GOVERNMENT POLYTECHNIC MUMBAI

(Academically Autonomous Institute, Government of Maharashtra)

Teaching and Examination Scheme (P22)

With effect from AY 2022-23

Programme: Diploma in Rubber Technology (Sandwich Pattern) **Term / Semester - I**

Course Code	Course Title	Teaching Hours/Contact Hours				Credits	Examination Scheme (Marks)						
							Theory			PR	OR	TW	Total
		L	P	TU	Total		TH	TS1	TS2				
SC22106	Engineering Chemistry	3	2	--	5	5	60	20	20	25*	--	25	150
SC22107	Basic Mathematics I	4	--	--	4	4	60	20	20	--	--	--	100
RT22103	Basic of Organic Chemistry	3	--	--	3	3	60	20	20	--	--	--	100
ME22204	Engineering Drawing	2	4	--	6	6	--	--	--	50*	--	50	100
EE22202	Basic of Electrical Engineering	2	2	--	4	4	--	--	--	--	50*	50	100
WS22208	Workshop Practice	--	4	--	4	4	--	--	--	25*	--	25	50
UV22101	Universal Human Values	--	2	--	2	2	--	--	--	--	--	--	--
RT22204	Libre office suite (Spoken Tutorial)	--	4#	--	4#	4	--	--	--	--	--	--	--
	Total	**14**	**18**	**--**	**32**	**32**	**180**	**60**	**60**	**100**	**50**	**150**	**600**
Student Centered Activity (SCA)					**03**								
Total Contact Hours					**35**								

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment)

***** Indicates assessment by External Examiner else internal assessment, **#** indicates Self, on- line learning Mode, **@** indicates on line examination

Note: Duration of Examination--TS1&TS2 -1hour, TH- 2:30 hours, PR/OR – 3 hours per batch, SCA- Library - 1 hour, Sports- 2 hours, Creative Activity-2 hours

Self, on- line learning Mode through MOOCS /Spoken Tutorials / NPTEL / SWAYAM / FOSSEE etc.

Coordinator,
Curriculum Development,
Department of Rubber Technology

In-Charge
Curriculum Development Cell

Head of Departments
Department of Rubber Technology

Principal

Programme: Diploma in Rubber Technology (Sandwich Pattern)										
Course Code: SC22107				Course Title: **BASIC MATHEMATICS**						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
TH	PR	TU	Total	TH (2 Hrs 30 Min.)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
4	--	--	4	60	20	20	--	--	--	100

Abbreviations: TH- Theory; PR-Practical; TU-Tutorial; TS1 and TS2- Term Tests; OR-Oral Exam; TW: Term Work (progressive assessment), * Indicates assessment by External Examiner else internal assessment
Note: For Minimum passing marks under various heads, refer, examination rule AR26.

Rationale:

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

Course Outcomes: Student should be able to

CO1	Solve the problems based on measurement of regular closed figures and regular solids.
CO2	Utilize basic concepts of trigonometry to solve elementary engineering problems.
CO3	Solve basic engineering problems under given conditions of straight lines
CO4	Use basic concepts of statistics to solve engineering related problems.

Course Content Details:

Unit No	Topics / Sub-topics
1	**1.Mensuration** 1.1 Area of regular closed figures, Area of triangle, square, parallelogram, rhombus, trapezium and circle. 1.2 Volume of cuboids, cone,cylinders and spheres**.** **Course Outcome: CO1 Teaching Hours : 12 hrs Marks:15 (R-6 , U- 5 , A-4)**
2	**2.Trigonometry:-** 2.1 Trigonometric ratios of Compound, allied, multiple and sub-multiple angles (without proofs) 2.2 Factorization and de-factorizationformulae(without proofs) 2.3 Inverse trigonometric ratios and related problem. 2.4 Principle values and relation between trigonometric and inverse trigonometric ratio. **Course Outcome: CO2 Teaching Hours : 12 hrs Marks:15 (R-6 , U- 5 , A-4)**

3	**3. Straight line:** 3.1 Angle between two lines & Condition of parallel and perpendicular lines 3.2 Various forms of straight lines:-Slope point form, two point form,Two points intercept form , general form 3.3 Perpendicular distance from apoint on the line. 3.4 Perpendicular distance between two parallel lines **Course Outcome: CO3 Teaching Hours :12 hrs Marks: :15 (R-6 , U- 5 , A-4)**
4	**4. Statistics:-** 4.1 Range, coefficient of range of discrete and grouped data 4.2 Mean deviation and standard deviation from mean of groupedand ungrouped data weighted means 4.3 Variance and coefficient ofVariance 4.4 Comparison of two sets of observations **Course Outcome: CO4 Teaching Hours :12 hrs Marks: :15 (R-6 , U- 5 , A-4)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Mensuration**	06	05	04	15
2	**Trigonometry**	06	05	04	15
3	**Straight line**	06	05	04	15
4	**Statistics**	06	05	04	15
	Total	**24**	**20**	**16**	**60**

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Mathematics for Polytechnic Students	S.P.Deshpande, Pune Vidyavardhini Graha Prakashan	-
2	Mathematics for Polytechnic Students (Volume I)	H.K.Dass, S.Chand Prakashan	9788121935241
3	Companions to Basic Maths	G.V.Kumbhojkar, Phadke Prakashan	10-B07951HJDQ 13-B07951HJDQ
4	Applied Mathematics	N.Raghvendra Bhatt late, Tata McGraw Hill Publication Shri R Mohan Singh	9789339219567, 9339219562

E-References:

1. www.math-magic.com
2. www.Scilab.org/-SCI Lab
3. www.mathworks.com/Products/Matlab/-MATLAB
4. www.wolfram.com/mathematica/-Mathematica
5. https://www.khanaacademy.org/math?gclid=CNqHuabCys4CFdoJaAoddHoPig
6. www.dplot.com/-Dplot
7. www.allmathcad.com/-Math CAD
8. www.easycalculation.com
9. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-maths
10. MYCBSEGUIDE

CO Vs PO and CO Vs PSO Mapping (Rubber Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3			2			1	1	1
CO2	3	2					1	1	1
CO3	3			2			1	1	1
CO4	3	2					1	1	

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. G.D.Rao	Sr. Engineer	Evershine PVT.Ltd.Mumbai
2	Mr. Pranshant Anvekar	Sr. Engineer	Innovative Energy Services, Mumbai
3	Mr. A. S. Patil	Lecturer in Mathematics	Government polytechnic Mumbai
4	Mr. V. S. Patil	Lecturer in Mathematics	Government polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Sci. & Humanities

Head of Departments
Department of Sci. & Humanities

I/C, Curriculum Development Cell

Principal

Program: Diploma in Rubber Technology (Sandwich Pattern)										
Course Code: RT22203				Course Title: Basics of Organic Chemistry						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2.30 Hrs.)	TS1 (1 Hr.)	TS2 (1Hr)	PR	OR	TW	Total
3	--	--	3	60	20	20	--	---		100

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26.

Rationale:
The intention of introducing organic chemistry in the first semester of rubber Technology is to make the student familiar with organic chemistry which is a prerequisite of rubber chemistry. Rubber Technology is typically based on organic chemistry and as a part of new curriculum it is our responsibility to teach 10 pass students basic of organic chemistry so that students become familiar with fatty acids, monomer, polymers and few reactions in organic chemistry.

Course Outcomes: Student should be able to

CO1	Understand the chemistry of carbon hydrogen and nitrogen
CO2	Understand the nature of aliphatic and aromatic organic compound
CO3	Study the organic substances like olefins and fatty acid
CO4	Study the various reactors groups in organic chemistry such as amines, etc.
CO5	Study the different polymer and their structure

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction of organic Chemistry:** 1.1 Organic chemistry, 1.2 molecular formula, empirical formula, 1.3 Carbon atom valency in organic chemistry, isomerism, example of isomers, saturated compounds example. Ethane and unsaturated compounds example ethylene 1.4 Classification of organic compound aliphatic or open chain and alicyclic or ring compounds functional group **Course Outcome: CO1 Teaching Hours: 6 hrs Marks: 8 (R- 2, U-4, A-2)**
2	**Aliphatic compounds:** 2.1 Definition, general formula and chemical structure of aliphatic compounds 2.2 Saturated compounds Methane, ethane, propane 2.3 Unsaturated compound, ethylene, propylene, 2.4 General properties, nomenclature 2.5 and isomerism of paraffins 2.6 Homologous series of normal paraffin, Iso paraffin group and their radical example and their structure. **Course Outcome: CO2 Teaching Hours: 6 hrs Marks: 8 (R- 2 , U-4 , A-2)**
3	**Olefins:** 3.1 General physical and chemical properties, 3.2 nomenclature of various olefins used in rubber chemistry, 3.3 chemical Structure and IUPAC nomenclature of methylene, ethylene, propylene, butylene, butadiene, isoprene their uses 3.4 and hydrocarbons with conjugated double bonds **Course Outcome: CO3 Teaching Hours : 6 hrs Marks: 8 (R-2 , U- 4 , A-2)**
4	**Fatty acids:** 4.1 Definition, general formula, Origin, nomenclature, 4.2 General properties, homologous series of fatty acid from formic to stearic acid, 4.3 C1-C6, C7-C12, C13-C22 fatty acids their nomenclature, physical state, use in synthesis of rubber fatty acids 4.4 Esters of fatty acids their applications and uses in rubber Technology 4.5 Saponification **Course Outcome: CO3 Teaching Hours :6 hrs Marks: 8 (R-2, U- 4, A-2)**

5	**Amines:** 5.1 Definition, general formula, Chemical structure 5.2 Primary, secondary and tertiary amine their structure IUPAC nomenclature and their uses 5.3 aliphatic and aromatic amines the structure and nomenclature 5.4 Uses of amines in rubber chemistry as accelerator and antioxidants, 5.5 Characteristic reactivity of aliphatic amine and aromatic amines in rubber synthesis. **Course Outcome: CO4 Teaching Hours : 8 Marks: 10 (R- 2 , U-6, A-2)**
6	**Polymer & Difference between rubber and plastic:** 1.1 Definition, properties, structure of Monomer, polymer, copolymer, terpolymer 1.2 common polymer, their formation, monomer used in synthesis of polymer 1.3 synthesis, application and properties natural polymer, proteins, natural rubber, 1.4 synthesis, application and properties synthetic polymer of polyethylene, polyisoprene, natural rubber, polychloroprene polyvinyl chloride, styrene. 1.5 Definition, Physical and chemical properties, origin, 1.6 classification of polymers natural polymer, semi synthetic polymer and synthetic polymer 1.7 Chemical structure and synthesis of rubber, proteins, cellulose, nitrocellulose, cell acetate, nylon Bakelite, 1.8 Types of polymer thermoplastic and thermosetting polymer 1.9 Additional polymer and condensation polymer **Course Outcome: CO5 Teaching Hours: 13 hrs Marks: 18 (R- 4 , U- 6 , A- 8)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Introduction of organic Chemistry**	02	04	02	08
2	**Aliphatic compounds**	02	04	02	08
3	**Olefins**	02	04	02	08
4	**Fatty acids**	02	04	02	08
5	**Amines**	02	06	02	10
6	**Polymer & Difference between rubber and plastic**	04	06	08	18
	Total	14	28	18	60

References/ Books:

Sr. No.	Title	Author, Edition and Year Of publication	Publisher,
1	Polymer Science	V.R. Gowarikar	New Age International Publishers
2	Polytechnic Chemistry	V.P. Mehta,	Jain Brothers, Delhi
3	Text book of organic Chemistry	I.L. Finar,	ELBS publication
4	Chemistry in Engineering and technology Volume 1 and 2	J.C. Kurlacose,	J. Jairam Tata Mcgraw hill. 9780074517352

E-References:

1. www.chemistry.org
2. www.ferrofchemistry.com
3. www.chemistryclassroom.com
4. http;//hperchemistry.phastr.gsu.edu/hbase/hph.html
5. www.youtube/chemistry
6. 6.www.sciencejoywagon.com
7. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-chemistry

CO Vs PO and CO Vs PSO Mapping (Rubber Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	1	2	2	1	1	1	1
CO2	3	2	1	2	2	2	1	1	1
CO3	3	2	1	1	2	2	1	1	2
CO4	3	2	1	2	2	2	1	2	2
CO5	3	2	1	2	2	2	1	2	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Shri. M.R.Meshram	Industry Expert	Aarti Industries Ltd.
2	Shri. P. Meshram	Lecturer in Chemistry	G.P. Mumbai
3	Mrs J. V. Iyengar	Lecturer in Chemistry	G.P. Mumbai
4	Shri. L. M. Khadake	Lecturer in Chemistry	G.P. Thane

Coordinator, Head of Department
Curriculum Development, Department of Rubber Technology
Department of Rubber Technology

I/C, Curriculum Development Cell Principal

Programme : **Diploma in Rubber Technology**										
Course Code: **EE22 202**				Course Title **Basic Electrical Engineering**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
TH	TU	PR	Total	TH	TS1	TS2	PR	OR	TW	Total
2	**-**	**2**	**4**	**--**	**--**	**--**	**50***	**--**	**50**	**100**

Rationale:- All the equipment related to rubber technology utilizes electrical energy for their operations. Diploma holders from this branch come across various types of electrical circuits and devices.The purpose of this subject is to give fundamental knowledge of electrical engineering so that they will be able to handle electrical equipment's, circuits and analyze simple DC/AC circuits.

Objectives:-

Student should be able to

CO1	Define basic terminologies related to electrical circuit
CO2	State concepts of ac fundamentals and solve simple ac circuits.
CO3	Identify suitable methods of Electric Heating for specific applications.
CO4	Describe working principle of different electric machines and equipment.
CO5	Identify various types of wiring and safety precautions

Unit No	Topics / Sub-topics	Hours
1	**Fundamental concept:** 1.1 Electric Current, Electric potential, Terminal voltage, Potential Difference, E.M.F. 1.2 Resistance, Factor affecting resistance, Effect of temp. on resistance. Temp.Co-efficient of resistance. 1.3 classification of Electric Current, compare AC with DC, Effects of an Electric Current. 1.4 Electrical Power & Electrical Energy 1.5 Faraday's Laws of Electromagnetic Induction 1.6 Direction of induced E.M.F : i)Fleming Right hand Rule ii) Lenz's Law 1.7 Types of Induced E.M.F. Self & mutual Induction and application	**6**
2	**A. C. Fundamentals** 2.1 Generation of A.C. Voltage, Equation of A.C. voltage and current. 2.2 Important terms: instantaneous value, waveform, cycle, Periodic Time, frequency, amplitude, R.M.S value, Average value, Phase, Phase difference	**6**

	2.3 concept of current, voltage, phasor relationship of current and voltage, waveform of pure resistance, pure inductance and pure capacitance. 2.4 Concept of Power, types of power and power factor. 2.5 Generation of three phase voltages, advantage of three phase over single phase 2.6 Voltage, current and power relationship in balance star and delta connected system.	
3	**Measuring Instruments & their Uses:** 3.1 Analog Ammeters, Voltmeters, Watt meters, Energy Meters, Megger and Earth Tester (connection diagram &use). 3.2 Digital Multimeter, Energy Meter, clip-on Ammeters, LCR Meter, PF Meter (uses)	**3**
4	**Induction Motor:** 4.1 Working principle of 3 ph. induction motor 4.2 3ph Squirrel cage induction motor – construction, application 4.3 Slip Ring Induction motor – construction, application 4.4 Starting of 3 ph induction motor (necessity and types only) 4.5 Reversal of Induction Motor 4.6 Single phase Induction motor construction, Schematic representation & application i) Capacitor start / capacitor run motor ii) Split phase motor iii) Shaded pole motor iv) Universal motor	6
5	**Electric Heating** 5.1 Advantages of Electric Heating. 5.2 Modes of Transfer of Heat: 5.3 Classification of Electric Heating Methods 5.4 Resistance Heating: Construction & Operation, Direct Resistance Heating - Salt Bath Furnace, Indirect Resistance Heating: Resistance Ovens, Applications of Resistance Heating. 5.5 Arc Heating - Construction & Operation, Direct Arc Furnace, Indirect Arc Furnace, Applications of Arc Heating.	**5**
6	**Electrical Wiring & Safety** 6.1 Types of Wire and Wiring Systems 6.2 Location & Function of: a) Current Switching Devices: Switches, Switch Fuse unit HRC b) Fuse & Circuit Breakers: MCB, ELCB, MCCB. 6.3 Wiring diagram: a) control of one lamp by means of one switch. b) Stair case wiring. c) Godown wiring. 6.4 Earthing: Definition, necessity of earthing, types of earthing. 6.5 Electrical Safety precautions in indoor and outdoor installations.	**4**

Suggested Specifications Table with Hours (Theory):

Unit No	Topic Title	Teaching Hours
1	**Fundamental concept**	6
2	**A.C.Fundamentals**	6
3	**Measuring Instruments & their Uses**	3
4	**Induction Motor**	6
5	**Electric Heating**	5
6	**Electrical Wiring & Safety**	4
	Total	**30**

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:

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	To determine change in resistance due to change in temperature of a coil	02
2	1	To measure current, voltage, power and energy in single-phase circuit	02
3	1	Observe that EMF is induced in coil when magnetic lines of force move across winding and observe its polarity.	02
4	2	Observe the phase relationship between voltage and current in pure resistive, inductive and capacitive circuit.	04
5	2	To verify line & phase values for star & Delta connected balanced load	04
6	3	a) To measure the circuit parameter by LCR Meter and D.C. voltage, D.C. current, A.C. Voltage and A.C. Current by using Digital Multimeter. b) To measure A.C. current by clip-on Ammeter	04
7	4	To reverse the direction of Induction motor	02
8	4	To study different types of starters.	04
9	6	Identify & know the application of ICDP, ICTP, MCB, ELCB, TPN, Switch Fuse unit, HRC Fuse, MCCB, Contactors, Control & Distribution panel.	04
10	6	Prepare a) control of one lamp by means of one switch. b) Stair case wiring.	04
11	6	Identify different types of wires and accessories switch, fuse, socket outlet used in wiring and write their rating	04
12	6	First Aid Treatment: Precautions if person gets an electric shock. Methods of artificial respiration	04
		Total	**32**

Notes: *If possible an industrial visit should be arranged or videos should be shown of different die and*

operations.

References/ Books:

Sr. No.	Name of Book	Author	Publisher
1	Electrical Technology (Volume I & II)	B. L. Theraja and A. K. Theraja	S. Chand and Co. Ltd.
2	Basic Electrical Engineering	V. K. Mehta and Rohit Mehta	S. Chand and Co. Ltd.
3	Electrical Power System	Dr. S. L. Uppal and Prof. S. Rao	Khanna Publisher, New Delhi.
4	Electrical & Electronic Measurement & instrumentation	A.K.Sawhney	Dhanpat Rai & Co

E-References:

1. https://www.electrical4u.com
2. https://ndl.iitkgp.ac.in/
3. https://nptel.ac.in
4. https://swayam.gov.in
5. www.khanacademy.org

Course Name:- Basics Of Electrical Technology Course Code:- RT 16 202

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
EE22 202.1	3	--	--	2	1	--	3	--	--
EE22 202.2	3	--	--	2	1	--	3	2	--
EE22 202.3	3	1	--	2	1	--	3	2	1
EE22 202.4	3	1	--	2	2	--	3	2	1
EE22 202.5	3	1	--	2	2	--	3	2	--

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Kuldeep Singh Rajput	Deputy Executive Engineer	400KV RSOM, Kharghar, Navi Mumbai
2	Mrs. S.P.Phadnaik	Lecturer in Electrical Engineering	G.P. Ahmadnagar
3	Miss A.V. Patil	Lecturer in Electrical Engineering	G.P.Mumbai
4	Dr. P. N. Padghan	Lecturer in Electrical Engineering	G.P.Mumbai

Coordinator, Head of Departments
Curriculum Development, Department of Electrical Engineering
Department of Electrical Engineering

I/C, Curriculum Development Cell Principal

Programme: Diploma in Rubber Technology (Sandwich Pattern)										
Course Code: SC22106				Course Title: Engineering Chemistry						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2.30 Hrs.)	TS1 (1 Hr.)	TS2 (1Hr)	PR	OR	TW	Total
3	**2**	**--**	**5**	**60**	**20**	**20**	**25***	---	**25**	**150**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term.

Rationale:

The subject is included under category of basic sciences. The role is to understand the fundamental concepts and facts about infrastructure of physical matters and their interrelationship. This will provide input for better understanding of other foundation and technology subjects

Course Outcomes: Student should be able to

CO1	Apply the principles of chemistry under different engineering situations.
CO2	Apply various applications of electrolysis in engineering field.
CO3	Illustrate various methods of softening of hard water
CO4	Adopt methods of prevention of corrosion for environmental and safety concerns.
CO5	Select suitable Lubricants, material for a particular use effectively.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Atomic Structure** 1.1 Introduction of atom, Molecules, Fundamental Particles, Proton, Neutron, Electron. their mass, charge, location. And symbol Bohr's theory, Postulates, Structure of modern atom. 1.2 Atomic number and atomic mass number. Atomic weight Numerical based on atomic number & atomic mass number 1.3 Rules governing filling up of atomic orbitals, Quantum Numbers.' Aufbau's Principle, Hund's rule. Pauli's Exclusive Principle, Electronic configuration of atoms up to atomic number 30 1.4 Valency and chemical bonding. Valency: Definition, & examples. Types of valancy Electrovalency &Co Valency 1.5 Electrovalent bond: Definition, Formation. Formation of NaCl, H2O 1.6 Co-valent bond: Definition & formation Formation of following molecules Single bond: Chlorine,.HCl Double bond : Oxygen,CO2 Triple Bond : Nitrogen,Acetylene. 1.7 Distinction between electrovalent and covalent compound. **Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 10 (R- 2, U-4, A-4)**
2	**ELECTROCHEMISTRY** 2.1.Definition of Electrochemistry, Electrolytes their definition and types,Difference between Atom and Ion,Definition of Ionization and Electrolytic Dissociation,Arhenous Theory,Degree of I onization with factors affecting it. 2.2. Terms related to Electrolysis,Mechanism of Electrolysis,Example of Mechanism of Electrolysis of CuSO4 using Copper Electrodes, 2.3 Faradays First law and its mathematical derivation. Faradays second law & its mathematical derivation, Numerical based on laws of Faraday. 2.4 Application of Electrolysis: Electroplating. **Course Outcome: CO2 Teaching Hours : 8 hrs Marks: 10 (R- 4 , U-4 , A-2)**
3	**WATER** 3.1Sources of water, impurities present in water (suspended, dissolved, colloidal, biological) Types of water: hard & soft Causes of hardness of water Types of Hardness, Unit of hardness, Definition of hardness. 3.2 Bad effects of Hard Water for Domestic purpose Industrial purposes (Textile ,Dyeing, Sugar industry, Bakery) 3.3 Bad effects of hard water in Boiler, Scales and Sludge's, causes of their formation, their disadvantages and their removal. 3.4 Treatment of hard water for industrial purposes by Zeolite &Ion Exchange process 3.5 Treatment of hard water for drinking purpose. (city water supply) Various steps: Screening, Sedimentation, Coagulation, Filtration, Sterilization by boiling. 3.6 pH value: Definition, Formula, pH scale, its salient features, Numerical based on pH, Applications of pH related to Engineering field (corrosion of bridges, Electroplating,). **Course Outcome: CO3 Teaching Hours : 8 hrs Marks: 10 (R-2 , U- 4 , A-4)**

4	**Corrosion** 4.1 Definition of corrosion. Types of corrosion. Atmospheric & Electrochemical Corrosion. 4.2 Mechanism of atmospheric corrosion, types of oxide films formed,(stable, unstable, volatile, with examples) 4.3 Electrochemical corrosion/immersed corrosion Definition. Example. Factors Affecting, Atmospheric & Electrochemical Corrosion. 4.4 Protection of metals from Corrosion:- By protective coatings a)organic coating (Paints and Varnishes), b)inorganic coating (Metallic Coating) 4.5 Different methods of Protective metallic coatings. A) Hot dipping (Galvanizing & Tinning) b) Sherardizing c) Metal Spraying **Course Outcome: CO4 Teaching Hours :8 hrs Marks: 10 (R-2, U- 4 , A-4)**
5	**Lubricants** 5.1 Definition of lubricant, example, functions of lubricant, classification of lubricants (solid, semi-solid and liquid) examples. Conditions under which each lubricant is used. 5.2 Lubrication: definition and types conditions under which each lubricant is used. Types of lubrications, Fluid film, Boundary, Extreme pressure lubrication. Definition, diagram & description of each type. 5.3 Characteristic of good lubricant A) Physical Characteristics Viscosity • Viscosity index • Oiliness • Volatility • Flash point & Fire Point • Cloud and Pour point B) Chemical Characteristics • Acidity /Neutralization no. • Emulsification Saponification value **Course Outcome: CO5 Teaching Hours : 6 Marks: 10 (R- 4 , U-4 , A-2)**
6	**Non-metallic Engineering Material** 6.1 Definition of non-metallic engineering materials 6.2 Plastic : definition , example Polymerization : definition ,Types of Polymerization addition and condensation. Addition polymerization: definition, formation of polyethylene, Condensation-polymerization : definition, Formation Of nylon-66 Types of plastic: thermo softening, thermo setting plastics, Differences between them. Compounding of plastic , Materials needed for it (pigments, fillers, Plasticizers Accelerators etc.,) Properties and engineering applications of plastic. 6.3 Rubber: definition of rubber (elastomer) Natural rubber : Basic unit in natural rubber(isoprene) Occurrence & Processing of Latex .Drawbacks of natural Rubber, Vulcanization Of rubber: D Chemical reactions, ,Types of Rubber Synthetic rubber Importance ,difference , Example Bu rubber, Thiokol, Neoprene Properties of rubber: Elasticity, Tack, Rebound ,Abrasion resistance Applications of rubber

	6.4 Thermal insulating materials Definition, Examples Thermocole, Glass wool. Thermocole: Definition, Preparation, Properties & uses, Glass wool: Definition, Preparation, Properties & uses **Course Outcome: CO5 Teaching Hours : 7 hrs Marks: 10 (R- 2 , U- 6 , A- 2)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Atomic Structure**	02	04	04	10
2	**Electrochemistry**	04	04	02	10
3	**Water**	02	04	04	10
4	**Corrosion**	02	04	04	10
5	**Lubricants**	04	04	02	10
6	**Non-metallic Engineering Materials**	02	06	02	10
	Total	**16**	**26**	**18**	**60**

List of experiments:

Sr. No.	Unit No	CO	List of Experiments	Hours
1	1	CO1	Introduction of chemistry laboratory &safety measures.	2
2	2	CO2	Determination of conductivity of different electrolytes by using conductivity meter.	2
3	3	CO3	Estimation of Chloride content from given water sample	2
4	4	CO4	Estimation of percentage purity of iron from the given alloy sample	2
5	5	CO5	To find out acid value of given lubricant	2
6	1	CO1	Basic radicals : $Cu^{++,}$ Fe^{++}, $Fe^{+++,}$ Cr^{+++}, Mn^{++}, Ni^{++}, $Zn^{++,}$ $Ca^{++,}$ $Ba^{++,}$ Mg^{++} $NH4^{+}$ Acidic Radicals: Cl^{-} ,Br^{-},I^{-},CO_3^{--}, SO_4^{--},NO_3^{-}	6
7	2	CO2	Determination of electrochemical equivalent of copper by using cu -electrodes	2
8	3	CO3	Find out the total hardness from given sample of water by EDTA method	2
9	4	CO4	To Study Corrosion of Aluminum rod in acidic and basic medium and plot a graph of rate of corrosion.	2

10	5	CO5	Determination of coefficient of viscosity of given oil (Glycerin) by using Ostwald's Viscometer	2
11	3	CO3	To find out pH of different solutions using Lovibond comparator, pH paper, pH meter.	2
12	4	CO4	Estimation of moisture content in given coal sample	2
13	6	CO5	Preparation of phenol formaldehyde / Bakelite plastic	2
			Total	**30**

Note: Experiments No. 1 to 10 are compulsory and should map all units and Cos.
Remaining experiments are to be perform on the basis of availability of time.

References/ Books:

Sr. No.	**Title**	**Author, Publisher, Edition and Year Of publication**	**ISBN**
1	Engineering Chemistry	M.M. Uppal, Khanna Publisher, Delhi	978-81-7409-262-5
2	Polytechnic Chemistry	V.P. Mehta, Jain Brothers, Delhi	978-81-8360-093-X
3	Applied Chemistry	P.C. Jain, Monica Jain, Dhanpat Rai and Sons , Delhi	13: 9788187433170
4	Chemistry in Engineering and technology Volume 1 and 2	J.C. Kurlacose, J. Jairam Tata Mcgraw hill.	9780074517352

E-References:

1. www.chemistry.org
2. www.ferrofchemistry.com
3. www.chemistryclassroom.com
4. http;//hperchemistry.phastr.gsu.edu/hbase/hph.html
5. www.youtube/chemistry
6. 6.www.sciencejoywagon.com
7. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-chemistry

CO Vs PO and CO Vs PSO Mapping (RUBBER TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	1	1		1	
CO2	3	2	1	2	2	2	1			
CO3	3	2	1	1	2	2	1		1	
CO4	3	2	1	2	2	2	1		1	
CO5	3	2	1	2	2	2	1			1

CO Vs PO and CO Vs PSO Mapping (RT)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	1	2	2	1	1	1	1
CO2	3	2	1	2	2	2	1	1	1
CO3	3	2	1	1	2	2	1	1	2
CO4	3	2	1	2	2	2	1	2	2
CO5	3	2	1	2	2	2	1	2	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
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3	Dr. Mrs. Smita Petkar Dhopate	Lecturer in Chemistry	Government Polytechnic Nagpur
4	Mrs J. V. Iyengar	Lecturer in Chemistry	Government Polytechnic Mumbai
5	Mrs S.M. Patil	Lecturer in Chemistry	Government Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Sci. & Humanities

Head of Departments
Department of Sci. & Humanities

I/C, Curriculum Development Cell

Principal

Programme : **Diploma in Rubber Technology (Sandwich Pattern)**										
Course Code: RT22104				Course Title: Basic Engineering Drawing						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
TH	PR	TU	Total	TH (2 Hrs 30min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
02	**04**	**-**	**06**	**-**	**-**	**-**	**50***	-	**50**	**100**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26.

Rationale:

Engineering drawing is the common graphical language of engineers, technicians and workers to express engineering ideas and concepts. Correct interpretation of engineering drawings is one of the basic duties of First Line Supervisors. Study of Engineering Drawing induces the concepts of accuracy and exactness of information necessary for the production of engineering component. It also develops judgement about distances and angles.

This basic course aims at building a foundation for the further courses in drawing and other allied subjects. This course is useful in developing imagination, drafting and sketching skills of the students.

Course Outcomes: Student should be able to

CO1	Draw geometric figures and engineering curves using appropriate drawing instruments
CO2	Draw orthographic views of given object by applying principles of orthographic projections
CO3	Draw isometric view from given orthographic views, by applying principles of isometric projections
CO4	Draw the free hand sketches of given engineering objects/elements

Course Content Details:

Unit No	Topics / Sub-topics
1	**Principles of Drawing** 1.1 Drawing instruments and their uses, Standard sizes of drawing sheets (ISO-A series),letters and numbers(single stroke vertical), Conventions of lines and their applications, Drawing Scales (reduced, enlarge and full size), Methods of Dimensioning: Chain, parallel and coordinate dimensioning (Refer SP-46Codelatest Edition) 1.2 Simple Geometrical Constructions, Redrawing figures using above geometrical constructions **Course Outcome- CO1 Teaching Hours – 04 Marks –08**

2	**Engineering Curves and Loci of Points** 2.1Method to draw Ellipse by Arcs of Circle Method and Concentric Circle Method. 2.2 Method to draw Parabola and Hyperbola by Directrix and Focus Method. 2.3 Methods to draw Involutes of circle and pentagon, 2.4 Methods to draw Cycloid, **Course Outcome- CO1 Teaching Hours – 06 Marks –08**
3	**Orthographic projections** 3.1 Introduction to orthographic projections, Symbol of First Angle Projection, Conversion of pictorial view into orthographic views –Top, Front and End View of objects containing plain surfaces, slant surfaces, slots, ribs, cylindrical surfaces. (First Angle Projection Method Only) 3.2.Sectional Orthographic Views and conversion of pictorial view into sectional orthographic views (Objects involving plain surfaces, slant surfaces, slots, ribs, cylindrical surfaces, threads etc.) **Course Outcome- CO2 Teaching Hours – 08 Marks –14**
4	**Isometric projections** 4.1 Isometric scale, Comparison of Natural Scale with Isometric Scale 4.2 Conversion of Orthographic Views into Isometric View/Projection (Objects involving plain surfaces, slant surfaces, slots, ribs, cylindrical surfaces, holes etc) **Course Outcome- CO3 Teaching Hours – 08 Marks –12**
5	**Free hand sketches** 5.1 Drawing of proportional freehand sketches of – Different types of thread forms, nuts, bolts, screws, washers and foundation bolts (Ragand Lewis type) (Teacher shall also explain use/ function of all the above elements) **Course Outcome- CO4 Teaching Hours – 04 Marks –08**

List of Sheets: All sheets compulsory

Sr. No.	Unit No	List of Experiments	CO	Hours
1	1	**Basics of Engineering Graphics** Drawing sheet containing types of lines, Lettering, Redrawing given figure, dimensioning and geometrical constructions	CO1	08
2	2	**Engineering curves and loci points** (minimum 4 problems)	CO1	08
3	3	**Orthographic projections** Using first angle method of projections (minimum 2 problems)	CO2	08
4	4	**Sectional Orthographic projections** Using first angle method of projection (minimum 2 problems)	CO2	10
5	4	**Isometric Projection-I** Using isometric scale (minimum 2 objects)	CO3	10
6	5	**Isometric Projection-II** To draw isometric views of objects including slots, holes and sloping faces (minimum 2 objects)	CO3	08

7	5	**Free hand sketches** To draw free hand sketches of different types of threads forms, nuts, bolts and screws, foundation bolts.	CO4	08
		Total		**60**

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Engineering drawing	N.D.Bhatt, Charotar Publishing House, 53rd Edition, 2016	978-93-80358-178
2	Engineering Graphics	P.J. Shah, S. Chand, revised edition,2014	978-81-21929-679
3	Engineering Drawing	Amar Pathak, Wiley Publication,1st Ed. 2010	978-93-50040-164
4	Engineering drawing	D.Jolhe, Tata McGraw Hill Education,2017	978-00-70648-371
5	Textbook on engineering drawing	K.L.Narayan,P.Kannaiah, Scitech publications, 24th reprint, 2010,	978-81-83714-228
6	Engineering drawing practice For school and colleges	IS Code SP-46	-

E-References:

1. https://ocw.mit.edu.courses.drawing
2. https://nptel.in.courses.drawin
3. https://home.iiik.edp.ac.in

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	1	1	1	1	1	2	1	1
CO2	2	2	2	1	1	1	2	1	1
CO3	3	2	2	2	1	2	2	1	1
CO4	3	2	2	2	2	2	2	1	1

Industry Consultation Committee:

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2	Mr. A.S. Sangwikar	Sel. Grade Lecturer in Mechanical Engineering	Govt. Polytechnic, Thane
3	Mr. U.A. Agnihotri	Sel. Grade Lecturer in Mechanical Engineering	Govt. Polytechnic, Mumbai
4	Mr. E.C. Dhembre	Lecturer in Mechanical Engineering	Govt. Polytechnic, Mumbai

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I/C, Curriculum Development Cell

Principal

Programme : **Diploma in Rubber Technology (Sandwich Pattern)**										
Course Code: RT22204				Course Title: Libre Office Suite (Write, Calc and Impress)						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
TH	PR	TU	Total	TH (2 Hrs)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
--	**4#**	**--**	**4**	**--**	**--**	**--**	**--**	**--**	**--**	**--**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at midterm and second skill test at the end of the term

Course Content Details:

Unit No	Topics / Sub-topics
1	**Libre office suite writer** **1. Promo of LibreOffice Suite** Outline: - LibreOffice promo - Features of LibreOffice - Uses of LibreOffice - LibreOfficeformats - LibreOffice tutorials in Spoken Tutorial - Applications of LibreOffice, Libre Office tutorials in various languages **2. Introduction to LibreOffice Writer** Outline: Introduction to LibreOffice Writer Basic Features Toolbars How to open, close andsave a document Save in MS Office, PDF and other formats Open MS Office Documents Change Bold icon Change Font Size , Change Font Name. **3. Typing text and basic formatting** Outline: Typing text and basic formatting Aligning Text in writer Bullet points and Numbering Cut Copy and Paste option Bold/Underline/Italics Font name/Font size/Fontcolor in Writer, Other important and popularly used formatting features. **4. Inserting pictures and objects** Outline: Inserting pictures and other objects in a document Inserting pictures InsertingTables Hyperlinks (within, across documents, from web) Creating tables AutoFormat Optimal Column Width option **5. Viewing and printing a text document** Outline: Viewing and printing a text document Viewing Documents Printing Documents Print Layout, Web Layout, Zoom factor , View layout. Page Preview bar Printer functionsQuick Printing Print in ,reverse page order **6. Using search replace auto correct** Outline: Using search replace auto correct Find, Search, replace for select text Auto-correctfeature Spell check Language Settings **7. Typing in local languages** Outline: Typing in local languages Using SCIM to type in Indian languages Bilingualtyping **8. Using track changes**

	Outline: Using track changes as a peer review / collaborative constructivist tool, acceptingand rejecting changes How to use record changes to peer review documents, accept/reject these **9. Headers Footers and notes** Outline: Headers, Footers and notes, Page format – header footer, how these can change within the same document (first page without header footers), Useful footer information (page number, title), Insert Footnotes and endnotes Insert/Remove Header and Footer **10. Creating newsletter** Outline: Creating newsletter Advanced use as a desktop tool to create a note with multiplecolumns use features like word count, Spell check, create newsletters in LibreOffice Writerand few operations that can be performed on them.
2	**Libre office suite Calc** 1. **Introduction to LibreOffice Calc:** Outline: - Introduction to LibreOffice Calc. Various toolbars in Calc window Opening new spreadsheet in Calc Opening an existing spreadsheet in Calc Save and close a spreadsheet Workbook. 2. **Working with Cells in Calc:** Outline: Working with cells in Calc Enter numbers in cells Enter text in cells Enter date and time in cells Use the Format Cells dialog-box Navigate between cells Select items. **3. Working with Sheets in Calc:** Outline: Insert a single row or a single column, Inserting multiple rows, Inserting multiple columns, Inserting sheets, Deleting sheets, Renaming Sheets, Moving Sheets Deleting single and multiple rows, Deleting single and multiple columns. 4. **Formatting Data in Calc:** Outline: Applying border styles from available list, Formatting borders of cells as per our preference, Adding background colors in cells, Formatting multiple lines within a single cell, Automatic Wrapping, Merging cells, Shrinking text to fit the cell 5. **Basic Data manipulation in Calc** Outline: Basic data manipulation in Calc, Introduction to basics of using formula in Calc, Basic arithmetic calculations - addition, subtraction, multiplication, division, Sorting by columns, Basics of filtering data, Formula for SUM, Formula for AVG, Sorting in Descending order, Sorting in Ascending order, Sort data using the Sort keys feature, Working of Auto Filter feature. 6. **Working with Data in Calc** Outline: Working with data in Calc, Speed up using Fill tools, Sharing content between sheets, Removing data, Replacing data, Changing part of a data, Different Fill tool, Different Fill Series. 7. **Viewing and Printing a Spreadsheet in Calc** Outline: Viewing in Normal mode, Viewing in Page Break mode, Viewing in Full Screen mode, Setting up Page Style options, Setting up the page order, Setting up Page Margin, Orientation and Layout, How to use Zoom slider, Different Zoom & View layout options, How to adjust the content to fit page, How to use Print Preview option, How to print the sheet as a PDF file, How to print selected pages, How to setup no of print copies, How to print selected cells, Other printing options

	8. Using Charts and Graphics in Calc Outline: Create, edit and format Charts, Resize and move Charts, Different Chart formats, 3D Look in Chart, Add a title to the Chart, Data Series in Chart, Data Ranges in Chart, Format Chart Wall, Format Chart Area, Chart Area Legend ON/OFF , Changing the Position and Size of a Chart **9. Inserting Images and inbuilt Graphics in Calc** Outline: Insert an Image file directly, Insert an Image file from a graphics program, Insert an Image with the help of a clipboard, Insert an Image from the gallery, Insert an Image using Drag and Drop option, Picture toolbar in Calc, Graphics mode in Calc, Hyperlink an image, Crop an image, Add filter option to an image **10. Advanced Formatting and Protection in Calc** Outline: Password protect from a spreadsheet, Remove Password protect from a spreadsheet, Password protect from a single sheet, Remove Password protect from a single sheet, Define Ranges for a database, Validate cells, Database range in Calc, Use Clone Formatting in Calc, Use SUBTOTAL in Calc, Use GRANDSUM in Calc **11. Formulae and Functions in Calc** Outline: Usage of Conditional Operator in Calc, Usage of If.. Or statement in Calc, Rounding off numbers, Usage of Function Wizard in Calc, Usage of following functions in Calc: SUM(), PRODUCT(), MIN(), MAX(), MEDIAN(), COUNT(), COUNTIF(). **12. Linking Calc Data** Outline: Cell Referencing in Calc, Inserting a Hyperlink in a spreadsheet, Navigate between sheets using Hyperlink, Navigate between documents using Hyperlink, Hyperlinking to a website, Usage of Hyperlink dialog box, Setting up a target document, Setting up a target sheet, Remove the Hyperlink.
4	**LibreOffice Impress** **1. Introduction to LibreOffice Impress** Outline: Basic Features, Various Toolbars, Given Title bar, menu bar, standard toolbar, formatting bar and status bar, Adding content to the slide in presentation, Saving the presentation, Closing the presentation, Reopen the presentation which we saved, Save as MS PowerPoint and other formats 2. **Creating a presentation and basic formatting** Outline: - Workspace, -Normal, -Outline, -Notes, -Slide sorter, View Tab Bar Sidebar, Inserting Slide, Copying Slide, Font size and Color, Bold, About Fonts, Formatting Fonts, Text in Bold, Italics and Underlined, Deleting Slides 3. **Viewing a presentation in Impress** Outline: Viewing Presentation document Views options – Normal, Outline, Master Layout Uses of different view options How to change Slide design Sections under Master Slides Write note. 4. **Inserting Pictures and Tables in Impress** Outline: Inserting Pictures and Tables, Resizing Pictures and Tables, Formatting Pictures and Tables, Creating a Table within a slide, Entering data in the table, Table styles, Insert picture from insert toolbar, Use the hyperlinks, Hyperlinking within the presentation, Hyperlinking outside the presentation, Hyperlinking webpage. 5. **Printing a Presentation**

	Outline: Print the slides, handouts, notes and outline, Print Preview, Use of Previous and Next Page icons, Choose the colour for printing document, Print Slide name Date, Time, Hidden pages, Pages per sheet option, Draw a border in slide, Select colour in slide, Visit file and print, Use the page layout, Printing slides and Handouts Different Options. 6. **Slide Master Slide Design in Impress** Outline: Creating Background for Slides, Custom Background for Slides, Use of Master Slide, Formatting of Master Slides, Use the Bitmap as a Background for Slide, Use the Font Effects, Use the Basic Shapes in Impress, Adding Logo to the Slides, Applying Different Slide Templates (Layouts) 7. **Custom Animation in Impress** Outline: Adding Animation to Textbox, How to set the Animation effects, List of Animation effect in Impress, Automatic Preview of Animation, Reorder the animation, How to change properties of Animation, Use of Effect Option, Delay in Animation, Use the Text Animation Tab, How to play multiple Animations 8. **SlideShow Creation in Impress** Outline: Shortcut keys for Slideshow, Use of Mouse Pointer as Pen, Slideshow from Current Slide, Slide Transition, Use of Slide Sorter tab, Slide Transition Effects, Modify Transition Effects, Adding Sound to Transition Effects, Automatic Slide Shows with fixed time interval, Automatic Slide Shows with different time intervals

Coordinator,
Curriculum Development,
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Head of Department
Department of Rubber Technology

I/C, Curriculum Development Cell

Principal

Programme : **Diploma in ME/CE/EE/CO/IF/IS/EC/RT/LT/LG (Sandwich Pattern), AIML**										
Course Code: UV19R101				Course Title: Universal Human Values-I						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total (Credit)	TH (2 Hrs 30min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
--	--	--	**02**	-	-	-	--	-	--	--

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26.Two practical skill tests are to be conducted. First skill test at mid-term and second skill test at the end of the term.

Rationale:

Human beings have materially developed to a great extent through technological development. Still the scarcity of happiness and satisfaction result in personal and social conflicts. The value system develops the frame of reference of the individual to benchmark his/ her behavioral pattern respecting the righteousness during life. The appreciation and inculcation of a value system can develop a person as a creative contributor for society, nation and by-large the world.

By inculcating universal values, not only can a person resolve the personal, social and professional situations positively but also can lead toward an enriched life. Once these values are inculcated in a student's personality, it will result in the sustainable development of a student.

This course is designed to make the student think that by observing the universally accepted human values, it is easy to become a good human being, a good citizen and make their own life goal-oriented, cladded with happiness and satisfaction. The core universal values to be inculcated: personal values, social values and professional values. The aspirations and concerns to be explored at the level of individual, at the level of family, at the level of society and at the level of nature.

Course Outcomes: On completion of this course, student should be able to

CO1	Appreciate universal human values to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
CO2	Develop a holistic approach to environment, family and society.
CO3	Develop more confidence in self .
CO4	Derive joy of giving .
CO5	Improve understanding and perform acts of kindness.

Course Content Details:

Sr. No.	Activity	Related Value/s	Methodology of Implementation	Student's Role	Mentor's role	Resources Required
01	Prepare a self-introduction sheet i)Name, School passed from,achievements upto 10th standard • What are your goals in your life • What are your expectations from institute ,Family ,Society • Information of family members • Most happy moments and difficult moments in your life, Special trips, Hobbies , Sports, Music , etc	Honesty, Self-exploration	Preparing a note and presenting in front of peers	Thoughtfully answer the questions in an honest manner.	Provide information about the institute and motivate students to honestly express themselves.	Official website of the institute
02	List behavioral characteristics and analyse self, friend, family members. • Do you like these characters yes/no – why	Self-exploration, Honesty	Preparing a presentation	Honestly and sincerely analyse self and others	Create a stress-free environment and see that there will be no conflict of expression.	Provide a list of character traits by referring to various resources like internet, books, etc. For e.g. https://www.teachervision.com/writing/character-traits-list-examples

03	Identify your needs and desires	Honesty Self-exploration	Making a list of needs and desires	Reflect and identify needs and desires.	Stay wary of controversial subjects	list of historical personalities who set the example.
04	Singing a patriotic song in group • Make group , select song, explain meaning, use music/karaoke and demonstrate to class	Patriotism	Forming group of interested students Students will rehearse the activity and will perform in groups	Diligently practice and cooperate with others.	Manage the logistics of creating groups and assigning roles.	Music system, list of patriotic songs.
05	Essay writing • My dreams as an Engineer • India a Super power in my views • Society & I • Indian culture and values • My role models in life	Self – exploration Patriotism Accountability	Selecting a topic from the list and writing an essay on it	Thoughtfully write the essay on a selected topic.	Display the best essays on the notice board.	notice board, panel of judges
06	Play Music instruments/ Singing/ Drawing/Any stage performance/ photography/any creative art	Derive the joy ,	**Present to peers (Two days competition)**	Pursue your creative interest	Identify and categorize students. Create groups accordingly	logistical support
07	Visit a nature park, identify the flora & fauna, ecological factors & their role in our life. (e.g Maharashtra nature park society , Dharavi , Mumbai)	Environment Conservation	Students to arrange visit under supervision of mentor	Study various flora & fauna in a disciplined manner.	Assure safety of students and manage activities.	**https://maharashtranaturepark.org/**

08	Tree plantation and caring for it.	Environment Conservation	Students to arrange activity under supervision of mentor	Plant the appropriate saplings according to instructions.	Assure safety of students and provide adequate instructions.	saplings, soil, shovels, fertilizer
09	List the distracters which are responsible to deviate you from integrity and find out the solution	Integrity, Righteousness	Observation and identification of common distracters.	Identify distracters like TV shows, movies and bad habits	Provide historical case studies of previous students.	Case studies
10	Prepare the chart DOs and DONTs for different situations like local trains, travel, public place, classroom, examination, etc.	Conscientiousness, honesty, social gratitude	Preparing the chart	Identify DOs and DONTs and prepare various charts	Create groups and assign topics.	Official websites of respective administrations like railways, Municipal corporation, etc.,
11	Beach cleaning, institute cleaning	Environment conservation, Health consciousness	Organizing a visit to clean the venue.	Clean the venue as per instructions.	Assure safety and aid in organization.	https://www.uniteddwaymumbai.org/cleanshores

12	a)To prepare a first aid box to be kept at home b)Preparation of a report on industrial accident	Care for others, accountability	Collection of information from various available sources and use it for intended purpose.	a)Prepare a list of contents for a first aid box to be kept at home b) Prepare a first aid box as per prepared list c) Prepare a list of various accidental hazards at home. d) Prepare a display of safety precautions for use of gas stove. e) Collect information of one industrial accident , its effects, probable causes from various resources and prepare a report.	To explain and monitor the task	Medicine, Box, paper

Methodology:

1. The course is Non Examination, Credit Course.
2. The course will be introduced during the student induction programme (orientation programme). Most of the activities are to be completed during induction programme and to be continued throughout the term during SCA hours under the guidance of mentor.
3. The mentor will be assigned to the student for a group of 20 students each.
4. In consultation and under supervision of a mentor, the student/ Group of students has to complete the activity.
5. The mentor will work as a facilitator/ advisor.
6. The strategies to learn the course is "Self- Exploratory" and "Experiential Learning"
7. The onus of responsibility for completing the activities is with students.
8. The student has to complete at least **seven** no. of activities throughout the term to earn the credits.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	978-8-174-46 781-2
2	Human Values	A.N. Tripathy, New Age International Publishers, 2003	978-8-122-42 589-5
3	Teacher's Manual - A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	-
4	Science and Humanism, Towards a Unified World View	PL Dhar, RR Gaur, Commonwealth Publications, 1992	978-8-171-69 222-4
5	Education for values in schools- a framework	NCERT	
6	Value oriented education	E N Gawande	

E-References:

1) https://youtu.be/kOJu1vj_BVk **(The 10 MostImportant Human Values)**
2) **Dr. Prakash Baba Amte- Movie**
3) https://youtu.be/QeogOlzG2ls **(Value of Education -short film)**

E-References for mentors:

1) https://www.edutopia.org/

2) https://sdgs.un.org/goals

Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Dr. L.A. Patil	Principal (Retired)	Pratap College, Amalner
2	Dr. Nitin Deshpande	Lead Consulatnt	Dnyanpeeth Academy, Pune
3	Dr. Chandrakant Shahasane	Founder Trustee	Karnala Charitable Trust, Pune
4	Mr. Sunil V. Joshi	Ex- Sr. Lecturer, Mechanical Engineering,	Government Polytechnic, Mumbai
5	Mrs. Swati D. Deshpande	Principal	Government Polytechnic, Mumbai
6	Mr. U.A. Agnihotri	Lecturer, Mechanical Engineering	Government Polytechnic, Mumbai
7	Mr. K. V. Patil	Lecturer, Mechanical Engineering	Government Polytechnic, Mumbai

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Principal
Government Polytechnic, Mumbai

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CDC Co-ordinator
G. P. Mumbai

Programme : Rubber Technology (Sandwich Pattern)										
Course Code: WS22208				Course Title: Workshop Practice						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 minutes)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
0	**4**	**0**	**4**	**0**	**0**	**0**	**25***	**0**	**25**	**50**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26.

Rationale:

Manufacturing is the backbone of industries, hence the technicians must have basic knowledge manufacturing processes, tools and equipment's, and safety practices followed. This course will introduce the students about basic workshop practices followed in Fitting shop, Welding shop, Turning shop etc. Workshop practice will inculcate technical skills in to the students along with attitude to work in in a team to complete the task. This foundation course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing. The students are advised to undergo each skill experience with remembrance, understanding and application with special emphasis on attitude of enquiry to know why and how for the various instructions and practices imparted to them in each hop. Furthermore, the demonstration on CNC Machine will give feel of advancement in industries.

Course Outcomes: At the end of the course student will be able to:

CO1	Draw lay-out of shop, know general safety rules, & use of first aid kit
CO2	Draw job drawing, and sketches of tools & equipment.
CO3	Select appropriate tools, machinery, equipment and consumables for given job.
CO4	Use & Operate hand tools, equipment and machinery in different shops.
CO5	Prepare the simple jobs as per specification & job drawing.
CO6	Maintain workshop related tools, equipment and machineries.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Workshop** 1.1 Introduction to workshop 1.2 Workshop layout, Importance of various sections/shop of workshop, Types of jobs done in each shop. 1.3 Causes of accidents, general safety rules and work procedure in workshop, Safety signs and symbols, First Aid. 1.4 Fire, Causes of Fire, Basic ways of extinguishing the fire. Classification of fire, Firefighting equipment, fire Extinguishers and their types. 1.5 Issue and return system of tools, equipment and consumables. **Course Outcome: CO1 Teaching Hours : NA Marks: NA (R-NA, U- NA , A-NA)**
2	**Fitting Section** 2.1 Sketching, understanding the specifications, materials, various applications and methods used in fitting, Marking, measuring, work holding, cutting & finishing tools. 2.2 Demonstration of various fitting operations such as chipping, filing, scraping, grinding, Sawing, marking, Drilling ,tapping, etc. 2.3 Preparation of male, female joint. 2.4 Safety precautions & Personal Protective Equipment's **Course Outcome:CO1, CO2, CO3, CO4, CO5, CO6 Teaching Hours : NA Marks: NA (R-N , U- NA, A-NA)**
3	**Welding Section :-** 3.1 Types, sketching, understanding the specifications, materials and applications of arc & Gas welding Accessories and consumables. 3.2 Demonstration of metal joining operations like arc welding, soldering and brazing. Show effect of Current and speed. Also demonstrate various welding positions. 3.3 Demonstrate gas cutting operation. 3.4 Preparation of metal joints. 3.5 Safety precautions & Personal Protective Equipment's. **Course Outcome: CO1, CO2, CO3, CO4, CO5, CO6 Teaching Hours : NA Marks: NA (R-N , U- NA, A-NA)**
4	**Turning Section:** 4.1 Working principle of lathe along with sketch, 4.2 Lathe Parts and their functions, 4.3 Simple operations performed on lathe such as plain turning, facing, step turning, taper turning, chamfering and threading. 4.4 Safety practices followed while working on lathe machine. 4.5 Preparation of simple job on lathe machine having operations like turning and facing. **Course Outcome: CO1, CO2, CO3, CO4, CO5, CO6 Teaching Hours : NA Marks: NA (R-N , U- NA, A-NA)**

5	**CNC Machines:** 5.1 Definition of CNC, Advantages of CNC, Applications of CNC 5.2 CNC Milling, parts and their functions, operations performed 5.3 CNC turning, parts and their functions, operations performed 5.4. Safety practices followed while working on CNC machines 5.5 Preparation of simple job on CNC milling or CNC turning centre (Demonstrative job- one job per batch) **Course Outcome: CO1, CO2, CO3, CO4, CO5, CO6 Teaching Hours : NA Marks: NA (R-N , U- NA, A-NA)**

Level of questions: R: Remember, U: Understand, A: Apply

List of experiments:

Sr. No.	Unit No	COs	List of Experiments	Hours
1	1	CO1	Introduction to causes of accidents, general safety rules and work procedure in workshop, Safety signs and symbols, First Aid. Perform mock drill session in group of students for Extinguishing fire.	08
2	2	CO1, CO2, CO3, CO4, CO5, CO6	Prepare one Male- Female type fitting job as per given drawing. (group of 2 students)	14
3	3	CO1, CO2, CO3, CO4, CO5, CO6	Prepare lap joint/butt joint using either arc / gas welding as per given drawing.(group of 2 students)	14
4	4	CO1, CO2, CO3, CO4, CO5, CO6	Prepare one simple turning job involving operations like simple turning, and facing. (group of 2 students)	14
5	5	CO1, CO2, CO3, CO4, CO5, CO6	Preparation of simple job on CNC milling or CNC turning centre (Demonstrative job- one job per batch)	10
			Total	**60**

SUGGESTED STUDENT ACTIVITIES:-List of proposed student activities like

a. Follow safety practices.
b. Practice good housekeeping.
c. Function as a team member.
d. Maintain tools and equipment.
e. Follow ethics & maintain discipline.
f. Prepare work diary/manual based on practical performed in workshop. Work diary/manual consist of job drawing, operations to be performed, required raw materials, tools, equipment, date of performance with signature of the teacher.
g. Prepare journals consisting of free hand sketches of tools and equipment in each shop, detail specifications and Precautions to be observed while using tools and equipment.

h. Prepare / Download specifications of following; i) various tools and equipment in various shop, ii) Precision Equipment in workshop, iii) Various machineries in workshop.
i. Undertake a market survey of local dealers for procurement of workshop tools, equipment machineries and raw material.
j. Visit any fabrication / wood working / sheet metal / forging workshop and prepare a report.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Workshop Technology - l	Hazra and Chaudhary Media promoters & Publisher private limited.	ISBN: 9788185099149
2	Workshop Technology - l	W.A.J. Chapmam Taylor & Francis.	SBN: 9780713132724
3	Workshop Practice Manual for Engineering Diploma & ITI Students	Hegde.R .K Sapna Book House, 2012,	ISBN: 13 : 9798128005830
4	Workshop familiarization.	E. Wilkinson Pitman engineering craft series.	ISBN: 0273316729
5	Mechanical workshop practice.	K.C.John PHI.	ISBN 10: 8120337212
6	Workshop practice manual	K. Venkata Reddy B. S. Publications.	ISBN-10: 8178001497
7	A Course in Workshop Technology	Raghuwanshi, B.S Dhanpat Rai sons, New Delhi	ISBN: 10 - 0000017108

E-References:

1. https://www.uclahealth.org/safety/classes-of-fires--fire-extinguishers
2. https://news.briotix.com/what-are-the-main-causes-of-industrial-accidents
3. http://www.uptti.ac.in/classroom-content/data/workshop%20Fitting%20shop.pdf
4. http://www.weldingtechnology.org e.http://www.newagepublishers.com
5. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=98862
6. https://hwacheonasia.com/cnc-lathes/
7. https://www.thomasnet.com/articles/custom-manufacturing-fabricating/understanding-cnc-milling/

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	1	1	1	1	1	3
CO2	3	2	2	1	1	1	1	1	3
CO3	3	2	2	1	1	1	1	1	3
CO4	3	2	2	1	1	1	1	1	3
CO5	3	2	1	1	1	1	1	1	3
CO6	3	2	1	1	1	1	1	1	3

Industry Consultation Committee:

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1	Shri. Ravindra Barde	Rubber Technologist	Siddhi Elasto Pvt. Ltd.
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