a project report using statistical techniques, graphs, etc. 2) Prepare a bar diagram for the data collected. 3) Prepare pie charts.
Measures of Central Tendency 9.1 Mean 9.2 Median 9.3 Mode	1) Solve practical problems of mean, median, etc.

Elective - I PHYSICAL BIOLOGY (Botany & Zoology) – 1st Year
(Subject Code : 90000013)

Theory	Practical
Detailed Syllabus : 1.0. General Biology 1.1. Definition and its concept 1.2. Living World: Nature and scope of Biology 1.3. Cell and Cell division: Structure of the cell, Cell division 1.4. Main features of life and its characteristics (Irritability, Homeostasis, Adaptations, Reproduction and Growth & death. 1.5. Origin and evolution of life 1.6. Theories of evolution of life, origin of life, special creation, spontaneous generation, Abiogenesis, Evidences of organic evolution paleontological anatomical & embryological 1.7. Study of Tissues	Study of cells and tissues
2.0. Introduction to Botany 2.1 Origin, development and scope of Botany 1.2 Classification and its need 1.3 Nomenclature 1.4. Taxonomic Hierarchy 1.5. Five Kingdom system of classification 1.6. Two Kingdom system of classification 1.7. Thallophyta, Bryophyta and Pteridophyta 1.8. Gymnosperms, Angiosperms	Study of angiosperms and gymnosperms
3.0. Vegetative Morphology of plants 3.1. Root: Root System – types, modifications of root (storage roots, velaman roots, photosynthetic roots, respiratory roots, parasitic roots, nodular roots) 3.2 Stem: Characteristics and Functions of the stem Modifications of the stems (Aerial – Tendrils, Thorns, Hooks, Phylloclade, Tuberous stems, Bulbils: Sub Aerial – Runners, Stolons, Suckers, Offsets: Underground – Rhizome, Corm, Stem Tuber, Bulb) 3.3 Leaf: Parts and Functions (Types and Modifications of leaf base, stipule, petiole are excluded) Venation Types of leaves (simple and compound) Phyllotaxy (alternate, opposite, Whorled) Modifications of leaves (tendrils, spines, scale leaves, Phyllode, reproductive leaves, trap leaves (details of Nepenthes only)	Study of the structure of a plant (root, stem, leaf)
4.0. Reproductive Morphology of plants 4.1. Inflorescence – Types (racemose, cymose, special) 4.2. Flower – Parts, Sex Distribution, Symmetry, Position of Gynoecium, detailed description of flower (perianth, calyx, corolla, aestivation, androecium – parts, fixation, dehiscence of anther, lengths of stamens, union of stamens), gynoecium – number of carpels, fusion of carpels (excluding variations under syncarpous), ovary – number of locules, placentation, types of styles, stigma.	

SECTION B - ZOOLOGY 5.0. General Biology of Living world 5.1. Main features of life and its characteristics (Irritability, Homeostasis, Adaptations, Reproduction and Growth & death. 5.2. Origin and evaluation of life 5.3. Theories of evaluation of life, origin of life, special creation, spontaneous generation, Abiogenesis, Evidences of organic evolution paleontological anatomical & embryological 5.4. Study of Tissues	
6.0 Diversity of life 6.1 Study and Classification of animals	Classification of animals
7.0. Genetics 7.1. Chromosomal basis of inheritance	
7.0 Study of Phylum: Chordata 7.1 General characters and out line classification of Chordata up to classes with typical examples. 7.2 Fishes: Distinctive features of cartilaginous and Bony fishes with typical examples. 7.3 Amphibia: Distinctive features of Urodela, Anura and Apoda with typical examples	Study of amphibians
8.0 Study of Reptiles, Aves and Mammals 8.1 Reptiles: Distinctive characters of Squamata, Rhynchocephalia, Crocodilia and Chelonia with typical examples. 8.2 Identification of Poisonous and Non- Poisonous Snakes, Poison apparatus, toxicity of Snake venom and treatment of snake bite including the first aid. 8.3 Aves: Distinctive features of Carinatae and Ratitae with typical examples. 8.4 Mammals: Distinctive features of Prototheria , Metatheria and Eutheria.	1) Study of mammals 2) study of reptiles
9.0 Anatomy of Earthworm 9.1. General characteristics of earthworm 9.2. Digestive and reproductive system 9.3. Inter-relation of earthworm with mankind	Study of earthworm

Elective - I PHYSICAL BIOLOGY (Botany & Zoology) – 2nd Year
(Subject Code : 90000013)

Theory	Practical
Detailed Syllabus : SECTION A - BOTANY 1.0. Reproduction in Angiosperms 1.1 Introduction 1.2 Microsporogenesis and development of male gametophyte 1.3 Ovule – structure, types, megasporogenesis, development of embryo sac 1.4 Pollination – Types, Contrivances of cross and self pollination. Agents of Pollination (definition with one example only) 1.5 Fertilization: Post Fertilization changes including seed structure (dicot, Monocot) and types of germination (epigeal, hypogeal & vivipary – definitions with one example)	Detailed Syllabus Study of reproduction in angiosperms in details

1.6 Fruits: – Classification; false fruits, true fruits – simple (fleshy fruits – berry, pome, pepo, hesperidium, drupe: Dry fruits – dehiscent - legume, septicidal capsule, septifragal capsule, loculicidal capsule: Indehiscent – caryopsis, cypsela, nut: schizocarpic – lomentum, schizocarp), Aggregate and multiple fruits	
2.0. Plant Taxonomy 2.1 Introduction – alpha and omega taxonomy , aspects of taxonomy, flora, herbaria, botanical gardens (RBG – KEW , IBG – Kolkatta, NBG – Lucknow), binomial nomenclature, ICBN, Types of classification, Units of classification, brief account of Bentham and Hookers classification 2.2 Study of Malvaceae 2.3 Study of Fabaceae 2.4 Study of Solanaceae 2.5 Study of Liliaceae	
3.0. Internal Organization of plants 3.1 Tissues – Types (meristematic and permanent) and Functions 3.2 Internal Structure of Dicot Root (Primary) and Monocot root 3.3 Internal Structure of Dicot Stem (Primary) and Monocot stem 3.4 Internal Structure of leaf (Dicot and Monocot) 3.5 Secondary Growth in Dicot Stem	Study of monocot and dicot stem
4.0. Genetics 4.1 Introduction to genetics 4.2 Mendel's Principles – Monohybrid, Dihybrid cross, Concept of probability in relation to Mendel's laws 4.3 Linkage and crossing over (only concept and significance) 4.4 Mutations – gene and chromosomal (only definitions of terms: – spontaneous, induced, chromosomal structural and chromosomal numerical changes)	Mendel's principle
SECTION B - ZOOLOGY 5.0. Morphology of Humans 5.1. Nutrition and respiration in man 5.2. Locomotion in man 5.3. Study of Human Skeleton	Study of human skeleton(Bone theory)
6.0 Physiology of Humans 6.1. Circulation 6.2. Osmoregulation and excretion 6.3. Nervous co – ordination 6.4. Hormonal co – ordination	1) Study of hormones 2) study of circulation and excretion(diagrammatic chart)
7.0 Reproduction, growth and development 7.1. Details of Reproduction and human development	Study of reproduction in humans
8.0 Biology in Human welfare 8.1. Aquaculture: List of animals of aquacultural importance in Tabular form only 8.2. Poultry: Poultry farming methods, Layers and Broilers, Poultry diseases (Bacterial,Viral and Fungal - Three each) 8.3. Study of diseases: AIDS, Cancer, Typhoid 8.4. Immunity system 8.5. Biotechnology (Elementary aspects) 8.6. Applications of Biology: Vermiculture and Fishery	Study of various diseases

Subject Name : ENTREPRENEURSHIP – 1st Year

(Subject code : 90000014)

Theory	Practical
Detailed Syllabus : 1.0. Entrepreneurship 1.1. Concept, Functions and need 1.2. Entrepreneurship: Characteristics and Competency 1.3. Relevance of Entrepreneurship to Socio-Economic Gain: generating National Wealth, creating Wage and Self -Employment, Micro, Small and Medium Enterprises, Optimizing Human and Natural Resource and Solving Problems in the path of prosperity, building enterprising Personality and Society. 1.4. Process of Entrepreneurship Development.	Detailed Syllabus I. Study visit by students to any enterprise of own choice. With the help of a schedule/questionnaire the students will record observation regarding – the background of entrepreneur, reasons for selecting the entrepreneurial career, starting the enterprise, the type of enterprise, the process of setting this enterprise, products/services, production process, investment made and marketing practices followed, profit or loss, growth and development, problems faced, institutions/organizations which offer support and entrepreneur's level and type of satisfaction.
2.0. Entrepreneurial Pursuits and Human Activities: 2.1. Nature, Purpose and pattern of Human Activities: Economic and Non-Economic, Need for innovation. 2.2. Rationale and Relationship of Entrepreneurial pursuits and Human Activities.	II. Preparation of a brief report based on the observations made during study-visit to an enterprise.
3.0. Acquiring Entrepreneurial Values and Motivation 3.1 Entrepreneurial Values, Attitude and Motivation-Meaning and concept. 3.2 Developing Entrepreneurial Motivation and Competency – concept and process of Achievement Motivation, Self-efficacy, Creativity, Risk Taking, Leadership, Communication and Influencing Ability and Planning Action. 3.3. Barriers to Entrepreneurship 3.4. Help and support to Entrepreneurs	
4.0. Introduction to Market Dynamics 4.1. Understanding a Market 4.2. Competitive Analysis of the Market 4.3. Patents, Trademarks and Copyright	
5.0. Project Selection 5.1. Product Identification 5.2. Project Formulation	

ENTREPRENEURSHIP – 2nd Year

Theory	Practical
Detailed Syllabus : 1.0. Entrepreneurial Opportunities and Enterprise Creation 1.1. Sensing Entrepreneurial Opportunities 1.2. Environment Scanning 1.3. Market Assessment 1.4. Identification of Entrepreneurial Opportunities 1.5. Selection of an Enterprise 1.6. Steps in setting up of an Enterprise	Detailed Syllabus
2.0. Enterprise Planning and Resourcing 2.1. Business Planning – Preparation of a Project Report 2.2. Resource Assessment -Financial and Non – Financial. 2.3. Fixed and Working Capital Requirement, Funds, Flows, Profit Ratios, Break Even Analysis etc. 2.4. Mobilizing Resources – Sources and Means of Fund, Facilities and Technologies for starting an Enterprise.	
3.0. Enterprise Management 3.1. General management: Basic Management functions. 3.2. Organizing/Production of goods and services – quality, quantity and flow of inputs. 3.3. Managing Market: Meaning, Functions of Marketing, Marketing Mix: * Product * Price * Place * Promotion (advertising and sales promotion). 3.4. Managing Finance – Sources of Long Term and Short Term Finances, Determination of Cost, Income, Calculation of Profit/Loss. 3.5. Managing Growth and Sustenance -Affecting Change, Modernization, Expansion, Diversification and Substitution. 3.6. Entrepreneurial Discipline – Laws of Land, Ecology, Consumer's Concept, Adherence to Contract and Credits.	
4.0. Industrial Relations and Personnel Management 4.1. Meaning, Source of recruitment, Internal/External recruitment procedure 4.2. Incentives, appraisal and training, Industrial relations, Industrial disputes.	
5.0. Report Writing 5.1. Guidelines 5.2. Model project reports	

Subject Name : Psychology – 1st Year

(Subject code : 90000015)

Theory	Practical
Detailed Syllabus : 1.0. Psychology Introduction : 1.1. Definition of Psychology 1.2. Methods of Psychology 1.3. Subfields of Psychology 1.4. Schools of Psychology (a) Old (b) New	Detailed Syllabus I. Study until by student to any organization for differently able person with special needs or a centre for the treatment of the mentally ill. With the help of a questionnaire the student will record observation regarding the type of treatment given, different therapies available at the organization/centre, prognosis of the patients improvement in quality of life, support for previous care given to the patient/clients.
2.0 Memory 2.1 A Theory of General Memory Function 2.2 Information Processing Theories 2.3 The Levels of Processing Theories 2.4 The Organization of Long Term Memory 2.5 Retrieval From Long term memory. 2.6 Forgetting	II. Preparation of a brief report based on the observations made during case study-visit to an organization.
3.0 Learning 3.1 Definition 3.2 Classical Conditioning 3.3 Instrumental Conditioning 3.4 Escape Learning 3.5 Avoidance Learning 3.6 Signature of Instrumental Conditioning 3.7 Cognitive Learning	
4.0 Motivation 4.1 Definition 4.2 Motives as References, Explanations and Predictions. 4.3 Theories of Motivation 4.4 A Normal of Biological Motivation 4.5 Biological Motivation 4.6 Social Motives 4.7 Self-Actualization Motivation 4.8 Frustration and Conflict of motives	
5.0 Personality 5.1 Definition 5.2 Theories of Personality	
6.0 Motivation 6.1 Definition 6.2 Etiology 6.3 Diagnosis 6.4 Clinical Features 6.5 Treatment	
7.0 Perception and Attention 7.1 Definition of Perception 7.2 Sensory Processes 7.3 Illusions 7.4 Attention	

8.0 Emotions 8.1 Definition 8.2 Expression and Perception of Emotions 8.3 Physiology of Emotions 8.4 Stress	
9.0 Intelligence 9.1 Definition 9.2 Intelligence Quotient (IQ) 9.3 Intelligence Testing	

Abnormal Psychology - 2nd Year

Theory	Practical
Detailed Syllabus : 1.0. Abnormal Psychology 1.1. Definition of Psychological Disorder 1.2. Classification of Psychological Disorder	Detailed Syllabus <p>The Main objective of the course in Psychology is to help the students establish a better rapport with their clients. A basic understanding and knowledge of this subject will enable the students to deal with each client as an individual, while also being aware of his/her unique needs. Also, due to the established mind-body connection, some patients requiring Physiotherapy have a Psychological cause as the basis of their physiological symptoms. Severe physiological symptoms requiring therapy can lead to psychological conditions in the patient. Relevant knowledge of psychology can help sensitize the physiotherapist to the needs of the client and treat the patient in a more holistic manner.</p> <p>Such a course would need to have an experimental component in the form of practical work. The objectives of the practical work are :-</p> <ol style="list-style-type: none"> 1. To give the students firsthand experience in field work with hospitals / centers catering to the psycho-physiological needs of patients. 2. To develop in the students the skill and sensitivity to deal with each patient as an individual with his or her own unique need. 3. To guide the students to prepare a project report. 4. To equip the students to make a note of patients psychological conditions in the case history of the patient. 5. To instill in the students the right values and a greater understanding of their patients.

2.0 Schizophrenia 2.1 Definition 2.2 Symptoms 2.3 Subtypes 2.4 Treatment 2.5 Prognosis	
3.0 Paranoia 3.1 Definition 3.2 Symptoms 3.3 Subtypes 3.4 Treatment	
4.0 Manic Depressive Psychosis 3.1 Definition 3.2 Symptoms 3.3 Subtypes	
5.0 Melancholia 5.1 Symptoms 5.2 Treatment	
6.0 Anxiety 6.1 Symptoms of anxiety 6.2 Difference between normal fears and anxiety disorder 6.3 Peripheral manifestations of pathological anxiety. 6.4 Classification of anxiety disorder. 6.5 Treatment	
7.0 Phobia 7.1 Definition 7.2 Symptoms 7.3 Types of phobia 7.4 Treatment	
8.0 Obsessive Compulsive neurosis (OCN) 8.1 Definition of Obsession 8.2 Definition of Compulsion 8.3 Symptoms 8.4 Treatment	
9.0 Hysterical Conversion Disorder 9.1 Definition 9.2 Clinical features (Symptoms) 9.3 Treatment	
10.0 Neurasthenia 10.1 Definition 10.2 Symptoms 10.3 Treatment	
11.0 Personality Disorders 11.1 Definition 11.2 Symptoms 11.3 Classification / Types of Personality Disorders 11.4 Anti-social Personality Disorder (i) Etiology (ii) Treatment	
12.0 Psychotherapy 12.1 Definition 12.2 Types of Psychotherapy	

13.0 Organic Psychosis 13.1 Definition 13.2 Symptoms 13.3 Types of Organic Psychosis (i) Causes (ii) Clinical Features (iii) Treatment (iv) Course and Prognosis	
14.0 Alcohol Related Mental Disorders 14.1 Definition 14.2 Etiology 14.3 Classification 14.4 Treatment and Rehabilitation.	
15.0 Epilepsy 15.1 Definition 15.2 Varieties / Types of epilepsy 15.3 Cause of epilepsy 15.4 Aggravating factors 15.5 Post-ictal disorders 15.6 Epilepsy Vs. Pseudo-seizures 15.7 Status Epilepticus & treatment 15.8 Treatment of Epilepsy	
16.0 Mental Retardation (MR) 16.1 Definition 16.2 Classification 16.3 Etiology 16.4 Diagnosis 16.5 Clinical Features 16.6 Treatment	
17.0 Frustration and conflict 17.1 Definition of Frustration 17.2 Sources of Frustration 17.3 Types of conflict	
18.0 Mental Mechanisms 18.1 Classification	

PRACTICAL (Second Year)

Introduction:

The Main objective of the course in Entrepreneurship is to generate in the students initiative, self reliance and enthusiasm so as to empower them to become entrepreneurs both in spirit and performance. A number of skills such as observation, evaluation, communication, resource mobilization and management, risk assessment, team building etc. is also to be developed in the students. Leadership qualities, sensitivity to business ethics and adherence to a positive value system are the core issues that the course highlights while presenting different concepts related to entrepreneurship.

Such a course should necessarily have a strong experiential component in the form of practical work. The objectives of the practical work are:

- 1 To introduce the students to the world of business by developing in them the core skills and competencies required for an entrepreneur.
2. To develop in the students qualities such as leadership, self-confidence, initiative, facing uncertainties, commitment, creativity, people and team building, integrity and reliability.

3. To enable the students to acquire the skills and knowledge needed for conducting surveys, collecting, recording and interpreting data and preparing simple estimates of demand for products and services.
4. To guide the students to prepare a Project Report.
5. To equip the students with knowledge and skills needed to plan and manage an enterprise through case studies conducted and recorded by the students in different fields such as resource assessment, market dynamics, finance management, cost determination, calculation of profit and loss etc.
6. To instill in the students important values and entrepreneurial discipline.

FORMAT

Total marks: 30

1. Project Report/Survey Report	10 Marks
2. Viva-Voce on PW /SR	05 Marks
3. Case Study	10 Marks
4. Problem Solving	05 Marks

1. Project Report/Market Survey Report

10 Marks

a) Project Report:

Preparation of a Project Report for an enterprise involving products/services Students may be provided adequate guidance to choose a project based on their interests and availability of information and authentic inputs in the locality. The specimen proforma of project report given in the textbook may be used for preparing the report. However, mechanical preparation of the report by filling in the information in the proforma should be discouraged.

Further, as the students will be required to appear for a Viva-voce on the basis of their projects, sufficient care should be taken by the students to prepare the report after studying the various aspects involved thoroughly. In a nutshell, the project report should lead to viable enterprise.

b) Market Survey Report

Market research is the process and technique of finding out who your potential customers are and what they want. The survey may be on products and services already available in the market or students may also conduct surveys for new products and services. The report of the survey should be organised under the following broad headings :

1. Objectives.
2. Methods and tools (interviews ,questionnaires etc.) to be used to collect information.
3. Records of data and information.
4. Analysis of data and information.
5. Interpretation and conclusion.

For example, a survey may be conducted to find out the choice of households in toiletry soap, tooth paste etc. The data may be analysed to establish a pattern that may be useful to an entrepreneur.

Guidelines for assessment of Project Report / Survey Report

1. Presentation: Format, Clarity, Use of graphs, tables and other visuals, organisation, methodical recording of data and information and general neatness of execution. 5 marks
2. Originality and Creativity 3 marks
3. Authenticity of information and correctness of calculations and general feasibility of the project/ sustainability of conclusion drawn in the survey. 2 marks

2. Viva Voce on the Project /Market Survey Report

5 Marks

The questions should establish that the report is the original work of the student and that the student has a reasonably clear understanding of the work carried out by him/her. Entrepreneurial qualities such as leadership, self-belief, creativity, originality, initiative etc. may also be assessed by asking a variety of questions related to the report.

3. Case Study

10 marks

A case study is a focused research on an organisation, enterprise, practice, behaviour or person undertaken to highlight an aspect that the study attempts to examine. For instance, a case study may be conducted on the pollution control methods being employed by an industry. Or a successful industrialist may be chosen as a subject of a case study to analyze and understand the strategies that the industrialist adopted :to achieve success.

Ideally, a case study should be conducted on subjects with the objectives of bringing to the fore beliefs, practices, strategies, values etc. that have made them what they are. Such studies help us to understand the way in which great minds think and operate. We may also conduct case studies on failures; why a company collapsed, how a service lost its market etc. From both the types of case study, we learn lessons; how to do something or how not to do something. They also provide valuable insight into the processes involved in an enterprise.

A few topics are suggested for carrying out case studies :

- i) Drawing a profile of a successful entrepreneur.
- ii) Studying a public sector undertaking and highlighting its success/failure, by analyzing the factors responsible.
- iii) Studying a small scale unit in the locality to bring out the procedures and processes adopted by the unit to become a feasible business venture.
- iv) A study of competition in business by choosing two or more rivals in the market and analyzing their strengths and weaknesses.
- v) Take the school itself for a case study and analyze any two aspects of the school plant for chalking out a plan of action: infrastructure, academics, co-curricular activities etc.
- vi) A case study on a thriving fast food shop/restaurant in your locality. What makes it so popular?
- vii) A case study on the ways in which a business unit has mobilised its financial resources.
- viii) A case study on the enterprise management techniques adopted by a business house.
- ix) A case study on the marketing strategies of a successful consumer durable company.
- x) A case study on the financial management of a Public Limited Company.
- xi) A case study on any Specialized Institution that supports and guides the establishment of a small scale unit.
- xii) Studying the balance sheets of two big private companies to assess their trade and credit worthiness.
- xiii) Studying the inventory management of a large manufacturing industry to ascertain the processes involved for optimizing cost.
- xiv) Carrying out a case study on an established industrial house/company to find out the value system of the company and how it fulfils its social commitment/obligations.
- xv) Carrying out a case study on an established industry to ascertain the processes followed to reduce/prevent pollution.
- xvi) Study on environment friendly companies and their contribution to preservation.

Assessment of Case Studies

- | | |
|---|---------|
| i) Presentation: Format, accuracy, clarity, authenticity and general neatness | 7 marks |
| ii) Analysis and Conclusions | 3 marks |

4. Problem Solving

5 marks

In this session, the students will be required to solve a problem in the form of a written test. The examiner may choose any problem related to the units in class XII Text Book and set it for the class. The problem may be in the following areas :

- a. How to scan the environment to establish the feasibility of a project.
- b. Given certain figures showing the consumption pattern of a product, drawing conclusions that have a bearing on similar products.
- c. Carrying out market assessment for a given product/service to ascertain the feasibility factor.
- d. Assessment of Working Capital.
- e. Calculation of total cost of production.
- f. Calculation of break-even point.
- g. Determining location of a manufacturing unit.
- h. Problems in inventory control (calculation of the Economic Order Quantity and carrying out ABC analysis).
- i. Applying Pricing methods to determine the price of a product or service.
- j. Applying promotion mix to plan a sales campaign for a product or service.
- k. Working out a simple budget for a given task or job.

Assessment of Answers

The examiner may prepare five problems which are solved by him/her before they are presented to the students. The student may choose anyone of the problems and solve it, showing the different steps/different reasons involved in the solution. If the problem does not involve actual calculations, it may not have anyone correct answer. So weightage should be given not only to the final answer but to the entire process of problem solving that the student has followed. Originality and innovative spirit should be rewarded. The students should not be penalized for pelling errors, grammatical mistakes etc. as long as the answer is coherent. Where definite formulas are involved, accuracy should be given due weightage.

LIST OF SUGGESTED REFERENCE BOOKS

01. Entrepreneurship – Class XI – C. B. S. E., Delhi.
02. Entrepreneurship – Class XII- C. B. S. E., Delhi.
03. Udyamita (in Hindi) by Dr. M M.P. Akhouri and S.P Mishra, pub. by National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla.
04. Trainer’s Manual on Developing Entrepreneurial Motivation, By M.M.P. Aukhori, S.P. Mishra and R. Sengupta, Pub. by (NIESBUD), NSIC-PATC Campus, Okhla.
05. Behavioral Exercises and games – manual for trainers, learning systems, by M. V. Despande, P. Mehta and M. Nandami.
06. Product Selection by Prof. H.N. Pathak, Pub. By (NIESBUD), NSIC-PATC Campus, Okhla.
07. Entrepreneurial Development – Dr. S. Moharana and Dr. C.R.Dash, Pub. by RBSA Publishers, Jaipur.
08. Entrepreneurial Development by S.S.Khanna, Published by S.Chand & Company Ltd., Ram Nagar, New Delhi.
09. Entrepreneurial Development by C.B. Gupta and N.P.Srinivasan, Publisher Sultan Chand & Sons, 1992.
10. Entrepreneurship Development – Principles, Policies and Programmes by P. Saravanel, Publishers Ess Pee Kay Publishing House, Madras.
11. Entrepreneurship, Growth and Development, by Rashi Ali, Pub. by Chugh Publication and Strech Road, Civil Lines, Post Box No. 101, Allahabad-211991.
12. Entrepreneur and Entrepreneurship Development and Planning in India, by D.N.Mishra, pub. by Chugh Publication, Allahabad.
13. Aoudhogik Disha Nirdesh (in Hindi) Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP), 60, Jail Road, Jhangerbad, Bhopal-462008.
14. Entrepreneur, Industry and Self-employment Project, Part-I and 2(in Hindi), Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal-462008.
15. Small Scale Industry & Self-Employment Projects, Part-I and 2 (in Hindi), Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP),60 Jail Road, Jhangerbad Bhopal.

Magazines

01. Udyamita Samachar Patra,(Monthly, Hind), Pub. by Centre for Entrepreneurship Development, M.P.(CEDMAP), 60 Jail Road, Jhangerbad, Bhopal-462008.
02. Science Tec. Entrepreneur (A Bi Monthly Publication), centre for Enterprenurship Development, M.P. (CEDMAP), 60 Jail Road, Jhangerbad , Bhopal -462008.
03. Laghu Udhdyog Samachar.
04. Project Profile by DCSSI.
05. Project Profile by Pub. Centre for Enterpreurship Development, M.P. (CEDMAP), 60 Jail . Road, Jhangerbad, Bhopal-462008.

Elective – II - APPLIED SCIENCE (Physics & Chemistry) – 1st Year

(Subject Code – 90000021)

Theory	Practical
Detailed Syllabus : SECTION A : PHYSICS 1.0. Measurement, Units, and Dimension 1.1 Introduction: Need for measurement, Units and documents, accuracy, precision of measuring instruments. 1.2 Types of Errors: Constant error, systematic error, environment error (errors due to external causes). Error due to imperfection, random error, gross error, percentage error. 1.3 Combination of Error: Error due to addition, subtraction, multiplication, division, powers of observed quantities. 1.4 Units and Dimensions: Fundamental and derived physical quantities, systems of units in SI systems. Rules for writing units in SI, derived units in SI. Multiples and submultiples of SI units. 1.5 Dimensions: dimensional formulae and dimensional equations, dimensional constants and dimensionless quantities, principle of homogeneity of dimensions. 1.6 Application of dimensional method of analysis: Conversion of one system of units into another, to check the correctness of an equation, to derive the relationship between different physical quantities. 1.7 Order of magnitude and significant figures 1.8 Concept of accuracy and estimation of errors	Detailed Syllabus Perform a simple experiment on measurement and error
2.0. Scalars and Vectors 2.1. Introduction to scalars and vectors 2.2. Addition and subtraction of vectors 2.3. Product of vectors	
3.0. Motion & Force 3.1. Definition of Motion, Uniformly accelerated motion along straight line 3.2. Position time graph and velocity-time graph 3.3. Equation of a projectile path 3.4. Time of light, Horizontal range, Maximum height of a projectile 3.5. Definition and types of forces 3.6. Introduction to gravitation, electromagnetic and nuclear forces 3.7. Law of conservation of momentum 3.8. Elastic and inelastic collisions 3.9. Momentum of force, couple and properties of couple 3.10. Centre of mass and gravity 3.11. Conditions of equilibrium of a rigid body	Experiment on gravitational force(example of a ball falling from a certain height)

4.0. Friction 4.1. Origin and nature of frictional forces 4.2. Laws of static and kinetic frictions 4.3. Pressure due to fluid column 4.4. Pascal's law and its applications 4.5. Newton's formula 4.6. Stoke's law 4.7. Equation for terminal velocity 4.8. Bernaulli's principle and its applications	Proof of Stoke's theorem and Bernaulli's principle
5.0. Dynamics 3.1 Introduction, Newton's Law of Motion. 3.2 Application of Newton's laws – Objects suspended by strings, blocks placed in contact with each other on frictionless horizontal surface, apparent weight in a lift. 3.3 Impulse, Law of conservation of linear momentum, Conservation of linear momentum during collision. 3.4 Work, power, energy potential Energy (PE), Kinetic Energy (KE), definition & derivation for both, relation between KE & linear momentum. 3.5 Conservation and non conservative forces, Work energy theorem, law of conservation of energy in case of freely falling body and vertically projected body.	Derivation for Potential energy and kinetic energy
6.0. Sound waves 6.1. Waves and oscillations 6.2. Progressive waves 6.3. Characteristics of transverse waves, longitudinal waves 6.4. Sound as longitudinal wave motion 6.5. Definition of period, frequency, wavelength giving their relations. 6.6. Newton's formula for velocity of sound, laplace's correction	
7.0. Thermal expansion 7.1. Expansion of solids, liquid 7.2. Linear expansion, area and volume expansion 7.3. Thermal conduction, temperature gradient and coefficient of thermal conductivity	Experiment on expansion of solids in a thermal envirnment
8.0. Refraction of light and lens 8.1. Refraction of light: Refraction of monochromatic light, Snell's law, Total internal reflection, Critical angle, Optical fiber, Dispersion of light, Prism formula, Rainbow, Scattering of light 8.2. Wave Theory of light: Huygen's principle, Construction of plane and spherical wave front, Wave front and wave normal, Reflection at a plane surface, Polarization, Plane polarized light 8.3. Interference and Diffraction: Interference of light, Condition's for producing steady interference, Young's experiment, analytical treatment, expression for path difference and fringe width, Measurement of wavelength by bi prism experiment, Diffraction due to single slit, Rayleigh's criteria, Difference between interference and diffraction 8.4. Critical angle, Optical fiber, dispersion of light, Prism formula, angular dispersion and dispersive power	Experiment on Refraction of light using a prism

8.5. Refraction at single curved surface 8.6. Lens maker's equation 8.7. Concept of conjugate foci 8.8. Magnifying power of simple microscope, compound microscope and telescope 8.9. Lens defects	
9.0. Modern Physics <u>Part A – Electrons and Photons</u> 9.1. Discovery of electron 9.2. Charge and mass of electron 9.3. Photo electric current 9.4. Einstein's equation 9.5. Photoelectric cell and its applications <u>Part B – Atoms, Molecules and Nuclei</u> 9.6. Bohr's model 9.7. Hydrogen spectrum 9.8. Laser as a light source 9.9. Wavelength of an electron 9.10. Davisson and Germer experiment 9.11. Elementary idea of electron microscope	

SECTION B – CHEMISTRY 1.0. Basics of Chemistry 1.1. Importance of Chemistry 1.2. Fundamental and derived units and their SI units 1.3. Gay-Lussac's law, Avogadro's law 1.4. Derivation of molecular weight, gram molecular volume 1.5. Stoichiometry Mole concept 1.6. Equivalent weight, Atomic weight, Molecular weight 1.7. Percentage composition and molecular formula 1.8. Numerical based on weight-volume relationship	Solve Problems based on weight – volume relationship
2.0. Atomic Structure 2.1 Characteristics of electron, proton and neutron. 2.2 Rutherford model of an atom. 2.3 Nature of electromagnetic radiation, 2.4 Planck's quantum theory. 2.5 Explanation of photo electric effect. 2.6 Features of atomic spectra. 2.7 Characteristics of hydrogen spectrum. 2.8 Bohr's theory of the structure of the atom. 2.9 Bohr's explanation of spectral lines. 2.10 Failure of Bohr's theory. 2.11 Wave-particle nature of electron. 2.12 de Broglie's hypothesis, Heisenberg's uncertainty principle. 2.13 Important features of the quantum mechanical model of an atom. 2.14 Quantum numbers, concept of orbitals, define an atomic orbital in terms of quantum numbers – shapes of s, p and d orbitals, state Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. 2.15 Electronic configurations of atoms. Explanation of stability of half filled and completely filled orbitals.	Study of Planck's quantum theory and Bohr's theory

3.0 Classification Of Element And Periodicity In Properties 3.1 The concept of grouping elements In accordance to their properties. 3.2 The periodic law. 3.3 The significance of atomic number and electronic configuration as the basis for periodic classification. 3.4 Classify elements into s, p, d, f blocks and discuss their main characteristics. 3.5 Periodic trends in physical and chemical properties of elements. 3.6 Periodic trends of elements with respect to atomic radii, ionic radii, inert gas radii, ionization energy, electron gain energy, electro negativity and valence. 3.7 Variation of atomic radii in inner transition elements.	Study of Structure of periodic table
4.0. Redox Reaction 4.1. Introduction to Oxidation & Reduction 4.2. Electron transfer concept 4.3. Oxidising & Reducing agents 4.4. Redox reactions in aqueous solutions 4.5. Oxidation number and rules for assigning oxidation number 4.6. Balancing of chemical equations	
5.0. Chemical Equilibrium 5.1. Introduction: Reversible and irreversible reactions 5.2. Rate of reaction and factors affecting it 5.3. Chemical Equilibrium 5.4. Laws of Mass action, Equilibrium constant, relationship between K_p and K_c	Numerical problems based on K_p and K_c
6.0. Adsorption: 6.1. Concept of adsorption 6.2. Difference between absorption and adsorption 6.3. Physical and chemical adsorption 6.4. Factors affecting adsorption 6.5. Applications of adsorption	Experiment on absorption(example of a sponge) to give the difference between absorption and adsorption
7.0 Chemical Bonding and Molecular Structure 7.1 Kossel-Lewis approach to chemical bonding. 7.2 Factors favorable for the formation of ionic bond, energy changes in ionic bond formation. 7.3 Crystal lattice energy – calculation of lattice energy – Bom-Haber cycle. 7.4 Crystal structures of sodium chloride and Caesium chloride. 7.5 Properties of ionic compounds. 7.6 Covalent bond – VSEPR theory and predict the geometry of simple molecules. 7.7 The valance bond approach for the formation of covalent bonds. 7.8 Directional properties of covalent bond. 7.9 Properties of covalent bond. 7.10 Different types of hybridization involving s, p and d orbitals and draw shapes of simple covalent molecules. 7.11 Definition of coordinate covalent bond with examples. 7.12 Description of molecular orbital theory of homonuclear diatomic molecules. 7.13 Bonding, antibonding molecular orbitals, o, n bond orbitals, their symmetry. 7.14 Energy diagrams of molecular orbitals of H ₂ , N ₂ and O ₂ .	

7.15 Concept of hydrogen bond – Types of hydrogen bonds, inter and intra molecular hydrogen bonds. 7.16 Effect of hydrogen bonds on some properties of substances with examples. 7.17 Different states of matter in terms of balance between intermolecular forces, thermal energy of particles.	
8.0. S-block, P-block, d-block & F-block elements 8.1. Introduction to S & P blocks 8.2. Position in periodic table, general electronic configuration 8.3. Comparison between alkali and alkaline earth metals 8.4. Sodium occurrence, uses of sodium 8.5. Methods of extraction 8.6. Physical and chemical properties 8.7. Difficulties in isolation of fluorine 8.8. Methods of preparation 8.9. Uses of fluorine	

Elective – II - APPLIED SCIENCE (Physics & Chemistry) – 2nd Year

(Subject Code – 90000021)

Theory	Practical
Detailed Syllabus : SECTION A - PHYSICS 1.0. Electrostatics 1.1 Gauss's theorem, proof and application 1.2 Mechanical force on unit area of a charged capacitor 1.3 Energy density of a medium 1.4 Concept of a condenser 1.5 Capacity of parallel plate condenser 1.6 Effect of dielectric on capacity 1.7 Energy of a charged condenser 1.8 Condensers in series and parallel	Detailed Syllabus 1) Proof of Gauss's theorem 2) Solve numericals on series and parallel plate capacitors
2.0. Current, Electricity and Magnetic effects of electric current <u>Part A – Current Electricity</u> 2.1. Ohm's Law 2.2. Ohmic and non-ohmic resistances , specific resistance, conductance, 2.3. Temperature dependence of resistivity 2.4. Thermistor 2.5. emf of a cell - internal resistance and back e.m.f's 2.6. Kirchoff's laws: statement and explanation, application to wheatstone's bridge for its balance conditions , metre bridge, principle of potentiometer 2.7. Comparison of e.m.f. of cell, determination of internal resistance of a primary cell, Series and parallel combination of cells.	1) Solve numericals on Ohm's law 2) Experiment on wheatstone's bridge

<p>Part B – Magnetic effects of electric current</p> <p>2.8. Biot Savart's law</p> <p>2.9. Right hand Thumb rule</p> <p>2.10. Magnetic induction at the center and at the point along the axis of circular coil carrying current</p> <p>2.11. Flemming's left hand rule</p> <p>2.12. Definition of Ampere</p> <p>2.13. Ampere's law and its applications</p> <p>2.14. Moving coil galvanometer</p> <p>2.15. Ammeter</p> <p>2.16. Voltmeter</p>	
<p>3.0. Magnetism</p> <p>3.1. Coulomb's inverse square law</p> <p>3.2. Couple acting on a bar magnet placed in a uniform magnetic field</p> <p>3.3. Magnetic moment of a magnet</p> <p>3.4. Expression for Magnetic induction due to a bar magnet on axial and Equatorial lines</p> <p>3.5. Superposition of magnetic fields</p> <p>3.6. Tangent law</p> <p>3.7. Deflection Magnetometer</p> <p>3.8. Comparison of magnetic moments in Tan-A and Tan-B positions by Equal distance method and null method</p>	
<p>4.0. Electromagnetic waves</p> <p>4.1. Electromagnetic waves and their characteristics</p> <p>4.2. Transverse nature of electromagnetic waves</p> <p>4.3. Electromagnetic spectrum</p> <p>4.4. Propagation of electromagnetic waves in atmosphere</p>	
<p>5.0. Electromagnetic Induction</p> <p>5.1. Laws of electromagnetic induction</p> <p>5.2. Eddy currents</p> <p>5.3. Self and mutual induction</p> <p>5.4. Transformer</p> <p>5.5. Coil rotating in uniform magnetic field</p> <p>5.6. Alternating currents</p> <p>5.7. Reactance and impedance</p> <p>5.8. Power in a a.c. circuit with resistance, inductance and capacitance</p> <p>5.9. Resonant circuit</p>	<p>Solve numericals on power in a.c circuit, transformers and resonating circuits</p>
<p>6.0. Semiconductors</p> <p>6.1. Energy bands in solids</p> <p>6.2. Intrinsic and extrinsic semiconductors</p> <p>6.3. p – type and n – type semiconductors</p> <p>6.4. P – N junction diode</p> <p>6.5. LED</p> <p>6.6. Rectifiers</p> <p>6.7. Zener diode as a voltage regulator</p> <p>6.8. Solar cell</p> <p>6.9. Transistor as an amplifier</p> <p>6.10. Oscillators</p> <p>6.11. Logic gates</p>	

7.0 Communication 7.1. Space communication 7.2. Ground, sky and space wave propagation 7.3. Satellite communication 7.4. Line communication 7.5. Two wire lines 7.6. Cables 7.7. Optical communication	Study of various types of cables and wires
SECTION B - CHEMISTRY 6.0. Electrochemistry 6.1 Electrolytes and Non-electrolytes. 6.2 Faraday's laws of electrolysis. 6.3 Galvanic & Voltaic cells representation 6.4 Nernst equation (No derivation) , e.m.f. calculations.	Experiment on faraday's law of electrostatics
7.0 Nuclear Chemistry 7.1 Composition of Nucleus - Isotopes, Isotones, Isobars, Nuclear stability - Factors effecting Nuclear stability, mass defect, binding energy, Average binding energy, N/P ratio, Magic Numbers). 7.2 Radio-active disintegration and its rate-Half-life and average life. 7.3 Natural and artificial radio-activity, disintegration series-Group displacement law-Types of Nuclear reactions (fission and fusion)-Differences between Nuclear and Chemical reactions- Radio-active isotopes and their applications Iodine 131 , Cobalt 60 , Sodium 24 , C 14 and P 30.	Solve numericals on binding energy and half life rate
8.0 Surface Chemistry 8.1 Adsorption and absorption. Physical and chemical adsorption-distinguishing properties- Adsorption of gases on Metals Adsorption from solutions (Elementary treatment). 8.2 Colloidal state:- True and colloidal solutions – Explanation of the terms - Dispersion medium, dispersed phase, lyo-philic and lyo-phobic sols using the examples; smoke, cloud, blood, milk, starch solution and gold sol. 8.3 Emulsions:- Emulsifying agent and emulsification - its applications. Cleansing action of soap. 8.4 Catalysis - Explanation of the terms – Homogeneous and Heterogeneous catalysis – distinctions with suitable Examples-auto catalysis with one example	
9.0. Acids and Bases 9.1 Theories of Acids and Bases Lowry - Bronsted concept Lewis theory of acids and bases. 9.2 Ionic product of water, PH, Buffers - Numerical problems on these, Indicators - Choice of indicators, PH-range and uses. 9.3 Salt hydrolysis - Types of hydrolysis with examples.	Solve numericals on pH value.

10.0 Alkanes, Alkenes, Alkynes and Aromatic compounds 10.1. Introduction and importance of organic chemistry 10.2. General characteristics of organic compounds Classification of organic compounds	
11. Ethers 11.1 Introduction:- Definition 11.2 Classification:- 11.3 Nomenclature and metamerism 11.4 Preparation, Reactions & Uses	Study of Simple and mixed ethers with examples.
12. Aldehydes and Ketones 12.1 Introduction 12.2 Carbonyl Compounds & classification 12.3 Nomenclature of aldehydes and ketones 12.4 Preparation & reaction of Aldehydes and ketones	
13.0 Acids & Esters 13.1. Introduction, Nomenclature, preparation, Reaction and uses of Acids & Esters	Study of various types of acids
14.0. Amines 14.1. Introduction, Classification and Nomenclature 14.2. Preparation of primary amines 14.3. Reaction of amines	
15.0. Biomolecules & Synthetic Fibres 15.1. Introduction 15.2. Carbohydrates and Proteins 15.3. Fats & Oils 15.4. Classification of Fibres 15.5. Preparation of fibres 15.6. Physical properties and uses of fibres	Study of fibres
16.0. Chemistry in application 16.1. Application of Chemicals in Medicine & healthcare 16.2. Application of chemicals in Food preservatives 16.3. Application of chemicals in Agricultural products	

Elective –II - Computer Applications– 1st year
(Subject Code – 90000022)

Theory	Practical
Detailed Syllabus : 1.0. Introduction 1.1. Basic Computer and its structural theory 1.2. Input devices 1.3. Output devices 1.4. Storage devices 1.5. Computer types and their applications 1.6. Computer Software/Hardware	Detailed Syllabus 1.0. Computer basics 1.1. Identification of Keyboard, Printer, Monitor Scanner, Webcam, Microphone, Speaker 1.2. Sample collection of various type of storage devices, specifications and charts
2.0. Operating systems 2.1. Various types of Operating systems 2.2. Comparison between the different types of OS 2.3. Network Operating systems and their features 2.4. Microsoft Disk Operating System, its nature and history. 2.5. Unix, features, merits and demerits in using Unix as OS. 2.6. Microsoft Windows, development & growth of MS Windows, features, merits and demerits of MS Windows. 2.7. MS Windows NT, features, merits & demerits 2.8. System requirements for various Operating Systems 2.9. Windows default icons and their applications	2.0. Practice 2.1. Practice of MS DOS commands 2.2. Installation of MS Windows 2.3. Practice on Add/Remove programs 2.4. Practice on My computer, Display properties, My documents, My Network places
3.0. Microsoft Word 3.1. Introduction to MS Office 3.2. MS Word applications 3.3. Creation of Document and file operations 3.4. Formatting features of document 3.5. Modification/ editing documents 3.6. Inserting images, files, tables, symbols and various attributes 3.7. Creating and formatting of tables 3.8. Mail merge 3.9. Page layout and design features 3.10. Spell & grammar check in documents 3.10. Print preview & printing of documents 3.11. Converting documents to PDF files.	3.0. Documentation 3.1. Create and save a document 3.2. Format the text with different font size, font styles 3.3. Setting up different page sizes, orientation. 3.4. Making various type of documents like Bio Data, letters, project reports 3.5. Printing of documents
4.0. Microsoft Excel 4.1. Introduction to Excel and its applications 4.2. Features of MS Excel 4.3. Outline of Worksheet & Workbook 4.4. Data types 4.5. Study of various menus of MS Excel 4.6. Creation of worksheet, editing worksheets, save, copy & deleting worksheets. 4.7. Functions of MS Excel 4.8. Formulas of MS Excel. 4.9. Types of charts, creation of data Charts, editing and insertion of charts. 4.10. Sort facility 4.11. Interconnecting Charts 4.12. Page setup, printing worksheets, charts... etc. 4.13. Converting Worksheets to PDF files.	4.0. Practice of Worksheets 4.1. Create and save worksheets 4.2. Editing the worksheets 4.3. Formatting worksheets 4.4. Insert charts 4.5. Making worksheets using formulas & functions 4.6. Making worksheets & printing with different formatting effects 4.7. Making worksheets with images, numbers and print them

Theory	Practical
5.0. MS Power point 5.1. General Introduction 5.2. Features & Applications of MS Power point 5.3. Creating Presentations 5.4. Study of different layouts and making presentations using different layouts 5.5. Using different animation effects. 5.6. Add Audio/Voice and visual effects to slides. 5.5. Filtration 5.6. Converting presentations to PDF files. 5.7. Inserting images, symbols to slides	5.0. Power Point practice 5.1. Create Slides of different types 5.2. Running presentations 5.3. Add slide transition effects and run slide show 5.4. Make presentations with audio/visual effects. 5.5. Printing PPT files 5.6. Making PDF format of PPT files
6.0. Networking & Internet Utilities 6.1. General Introduction of Computer Networking 6.2. Requirements/ Applications of Computer Networking 6.3. Layouts of Different Networks 6.4. Study of various Networking components 6.5. Limitations and merits of different topologies 6.6. Study of Server/client concept 6.7. Internet & its applications 6.8. Email and Chatting 6.9. E-trading concepts 6.10. Downloading files (Text and media files)	6.0. Networking practice 6.1. Identifying different network components 6.2. Collecting samples, charts, images of different networking components. 6.3. Installation of Network Interface card 6.4. Getting connected to Internet and accessing the internet 6.5. Creating personalized Email account 6.6. Chatting (Text and Voice chat) 6.7. Searching/surfing for the information in different sites. 6.8. Downloading
7.0. Project work 7.1. Understand the concept of making projects and preparing the project reports. 7.2. Preparation of a project using the software skills learned during the course.	7.0. Project Work 7.1. Making a working model/project using MS Excel/Power Point 7.2. Project Report

Elective –II - Computer Applications– 2nd year

(Subject Code – 90000022)

Theory	Practical
Detailed Syllabus : 1.0. Introduction MS Access 1.1. Objects of learning MS Access 1.2. Applications of MS Access 1.3. Database and Database Management System 1.4. Elements of Database Management System 1.5. Types of Data Bases & the merits & demerits	1.0. Study of overview of MS Access 1.1. Accessing MS Access and its menus to get familiar with it
2.0. Controlling Data Entry 2.1. Restrict Data Entry using field properties 2.2. Establish a pattern for entering field values 2.3. Create a list of values for a field	2.0. Creating Data Tables, Designing Fields and setting field properties
3.0. Joining Tables and creating Queries 3.1. Create Query joins 3.2. Join unrelated tables 3.3. Relate data within a table 3.4. Set Select Query properties 3.5. Create Parameter Queries 3.6. Create Action Queries	3.0. Creating Queries

4.0. Forms & Reports 4.1. Design a Form Layout 4.2. Enhance the appearance of a Form 4.3. Restrict Data entry in forms 4.4. Adding a command button to a Form 4.5. Create a Subform 4.6. Organize report information 4.7. Format the report 4.8. Set Report Control properties 4.9. Control Report pagination 4.10. Summarize Report information 4.11. Add a sub report to an existing report 4.12. Create a mailing label report	4.0. Practicing Forms and Reports 4.1. Creating different forms using different layouts 4.2. Data entry in to the forms 4.3. Creating different Reports using different layouts 4.4. Data formatting in to reports
5.0. Sharing data across applications 5.1. Import data in to Access 5.2. Export data from Access 5.3. Analyze Access data in Excel 5.4. Export Access data to a Text file 5.5. Merge Access data with a Word document	5.0. Practice: 5.1. Import Excel sheets in to Access 5.2. Import Tables in to Access 5.3. Export Access tables in to Excel format 5.4 Export Access data to a Text file 5.5. Merging data
6.0. Study of Application packages 6.1. Introduction to application oriented software packages 6.2. Study of Railway reservation Package 6.3. Study of different modules and menus available in online Railway Reservation Package 6.4. Study of Banking packages 6.5. Study of Library Management packages 6.6. Study of Inventory control packages 6.7. Study of School Management Packages	6.0. Practice 6.1. Collection of different trial packages 6.2. Visiting Organizations to collect different formats and procedures used in the system 6.3. Creating forms and Reports for the different packages using appropriate data bases
7.0. Project work 7.1. Understand the concept of making projects and preparing the project reports. 7.2. Visiting different organizations to have an idea of different packages 7.3. Preparation of a project using the software skills learned during the course.	7.0. Project Work 7.1. Making a working model/project using MS Access 7.2. Project Report

Elective – II - Business Mathematics – 1st year

(Subject Code – 90000023)

Theory	Practical
Detailed Syllabus: 1.0. Logarithms 1.1. Introduction to logarithms 1.2. Laws of logarithm, characteristics and mantissa	Practice: 1. At least 5 to 10 exercises per chapter 2. One home/class assignment per chapter
2.0. Sets, Relations and functions 2.1. Study of Relation, Function 2.2. Types of functions 2.3. Domain, Co – domain, Range of a function 2.4. Composite and Inverse functions 2.5. Graphs of functions	
3.0. Complex Numbers 3.1. Definition of complex numbers 3.2. Line	
4.0 Quadratic Equations 4.1 Nature of roots of Quadratic Equation 4.2 Sum and Product of roots of quadratic equations 4.3 Formation of Quadratic Equations 4.4 Symmetric functions of roots 4.5 Cubic roots unity	
5.0. Determinants 5.1 Determinant of order three 5.2 Applications of Determinants	
6.0. Trigonometric ratios 1.1. Angles & its measurements 1.2. Trigonometric ratios 1.3. Relation between degree and radian. 1.4. Fundamental identities. 1.5. Examples based on Fundamental Identities 1.6. Trigonometric ratios of sum and difference of two angles 1.7. Factorization formulae 1.8. Inverse trigonometric functions 1.9. Properties of a Triangle	
7.0. Plane Co-ordinate Geometry 7.1. Locus 7.2. Line	
8.0 Partition values and measure of dispersion 8.1 Partition values 8.2 Measures of Dispersion	
9.0. Moments Skewness Kurtosis 9.1 Moments 9.2. Skewness 9.3 Kurtosis	
10.0. Bivariate frequency distribution and correlation 10.1. Bivariate frequency distribution 10.2 Bivariate Correlation 10.3 Rank correlation	
11.0. Permutations and Combinations 11.1 Factorial notation 11.2 Principle of counting 11.3 Permutations 11.4 Combinations	

12.0. Probability 12.1 Types of Event 12.2 Addition Theorem 12.3 Conditional Probability	
13.0. Random Variable and Probability Distribution 13.1 Definition and Types of Random variable 13.2 Probability Distribution of random variable 13.4. Risk and uncertainty	
14.0. Commercial Arithmetic 14.1 Commission Brokerage 14.2 Discount 14.3 Insurance	

Elective – II - Business Mathematics – 2nd year

(Subject Code – 90000023)

Theory	Practical
1.Mathematical Logic 1.1 Statements and logical connectives 1.2 Statement pattern and logical equivalence 1.3 Venn Diagram	
2. Matrices 2.1 Definition and Types matrices 2.2 Algebra Matrices 2.3 Inverse of a Matrix 2.4 Solution of Equations	
3. Limit and Continuity 3.1 Definition 3.2 Algebra of limits 3.3 Application of Standard limits 3.4 Continuity of a function at a point	
4. Differentiation 4.1 definition of Derivative 4.2 Derivative from first principles 4.3 Rules of Differentiation 4.4 Derivative of composite functions 4.5 Derivative of Inverse functions 4.6 Logarithmic Differentiate 4.7 Derivates of Implicit functions 4.8 Derivatives of Parametric functions. 4.9 Second order derivatives	
5. Application of Derivatives 5.1 Increasing and Decreasing functions 5.2 maxima and Minima 5.3 Approximation and Error	
6. Integration 6.1 Definition of an integral 6.2 Integral of standard functions 6.3 Rules of Integration 6.4 Methods of Integrations Integration by parts 6.5 Definite Integrals	
7. Differential Equations 7.1 Definition 7.2 Formation of Differential Equations 7.3 Solution of first order and first degree differential equations 7.4 Applications of Differential equations	

1.Theory of Attributes 1.1 Introduction Notation and class frequencies 1.2 Consistency of data 1.3 independence of Attributes 1.4 Association of Attributes	
8. Regression Analysis 8.1 Introduction 8.2. Data and information 8.3. Tabulation of data 8.4. Graphs and diagrams, scatter diagrams, histograms, bar charts...etc 8.5 Equation of lines of regression 8.6 Regression coefficient and its properties	
9. Numerical Methods 9.1 Finite differences 9.2 Interpolation with equal intervals 9.3 Interpolation with unequal intervals 9.4 Numerical integration	
10. Discrete Probability Distribution 10.1 Binomial Theorem 10.2 Binomial Distribution 10.3 Poisson Distribution	
11. Management Mathematics 11.1 linear programming problem 11.2 Assignment problem 11.3 Sequencing	
12. Demography 12.1 Introduction, definition, Uses of vital statistics 12.2 Measurements of Mortality 12.3 Life tables	
13. Index Number 13.1 Introduction 13.2 Definition and Notations of index numbers 13.3 Types of index number 13.4 Construction of index number 13.5 cost of living index number 13.6 Uses of cost of living index number	
14.0. Spread sheets 14.1. Introduction to spread sheets 14.2. Features and functions of spread sheet softwares 14.3. Use and limitations of spread sheet softwares in business 14.4. Apply spread sheet software to the manual work of chartered management accountant.	Practice: 1. Using spread sheet package 2. Entering data in to Spread sheet 3. Making graphs the selected data using Spread sheet packages 4. Using functions and formulas 5. Making accounts using Spread sheet packages

Subject Code: 30140018

Subject Name : Basic Electricity and Measurement

1. Conducting material
 - 1.1 Conducting material-Properties, Classification,
 - 1.2 Characteristics of good/Bad Conductors, Semi/Super Conductors and their Applications.
 - 1.3 Bare Conductors, O.H. Conductors, ACSR, Copper Aluminum G. I., , winding wires Bus Bars ,
 - 1.4 Wires & Cables, L.T.& H.T. Cables Conductors.
 - 1.5 Requirements of Resistive Material.
 - 1.6 Properties of Resistive material.
 - 1.7 Types of Resistive Material.
2. Insulating material
 - 2.1 Properties of Insulating material, Classifications,
 - 2.2 Types w. r. t. Thermal sensitivity Insulating material & its Die electric strength Solid, Liquid & Gas)
 - 2.3 Insulation material Required for--Winding wires, Cables/ wires (HT & LT), O.H. Insulators (Advance) HT & LT, Switch gear
 - 2.4 Die electric medium its properties. .
3. Semi Conductor material
 - 4.1 Characteristics of semi conductors material.
Semi conductor alloys, oxides, sulphides & Halides etc.
 - 4.2 Commonly used semi conductor material and their Application.
4. Magnetic material
 - 5.1 Requirements of magnetic material Permanent Magnetic material,
 - 5.2 Magnetic material used for cores (CRGO, Ferrites) Application.
5. Special Application of materials
 - 6.1 Contact material- slip ring, force free spring, carbon brushes, Brush Holder, commutator, Switch gear, Contacts
 - 6.2 Thermocouple materials,
 - 6.3 Bimetal materials,
 - 6.4 Soldering materials, Fuse materials
6. Cell and Batteries
 - 7.1 Requirements of Cell and Batteries materials
 - 7.2 Primary Cells description, Classification
 - 7.3 Secondary Cells , Classification Lead Acid Battery, Construction, Nicel Battery Maintenance free Battery
 - 7.4 Maintenance, installation, applications, write off procedures..

7. Electrostatics
 - 1.1 Voltage & Die-Electric Strength (concepts only)
 - 1.2 Principle of Capacitor. Capacitance, Series / Parallel Combination Charging & Discharging of Capacitor.
8. Electric Current & Circuits
 - 2.1 Concepts & Types of circuit., Ohm's Law, Factors Controlling the 'R' of material. Effect of Temp., Law of Resistance, Resistivity etc.
 - 2.2 Polarity of 'IR' Drops. Internal Resistance, Potentiometer- Construction & Applications. Shunts-Applications.
9. Network Circuits
 - 3.1 Kirchhoff's Laws (KCL, KVL), Simple problems, Wheatstone's Network, Meter Bridge & Applications.
 - 3.2 Simple numerical Problems
10. Electro- Chemistry
 - 4.1 Chemical effects of Electric current, Faraday's Laws of Electrolysis- E.C.E., Applications of Electrochemistry,
11. Thermo- Electricity
 - 5.1. Heating effect of elect. Current, Joule's Law Thermocouple, See-back effect, & Application.
 - 5.2 Simple Calculations on Joule's Law Electric Power, Energy, Calculations on Power & Energy (Elect. Bills).
12. Electro-magnetism.
 - 6.1 Permeability, Laws of Magnetic Forces, Definitions Of Mag. Field strength, Flux density, Intensity of Magnetism,, MMF, Ampere-Turns, Reluctance. Etc. Comparison between Mag. Field & Elect. Field.
 - 6.2 Ampere's Rule, Laplace's Law, Force on current carrying conductor in Mag. Field, Fleming's Left Hand Rule. Force between two parallel current carrying conductors, Solenoid.
 - 6.3 Faraday's Laws of Electromag. Induction. Magnitude of Dynamically & Statically induced EMF, Eddy current. Lenz's Law, Magnetic Losses-
13. A. C. Fundamentals
 - 7.1 Generation & Equation of Alternating Voltages & Currents, Definitions of Phase, Phase Difference, Max. / Peak Value, R.M.S. Value. Average Value etc.
 - 7.2 Vector algebra of A.C. Quantities. Characteristics of A.C. Circuit. Having Pure Resistance, Pure Inductance and Pure Capacitance

14. A. C. Circuits

- 8.1 A.C. Ckt. Having R, L & C in series, Power Factor, and P. F. improvement methods, Advantages/ Disadvantages.
- 8.2 A.C. Ckt. Having R, L & C in parallel, Vector & Admittance method. Series & Parallel Circuit and Its Characteristics. A.C. Bridges,
- 8.3 Poly-Phase Circuit. Generation & Phase Sequence Star / Delta Connection & its Characteristics. Power in 3 Ph. System for Balance & Unbalance load.

15. Electrical Measuring Instruments & Measurements

- 9.1 Absolute & Secondary Instruments. Principles of Operation of Instruments. Types of Torques for Instruments.
- 9.2 Classification of meters. M.I. meters, M.C. meters, Wattmeters Types, Explanation, Applications.
- 9.3 Energy meters- Types, Construction, Working, Errors in Energymeters, Applications. Digital Meters- Study, Advantages/ Disadvantages. Multimeters- Analog / Digital, merits- demerits.
- 9.4. Instrument Transformers- CT, PT, Characteristics, Applications, Testing Clip-On meter- construction, working, Megger, Earth Tester-Construction, Working & Applications.

Practical Contents :

Engg. Material -

- 01 To study the Construction of various types Cable
 - 1.1 Construction of LT cable.
 - 1.2 Construction of HT cable.
- 02 To study the various types of insulation material class wise
- 03 To find out the break down voltage of given transformer oil sample
 - 3.1 To collect various samples of insulating oil.
 - 3.2 To test the die elect. strength of samples.
- 04 To study LT & HT overhead lines insulator
- 05 To study characteristics of various types of special Resistive material
 - 5.1 To study Temperature sensitive resistive material.
 - 5.2 To study Light sensitive resistive material.
- 06 To study negative resistance characteristic of semi conductors
- 07 Collect any various magnetic materials e.g. Ferrite Core of Transformer & study.
- 08 Study characteristics of various types of thermocouple & its material
- 09 Study characteristics of Fuse material.
- 10 To prepare a chart of various types of batteries and troubleshooting
- 11 To study the Lead acid Battery material
- 12 To study related Indian Standard with Tech. Specifications, from related Web-sites of various engineering materials.

Electricity and Measurement

- 1 To Prepare a sheet of Atomic Structure.
- 2 To measure the Potential Diff. of a charged line.
- 3 To determine the Resistivity of a given material.
 - 3.1 To measure the length of given wire.
 - 3.2 To measure the diameter of wire & calculate cross section area
 - 3.3 To measure the resistance of wire by ohmmeter/multi meter.
- 4 To measure the Internal Resistance of a Cell by Potentiometer.
 - 4.1 To study the concept of internal resistance
 - 4.2 To make connections as per ckt. diagram.
 - 4.3 To calculate the internal resis. by using formula.
- 5 To Verify the characteristics of Kirchhoff's Laws.
 - 5.1 To verify Kirchhoff's voltage and current law
 - 5.2 To verify Thevenins, Nortons and Superposition's.
- 6 To Verify the Faraday's Laws of Electrolysis & determine the E.C.E. of copper.
 - 6.1 To understanding the process of electrolysis.
 - 6.2 To know the concept of metal deposition through electricity passing
- 7 To determine the Joule's constant by electric method.
 - 7.1 To understand the relations between current passing & heat generated.
 - 7.2 To calculate the Joule's constant by formula.
- 8 To Verify the Fleming's Left hand Rule.
 - 8.1 To find out the direction of mag. field around conductor.
 - 8.2 To observe the direction of torque of conductor.
- 9 To verify the Faraday's Laws of Electromag. Induction.
 - 9.1 To verify the Faraday's 1st law of elect. mag. induction.
 - 9.2 To verify the Faraday's 2nd law of elect. mag. induction.

- 10 To trace out the sine wave of A.C. on C.R.O. & find out the various values of A.C. quantities.
 - 10.1 To trace & measure the Peak value of A.C. sine wave.
 - 10.2 To calculate the R.M.S. & Average value.
- 11 Verification of Improvement of P. F. by using Capacitors.
- 12 To verify the characteristics of Star & Delta connections.
 - 12.1 To verify the characteristics of star connection.
 - 12.2 To verify the characteristics of delta connection.
- 13 To measure the power of 3 ph. balance & unbalance load using two-wattmeter method & calculate the P.F. of load.
 - 13.1 To measure the power of 3 ph balance load
 - 13.2 To measure the power of 3 ph unbalance load
 - 13.3 To calculate the P.F. of load using formula.
- 14 To calibrate the given 1 ph. Energy meter.

Title of Book Author Publication

- A Text Book of Electrical Technology. Vol.-I B. L. Thereja, A. K. Thereja. S. Chand & Company Ltd, New Delhi.
- Applied Physics B. G. Bhandarkar. Vrinda Publications.
- Basic Electricity & Electronics-I S. K. Patel. A. D. Maydeo. Nirali Prakashan.
- Electrical Measurements & Measuring Instruments. E. W. Golding. F. C. Widdis. Wheeler Publishing, Allahabad.
- Basic Electrical Engineering, Volume –I P. S. Dhogal. Tata McGraw-Hill.
- Electrical Engineering Measurements A K Sawhny S Chand & Company Ltd,
- 1 Basic Electrical Engineering M. L. Anvani
 - 2 Modern Electrical Engineer, volume-1 W. J. John
 - 3 Electrical Engineering materials A. J. Dekker
 - 4 Electrical Engineering materials Uppal / Arrora
 - 5 Electrical Engineering materials Indulkar
 - 6 Electrical Engineering materials Manchand

List of Tools & Equipments :

- 1 Plier Insulated combination 150 mm. -5
 - 2 Long Nose Insulated Plier 150 mm -5
 - 3 Punch Centre 150 mm x 9 mm.- 5
 - 4 Wire Stripper 150mm- 5
 - 5 Tweezer 100 mm Insulated -5
 - 6 Neon Tester -5
 - 7 Heat sink Plier -5
 - 8 I.C. Tweezer / Puller -5
 - 9 Screw Driver Set of 6 Nos. -5
 - 10 Watch Maker Screw Driver -5
 - 11 Adjustable Spanner / Slide Wrench (15 to 20 cis) -5
 - 12 Electrician Screw Driver 250 mm thin Stem Insulated -5
 - 13 Plier Side Cutting 150 mm -5
 - 14 Allen Key set -5
-
1. 1 sq. mm PVC Copper flexible wire
 2. Electric lamps 100 watt, 250 v.
 3. Capacitors 400 v. assorted
 4. Bare copper,allu, nichrome wire
 5. Battery 6 volt
 6. Testing Board
 7. Assorted wires & cables
 8. Latest Primary cells
 9. Secondary Battery (Tubular plates)
 10. Allu. soldering material & flux
 11. Pin type Insulator Porcelain
 12. Threaded Pin G.I
 13. G.I.wire 10SWG
 14. Sand Paper 0 Nos.
 15. Cotton Waste
 16. Neutral link
 17. PVC Insulted single strand Aluminum cable 1.5 mm² ,250V grade
 18. Flexible PVC insulated cable 14/0.2 250V grade
 19. Bare copper wire 8SWG
 20. Fuse wire 1,2,5,10,&25AMP
 21. Insulation tape 20mm width 10m Coil
 22. Tube light Choke 40W,240V
 23. Copper Sleeves for 16mm² Cable
 24. Copper Ferrule for 16mm² Cable
 25. Copper Lug for 16 mm² Cable
 26. Solder flux 25gm tin
 27. Alca P Solder
 28. Bearing Grease Shell Alrania or equivalent
 29. Machine Screw 30mm long with nut & 2 Washers 25 nos
 30. Emery Sheet No."00" 05 Sheet

Subject Code : 30140021

Subject : Electronics for Computer Hardware

Theory	Practical
<ul style="list-style-type: none">a) Identification, specification and application of basic hand tools.b) Types, specification and application of screws, bolts, washers, clamps, rivets, taps, connectors etc.c) Drills, drilling machines. High speed drilling for PCB's.d) Sheet metals and Bending.e) Special tools used in electronics trade.	<ul style="list-style-type: none">a) Demo on uses of basic hand tools, simple mechanical fixtures.b) Identification of different types of screws, bolts, washers, clamps, rivets, taps, connectors etc. Simple exercises using the above.c) Simple exercise on drilling practice.d) Simple sheet metal works such as bending and riveting.e) Identification and simple exercises using special tools used in electronic trade.
<ul style="list-style-type: none">a) Matter, molecule, atom, electron, proton, neutron, orbit, valency. Classification of matter- conductor, insulator, semi conductors.b) Specification of wires and cables used in electrical and electronic applications. Use of SWG, micrometer. Wire strippingc) Concept of current and voltage. AC, DC Supply indicating lamps. Different types of Fuses and their applications. Different types of and electronic applications. Different types of switches used in electrical and electronic applications.d) Circuit voltage and current. Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters.e) Measuring instruments, MC, MI type, Ammeter, Voltmeter, Multimeter for measuring voltage and current. Construction, characteristics/features and specification. Digital Multimeterf) Meaning of Circuit and basic electrical circuits.g) Meaning of resistance, continuity and continuity testers. Multimeter for checking continuity.h) Concept of Power and measurement using V&I meter and Power meter.	<ul style="list-style-type: none">a) Identification of conductors, insulators with specification.b) Measure wire gauge using S.W.G /Micrometer. Remove Wire insulation using wire stripper.c) Demonstration of sources of electricity, AC, DC. Basic Electrical appliances using AC, DC.d) Identify specification of types of lamps. Identify specification of types of fuses. Identification and specification of type of switches.e) Identification of meter types and measuring range.f) Construct a simple circuit using AC/DC supply, lamp, fuse and switch..g) Measure circuit voltage and current using voltmeters and ammeters.h) Measure voltage and current using Multi-meter (analog-digital).i) Use Multimeter to check fuses, lamps and switches.j) Measure DC and AC power using V-I method and using power meter.

<ul style="list-style-type: none"> a) Classification, characteristics and application of different types of resistors.-carbon film, metal film, wire wound, d f d cermet and surface mounted. b) Colour coding of resistors. Calculating /measuring resistance value and its tolerance value. Wattage of resistors, specific resistance and their importance. c) Resistors in series and parallel. d) Soft soldering and precautions to be taken for making a good solder joint. Types of solder and need of soldering paste. e) Ohms law and Kirchoff's Laws. f) Printed circuit boards and its application. g) De-soldering tools. h) Temperature dependent resistors and their applications.(PTC and NTC) . i) Voltage dependent resistors (VDR). j) Photoelectric effect, Light Dependent resistors. k) Variable resistors, pots, presets, types and application. Log and Linear resistors. 	<ul style="list-style-type: none"> a) Identify different types of resistors from physical appearance. b) Identify resistor value and tolerance using colour code tolerance using colour code. c) Measuring resistance using multimeter. d) Soldering practice using hook-up wires. Soldering resistors on Tag board. e) Verification of Ohms Law and Kirchhoff's Laws. f) Soldering resistors on PCB. g) De-soldering practice. h) Experiment using P.T.C and NTC resistors. i) Experiment to check VDR's. j) Experiment to check L D R's. k) Test Pots, Presets.
<ul style="list-style-type: none"> a) Cells and Batteries. Construction, working and types of Primary and Secondary batteries and their specifications-Voltage, Amp- Hr capacity etc. b) Special types of miniature cells/batteries used in electronic circuits. c) Voltage rating of secondary battery cells and their relationship with the electrolyte. d) Series and parallel connection of batteries and its effect on total voltage and current capacity. Ampere hour of batteries. e) Measurement of Specific gravity of electrolytes. f) Meaning and need for top-up of secondary battery and precautions. g) Battery chargers. h) Maintenance of Secondary batteries. 	<ul style="list-style-type: none"> a) Identification of cell from physical appearance and markings. b) Identifying special types of cells/batteries used in digital watches and calculators. Replacing dead cells in digital watches. c) Measure the voltage of a given cell/battery. d) Measure voltage of primary Cells in series, parallel. Calculate current capacity. Measure voltage of cells in secondary batteries. e) Measure the specific gravity of electrolyte in secondary cells using hydrometer. f) Top-up batteries. g) Recharge battery using a battery charger. h) Carryout general maintenance of secondary batteries. i) Demo of properties of magnets. j) Direction finding using magnetic needle/compass. k) Magnetizing a magnetic material into a magnet using bar magnet. l) Prepare a solenoid. m) Test /Repair Calling bell and buzzer.

<ul style="list-style-type: none"> i) Magnetism and its properties. Classification of magnets. Magnetic materials j) Application of magnets. k) Magnetizing magnetic materials. Application of temporary magnets. l) Temporary magnets, Solenoids and its applications. m) Construction and working of Calling bells and Buzzers. n) Construction and working of EM relays and its applications. o) Magnetic shielding and its importance. p) Use of magnets in Motors and Generators. 	<ul style="list-style-type: none"> n) Test different types of EM relays. o) Experiment on Magnetic Shielding. p) Visit to Electrical section to observe the magnets used in Motors and Generators.
<ul style="list-style-type: none"> a) Introduction to Alternating current. Parameters of AC wave form and their relationship. Instantaneous, RMS, average value of AC, Cycle and time period b) Meaning of phase and Phase relationship between two or more AC signals. 3 Phase Ac and its uses . c) Phase, Neutral and Earth in Domestic AC Mains supply. Rules for wiring and hazards due to wrong connections. d) Generation of Electricity. Faraday's Law and EMF equation. induction and induced EMF. Lenz's LAW. 	<ul style="list-style-type: none"> a) Demo of AC and DC waveforms on CRO. Measure Peak, Peak-to-peak, Cycle time, frequency and Demo of induced e.m.f. Calculate RMS and average value. b) Demo of phase relationship between two or more AC signals. c) Measure AC voltage and current. Measure mains AC voltage and identify Phase, Neutral and Ground sockets. d) Visit to nearby generating station.
<ul style="list-style-type: none"> a) Definition of inductance. Properties. Types of inductors and their application. b) Inductive reactance, measuring inductance and inductive reactance. Meaning of lead, lag. Effect of inductor on power factor. Frequency dependence of inductive reactance. c) Self and Mutual inductance. Coefficient of coupling. d) Transformers. Turns ratio. Transformer winding. Winding machines. e) Transformer losses and efficiency. f) Uses, losses, efficiency type of cores and uses for LF, HF, VHF transformer. g) Transformers used in high frequency applications. 	<ul style="list-style-type: none"> a) Identification of different types of inductors and its specifications. b) Measure inductance using LCR meter. Calculate inductive reactance at different input signal frequencies. c) Demo on self and mutual induction. d) Check step down transformers. e) Rewind a transformer to given specification using winding machine. f) Finding losses and efficiency of given transformers. g) Identifying and testing high frequency transformers used in electronic circuits.
<ul style="list-style-type: none"> a) Working principle of capacitors. Electrostatic action,, dielectric constant. Unit of capacitance and capacitive reactance. Types of Capacitors-electrolytic, ceramic,polyester, tantalum, mica, surface mounted. Colour coding, and tolerance. 	<ul style="list-style-type: none"> a) Identify of different types of capacitors from colour code and typographic code. b) Test working condition of capacitor. Measure capacitance using RLC meter. c) Measure capacitive reactance at different frequencies.

<ul style="list-style-type: none"> b) Measuring capacitance and capacitive reactance. c) Behavior of capacitance at different frequencies. d) Capacitors in series and parallel. e) Meaning of Resonance. Application of resonance. Series and parallel resonance circuits 	<ul style="list-style-type: none"> d) Measure capacitance and capacitive reactance of, capacitors in series and capacitors in parallel. e) Find the resonance frequency of a given Series and parallel resonance circuit.
<ul style="list-style-type: none"> a) Use of CRO. Oscilloscope block diagram, working and application. b) Precautions to be taken while measuring voltages using CRO. c) Internal parts of a CRO. Construction and function of CRT and its associated circuitry. d) Simple Calibration procedures care and maintenance. 	<ul style="list-style-type: none"> a) Identify CRO front panel controls. b) Measure of DC/AC voltages and frequency using CRO. c) Identify the internal parts of a CRO and CRT. d) Calibrate a given CRO.
<ul style="list-style-type: none"> a) Semiconductor, intrinsic and extrinsic semiconductors, P and N type semiconductor. Development of P.N. junction barrier potential. Effect of temperature. Breakdown voltage. b) Different types of Diodes. Diode terminals. Diode specifications using data book. c) Forward and reverse characteristics of diode. Testing diodes using Multimeter. d) Half wave and Full wave rectifiers using diodes. Transformer requirements Calculating output DC, ripple factor. e) Bridge rectifier. Calculating output DC, ripple factor. f) Filters for rectifiers. Calculating output DC, ripple factor. g) Zener diode-Its characteristics and application for voltage regulation. Calculating the series resistor for required current rating. h) Specifications of a regulated power supply and testing a power supply for its specifications. 	<ul style="list-style-type: none"> a) Film on semiconductor, film on PN junction, demo on barrier potential for GE and SI. b) Identify terminals of different types of diodes. Record its specifications referring to diode data sheet. c) Plot forward and reverse characteristics of diode Testing working condition of diodes. d) Construct and test a half wave and full wave diode rectifiers. e) Construct and test a Bridge rectifier with and without filter f) Construct a bridge rectifier with capacitance input filter. g) Draw Zener diode characteristics, Simple voltage regulator using zener diode. h) PROJECT : Construct a Bridge rectifier with capacitance input filter
<ul style="list-style-type: none"> a) Working principle of PNP, Bipolar transistors. Types of transistors and applications. Leads of transistors and their identification. b) Forward and reverse bias of transistor Junction. General values of junction resistances. Quick testing a transistor-using Multimeter. 	<ul style="list-style-type: none"> a) Identify types transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. b) Quick test given transistors using Multimeter. Identify opens, shorted junctions.

<p>c) Transistor configuration – CB, CE, CC, alpha, beta. Types of Biasing of transistor amplifiers, comparison and applications. Thermal runaway. Steady and Dynamic characteristics. Testing- get frequency response, gain bandwidth product, signal to noise ratio.</p> <p>d) Types of Coupling , Multistage amplifiers.</p> <p>e) AF -small signal transistor amplifiers. Class A and B.</p> <p>f) AF- large signal Amplifiers Class B, Push-Pull.</p> <p>g) Power amplifiers. Power considerations, and heat sinks.</p> <p>h) Introduction to Class C amplifiers and their applications.</p> <p>i) Introduction to analog integrated circuits. Types and applications in Audio circuits.</p> <p>j) Audio voltage amplifiers using IC's.</p> <p>k) Audio power amplifiers using IC's.</p> <p>l) Signal to noise ratio, thermal stability in cascaded amplifiers.</p>	<p>c) Wire and find the gain of amplifiers in – CB, CE, CC configurations.</p> <p>d) Construct and test an AF amplifier in class A and B.</p> <p>e) Construct and test an AF amplifier in Class B mode.</p> <p>f) Construct and test a multistage RC coupled amplifier.</p> <p>g) Construct and test a AF power amplifier using of transistors.</p> <p>h) Construct and test a simple class C tuned amplifier.</p> <p>i) Identification of IC's and finding its specification using data sheets.</p> <p>j) Construct and test a small signal amplifier using IC.</p> <p>k) Construct and test a Power amplifier using IC.</p> <p>l) Measure noise in amplifiers.</p>
<p>a) Principle of OP-AMP. Types and features.</p> <p>b) Characteristics of OP-AMPs. Differential, inverting, noninverting amplifier,</p> <p>c) Summing amplifier using opamps.</p> <p>d) AF amplifier using op-amps. Frequency, band-width considerations</p>	<p>a) Identification of OP-AMPs and finding its specifications referring to data sheets</p> <p>b) Measuring the characteristic features of op-amp. Construct and test inverting, non-inverting dc amplifier using op-amp.</p> <p>c) Construct and test summing amplifier using op-amp.</p> <p>d) Construct and test AF amplifier using op-amp.</p> <p>e) Project: Construct and test a 20+20 watt stereo audio amplifier using a single IC. (This amplifier should be used with multimedia speaker in later weeks of the training).</p>
<p>a) Unregulated, regulated DC Power supply specifications. Application of different types of power supply for specific application types.</p> <p>b) Series regulator using transistor. Short circuit protection. Overload protection.</p> <p>c) Shunt regulators using transistors.</p> <p>d) Fixed Voltage regulators using IC's.</p> <p>e) Variable voltage regulators using IC's.</p> <p>f) Mains voltage stabilizers.</p> <p>g) Inverters and converters.</p> <p>h) Un-interrupted power supply, types and applications.</p>	<p>a) Practice on identifying and using the controls on a regulated power supply.</p> <p>b) Assemble and test a series regulated power supply.</p> <p>c) Assemble and test a shunt regulated power supply.</p> <p>d) Assemble and test a fixed voltage regulator using 3pin IC.</p> <p>e) Assemble and test a variable voltage regulator using IC.</p> <p>f) Assemble a simple mains voltage stabilizer for use with TV/Refrigerator.</p>

	<p>g) Assemble a simple inverter and converter for use with emergency lamp.</p> <p>h) Identify the parts and controls of a UPS. Practice switch-on and switch-off procedures.</p> <p>i) Project: Construct a regulated Dc power supply for use with the 20+20 watt audio amplifier constructed in earlier weeks of the training.</p>
<p>a) Types of waveforms- pulse, sinusoidal, saw tooth, and its representation.</p> <p>b) RC wave shaping circuit circuits- differentiating circuit and its application.</p> <p>c) Integrating circuit and its applications.</p>	<p>a) Construct and test a differentiating circuit</p> <p>b) Construct and test a integrator circuit.</p>
<p>a) Types of oscillators –sinusoidal and non-sinusoidal. Criteria for oscillations. Testing of Oscillators-measurement of frequency, voltage, wave form on CRO</p> <p>b) Working of a Hartley Oscillator, applications and limitations.</p> <p>c) Working of a Colpitts Oscillator, applications and limitations.</p> <p>d) Working of a Crystal Oscillator, applications and limitations.</p> <p>e) Working of a Wein-bridge Oscillator, applications and limitations.</p>	<p>a) Assemble and test a RC oscillator.</p> <p>b) Assemble and test a Hartley oscillator.</p> <p>c) Assemble and test Colpitts oscillator.</p> <p>d) Assemble and test a crystal oscillator.</p> <p>e) Assemble and test a wein-bridge oscillator.</p>
<p>a) Modulation – types of modulation. AM, FM, PM. Amplitude modulation. Measurement of percentage of modulation.</p> <p>b) AM Transmitter block diagram. Amplitude modulator circuit and working.</p> <p>c) AM receiver block diagram. Principle of a AM demodulator/detector – analysis of crystal receiver.</p> <p>d) Frequency modulation bandwidth requirement. FM transmitter block diagram. Comparison with AM advantages of FM over AM.</p> <p>e) FM receiver block diagram. Principle of Demodulation of FM signals.</p> <p>f) Pulse modulation – PAM, PWM and PCM. Demodulators. Advantages and applications.</p>	<p>a) Identifying AM signal. Measurement of percentage of modulation using CRO.</p> <p>b) Construct and test a simple Amplitude modulator.</p> <p>c) Construct and test a crystal receiver.</p> <p>d) Construct and test a simple Frequency modulator /transmitter. Test transmitter using FM radio.</p>
<p>a) Principle of communication using satellites.</p> <p>b) Types of antennas, directivity and pattern.</p>	<p>a) Visit to a Microwave tower/station.</p>
<p>a) Field effect transistors, types, working principle, applications.</p> <p>b) Working principle and application of UJT.</p> <p>c) Working principle and application of SCR.</p>	<p>a) Construct and test a JFET amplifier.</p> <p>b) Construct and test a MosFET application circuit.</p>

d) Working principle and application of TRIAC. e) Working principle and application of DIAC.	c) Construct and test a relaxation oscillator using UJT. d) Construct and test an application circuit using SCR. e) Construct and test an application circuit using DIAC. f) Construct and test an application circuit using TRIA
a) DC motors – construction, principle of operation , b) Types of speed control, using SCR, DIAC, TRIAC.	a) Visit to Electrical Motors section i identification of different types of motors and their specifications. b) Speed control of motors using SCR, DIAC, TRIAC.
a) Working principle of ac motors, types of AC motors. b) Construction of single phase and three phase AC motors. c) Fractional hp, capacitor motors. d) Stepper motors.	a) Identification types of ac motors, specifications. b) Running of single phase and three phase ac motors. c) Running of fractional hp motors. d) Running stepper motors.
a) Number systems and conversions. Classification of digital IC's. Use of data book for identification of digital IC's. b) Basic LOGIC GATES and truth table. Boolean algebra. c) Logic families, logic levels, propagation delay. Multiple input gates. d) XOR, XNOR gates and application. e) Simplification of Boolean equations. f) Combinational logic circuits. g) Half adder, full adder, parallel binary adder, half subtractor, full subtractor. h) Commercially available adders/subtractors. i) Comparator, decoders, encoders, multiplexer, demultiplexer. j) Parity generators/checkers. RS Flip – Flop, JK flip-flop, Master- Slave flip-flops. k) Types of triggering and applications. D flip-flops. l) Counters, ripple, synchronous, up-down, scale-n counters. m) Principles of A/D & D/A converter. Commercially available A/D & D/A converters. Applications. n) Shift registers. Types, applications. o) Commercially available shift registers and applications. p) Conversion of serial data into parallel and vice-versa.	a) Identify the specifications of given digital IC's referring to data books. b) Verify the truth table of two input OR, NOR, AND, NAND, NOT gates. c) Verify of truth table of multiple input logic gates. d) Verify the truth table of XOR and XNOR Gates. e) Realization of different gate type using NAND gates. f) verification of Boolean laws. g) Realization of half adder & full adder using NAND gates. Realization half subtractor and full subtractor using NAND gates. h) Verification of truth table of 7483- 4bit adder. i) Verifying encoder/decoder/multiplexer/ demultiplexer IC truth tables. j) Realization and verification of truth table of RS, JK and MS- JK flip-flop. k) Realization and verification of D flip flop. l) Realization and verficiation of up & down (sync/async) counter. m) Verification of A/D & D/A converter. n) Realization of shift registers using F. o) Verification of Right-shift, Leftshift registers. p) Verification of Serial-in-parallel out and parallel in serial out of data.

Subject Code : 30140022**Subject No. : Computer Hardware Theory and Practice**

<p>a) Introduction to microprocessor, function of microprocessor in computer.</p> <p>b) Meaning and example of 4-bit, 8-bit, 16 bit microprocessors. Block diagram of 8085. Functions of blocks.</p> <p>c) Registers and memory. Concept of bus: address bus, data bus, control bus. High level, low level and Machine level languages.</p> <p>d) Instruction set of 8085. Data transfer group of instructions.(MOV,LDA,STA,X I, OUT,IN)</p> <p>e) Arithmetic and logical group of instructions. (ADD,ADC,ADI,SUB,SBB,SBI,SUI,INR,INX,DCR,DCX,ANA,ANI,ORA,ORI,XRA,XRI,CMP,RRC,RLC,CMA,CMC)</p> <p>f) Branching and loop group of instructions. JMP, JNZ, JZ, RET, CONTROL, NOP, HLT)</p> <p>g) Advanced microprocessors used in PCs 8086,8088,80286,80386,80486 and Pentium processor architecture basics.</p> <p>h) Microprocessors from other than INTEL used in PCs.</p>	<p>a) Familiarization with microprocessor training kit. (Understanding the function of all the sockets and controls)</p> <p>b) Examine and modify contents of registers and memory location in RAM.</p> <p>c) Entering simple program and program execution procedure using single step and run mode.</p> <p>d) Entering programs using data transfer group instructions and executing. Debugging programs.</p> <p>e) Writing simple programs in using arithmetic and logical group instructions, executing. Debugging programs.</p> <p>f) Writing programs using branching and control group instructions, and executing. Debugging programs.</p> <p>g) Identification of different advanced Intel microprocessor chips.</p> <p>h) Identification of different advanced microprocessor chips other than from Intel.</p>
<p>a) Memory devices, types, principle of storing. Data organization 4 bit, 8 bit, word.</p> <p>b) Semiconductor memories, RAM, ROM, PROM, EPROM, EEPROM, Static and dynamic.</p> <p>c) Example of memory chips, pin diagram, pin function of popularly used RAM, EPROM, and EEPROM Chips in PC's.</p>	<p>a) Identification of different types of memory devices.</p> <p>b) Identification of memory chips.</p> <p>c) Identification of SIMM and DIMM memory modules, number of pins, type.</p>
<p>a) Concept of interfacing I/O devices- mismatch in characteristics and DATA format of devices. Types of data transfer. Serial and parallel- RS 232 and 232C standard voltage drivers 1488 and 1489 Concept of hand shaking.. Brief description of chips used for serial interface such as 8251,16450,16550 etc.,(Restricted to pin diagram and their functions only).</p> <p>b) Serial interface with tape recorder or any other serial device using 8251 or other relevant serial I/C.</p>	<p>a) Identifying serial interface connector, pins, cable. Prepare a RS 232C/serial port cable.</p> <p>b) Experiment with 8085 for serial interface (8051 or relevant) using 1488, 1489 and available serial interface kit.</p> <p>c) Identifying parallel interface connector, pins, cable. Prepare a Centronics parallel port cable.</p> <p>d) Experiment with 8085 for parallel interface (8255 or relevant) using available parallel interface kit.</p>

<p>c) Parallel data transfer, parallel port. Brief description of chips used for parallel interface such as 8255 etc.,(Restricted to pin diagram and their functions only).</p> <p>d) Parallel interface with any parallel device using 8255 or other relevant I/C.</p> <p>e) Keyboard interface using keyboard interface IC.</p> <p>f) Display interface using 8279 or relevant IC.</p> <p>g) Interfacing memory to specific data and address.</p> <p>h) Principle of Interrupt and Interrupt controller 8259 pin diagram and function (without internal architecture and programming). Principle of DMA and DMA controller 8237/57 pin diagram and function (without internal architecture and programming). PIT 8253 pin diagram and function.</p>	<p>e) Experiment with keyboard interface with keyboard controller chip(using available interface kit).</p> <p>f)Experiment with display interface.(using available interface kit).</p> <p>g) Design a memory board for 4/8 bit data and 16 bit address. Change decoder input output for obtaining different addresses read write data into these locations.</p> <p>h) Working with circuit interface boards using DMA controller, Interrupt controller and timer.</p>
<p>Revision of all topics covered from Week 2 to Week 51</p>	<p>Revision of difficult skills and Project Work Project to be decided under the guidance of the instructor from skills covered under Digital and Microprocessor.</p>
<p>a) Types of software. System software-OS, Compiler. Application software-like MS office. High level, low level language, Computer application scientific industrial and business Functions of an operating system. Disk operating system.</p> <p>b) DOS internal commands.</p> <p>c) DOS internal commands.</p> <p>d) DOS internal commands.</p> <p>e) DOS external commands.</p> <p>f) DOS external commands.</p> <p>g) DOS rescue disk.</p>	<p>a) Starting and shutting down a PC. Switching between DOS and WINDOWS mode.</p> <p>b) Use of Internal DOS commands-1.</p> <p>c) Use of Internal DOS commands-2.</p> <p>d) Use of Internal DOS commands-3.</p> <p>e) Use of external DOS commands-1.</p> <p>f) Use of external DOS commands-2.</p> <p>g) Creating DOS rescue disk.</p>
<p>a) Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. Types of I/O devices and ports on a standard PC for connecting I/O devices.</p> <p>b) Function of keyboard, brief principle, types, interfaces, connectors, cable.</p> <p>c) Function of Mouse, brief principle, types, interfaces, connectors, cable.</p> <p>d) Function of monitor, brief principle, resolution, size, types, interfaces, connectors, cable.</p>	<p>a) Identify the front panel controls and ports on a PC.</p> <p>b) Identify types of keyboards and connectors /interface.</p> <p>c) Identify types of mouse and connectors/ interface.</p> <p>d) Identify type of display connector /interface.</p> <p>e) Identify type of speaker, Mic connector/interface.</p>

<p>e) Function of Speakers and Mic, brief principle, types, interfaces, connectors, cable.</p> <p>f) Function of serial port, parallel port, brief principle of communication through these ports, types of devices that can be connected, interface standards, connectors, cable.</p> <p>g) Precaution to be taken while connecting/removing connectors from PC ports. Method of ensuring firm connection.</p>	<p>f) Identify type of serial and parallel port connectors/interface.</p> <p>g) Connect basic I/O devices(above listed) to PC.</p>
<p>a) . Concept of GUI, Modes of starting on different occasions.</p> <p>b) Desktop, Icon, selecting, choosing, drag and drop.</p> <p>c) My computer, network neighborhood.</p> <p>d) Recycle bin, briefcase, task bar, start menu, tool bar, menus.</p> <p>e) Windows Explorer.</p> <p>f) Properties of files and folders.</p> <p>g) Executing application programs.</p> <p>h) Properties of connected devices.</p> <p>i) Applications under windows accessories.</p> <p>j) Windows Help.</p> <p>k) Finding files, folders, computers.</p> <p>l) Using windows explorer</p> <p>m) Control panel. Installed devices and properties.</p> <p>Note: The list given above is not exhaustive, instructors to go through any standard book on the windows version being used and make the list exhaustive such that majority of the features of windows other than those used for maintenance are practiced.</p>	<p>a) Starting and shut down. Starting in Safe, DOS mode.</p> <p>b) Setting Desktop and properties.</p> <p>c) Creating files and folders. Opening of files and folders. Deleting files and folders.</p> <p>d) Restoring files, Creating short cuts.</p> <p>e) Working with Explorer.</p> <p>f) Changing file/folder properties.</p> <p>g) Running application programs.</p> <p>h) Identifying properties of connected devices.</p> <p>i) Using applications under accessories of windows program.</p> <p>j) Using help.</p> <p>k) Using find.</p> <p>l) Using windows explorer</p> <p>m) Identifying installed printers and other devices using control panel.</p>
<p>a) Introduction to word processing and comparison of features. Creating and saving document files using MS WORD.</p> <p>b) Formatting text and editing.</p> <p>c) Setting page and margins. Tabs and indents.</p> <p>d) Creating multicolumn documents.</p> <p>e) Inserting pictures in documents.</p> <p>f) Creating tables.</p> <p>g) Creating different types of documents.</p> <p>h) Saving word documents in other formats.</p> <p>i) Mail merge.</p> <p>j) Printing documents.</p> <p>k) Introduction to spread sheet. Creating Worksheets using EXCEL</p> <p>l) Formatting cells.</p>	<p>a) Creating and saving document files using MS WORD.</p> <p>b) Formatting text and editing.</p> <p>c) Setting page and margins. Tabs and indents.</p> <p>d) Creating multicolumn documents.</p> <p>e) Inserting pictures in documents.</p> <p>f) Creating tables.</p> <p>g) Creating different types of documents.</p> <p>h) Saving word documents in other formats.</p> <p>i) Mail merge.</p> <p>j) Printing documents.</p> <p>k) Creating Worksheets using EXCEL.</p> <p>l) Formatting cells.</p>

<p>m) Using formula in cells.</p> <p>n) Creating simple spreadsheet for an application.</p> <p>o) Creating relation between sheets.</p> <p>p) Graphs and tables in Excel.</p> <p>q) Advanced features in Excel.</p> <p>r) Printing spread sheets.</p> <p>s) Introduction to multimedia slide presentations. Creating slides using POWER POINT.</p> <p>t) Including text and formatting text in slides.</p> <p>u) Slide layout and colour scheme.</p> <p>v) Design template and master slides.</p> <p>w) Inserting pictures and movies.</p> <p>x) Creating slide transition, animation.</p> <p>y) Recording presentation with voice presentation.</p> <p>z) Introduction to database and database management. Creating data base tables using MS ACCESS.</p> <p>aa) Entering and editing data.</p> <p>bb) Creating queries.</p> <p>cc) Creating data entry forms.</p> <p>dd) Working with forms.</p> <p>ee) Creating reports.</p>	<p>m) Using formula in cells.</p> <p>n) Creating simple spreadsheet for an application.</p> <p>o) Creating relation between sheets.</p> <p>p) Graphs and tables in Excel.</p> <p>q) Advanced features in Excel.</p> <p>r) Printing spread sheets.</p> <p>s) Creating slides using POWER POINT.</p> <p>t) Including text and formatting text in slides.</p> <p>u) Slide layout and colour scheme.</p> <p>v) Design template and master slides.</p> <p>w) Inserting pictures and movies.</p> <p>x) Creating slide transition, animation.</p> <p>y) Recording presentation with voice presentation.</p> <p>z) Creating data base tables using ACCESS.</p> <p>aa) Entering and editing data.</p> <p>bb) Creating queries.</p> <p>cc) Creating data entry forms.</p> <p>dd) Working with forms.</p> <p>ee) Creating reports.</p>
<p>a) Reviving a faulty computer. Need of DOS rescue, Windows startup diskette.</p> <p>b) Mouse interface, Drivers, properties.</p> <p>c) Keyboard interface, drivers, features of multimedia keyboards.</p> <p>d) Types of monitors, standards, sizes, resolution interface, properties, features.</p>	<p>a) Create DOS utility and Windows start-up diskette.</p> <p>b) Install a given mouse. Set properties of mouse and cursor.</p> <p>c) Install a given multimedia keyboard and test features.</p> <p>d) Set the resolution and other features of monitor.</p>
<p>a) Floppy disk drive. Types of floppy disk drive 1.2 Mb, 1.44 Mb. Trends in higher capacity FDD's. Edge connectors, pin detail, jumper setting, floppy disk, storage capacity,</p> <p>b) Concept of track, sector, cylinder. FD Drive component spread write head, head actuator, spindle motor, sensors, PCB.</p> <p>c) Precaution and care to be taken while dismantling Drives.</p> <p>d) Drive bay, sizes, types of drives that can be fitted. Precautions to be taken while removing drive bay from PC.</p> <p>e) Principle of working of Floppy disk drive, types, media, capacity, popular manufacturers, cost, possible errors, remedial measures.</p>	<p>a) Identify FDD connector, jumpers, sensing slots.</p> <p>b) Dismantle a bad FDD and identify inner mechanical and electronic circuit.</p> <p>c) Carryout minor repairs and cleaning of FDD.</p> <p>d) Disconnect cables and remove the 3.5" and 5.5" drive bays from inside PC.</p> <p>e) Remove floppy drive from drive bay and identify specifications.</p> <p>f) Remove one or more hard disks fitted into the drive bay. Check specifications, jumper settings. Study of internal components of HDD with the help of non working HDD.</p>

<p>f) HDD, advantages, Principle of working of Hard disk drive, cylinder and clusture, types, capacity, popular brands, standards, interface, jumper setting. Drive components- hard disk platens, and recording media, ,air filter, read write head, head actuator, spindle motor, circuit board, sensor, features like head parking, head positioning, reliability, performances, shock mounting capacity. HDD interface IDE, SCSI-1/2/3 comparative study. Latest trends in interface technology in PC and server HDD interface.</p> <p>g) Precautions to be taken while fitting drives into bays and bay inside PC cabinet.</p> <p>h) CMOS setting.(restrict to drive settings only).</p> <p>i) Meaning and need for using Scan disk and defrag.</p> <p>j) Utilities for recovering data from defective/bad hard disks.</p>	<p>g) Refit drives into the drive bay and fix the drive bay inside PC. Connect back cables to drives. Test system working.</p> <p>h) Identifying, enabling/ disabling/ changing features of drives using CMOS setup.</p> <p>i) Using scan disk and defrag to clean-up drives.</p> <p>j) Recovering data from drives using windows/third party utilities. (use a bad hard disk for practicing this skill).</p>
<p>a) Introduction to removable storage devices, Bulk data storage devices-magnetic, optical, magneto optical drives, WORM drives.</p> <p>b) CD ROM drives- Technology, Types of CD drives, working principle application.</p> <p>c) Minor repairs and maintenance of CD ROM drives.</p> <p>d) Technology, working principle, capacity, media of ZIP drives.</p> <p>e) Important parts and functions of a ZIP drive.</p> <p>f) Minor repairs and maintenance of ZIP drive.</p> <p>g) Technology, working principle, capacity, media of DAT Drive and back-up procedures.</p> <p>h) Important parts and functions of DAT drive.</p> <p>i) Minor repairs and maintenance of DAT drive.</p> <p>j) Technology, working principle, capacity, media of DVD ROM drive .</p> <p>k) Important parts and functions of DVD ROM drive.</p> <p>l) Minor repair works on a DVD ROM drive.</p> <p>m) Technology, working principle, capacity, media of CD WRITER and use different modes of writing on a CD. Using of utility for CD writing.</p> <p>n) Minor repair works on a CD WRITER.</p> <p>o) Technology, working principle, capacity, media of Magneto- Optical Disk (MOD) drives. Applications.</p>	<p>a) Identification of different types of bulk storage device.</p> <p>b) Dismantle and identify the parts of a CD ROM drive.</p> <p>c) Carryout minor repairs and maintenance of CD ROM drives.</p> <p>d) Install ZIP drive and back-up data on ZIP media.</p> <p>e) Dismantle and identify the parts of a ZIP drive.</p> <p>f) Carryout minor repairs and maintenance of ZIP drive.</p> <p>g) Install DAT Drive and back-up data.</p> <p>h) Dismantle and identify the parts of a DAT drive.</p> <p>i) Carryout minor repairs and maintenance of DAT drive.</p> <p>j) Install a DVD ROM drive and test working.</p> <p>k) Dismantle a DVD ROM drive and identify parts.</p> <p>l) Carryout minor repair works on a DVD ROM drive.</p> <p>m) Install a CD WRITER and use different modes of writing on a CD using the supplied utility.</p> <p>n) Dismantle CD Writer and identify parts of CD writer.</p>

<p>p) Important parts and functions of MOD drive.</p> <p>q) Minor repair works on MOD.</p> <p>r) Latest trends in backup devices/media.</p>	<p>o) Carryout minor repair works on a CD WRITER.</p> <p>p) Install a MOD and back-up data.</p> <p>q) Dismantle a MOD and identify parts.</p> <p>r) Carryout minor repair works on MOD.</p>
<p>a) Types of monitor, Monochrome and colour, CGA, EGA, VGA, SVGA, Digital Analogue, interlaced non interlaced.</p> <p>Specifications and comparison of Monitors. Front panel controls brightness, contrast, horizontal and vertical height settings.</p> <p>b) Display cards, bus standards, types CGA, EGA VGA, SVGA, AGP , memory and drivers.</p> <p>c) Main components and connectors on display cards, display controller IC, RAM chips and dual port feature principle of working and use of display memory.</p> <p>d) Installing display drivers, setting features.</p> <p>e) Information required before changing the display driver card and precautions to be taken while installing a display driver card.</p>	<p>a) Identify the type of monitor connected to PC. Specifications, front panel controls and settings.</p> <p>b) Identify the specifications of the display driver card installed in the PC.</p> <p>c) Remove the display driver card and identify the main components and connectors on the display driver card.</p> <p>d) Replace the display driver card and re-install. (before practicing this skill set, the already installed driver should be removed from device manager)</p> <p>e) Change the exiting display card with a different card given and install.</p>
<p>a) Specifications of sound card 16/32 bit stereo mono . Frequency response, sound file format, compression and decompression Principle of working and functional units of sound card.</p> <p>b) Installation procedure of sound cards. Setting playback and recording features.</p> <p>c) Main components on a sound card and its working.</p> <p>d) Properties and specification of sound cards.</p> <p>e) Information and resources required before installation of sound card.</p> <p>f) Type of speaker and microphone, frequency response, control adjustments, cable and connectors of speaker.</p> <p>g) Laptops, advantages, essential difference in construction, additional features, PCMCIA cards.</p> <p>h) General maintenance procedures and replacement of battery.</p>	<p>a) Identify the specifications of the installed sound card in the PC.</p> <p>b) Identify and adjust the playback and recording properties of sound card/driver.</p> <p>c) Remove the sound card from PC and identify the main components on the card.</p> <p>d) Replace the card and reinstall the sound card and set properties.</p> <p>e) Change the existing sound card with a different card given and install.</p> <p>f) Connect the speaker and microphone, adjust the controls for better quality sound and testing.</p> <p>g) Interconnect laptop to a multimedia projector and carryout adjustments.</p> <p>h) Replace battery pack in laptops and carryout general maintenance.</p>
<p>a) DC power source to PC. Need for SMPS. Specifications. Rating of SMPS based on type of motherboard and devices used. (AT /ATX, Micro ATX, mini ATX)</p> <p>b) Colour coding adopted. Types of connectors used. Output voltage levels. Measuring technique.</p>	<p>a) Remove the SMPS from PC cabinet. Identify the types of output connectors of SMPS.</p> <p>b) Identify output voltages using colour coding. Measure voltage levels. Test power cable and fuse.</p> <p>c) Open and cleaning the cooling fan</p>

<ul style="list-style-type: none"> c) Precautions to be taken while cleaning the internal area of SMPS. d) Precautions to be taken while fixing the SMPS inside the cabinet. 	<ul style="list-style-type: none"> and other parts. d) Fix the SMPS inside the PC cabinet and test PC.
<ul style="list-style-type: none"> a) Block diagram of UPS, Principle of working of offline and on line UPS. b) Role of battery, specification of battery inverter and charging circuit. Procedure for switching on-off inverter/UPS. c) Study of typical working UPS circuit, explanation of each stage involved. Voltage, current, frequency and KVA specifications. d) Controls of different type of UPS: On-line, Off-line, Line interactive etc., Typical circuit blocks. e) Routine maintenance of battery and UPS. f) Back-up time, its dependence on battery, load and its calculations. g) Possible problems in UPS, fault finding procedures. h) Simulated faults and serving of UPS. 	<ul style="list-style-type: none"> a) Identify the specifications of UPS. b) Switch-on and Switch-off procedure of UPS. c) Measurement of Input/output voltage /current levels, battery charge level. d) Identifying status of UPS from front panel indicators. e) Carryout routine maintenance of battery, battery terminals, loose contacts etc., f) Test UPS as per specification. Verification of back-up time. g) Circuit tracing and fault finding practice. h) Servicing of UPS by simulating more likely faults and systematic approach to identify and rectify them.
<ul style="list-style-type: none"> a) Mother board function, types, Main components on the mother board and their interconnection. Functional description of mother board, specification and variation. Precautions to be taken before removing the mother board from PC cabinet.. b) Form factor of mother board. c) Meaning and function of chips sets. Manufacturers, comparison, importance of quality chip set for performance of PC. d) Bus standards-evolution, speed, latest trends (ISA, PCI, AGP, new trends). e) Types of processor connectors, examples of latest processor connectors, number of pins. f) Function of BIOS, manufacturers of BIOS. 	<ul style="list-style-type: none"> a) Remove the mother board from PC cabinet. Identify the main components on the mother board. b) Identify the form factor of the mother board. c) Identify the chipset used. d) Identify the number of slots available for add-in cards (ISA, PCI, AGP). e) Identify the type of processor connector (slot/socket/dual). f) Identify the BIOS ROM, make, version. g) Identify the jumper settings (if any) on the mother board. h) Identify the types of slots available for memory modules.
<ul style="list-style-type: none"> g) IDE ports available. Primary, secondary. Number of drives that can be connected. Methods of adding SCSI drives. h) Details of FDD connector on mother board. i) Facility for serial Communication ports on mother board. j) Facility for PS/2 Communication ports on mother board. k) Meaning and advantage of USB ports. Facility for USB Communication ports on mother board. l) Facility for game ports on mother board. 	<ul style="list-style-type: none"> i) Identify the connectors for Hard disk (IDE) j) Identify the connector for FDD k) Identify the connector for COM1, COM2. l) Identify the connectors for PS/2. m) Identify the connectors for USB. n) Identify the connectors for Game port. o) Identify the connector for parallel port (Centronics). p) Identify the connector for Keyboard (in exclusively available) q) Identify the specifications of the

<p>m) Facility for parallel Communication port on mother board.</p> <p>n) Type of connectors in which keyboards can be used, old type full size DIN connector.</p> <p>o) Need of Lithium battery. Its specifications. Replacement procedure. Effect of removing the battery from mother board.</p> <p>p) Other special components available on mother boards such as integrated devices/drivers,</p>	<p>Lithium battery.</p> <p>r) Identify any other special component available on the mother board.</p> <p>s) Identify the connectors for front panel switches and display.</p>
<p>a) Effect of weak/dead battery on PC performance. Identifying weak/dead battery. Precautions to be taken before replacing the battery. Setting to be done after replacing the battery.</p> <p>b) Organization of RAM, types of RAM's, Module types, pins, replacement procedure and precautions. Compatibility of memory modules to the motherboard.</p> <p>c) Type of processors, generation, features, speed, popular manufacturers. Advantages and possibility of upgrading Processor of a PC. Mother board/Chip set /speed /connector /power/other compatibility criteria for upgrading processor. Precautions to be taken while removing and placing processor in sockets and slots.</p> <p>d) Types of jumper settings on motherboard. Its functions and effects.</p>	<p>a) Replace the weak/dead battery on the mother board.</p> <p>b) Replace/upgrade RAM memory modules.</p> <p>c) Replacing/upgrading Processor.</p> <p>d) Carryout Jumper setting on mother board.</p>
<p>a) CMOS set-up features. Need and procedure for changing the CMOS set-up. Updating Flash BIOS.</p>	<p>a) Changing CMOS set-up and setting system level password.</p>
<p>a) Procedure and precautions to be taken while disassembling a PC.</p> <p>b) Procedure and precautions to be taken while reassembling a PC.</p>	<p>a) Disassemble a given PC totally following the safety precautions.</p> <p>b) Reassemble the PC and test for its satisfactory performance.</p>
<p>a) Meaning of formatting hard disk. Procedures for formatting. Meaning of hard disk partition, procedure for partitioning hard disk.</p> <p>b) Criteria for adding additional hard-disk, limitations, setting Master-Slave.</p> <p>c) Need of special controller card for adding SCSI hard disks. SCSI standards. Comparison of IDE and SCSI HDD's. Installing Controller card. Procedure for adding, formatting and partitioning SCSI drives.</p>	<p>a) Format a given hard disk and partition as instructed.</p> <p>b) Adding a second hard disk to PC.</p> <p>c) Adding a SCSI hard disk to PC.</p>

<ul style="list-style-type: none"> a) Introduction to networking definitions – LAN, MAN WAN, basic differences. Basic building blocks of a network, server, terminals, workstation, network interface adapter, printers and software, advantages and disadvantages of a network. Logging in / out onto a server, commands used, using printers connected at server and nodes b) Network operating system function simple commands. LAN access – concept of standards, Topology, protocols, network services, file services print services, message services, database services. Sharing system resources. c) Types of resource sharing, user level, share level. d) Creating users and profiles. e) Resolving problem in shared devices. f) Cables, connectors and standards. UTP cable connections. Crimping. g) Testing UTP cables. h) Need of termination in thinnet and preparing termination adaptor. i) Use of BNC cables and connectors, standards and crimping/soldering BNC connectors to coax cables. j) Testing coax network cables in a network environment. k) Installing conduits and wall boxes for LAN wiring. l) Connectors used with UTP cables, cabling scheme, installing outlets. m) Installing and connecting Hubs. n) Network switching devices, functions, network interface cards, Boot ROM, repeater, hub, bridge, router, 8 bit and 16 bit , 32 bit cards. types, standards and installation. o) Installing NIC cards using non-automatic detection method. p) Setting NIC hardware configuration. q) Hardware conflicts and resolving conflicts. r) Installing a client under network. s) Installing protocol drivers. t) System ID, concept of workgroup and configuration. u) Network settings on PC. v) Use of network neighborhood utility for viewing and accessing network resources. 	<ul style="list-style-type: none"> a) Log into network and access other system resources. b) Share your system drives and folders. Share your printer,scanner to other network users with or without password. c) Share your resources under share level/user level sharing. d) Create users and profiles. e) Resolve problems in shared devices. f) Crimp a UTP cable ends with RJ45 plug. g) Test a given UTP network cable. h) Prepare 50 Ohms termination adaptors for Coax cables. i) Solder/Crimp BNC connector at ends of coax RG 58 cable(thinnet). j) Test a given Coax network cable. k) Install Conduits and Wall boxes for network cabling. l) Install RJ 45 outlets. m) Install a Ethernet HUB and lay cable connections. n) Install a Network Interface card (NIC) in your PC using automatic detection(Plug & Play). o) Install NIC card in your PC using non-automatic detection. p) Check and set NIC hardware configuration. q) Resolve hardware conflicts. r) Install Microsoft network client. s) Install protocol drivers. t) Configure Names and workgroups. u) Carryout Network settings in your PC. v) Use network neighborhood utility for viewing and accessing network resources. w) Using Net Watcher utility for managing the network. x) Identifying defective cables, termination and rectifying simple network problems. y) Installation and connection to Routers. z) Installation and connection with Switches. aa) Installation of repeaters and Bridges. bb) Site preparation, deciding location of server and nodes, providing power connection. Planning for routing of power and signal cables. cc) Selecting cable, preparing cables.
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<p>w) Use of Net Watcher utility for managing the network.</p> <p>x) Rectifying simple network problems.</p> <p>y) Router, its function, installation.</p> <p>z) Switches, layer-2, layer -3 its function and Installation.</p> <p>aa) Repeaters, Bridges, its uses and Installation.</p> <p>bb) Planning a small LAN. Structured and unstructured cabling.</p> <p>cc) Suitability of cable for a LAN and selection criteria.</p> <p>dd) Need of patch panels, mounting racks and patch cords, its preparation.</p>	<p>dd) Preparing patch panel., patch cords, and mounting racks.</p> <p>ee) Laying down cables as planned and test working of system</p>
<p>ee) Care and procedure for cable laying. Cable testing.</p> <p>ff) Networking using Fiber optic lines.</p>	
<p>i) Modem, Functional block diagram, specifications and working principle Modems applications, connecting to P&T line or between two computers. Types of modems – smart modems radio modems, modem standards. Functional units, types, Data transfer, buffering..</p> <p>j) Installation of Fax/modem card in PC.</p> <p>k) Need of Internet service providers and getting connected to internet.</p> <p>l) Web sites and active and passive.</p> <p>m) Search engines and method of getting information from website.</p> <p>n) Procedure for down loading software's from web sites.</p> <p>o) Creating Email ID.</p> <p>p) Sending and receiving mails with/without attachments.</p>	<p>i) Identify the specifications of the modem card.</p> <p>j) Install Fax/modem card and carryout necessary settings.</p> <p>k) Install ISP provided software and connect to internet.</p> <p>l) Browse web sites.</p> <p>m) Search for required information on internet using search engines.</p> <p>n) Down load free soft wares from web sites.</p> <p>o) Create E-mail ID.</p> <p>p) Send and Receive Email with/without attachments.</p>
<p>a) Safety precautions in handling PC, sub assemblies and components, Important points to be considered while purchasing and replacing components. Concept of Preventive and corrective maintenance. Maintenance scheduling. Need of diagnostics program. Features, limitations. Examples of commonly used diagnostic programs.</p> <p>b) Probable defects in PC. Localizing faults through its observable visual or audio symptoms and possible methods for rectification /servicing. Understanding serviceability of component. Economy in repair/replacement.</p>	<p>a) Running diagnostics program to identify the health and defects of a PC. Check system performance using third party utilities. Use benchmarking utilities to benchmark systems.</p> <p>b) Identify the defect in PC from the audible and observable symptoms such as beep sounds, post messages. hanged keyboard, erratic display etc., and corrective action.</p> <p>c) Tracing the circuit of a KB.</p> <p>d) Trouble shooting defects related to Keyboard and its related ports ports loose connections, replacing cable, replacing keys (DIN,PS/2,USB).</p>

<p>c) Block diagram of a KB, function of controller, LED driver Sample circuit</p> <p>d) Defects related to Keyboard and its related ports(DIN,PS/2,USB) Discontinuity in cable, and bad keys. Servicing procedure.</p> <p>e) Defects related to Mouse and its related ports (COM ,PS/2, USB) and servicing procedure.</p> <p>f) Working principle, electro mechanical circuits of Light pen scanner and digitizer.</p> <p>g) Defects and symptoms related to FDD and its cable, connector and servicing procedure.</p> <p>h) Defects and symptoms related to HDD and its cable, connector and servicing procedure.</p> <p>i) Defects related to CD ROM Drive jamming of mechanical assembly mal function of control circuit. and its cable, connector and servicing procedure.</p> <p>j) Defects related to Ports jumper setting on mother board and servicing procedure.</p> <p>k) Defects related to processor, its socket, cooling and servicing procedure</p> <p>l) Defects related to RAM memory module connector and servicing procedure.</p> <p>m) Defects related to BIOS, upgrading and servicing procedure.</p> <p>n) Defects related to CMOS, COMS setup and servicing procedure.</p> <p>o) Defects related to battery and servicing procedure.</p> <p>p) Basic blocks of SMPS, description of sample circuit. Defects related to SMPS, its cable, connector and servicing procedure.</p> <p>q) Defects related to multimedia speakers, microphone its cable, connector and servicing procedure.</p> <p>r) Defects related to other devices attached to the computer such as SCSI controller, Zip driver etc., its cables, connectors and servicing procedure.</p>	<p>e) Trouble shooting defects related to Mouse and its related ports loose connections, replacing cable, replacing roller and sensing elements. (COM ,PS/2,USB).</p> <p>f) Study of interface cable connector, replacing of subassemblies of Light pen, scanner, digitizer</p> <p>g) Trouble shooting defects related to FDD replacing head assembly, motor, sensors, PCB, cable and connector.</p> <p>h) Trouble shooting defects related to HDD,(practice of replacing motor, head, PCB among faulty drives) cable and connector.</p> <p>i) Trouble shooting defects related to CD ROM Drive, Attempting for replacement and adjustments) cable and connector.</p> <p>j) Trouble shooting defects related Ports to Jumper setting.</p> <p>k) Trouble shooting defects related to Processor.</p> <p>l) Trouble shooting defects related to RAM memory modules.</p> <p>m) Trouble shooting defects related BIOS.</p> <p>n) Trouble shooting defects related to CMOS setup.</p> <p>o) Trouble shooting defects related to Battery.</p> <p>p) Circuit tracing of SMPS measurement of voltages and wave forms at test points Trouble shooting defects related to SMPS.</p> <p>q) Trouble shooting defects related to multimedia speakers, microphone its related ports, cables, connectors and drivers.</p> <p>r) Trouble shooting any other devices attached to the computer such as SCSI disk controller, ZIP drive etc.,</p> <p>Note: Any other exercise on trouble shooting may be carried out depending on facilities of Institute.</p>
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<ul style="list-style-type: none"> a) Block diagram of a monitor, function of each block. Types of monitors – monochrome, colour, CGA, EGA, VGA, SVGA, digital analogue interlaced non interlaced, microprocessor based, resolution. High end Graphic cards such as AGP. Specification of monitor comparison of monitors. b) CRTs used in monitors, specifications, test procedure, servicing. c) Function of LOT, test procedure, replacement procedure, servicing. d) Alignment required in a monitor, procedures. e) Circuit of vertical and horizontal section, power supply, EHT, and Video section. Possible defects, servicing procedure. f) Use of diagnostic tools for serving of monitor defects. g) LCD displays and Video/multimedia projectors. 	<ul style="list-style-type: none"> a) Identification of specifications of monitors, suitability. b) Replacing defective CRT. c) Replacing defective PCBs. d) Replacing LOT. e) Alignment and adjustment of external and internal controls. f) Circuit tracing – vertical and horizontal section, power supply, EHT, and Video section. g) Measurement of voltages and testing monitors with diagnostic tools. h) Identify specification of LCD displays and multimedia projectors. Connecting and testing LCD and multimedia projectors with PC's. <p>Note: Experiment is to be repeated at different types, makes of monitors.</p>
<ul style="list-style-type: none"> a) Types of printers, Dot Matrix printers laser printer, Ink jet printer, line printer. Block diagram and function of each unit head assembly, carriage, and paper feed mechanism. Front panel controls and interfaces. Pin details of interface port. b) Installation of a printer driver. and self test. c) Ribbon types used. d) Refilling of ribbons. e) Printer cable testing defects, effect and servicing. f) Printer head, types, cleaning procedures. g) Precaution to be taken while removing and replacing printer head assembly. h) Pinter power supply, circuit analysis, defects, servicing. i) Carriage motor assembly, paper feed assembly, sensors . <p>Procedure for dismantling and replacing mechanical parts.</p> <ul style="list-style-type: none"> j) Printer control board, circuit, function, probable defects, servicing. k) Working principle of LASER printer. l) Toner cartridge, types, replacing toner cartridges m) Refilling toner cartridges, equipment available for refilling and procedure. 	<ul style="list-style-type: none"> a) Testing front panel controls. Interface pins , cables, measurement of voltages and waveforms. b) Installing a printer and carrying self- test. c) Replacing ribbon in a DMP. d) Refilling ribbon tape of DMP. e) Testing and Rectifying defective cable. f) Removing and cleaning printer head. g) Replacing a new printer head. h) Testing and servicing Printer power supply. i) Changing rollers and other mechanical parts. j) Tracing the control board and identifying defective components. Servicing of control board. k) Replacement of toner cartridge of laser printers. l) Refilling toner cartridge of laser printers. m) Drum cleaning and replacement of laser printers. n) Testing and servicing Printer power supply of laser printers. o) Changing mechanical parts of laser printers. p) Tracing the control board circuit and identifying defective components. Servicing of control board of laser printers.

<p>n) Printer drum, function, cleaning and replacing procedure.</p> <p>o) Power supply in laser printers, circuit, defects, servicing.</p> <p>p) Mechanical parts and sensors on laser printer, function, replacement procedure.</p> <p>q) Control board(s) in laser printer, circuit diagram, defects and servicing procedure.</p> <p>r) Working principle of INK JET/Deskjet printers. Type of ink used and replacement of ink cartridge.</p> <p>s) Refilling of ink, equipment available, quality of refilled cartridges.</p> <p>t) Printer drum, function, cleaning and replacing procedure.</p> <p>u) Power supply in inkjet printers, circuit, defects, servicing.</p> <p>v) Mechanical parts and sensors on inkjet printer, function, replacement procedure.</p> <p>w) Control board(s) in inkjet printer, circuit diagram, defects and servicing procedure.</p> <p>x) Use of diagnostics software for identifying and servicing defective printers.</p>	<p>q) Replacement of ink cartridge of deskjet/inkjet printers.</p> <p>r) Refilling ink cartridge of deskjet/inkjet printers.</p> <p>s) Drum cleaning and replacement in deskjet/inkjet printers..</p> <p>t) Testing and servicing Printer power supply of deskjet/inkjet printers..</p> <p>u) Changing mechanical parts of deskjet/inkjet printers..</p> <p>v) Tracing the control board and identifying defective components. Servicing of control board of deskjet /inkjet printers.</p> <p>w) Connecting and using high speed line printers.</p> <p>x) Replacing spares of line printers.</p> <p>y) Self test procedures in printers. Use of diagnostics software for serving printers.</p>
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**List of Tools/Equipment for the Trade of Computer Hardware
(For A Batch of 25 Trainees)**

Sr. No.	Description	For Trainees
Trainees Tool Kit		
1.	Combination Pliers 15 Cm Insulated	20
2.	Diagonal Cutter 15 Cm Insulated	20
3.	Digital/analog hand held multi-meter	20
4.	End Cutting Nipper Insulated 15 Cm.	20
5.	Heat Sink Pliers	20
6.	I.C. Tweezers/Puller	20
7.	Knob Screw Driver Insulated 10 Cm.	20
8.	Long Nose Insulated Pliers 15 Cm.	20
9.	Multi-meters Analog or Digital hand-held/pocket type	20
10.	Neon Low Tester	20
11.	Screw Driver set Of 6.	20
12.	Soldering Iron (25 W)	20
13.	Tweezers 10 Cm Insulated	20
14.	Knife Electrician	20
Shop Out Fit		
1.	AC motor – 1 phase	1 No.
2.	AC motor – 3 phase – Instructional chart showing parts	1 No.
3.	Allen key sets	5
4.	AM/FM signal generator	2
5.	Anti static mat (as required around PC maintenance tables)	5
6.	Anti static wrist band kit	10
7.	Auto transformer	2
8.	Bar code reader	1
9.	Basic Electronic Trainer	5 Nos.
10.	Battery Charger suitable to charge secondary batteries	2
11.	Bench type Multi meter (for calibration)	2
12.	Cables of different types	As required.
13.	Calling bells of different types/makes	5
14.	Cat 5 UTP Cable	As required.
15.	CD ROM Drives (52X and above)	4 Nos.
16.	CD Writer.	2 Nos.
17.	Colour TV - 29"	1 No.
18.	Computer Microphone, Head set	4 each.
19.	Continuity tester for testing cables & connections	4
20.	Crimping tool for RJ 45 Connectors for use in networking	2
21.	Crimping tools to prepare different types of connectors (UTP cable and flat cable connectors)	5
22.	CRO (dual trace storage type 20 MHz or more)	5
23.	DAT with media (5 no.)	1 No.
24.	DC Ammeter (0 – 10 mA), (0 – 50 mA), (0 – 100 m A)	5 each

25.	DC Motor series & shunt	1 No. each
26.	DC Voltmeter (0 –1V), (0 – 10 V), (0 – 30V)	5 each
27.	De soldering pump (hand operated)	5
28.	Dentist mirrors	5
29.	De-soldering station of latest type with kit for IC extraction	4 Nos.
30.	Digital IC Tester	2 Nos.
31.	Digital IC trainer kit	5 Nos.
32.	DMM with Diode/transistor tester	5
33.	Drill bit set	5
34.	Drill machine pillar type – 1, High speed portable - 1	2
35.	DVD with media (5 Nos.)	2 Nos.
36.	Ethernet, SVGA cards.	
37.	FAX modem cards, Super IDE cards	5 Nos. each - separate modems.
38.	Fiber optic Networking trainer	1 No.
39.	Floppy disk (min. 3 box)	As required
40.	Floppy disk drive head cleaning kits	5
41.	Floppy Disk Drives 3 ½ and Hard Disk Drive.	5 Nos. each.
42.	Function generator	5 Nos.
43.	HUB 16 port / Layer 2 Switch	2
44.	IBM Compatible Computer with Latest Processor with Multimedia (One Server + Ten Nodes With Disk + One Computer For Instructors Practice/Data/Presentation/ Storage)	11
45.	Illuminated magnifying glass	5
46.	Interface cards for 8255, 8251, 8259, 8257, 8253, 8279 compatible to microprocessor training kit.	2 each.
47.	LAP TOP Computer with multimedia and modem.	1
48.	Light pen (with interface if required)	2 Nos.
49.	Linear IC trainers	5 Nos.
50.	Logic Probe	4 Nos.
51.	Logic Pulser	4 Nos.
52.	Micrometer (for measuring wire gauge)	5
53.	Microprocessor training kit (8085)	5 Nos.
54.	Mini transformer Winding machine	2
55.	MOD drive with media(2Nos.)	1 No.
56.	Modem (dial up)	4
57.	Monitors (VGA mono 2 Nos. SVGA colour 3 Nos.)	5 Nos.
58.	Multimedia Projector	1 No.
59.	Multimedia Speakers	4 Sets.
60.	Networking cards	11
61.	Over Head Projector	1
62.	PC internal cables for interconnecting drives and ports	10 sets.
63.	Permanent magnet of different shapes and magnetic compass	1 set.

64.	Philips alignment kit	5
65.	Printer DMP of Different types and sizes	4
66.	Printer Ink Jet	4
67.	Printer laser	2
68.	Refilling kit for inkjet printer	1
69.	Relays and solenoids of different types and makes	5 each.
70.	Rheostat – 100 Ohm, 1000 Ohm	5 each
71.	Routers	1
72.	Scanner (hand held 1 Nos. and Table top 1 Nos.)	2
73.	Screw driver star head	5
74.	Screw driver 3”	5
75.	Screw driver 6”	5
76.	Screw driver 8”	5
77.	Screw driver set with replicable bits	5
78.	Small adjustable spanners	5
79.	Small file set	5
80.	SMPS with ATX PC cabinets.	5 Nos.
81.	Soldering Station	5 No.
82.	Spare Mother boards, DIMS 128 Mb, 256 Mb and latest capacity of latest ROM type.	5 Nos. each.
83.	Standard Wire Gauge	5
84.	Stepper motor	2 Nos.
85.	Table lamps	5
86.	Telephone facility for using internet	1
87.	Tool for making inter connecting cables	2
88.	Touch screen monitors	2 Nos.
89.	TTL CMOS IC	As required
90.	Types Keyboards, Types of Mouse (including one optical mouse, cordless mouse)	5 Nos. each.
91.	Universal counter	4
92.	UPS (off line 1 KVA 2 Nos., 2KVA- 2 Nos.)	4
93.	UPS on line 3 KVA.	2
94.	Vacuum cleaner	1 Nos.
95.	VCR	1 No.
96.	VDC player	1 No.
97.	Voltage stabilizer/CVT(1 KVA – 2 No, 5KVA – 1 No.)	3
98.	Watch maker screw driver set	5
99.	Web Camera	2 Nos.
100.	Wire stripper	5
101.	ZIP drives (100Mb/250 Mb) Internal – 2 Nos. External – 2 Nos. with media (5 Nos.)	4 Nos.

Software		
102.	Anti virus for stand alone and network	1
103.	Bench marking software's (Preferably free down load)	
104.	Diagnostic software's.	As required
105.	Internet account (calculated based on maximum of 50 hrs per month)	1
106.	Latest Microsoft office suit (Omit this if COPA trade is conducted in the institute)	1
107.	Self learning packages	As required
108.	Windows 98.	1 No.
109.	Windows NT latest version/WINDOWS XP (10 USER)	1 No.

Computer Consumables (Per Year)		
1	Floppy diskettes	As Required
4	Printer Ribbon, refill cartridges, toner cartridges.	As required.
5	Printer stationary	As required.
3	Re writeable CD's .	10 Nos.
2	Writable CD's	As Required
Class Room Furniture		
110.	Chalk board	1
111.	Computer maintenance table, round of 3-4feet Diameter.	5
112.	Cup board for library	5
113.	Cup board for storing computer spares	5
114.	OHP Trolley	1
115.	Pigeon hole lockers for trainees	As required
116.	Student chair swivel type	20
117.	Student table	20
118.	Teacher chair swivel type	2
119.	Teacher table	2
120.	White board	1
121.	Wood stools for maintenance tables (@ 4 per table)	20
General Consumables		
122.	Analog ICs	As Required.
123.	Bread board for wiring practice	20.
124.	De-soldering Wick	As required.
125.	Different types and ratings of Fuses	As required
126.	Different types of connectors	As required.
127.	Different types of Switches	As required.
128.	Different types of wires, cables	As required
129.	Digital (gates, adders, FFs, Counters, mux/demux, etc., as required for exercises)	As required.
130.	Diodes, Zeners, Transistors, UJT, FET, SCR, TRIAC, DIAC, of different types, ratings.	As required.
131.	High frequency transformers	As required.

132.	Memory modules of PCs, 128, 256, 512 etc., DIMM or latest	5 each
133.	Metal sheets for bending, drilling, riveting and tapping practice	As required.
134.	Miniature lamps (3/6/12Volts)	20
135.	Nuts, bolts, Rivets, screws	As required.
136.	Primary cell of different sizes and types	1 set.
137.	PTC, NTC, LDR, VDR, Pots, Presets	As required.
138.	Re-chargeable secondary batteries	5
139.	Resistors, Capacitors, Inductors of different types, ratings	As required.
140.	Solder and Flux	As required.
141.	Spare Lithium battery for mother board	As required.
142.	Speakers of different ohms and wattage ratings	5
143.	Specific connectors and cables required for internal PC wiring and for external ports (serial and parallel).	5 sets.
144.	Step-down transformers	20
145.	Tag board of suitable size for circuit wiring practice	20
VIDEO and other Teaching Aids		
146.	Video on Artificial respiration	1
147.	Video on DGE&T	1
148.	Video on Electrical safety	1
149.	Video on First aid	1
150.	Video on Satellite communication	1

NOTE:

1. Specification of Computers and Peripherals may be updated by the competent authority from time to time, at the time of purchase in view of the fast changes in technology and market trends.
2. Any raw material required to conduct the listed practical exercises but not found in the list may be added.
3. Training Video CD on different areas relevant to the Practical and theoretical contents, not listed may be added.