



Government Polytechnic Mumbai

(Academically Autonomous Institute of Maharashtra Government)

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Programme: Information Technology

First Semester

With effect from 2016-17

Course Code	Course Title	C/O	Credits				Examination Scheme					
			L	P	TU	Total	Theory		PR	OR	TW	Total
							TH	TS				
HU16101	Basics of Communication	C	2	---	1	3	70	30				100
SC16107	Mathematics I	C	3	----	1	4	70	30				100
SC16106	Chemistry of Engineering Materials	C	3	2	---	5	70	30			50	150
EE16201	Fundamentals of Electrical Engineering	C	3	2	----	5	70	30		25	25	150
ME16201	Engineering Drawing I	C	2	4	---	6			50		50	100
HU16103	Generic Skills	C	----	----	2	2				50		50
IT16201	Basics of Information Technology	C	1	4	----	5			50*		50	100
	TOTAL		14	12	4	30	280	120	100	75	175	750

Abbreviations: C- Compulsory; O- Optional; L- Theory Lecture; P-Practical; TU-Tutorial; TH- Theory Paper; TS- Term Tests (02); PR-Practical Exam; OR-Oral Exam; TW- Term Work.

* Indicates assessment by External Examiner

Academic Coordinator

Head of Department
(Information Technology)

Principal
Government Polytechnic Mumbai

Programme : CE/ME/EE/IS/EC/CO/IF/LG/LT									
Course Code: HU16101			Course Title: Basics of Communication						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
2	1	-	3	70 (3 Hrs.)	30	---	---	---	100

Rationale:

English is the global language today. The basic knowledge of this language is essential for everyone. It is necessary for the Engineering and Technology related students to cope up with the challenges of the modern world with the help of English. The major part of their work experience needs certain knowledge of this language. At worksite, on the shop floor or fields, they might be required to take the instructions from superiors and to pass them on to subordinates. To write letters, circulars, memos, notice and reports will be an important task for them. While designing the curriculum of communication skills and communication practice the probable needs of the future technicians are kept in view.

Course Outcomes:

Student should be able to

CO1	Make use of the basic concepts of grammar and communication techniques.
CO2	Interpret positive feedback at various situations by using appropriate body language.
CO3	Write letters circulars, memos, notices and reports to communicate.
CO4	Apply proper communication technique to cope up with the challenges of the modern world.
CO5	Adopt appropriate approach to take instructions from seniors and pass it on to the subordinates.



Course Content Details:

Unit No	Topics / Sub-topics
1	Basics of Grammar: Articles, Tense, Transformation of Sentences, Affirmative and negative, Interrogative and assertive , Exclamatory and assertive , Degrees of comparison, Direct indirect speech, Voice, Types of sentences
2	Theory and methods of communication: Meaning and definitions of communication, Elements of communication, Communication cycle, Methods of communication, verbal: Oral, Written, Non verbal: Body language ii) Visuals
3	Types and Barriers of communication: Formal - upward, downward, vertical, horizontal, diagonal. Informal, grapevine, Barriers of communication: Mechanical, Physical, Language, Semantic, Psychological, Status
4	Application Letters: Job application, Resume / CV / Bio-Data, Application for loan, (home loan, car loan, education loan)
5	Business correspondence & Office drafting: Memorandum, notice, circular, Enquiry and quotation, Order and complaint
6	Report writing : Need of report writing, Principles of effective report writing, Types of reports: Individual & committee report, Accident report Feasibility and survey report, Report on fall in sales and production

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Basics of Grammar:	06	4	4	4	12
2	Theory and methods of communication	06	2	4	6	12
3	Types and Barriers of communication	04	2	4	6	12
4	Application Letters	06	4	4	6	14
5	Business correspondence & Office drafting	04	2	4	6	12
6	Report writing	06	2	2	4	08
Total		32	16	22	32	70

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.



Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	Grammar related written worksheet.	02
2	2	Dialogue between two students (observing the basics of grammar.) on a formal situation	02
3	2	Dialogue between two students (observing the basics of grammar.) on a informal situation	02
4	2.3	Presentation of communication cycle (4 students)	02
5	3	Presentation on different types of barriers and remedies. (04 students)	02
6	3	Presentation on the given situation with the help of body language and visuals (4 students)	02
7	4	Writing a letter to the editor of a newspaper for social cause.	01
8	4	Writing a job application with bio data.	01
9	5	Activity on business correspondence and office drafting	01
10	6	Report writing	01
Total			16

References/Books

Sr.No.	Author	Title	Publication
1	Meenakshi Raman Sangita Sharma	Communication Skills	Oxford Higher Education
2	Homai Pradhan D.S.Bhende Vijaya Thakur	Business Communication	Himalaya Publishing House
3	Curriculum Development Centre	A Course in Technical English	Somaiya Publications Pvt.Ltd.

Course Curriculum Development Committee:

a. Internal Faculty

- 1) Smt. S.S. Kulkarni
- 2) Mrs. K.S. Pawar

b. External Faculty :-

- 1) Mr. Sandeep Barde


Academic Coordinator


Head of Department
(Science)


Principal
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Mumbai



Programme : CE/ME/EE/IS/EC/CO/IF/LG/LT													
Course Code: SC16107	Course Title: Mathematics-1												
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits			Examination Scheme										
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total				
3	1	-	4	70 (3 Hrs.)	30	-	-	-	100				

Rationale:

This subject is kept under the branch of science. This subject intends to teach student basic facts, concepts, principle and procedure of mathematic as a tool to analyze Engineering problems and as such lays down foundation for understanding the engineering and core technology subjects.

Course Outcomes:

Student will be able to:

CO1	Identify the basic principles of mathematics about the field analysis of any engineering problem.
CO2	Apply rules, concept and properties to solve the basic problems.
CO3	Establish the relation between two variables.

Course Content Details:

Unit No	Topics / Sub-topics
1	Logarithms: 1.1 Definition of logarithm(Natural and Common logarithm) 1.2 Laws of logarithm 1.3 Change of base rule& simple examples based on laws. 1.4 Application of concept.
2	Determinants: 2.1 Definition of determinant 2.2 Expansion of determinant of order 2&3 2.3 Crammer's rule to solve simultaneous equations in 3 unknowns 2.4 Application of concept.
3	Matrices: 3.1 Definition of a matrix of order $m \times n$ 3.2 Types of matrices 3.3 Algebra of matrices - equality, addition, subtraction, multiplication & scalar multiplication. 3.4 Transpose of matrix. 3.5 Minor , co-factor of an element.

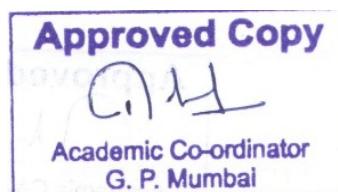
	3.6 Adjoint & inverse of a matrix by adjoint method. 3.7 Solution of a simultaneous equations by matrix inversion method. 3.8 Application of concept.
4	Trigonometry: 4.1 Trigonometric ratios of allied angles, compound angles, multiple angles ($2A$, $3A$), Sub multiple angles 4.2 Factorization and De-factorization Formulae 4.3 Inverse Circular function (definition and simple problems).
5	Straight line: 5.1 Slope & intercept of straight line. 5.2 Equation of straight line in slope point form, slope intercept form, two point form, two intercept form, General equation of straight line. 5.3 Angle between 2 straight lines; condition of parallel & Perpendicular lines. 5.4 Intersection of two lines. 5.5 Length of perpendicular from a point on the line & Perpendicular distance between parallel lines.
6	Vectors: 6.1 Definition of vector , position vector 6.2 Algebra of vectors(Equality, addition ,subtraction and scalar multiplication) 6.3 Dot (Scalar) product & Vector (Cross) product with properties.

Suggested Specifications Table with Hours and Marks (Theory):

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Logarithms	03	02	04	00	06
2	Determinants	03	00	04	00	04
3	Matrices	14	06	08	06	20
4	Trigonometry	14	06	08	06	20
5	Straight line	10	04	04	06	14
6	Vectors	04	00	02	04	06
		Total	48	18	30	70

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.



List of Tutorials:

Note: 1) Tutorials are to be used to get enough practice.

2) Make group of 20 student and for each group minimum 10 problems are to be given.

Sr. No.	Unit	Tutorials	Approx. Hours
1	1	Logarithms	02
2	2	Determinants	02
3	3	Matrices(Algebra of matrices)	02
4	3	Matrices(Adjoint , inverse& solution of equation using matrix inversion method	02
5	4	Trigonometric ratio of allied, compound, multiple and sub multiple angles.	02
6	4	Factorization and De-factorization formulae	02
7	4	Inverse trigonometric ratios	01
8	5	Straight line	02
9	6	Vectors	01
Total			16

References/ Books:

Sr.No.	Name of Book	Author	Publisher
1	Mathematics for polytechnic students	S.P. Deshpande	Pune Vidyarthi Graha Prakashan
2	Mathematics for polytechnic students (Volume I)	H. K. Das	S .Chand Prakashan
3	Companions to basic math's	G. V. Kumbhojkar	Phadke Prakashan
4	Applied Math's	N. Raghvendra Bhatt Late Shri R Mohan Singh	Tata McGraw Hill Publication

Course Curriculum Development Committee:**a. Internal Faculty**

- i. Miss.J.J.Ratnanai.
- ii. Mr.V.S.Patil

b. External Faculty

- i. Prof.P.S.Dave



Academic Coordinator


Head of Department
(Science)

Principal
Govt. polytechnic, Mumbai

Programme : EE/EC/IF/IS/CO									
Course Code: SC16106			Course Title: Chemistry of Engineering materials						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	2	5	70 (3 Hrs.)	30	-	-	50	150

Rationale:

The subject is offered as one of the foundation subjects as it belongs to the category of basic sciences. The subject helps to understand and select different materials, their compositions, their properties and uses. The subject helps in reinforcing basic knowledge gained by students to apply and solve day to day problems related to the various engineering fields. This will provide input for better understanding of other foundation and technology subjects.

Course Outcomes: Student should be able to:

CO1	Identify and classify various materials used by them.
CO2	Select suitable substance, metal/alloy for a particular use.
CO3	Adopt methods of safety and precaution to aid preventive measures.
CO4	Develop problem solving attitude towards given problems related to the field of study.
CO5	Apply acquired knowledge to solve core engineering and technological problems.

Course Content Details:

Unit No	Topics / Sub-topics
1	Atomic structure <ul style="list-style-type: none"> 1.1 Introduction of atom, Fundamental Particles, Proton, Neutron, Electron; their mass, charge, location. and symbol 1.2 Atomic number and atomic mass number. (Definition, symbol, fundamental nature, difference between. Atomic no. and atomic mass no.) Numerical based on atomic number & atomic mass number. Orbitals, Orbital, quantum no. and their significance 1.3 Rules governing filling up of atomic orbitals, Aufbau's Principle, Pauli's exclusion principle, Hund's rule. Electronic configuration of inert gases. Electronic configuration of atoms up to atomic number 20, Isotopes and isobars and their differences, etc.

	<p>1.4 Valency and chemical bonding. Valency: Definition, & examples. Types of valency: Electro valency & co-valency Examples.</p> <p>1.5 Electrovalent bond: Definition, Formation, examples. Formation of NaCl , MgCl₂, MgO,CaCl₂,CaO,AlCl₃.</p> <p>1.6 Co-va lent bond : Definition & formation Formation of following molecules Single bond : Hydrogen, Chlorine, Water , Ammonia, Hydrogen Chloride, Methane. Double bond : Oxygen, Carbon dioxide, Ethylene. Triple Bond : Nitrogen, Acetylene.</p> <p>1.7 Distinction between electrovalent and covalent compounds.</p>
2	<p>Electrochemistry</p> <p>2.1 Definition of Electrochemistry, Electrolytes: Definition, Types. Differences between Atom and ion. Definition of ionization & electrolytic dissociation, Arrhenius theory, Degree of ionization with factors affecting it.</p> <p>2.2 Terms related to Electrolysis (resistance, conductance, potential difference, their units) Mechanism of electrolysis. Examples of: mechanism of electrolysis of NaCl in fused & in aqueous state, electrolysis of CuSO₄ using Cu and Pt electrodes.</p> <p>2.3 Faradays First law of electrolysis and its mathematical derivation. Faradays second law of electrolysis& its mathematical derivation, Numerical based on laws of Faraday.</p> <p>2.4 Application of Electrolysis, electro- refining, Electroplating.</p> <p>2.5 PH value : Definition ,Formula, PH scale, its salient Features, Numerical based on PH, Applications of PH related to Engg. field. (Corrosion of bridges, Electroplating Sewage treatment, City water supply).</p> <p>CASE STUDY RELATED TO PH/ ELECTROLYSIS PROCESS</p>
3	<p>Cells and batteries</p> <p>3.1 Conductors: Definition, types (Metallic & Electrolytic) Difference between the two,</p> <p>3.2 Ohm's law, charge & discharge of cells, closed circuit voltage, open circuit voltage , Electrochemical couple, separator, electromotive force (EMF),</p>

	<p>3.3 Cells Definition, types (Electrolytic & Electrochemical), differences between them</p> <p>3.4 Classification of electrochemical cell (Primary & secondary cells) Definition & Difference between the two.</p> <p>3.5 Primary cells: Lac lance cells, Dry cells, Daniel cells.</p> <p>3.6 Secondary cells: Lead acid storage cell (Construction working charging & discharging) Nickel- cadmium cell (Construction working charging & discharging) Battery : Definition, Example</p> <p>CASE STUDY: PRIMARY CELLS/ SECONDARY CELLS</p>
4	<p>Metallurgy & alloys</p> <p>4.1 Metals & their characteristics, (hardness, ductility, malleability, toughness, brittleness, tensile strength, weldability, casting, forging, soldering) Occurrence of metals (native state and combined state, examples) , definition of Mineral, Ore, Gangue, Flux, Slag, Metallurgy.</p> <p>4.2 Process of extraction of metal from ore i.e Flowchart of metallurgy. Different steps of metallurgy. A) Grinding and pulverization B) Concentration (definition) a. Physical method (to be taught in detail) • Gravity separation • Magnetic separation • Froth floatation b. Chemical method • Calcination • Roasting (difference between the two) C) Reduction by a. Smelting (in detail: definition, diagram, description and zones of blast furnace, products of blast furnace) b. Aluminothermic (only definition) c. Electrolysis (only definition) D) Refining:</p>

	<ul style="list-style-type: none"> • Definition and Name of different methods (Poling, Liquation, Distillation, electro-refining) <p>4.3 Important ores of iron, Copper, Zinc, Aluminum,</p> <p>4.4 Physical properties and uses of some metals along with chemical properties Ex :- Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W</p> <p>4.5 Definition of alloy: purposes of preparation of Alloy. Preparation of binary alloy by fusion method</p> <p>4.6 Some useful alloys : composition, properties and uses</p> <ol style="list-style-type: none"> 1 Brass 2 Duralumin 3 Solder: Wood's metal 4 Babbitt metal.
	<p>ACTIVITY: PREPARATION OF METALLURGY FLOWCHARTS / VARIOUS METHODS OF CONCENTRATION</p>
5	<p>Semiconductors & Insulators</p> <p>5.1. Semiconductors: Definition, Example, properties & uses of silicon & Germanium , formation of semiconductor.</p> <p>5.2. Insulators : Definition, Example: air; silicone fluids : Definition, Example, properties & uses</p> <p>5.3 Superconductors: Definition, Example, properties & uses.</p>
6	<p>Corrosion.</p> <p>6.1 Definition of corrosion, Types of corrosion (Atmospheric & Electrochemical Corrosion)</p> <p>6.2 Mechanism of atmospheric corrosion, types of oxides formed, (stable, unstable, volatile, with examples), factors affecting atmospheric corrosion.</p> <p>6.3 Electrochemical corrosion / immersed corrosion</p> <ul style="list-style-type: none"> • Definition, types of cells formed (galvanic cells & concentration cells, examples of both cell formations). • Mechanism of immersed /electrochemical corrosion (hydrogen evolution mechanism & oxygen absorption mechanism, diagram, explanation and chemical equations of both mechanisms).

	<ul style="list-style-type: none"> Factors affecting immersed corrosion (Ph value, hydrogen over voltage, solubility of corrosion products, irregularities on surface, etc.) <p>6.4 Protection of metals from Corrosion :- only definition:</p> <ol style="list-style-type: none"> purification of metals alloy formation cathodic protection controlling external conditions protective coatings <ol style="list-style-type: none"> organic coating(by paints and varnishes), inorganic coating (metallic oxides) metallic coating (detail) <p>6.5 Protective metallic coatings (definition, process, application, diagram)</p> <ol style="list-style-type: none"> hot dipping(galvanizing & tinning) sherardizing metal spraying
7	<p>ACTIVITY : VIEWING THE PROCESSES DESCRIBED ABOVE</p> <p>Lubricants</p> <p>7.1 Definition of lubricant, example, various functions of a lubricant, classification of lubricants (solid, semi-solid and liquid) examples, conditions under which each lubricant is used.</p> <p>7.2 Lubrication: definition and types.</p> <p>Types of lubrications: (Definition, diagram & description of each type.)</p> <ul style="list-style-type: none"> Fluid film Boundary, Extreme pressure lubrication. <p>7.3 Characteristic of good lubricants, requirements of an ideal lubricant</p> <p>A) Physical Characteristics</p> <ul style="list-style-type: none"> Viscosity Viscosity index Oiliness Volatility

	<ul style="list-style-type: none"> • Flash point & Fire Point • Cloud and Pour point <p>B) Chemical Characteristics</p> <ul style="list-style-type: none"> • Acidity /Neutralization no. • Emulsification • Saponification value <p>7.4 Selection of lubricant for a particular machine depending upon its working condition (Table showing machines, their working condition, nature of lubricant needed, type of lubrication used).</p> <p>ACTIVITY: SELECTION OF LUBRICANT BASED ON NATURE OF MACHINE</p>
8	<p>Engineering. Materials</p> <p>8.1 Plastic</p> <ul style="list-style-type: none"> • definition , example • Polymerization: definition different methods of Polymerization addition and condensation. • Addition polymerization : definition formation of polyethylene Polytetrafluoroethylene PVC , polystyrene etc., • Condensation-polymerization: definition and examples (formation Of Bakelite , nylon-66 etc). • Types of plastic: thermosoftening ,thermosetting plastics, Differences between them. • Compounding of plastic , Materials needed for it (pigments, fillers, Plasticizers accelerators etc.,) • Properties and engineering applications <p>8.2 Rubber :</p> <ul style="list-style-type: none"> • Definition of rubber (elastomer). • Natural rubber : Basic unit in natural rubber(isoprene) • Occurrence & Processing of Latex .Limitations of natural rubber, • Vulcanization Of rubber: Definition. process, examples • Synthetic rubber: need for it, various examples (Buna-S, Buna –N, Thiokol, neoprene, butyl rubber)

	<ul style="list-style-type: none"> Properties of rubber (elasticity, tack, shock absorbance, rebound, tensile strength, related uses) <p>8.3 Insulators (definition, examples)</p> <ul style="list-style-type: none"> Teflon(PTFE): Preparation, Properties and uses Ceramics : properties and uses <p>8.4 Adhesives</p> <ul style="list-style-type: none"> Phenol Formaldehyde resin : Preparation, Properties, Uses Urea Formaldehyde resin : Preparation, Properties, Uses Epoxy resin : Properties, Uses <p>8.5 Conducting Polymers : Properties, Uses</p> <p>8.6 Liquid Crystal Polymers : Properties, Uses</p> <p>8.7 XLPE Cross polyethylene: Properties, Uses</p>
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Suggested Specifications Table with Hours and Marks (Theory):

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Atomic Structure	06	04	04	00	08
2	Electrochemistry	06	02	04	02	08
3	Cells and batteries	05	02	04	02	08
4	Metallurgy and alloys	06	04	02	02	08
5	Semi conductors and insulators	04	02	04	02	08
6	Corrosion	06	02	04	02	08
7	Lubricants	06	02	04	02	08
8	Engineering materials	09	04	08	02	14
Total		48	22	34	14	70

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

List of experiments/Assignments: (any 12 experiments)

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	Tour of chemistry laboratory &safety measures.	02
2	2	To find out the electrochemical equivalent of copper	02
3	2	To find out PH of different solutions using Lovibond comparator, PH paper, PH meter	02
4	3	To Prepare Daniel Cell and note its EMF.	02

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Academic Co-ordinator
G. P. Mumbai

5	4	To Find out the percentage of Cu. from the given alloy sample	02
6	1,4	Qualitative analysis of any three salt solutions.	02
7	1,4	Solution 1	02
8	1,4	Solution 2	02
9	1,4	Solution 3	02
10	3,5	Compare electrode potentials of different electrodes using a standard electrode and help determine which metal corrodes faster	02
11	6	To study corrosion of aluminum rod/ in acidic and an alkaline medium and plot a graph of the cell.	02
12	7	Determination of coefficient of viscosity of given Oil by Ostwald's viscometer	02
13	7	To find out acid value of given lubricant oil by titration with KOH.	02
14	8	Preparation of phenol formaldehyde resin and to study its properties and uses	02
15	2	To find out end point of titration between weak acid and weak base using conductivity meter	02
16	8	Preparation of urea-formaldehyde resin and to study its properties and uses	02
Total			32

References/ Books:

Sr.No.	Name of Book	Author	Publisher
3	Engineering Chemistry	M. M. Uppal	Khanna Publisher, Delhi
1	Polytechnic Chemistry	V. P. Mehta	Jain Brothers, New Delhi.
2	Applied Chemistry	P. C. Jain & Monica Jain	DhanpatRai and Sons, New Delhi
4	Chemistry in Engineering and Technology Volume I and II	J. C. Kurlacose J. Jairam	Tata Mcgraw hill.

Course Curriculum Development Committee:

a. Internal Faculty

- i. Mrs. J.V. Iyengar (Lecturer in Chemistry)
- ii. Head of Departments of EC, EE, CO, IF, IS

Academic Coordinator

Head of Department
(Science)Principal
Govt. polytechnic Mumbai

Programme : Diploma in CO/EC/IS/IT									
Course Code: EE16201			Course Title: Fundamentals of Electrical Engineering						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits			Examination Scheme						
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	2	5	70 (3 Hrs.)	30	-	25	25	150

Rational:

All the equipment related to electronics, instrumentation, computer and information technology utilizes electrical energy for their operations. Diploma holders from these branches, comes across various types of electrical circuits. The purpose of this subject is to give fundamental knowledge of electrical engineering so that they will be able to handle electrical equipments, circuits and analyze simple DC/AC circuits.

Course Outcomes:

Students should be able to

CO1	Define basic terminologies related to, Generation, AC/DC circuits and transformer.
CO2	State various laws related to Magnetism, Electromagnetism, Circuits and Energy generation.
CO3	Solve simple DC/AC circuits
CO4	Analyse response of various types of simple AC circuits when applied to AC excitation.
CO5	Utilize electrical energy for simple applications confidently and with attention to safety.

Unit No	Topics/subtopics
1	Power Generation: 1.1 Basic block diagram of generating station, Generator principle. 1.2 Conventional and Nonconventional energy sources. 1.3 Types of power stations in Maharashtra and their list with capacities. 1.4 Current energy scenario in India and Maharashtra.
2	Basic Concepts : 2.1 Electric Current: Definition, Direction of current, unit, Electric potential, Potential difference, Concept of EMF and Potential difference. 2.2 Resistance: Definition, unit, Factors on which resistance depends Effect of temperature on resistance. (<i>simple numerical</i>) 2.3 Conductance, Ohms Law .(<i>simple numerical</i>) 2.4 Electric power and energy concept and unit. (<i>simple numerical</i>) 2.5 Measurement of voltage, current, power and energy.

	2.6 Effects of Electric Current: Heating Effect, Magnetic Effect and Chemical Effect. <i>(Only Introduction)</i>
3	<p>DC Circuits:</p> <p>3.1 Introduction to concept.</p> <p>3.2 DC series circuit: Concept, Equation for equivalent resistance connected in series, Main Characteristics, Advantages, Disadvantage, Application of series circuit.</p> <p>3.3 DC Parallel circuit: Concept, Equation for equivalent resistance connected in parallel, Main Characteristics, Advantages, Application of Parallel circuit, Current divider rule.</p> <p>3.4 Series parallel circuit, Application of series parallel circuit.</p> <p>3.5 Definition of: Circuit, Parameter, Liner circuit, Nonlinear circuit, Bilateral circuit, Unilateral circuit, Electric network, Passive-Network, Active network, Node, Branch, Loop, Mesh.</p> <p>3.6 Kirchhoff's current law, Kirchhoff's voltage law, sign convention. <i>(simple numerical limited up to two variables on above)</i></p>
4	<p>Magnetism and Electromagnetic induction:</p> <p>4.1 Definition of Magnetic field, Magnetic flux, Magnetic flux Density, Magnetic Intensity, absolute and Relative permeability, relation between B and H.</p> <p>4.2 Magnetic effect of electric current, Right hand rule, cork screw rule, Current carrying conductor in magnetic field, Fleming's left hand rule.</p> <p>4.3 Magnetic circuit, mmf, Reluctance, permeance, comparison between Magnetic and Electric circuit.</p> <p>4.4 Magnetisation curve for magnetic and non magnetic material, Magnetic Hysteresis, Hysteresis Loop, Hysteresis Loops for Hard & Soft Magnetic Materials, residual flux, retentivity, coercive force, Hysteresis loss.</p> <p>4.5 Electromagnetic induction , Faradays laws of electromagnetic Induction , Lenzs law, Flemings right hand rule , Dynamically induced EMF, Statically induced EMF ,self inductance , mutual inductance , coefficient of coupling. <i>(Only equations , No derivation of equations and numerical on unit 4)</i></p>
5	<p>AC Fundamentals :</p> <p>5.1 Difference between AC and DC quantity.</p> <p>5.2 Advantages of AC Over DC.</p> <p>5.3 Generation of A.C. Voltage and current.</p> <p>5.4 Mathematical Expression of alternating quantity & its derivation.</p> <p>5.5 Definition of Waveform, Instantaneous value ,Cycle, Time period, Frequency, Amplitude, Peak value , Average value and RMS value, Form factor and Peak factor for sinusoidal</p> <p>5.6 Phase, Phase difference , Phasor representation of sinusoidal quantities</p>
6	<p>AC series circuit :</p> <p>6.1 Circuit diagram, phasor diagram and wave form of a.c. circuits through pure Resistance, Pure Inductance and pure Capacitance. Concept of inductive reactance and capacitive reactance .</p> <p>6.2 Circuit diagram, phasor diagram and wave form of a.c. circuits RL, RC and RLC circuit. Impedance and Impedance Triangle.</p> <p>6.3 Active power, Reactive power and apparent power, power factor.</p>
7	<p>Transmission Distribution and Transformer:</p> <p>7.1 Single line diagram of electrical system. Definition of transmission, distribution and</p>

	their voltage levels. 7.2 Working Principle of transformer. E.M.F. equation (<i>No derivation</i>) 7.3 Transformation ratio. (<i>Simple numerical problems</i>) 7.4 Transformer rating. Construction of transformer. 7.5 Types of transformer based on transformation ratio and construction with their applications.
8	Electrical wiring: 8.1 Types of wiring for Domestic Installation : Conduit , Casing and Capping and Concealed (<i>brief information and application</i>) 8.2 Concept of lighting circuit and power circuit. 8.3 Electric wiring - wiring accessories, switches, sockets, ICDP, ICTP, Ratings of Wires, switches, sockets used for lighting and power circuit. 8.4 Fuses, importance and types for domestic applications .MCB, their ratings for domestic applications. 8.5 One lamp controlled by one switch. Staircase wiring. 8.6 Earthing, necessity and types. 8.7 Safety precautions in electrical indoor & outdoor installations.

Suggested specification table with Hours and Marks (Theory)

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Power Generation	2	02	02	00	04
2	Basic Concepts	5	02	04	02	08
3	DC Circuits	6	02	04	06	12
4	Magnetism and Electromagnetic induction	8	02	04	06	12
5	AC Fundamentals	5	02	04	06	10
6	AC series circuit	10	02	06	00	08
7	Transmission Distribution and Transformer	6	02	04	00	08
8	Electrical wiring	6	02	02	04	08
Total		48	16	30	24	70

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

List of Experiment (Any Eight)

Sr. No	Unit	Experiment/Assignment	Approx. Hours
1	8	Safety precautions to be observed for indoor and outdoor installations and know first aid practice also refer artificial respiration chart.	04
2	3	Measure voltages and currents in series and parallel resistive circuit.	04
3	3	Verify Kirchhoff's current & voltage laws.	04

4	4	Observe that EMF is induced in coil when magnetic lines of force move across winding and observe its polarity	04
5	5	Observe AC waveform and measure AC voltage & DC voltage with oscilloscope.	04
6	6	Observe the phase relationship between voltage and current in pure resistive, inductive and capacitive circuit.	04
7	6	Observe the phase relationship between voltage and current in R-L series circuit.	04
8	2 , 6	Measure Power and Energy consumed by Resistive circuit and purely inductive circuit.	
9	7	Measure the transformation ratio of transformer.	04
10	2, 6	Prepare the list of household electrical equipments and write down their wattage. Estimate the total energy consumed in a month by the household appliances listed above.	04
11	8	Identify different types of wires and accessories switch, fuse, socket outlet used in wiring and write their rating	04
12	8	Prepare extension board with three pin sockets.	04
13	8	Measure Earth resistance using earth tester. Observe procedure of plate earthing.	04

Reference Books:

Sr. No	Author	Title	Publication
01	B. L. Thereja and A. K. Thereja	Electrical Technology (Volume I)	S. Chand and Co. Ltd.
02	V. K. Mehta and Rohit Mehta	Basic Electrical Engineering	S. Chand and Co. Ltd.
03	Edward Hughes	Electrical Technology	ELBS Publications.

Course Curriculum Development Committee:**a. Internal Faculty**

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Programme : ME/CE/EC/CO/IF/IS/EE/RT/LT/LGFT									
Course Code: ME16201			Course Title: Engineering Drawing - I						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
2	-	4	6	-	-	50*	-	50	100

* Assessment by both internal & external examiner.

Rationale:

Engineering drawing is the graphical language of engineers, designers, planners, supervisors and technicians to express their thoughts, ideas and concepts used in it. Engineering drawing offers students an insight into the methods of exploring engineering problems. It imbibes the principles of accuracy and exactness with regard to the information necessary for the production of an engineering component. This preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing imagination, drafting and sketching skills of students.

Course Outcomes:

Student should be able to,

CO1	Effectively use drawing instruments for enhancing speed and accuracy in drawing.
CO2	Construct different engineering curves and know their applications.
CO3	Draw Orthographic Projections of solids with given orientation.
CO4	Visualize three dimensional objects and draw Isometric Projections.
CO5	Draw the free hand sketches of different thread forms, bolts, screws and nuts.

Course Content Details:

Unit No.	Topics / Sub-topics
1	Principles of Drawing : Drawing Instruments and their uses, Standard sizes of drawing sheets (ISO-A series), Letters and numbers (single stroke vertical), Convention of lines and their applications, Scale (reduced, enlarged & full size), Dimensioning as per SP-46 (Latest edition), Simple geometrical constructions, Redrawing figures using above geometrical construction.



2	Engineering curves & Loci of Points: To draw an ellipse by Arcs of circle method & Concentric circles method, To draw a parabola and hyperbola by Directrix and focus method. To draw involutes of circle & pentagon, To draw a cycloid, Loci of points of Single slider crank mechanism with given specifications.
3	Orthographic projections: Introduction to Orthographic projections, Conversion of pictorial view into Orthographic views (first angle projection method only) – elevation, plan and end view, Types of sections and Conversion of pictorial view into sectional orthographic views. (Complete object involving slots, threads, ribs etc.;)
4	Isometric projections: Isometric scale, comparison of true scale with isometric scale, Conversion of orthographic views into isometric view/projection. (complete object involving slots, ribs, holes etc.;)
5	Freehand Sketches: Draw neat & proportionate free hand sketches of given elements and understands its function and use. Different types of thread forms, nuts, bolts, screws and foundation bolts (Rag, Eye and Lewis type).

Suggested Specifications Table with Hours and Marks (Theory):

Unit No	Topic Title	Teaching Hours	Distribution of Practical Marks			
			R Level	U Level	A Level	Total Marks
1	Principles of Drawing	04	06	-	-	06
2	Engineering curves & Loci of Points	08	-	08	-	08
3	Orthographic projections	08	-	-	14	14
4	Isometric projections	08	-	-	14	14
5	Freehand Sketches	04	08	-	-	08
Total		32	14	08	28	50

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.



List of Sheets/Assignments:

Sr. No.	Unit No.	Sheets /Assignment	Approx. Hours
1	1	Drawing types of lines, problems on redraw figures & geometrical construction.	08
2	2	Engineering curves & Loci of Points (Minimum four problems)	08
3	3	Orthographic projection of objects by first angle method of projection. (Minimum two problems)	10
4	3	Orthographic projection with section of objects using first angle method of projection. (Minimum two problems)	10
5	4	To draw Isometric planes, Isometric projections with Isometric scale. (Minimum two objects)	10
6	4	To draw Isometric views of objects including slots, holes and sloping faces. (Minimum two objects)	10
7	5	Free hand sketches of different types of thread forms, nuts, bolts and screws.	08
Total			64

Assignment:- Assignments on above five topics to be given.

Note: Practical examination will be conducted based on the question bank provided.

References/ Books:**1. Books:**

Sr. No.	Name of Book	Author	Publisher
1	Engineering Drawing	N. D. Bhatt	Charotar Publishing House 2010
2	Engineering Drawing	Amar Pathak	Dreamtech Press, 2010
3	Engineering Drawing	D. Jolhe	Tata McGraw Hill Edu., 2010
4	Text Book on Engineering Drawing	K. L. Narayan, P. Kannaiyah	Scitech Publications, 24th Reprint August 2011
5	Engineering Drawing and Graphics + AutoCAD	K. Venugopal	New Age Publication, Reprint 2006.
6	Engineering Drawing practice for schools and colleges	IS Codes SP - 46.	-

2. Video Cassettes / CD's

1. Instructional / Learning CD developed by ARTADDICT.



Course Curriculum Development Committee:

a. **Internal Faculty**

1. Dr. S. B. Mahagaonkar (LME, G. P. Mumbai) *[Signature]*
2. Mr. K. B. Salunke (LME, G. P. Mumbai) *[Signature]*
3. Mr. S. P. Kadam (LME, G. P. Mumbai) *[Signature]*

b. **External Faculty**

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(R. A. Patil)
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Head of Department
(Mechanical Engineering)

[Signature]
Principal
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Programme : ME/CE/EC/CO/IF/IS/EE/RT/LT/LGFT									
Course Code: HU16103			Course Title: Generic Skills						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
-	2	-	2	-	-	-	50		50

Rationale:

The inclusion of this course is need of the day. The technicians along with technology must learn the generic skills to be successful technician. The subject is included under the category of humanities. The role of subject is to make the student aware of its importance in the society to inform him/her about technical education system, the institute (library, various dept, curriculums etc.) to help him/her with essential etiquettes & manners.

Course Outcomes: Student should be able to,

CO1	Identify his/her role in various areas of life.
CO2	Know the various areas in technical education system.
CO3	Know importance of curriculum, MIS, IS, etc
CO4	Exhibit his/her behavior in proper manner
CO5	Develop & adopt self study techniques.
CO6	Follow rules & regulation strictly & become a law abiding citizen.

Course Content Details:

Unit No	Contents
1	<p>Social Aspects:</p> <p>1.1 Role of an individual in the family, in the institute, in the society. 1.2 Social responsibilities & rights of an individual. 1.3 Role of a diploma holder in the present day scenario.</p>
2	<p>Technical education in Maharashtra:</p> <p>2.1 Definition of technical education its types, structure (ITI, Diploma & Degree) 2.2 Governance in Technical Education (MSBTE, Autonomous & private – structure, fees, faculty, exam, evaluation etc.)</p>

3	<u>Awareness of curriculum:</u> 3.1 Definition of curriculum . Steps observed in its design. 3.2 Objectives, rationale, core subjects, other subjects and credit system.
4	<u>MIS (Management Information System) :</u> 4.1 Definition, its working, applications & relevance in the present day scenario. 4.2 MIS applied to exam section, student registration, subject registration, exam registration. 4.3 Department related applications: Work related to office, library & others.
5	<u>Library :</u> 5.1 Introduction to library, its functioning, its role in an institute. 5.2 Facilities available in library, search facility for books on internet, concept of digital library. 5.3 Lectures by librarian on Library functioning 5.4 Knowing library ethics.
6	<u>Health Awareness and Social mannerism:</u> 6.1 Introduction to health and hygiene (WHO- definition) Definition, its importance. 6.2 Mannerisms– In the Institute: Overall discipline including pitch and tone of voice ,accent, body language, dressing sense. In the Laboratory : Handling of tools and equipments and its Maintenance. In the Classroom: Peer sensitivity and relationship, body posture and attentivity norms. 6.3 Seminar culture –Etiquettes to be observed while attending seminars, And presenting seminar. 6.4 Party and Ceremonial functions
7	<u>Self Study Techniques :</u> 7.1 Extraction / Collection of information from various sources. 7.2 Importance of soft skills . Listening, reading & writing skills 7.3 Safety precautions in laboratories and. workshop.
8	<u>Self Presentation</u> 8.1 Resume – 8.1.1 Resume writing tips 8.1.2 Types of resumes



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Sr. No.	Unit	Assignment	Approx. Hours
1	1	Define role and responsibility of individual in the family	04
2	1	State in brief the role of diploma holder in industry.	02
3	2	Draw organization chart / hierarchy in Technical Education System of Maharashtra State Understand about Autonomous and State Governed Curriculum Scheme.	03
4	3	Enumerate in detail steps observed in designs of curriculum	03
5	3	To develop good learning habits, abilities and attitudes for enjoy learning.	04
6	4	To know MIS system and its effect on efficiency of the system.	03
7	5	Functioning of Library and Concept of digital library.	03
8	6	Significance of hygiene for maintaining health.	02
9	7	Development of Listening, Reading and Writing Skills.	04
10	7	Safety precautions in various laboratories and workshop.	02
11	8	Resume writing techniques.	02
Total			32

References/ Books:

Sr.No.	Name of Book	Author	Publisher
1	Generic Skills	A.K.Gupta	S.K.Kataria
2	Generic skill Development Manual.		MSBTE, Mumbai
3	Lifelong learning in Global Knowledge Economy, Challenge for Developing countries.		World Bank Publication



Government Polytechnic, Mumbai

Course Curriculum Development Committee:

- a. Internal Faculty: 1) Mr. S. V. Joshi - HOD Of Mechanical Engg. *A.S.J.*
2) Mr . R. A. Kulkarni - Workshop Superintendent
3) Mrs. M. P. Deshpande - Lecturer in Electronics Engg. *M.P.D.*

- b. External Faculty: 1) Mr . S.G.Deshpande
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Programme : Diploma in Information Technology									
Course Code:IT16201			Course Title: Basics of Information Technology						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
1	-	4	5	---	--	50*	---	50	100

*Assessment by External Examiner

Rationale:

The course provides a broad perspective on basics of Information technology, how to use and apply a variety of technologies, and the impact of Information technology on self and society. It is designed to assure a basic level of computer literacy to include word processing, spreadsheet, presentation software, database, LAN, e-mail, and Internet utilization. It also covers application software like MS-Office, which helps for documentation, calculation, presentation purpose etc.

Course Outcomes:

Student should be able to

CO1	Understand the nature and key elements of information technology
CO2	Identify the major hardware components of a computer system
CO3	Identify specific operating systems and their purposes, features and how they relate to application software.
CO4	Demonstrate and understand Computer Networks and its components.
CO5	Prepare Documents, Excel Sheet, Charts and power point presentation
CO6	Create Database in Ms-Access
CO7	Create their own email account for sending and receiving mails

Course Content Details:

Unit No	Topics / Sub-topics
1	Introduction to Information Technology 1.1 Basic concepts of Information Technology 1.2 Applications of Information Technology: In Home, education and Training, Entertainment, Science, Medicine, Engineering etc. 1.3 Evolution of Computer & Generations of Computer. 1.4 Functional block diagram of computer 1.5 Terminologies :- Hardware, Software, Firmware 1.6 Peripherals : Keyboard, monitor, printer, Scanner 1.7 Storage devices: RAM, ROM, Magnetic Disk, Floppy Disk, CD, DVD, Pen drive USB Drive, Portable Disk. 1.8 Introduction to operating system 1.8.1 What is operating system? 1.8.2 Need of OS. Types of operating system. 1.8.3 Functions of operating system, Booting Concepts, Booting procedure.

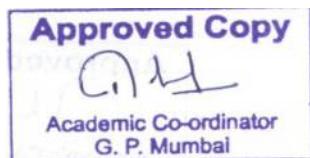


2	Working With DOS and WINDOWS Operating System 2.1 Introduction to Disk Operating System 2.2 Basic DOS commands CLS, DATE, TIME, CD, MD, RD, DIR, COPYCON, COPY, REN, DEL, TYPE, ATTRIB. 2.3 Introduction to windows OS 2.4 Windows Explorer: Copy, move, delete files, creating folder, copy and paste. 2.4 Find Utility: To search file by name. 2.5 Control panel: Purpose, changing date and time, choosing background, getting on line help, and installation of software. 2.6 Accessories: Paint, Calculator, Notepad.
3	Introduction to Computer Network & Internet 3.1 Introduction to Networking 3.2 Components of Networking 3.3 Types of Networks 3.4 Applications of Computer Network 3.5 The Internet 3.6 Internet Services: Email, Messenger, Newsgroups, Search engines, Forums, Online Shopping, E-learning. 3.7 Introduction to World Wide Web.
4	Microsoft Word 4.1 Introduction to Microsoft word: Features of Ms word. 4.2 Working with word document. 4.2.1 Edit menu: go to, replace, find, select all, and cut, copy, paste. 4.2.2 View: document and map, header and footer, all tool bars. 4.2.3 Insert: hyperlink, foot note, end note, comment, picture, chart, date and time, page number, etc... 4.2.4 Format: tab setting, font, borders and shading, bullets and numbering, background, etc 4.2.5 Tools: printing envelopes and labels, mail merge, etc 4.2.6 Table: draw table, insert table, formula, convert, sort, etc 4.3 Printing Document 4.3.1 Page Setup 4.3.2 Page Formatting 4.3.5 Print Preview 4.3.6 Printing Document
5	Microsoft Excel 5.1 Introduction to Microsoft Excel: Features of Microsoft excel 5.2 Working with worksheet: Entering data, editing worksheet. 5.3 Creating formulas and auditing work sheet. 5.3.1Creating formula 5.3.2Creating a simple worksheet 5.3.3Creating auto sum method 5.3.4Automatic calculation method 5.4 Formatting worksheet

	5.4.1 Text, number, currency, date and time 5.4.2 Alignment and Orientation 5.4.3 Font, font size, text color. 5.4.4 Concept and creation of Macro 5.4.5 Run created macro
6	Microsoft Power Point 6.1 Introduction to Microsoft PowerPoint: 6.1.1 Use and applications of Power Point 6.1.2 What is Slide show 6.2 Starting PowerPoint. 6.2.1 Understanding the PowerPoint window, Title bar and Menu bar. 6.2.2 Using Toolbars, Rulers, status bar 6.2.3 Using basic drawing tools, using auto shape tools, inserting text into object. 6.3 Understanding the various views in power point. 6.3.1 Slide view 6.3.2 Outline view 6.3.3 Slide sorter view 6.3.4 Notes page view 6.3.5 Slide show view. 6.4 Slide Transition 6.5 Custom animation. 6.5.1 Slide objects without animation. 6.5.2 Animation orders, Timing. 6.5.3 Start animation On mouse click or Automatically
7	Microsoft Access 7.1 Introduction to Ms-Access 7.1.1 How to create table in Ms-Access. 7.1.2 How to Create a database. 7.2 Basic Operations on Table(Queries): Select, Insert ,Delete, Add, Update. 7.3 Import report from Excel to MS Access and view

Suggested Specifications Table with Hours and Marks (Theory):

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks
			Not Applicable
1	Introduction to Information Technology	02	
2	Working With DOS and WINDOWS Operating System	02	
3	Introduction to Computer Network & Internet	02	
4	Microsoft Word	02	
5	Microsoft Excel	03	
6	Microsoft Power Point	03	
7	Microsoft Access	02	
Total		16	



List of experiments/Assignments:

Sr. No.	Unit	List of Experiments	Approx. Hours
1	1	Understand the components of Computer ,its use and applications in different domains.	04
2	2	Creating Files ,icons and folders in Windows.	02
3	2	Using Windows Accessories such as Notepad, Paint, Calculator, clock and calendar.	06
4	2	Executing basic DOS commands CLS, DATE, TIME , CD, MD, RD, DIR, COPY CON, COPY, REN, DEL, TYPE, ATTRIB.	04
5	3	Study of different networking devices and LAN setup in your lab.	06
6	3	Sharing files and printer in Local Area network	02
7	3	Creating E-mail Id and sending mails.	02
8	3	Demonstrate and use various Internet services like news groups, E-learning, online shopping etc.	04
9	4	Using basic features of MS-word and Preparation of Bio-Data in Ms-word.	04
10	4	Preparation of Application in Ms-word(Any two)	04
11	5	Using basic features of MS-Excel and Preparation of Student Mark-sheet in MS-excel.	04
12	5	Prepare two Excel sheets using formulas and functions.	04
13	6	Using basic features of MS-Power point and Prepare a Power point presentation to display information of any organization.	04
14	6	Prepare a Power point presentation using transition and animation effects.(Any two)	04
15	7	Understand database concepts and basic operations in Ms-Access.	04
16	7	Creating tables and accessing data in MS-access.	06
Total			64

References/ Books:

Sr. No.	Book Title	Author	Publication
1	Foundation of Information Technology	Satish Jain, M.Geeta	BPB Publication
2	DOS Guide	Peter Norton	Techmedia
3	Microsoft Office 2013: Quick steps	Carole Mathews, Marty Mathews	Tata Mc-graw hill
4	Teach Yourself Internet in 24 hours	SAMS	SAMS Publication

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