Government Polytechnic, Mumbai

Department of Electrical Engineering

P-16 Curriculum
[Out Come Based (OBE)]

Semester-II
(Course Contents)

Government Polytechnic Mumbai

(Academically Autonomous Institute of Maharashtra Government)
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Programme: Electrical Engineering **Second Semester** **With effect from June 2016**

Course Code	Course Title	Teaching Hours				Credits	Examination Scheme					
							Theory		PR	OR	TW	Total
		L	P	TU	Total (Hrs)		TH	TS				
HU16 102	Communication Skills	---	---	2	2	2				50*		50
SC16 108	Mathematics II	3	----	1	4	4	70	30				100
SC16 106	Chemistry of Engineering Material	3	2	---	5	5	70	30			50	150
EE16 202	Basic Electrical Engineering	4	4	----	8	8	70	30	50*		50	200
EC16 202	Elements of Electronics Engineering	4	2	---	6	6	70	30	50			150
ME16 201	Engineering Drawing- I	2	4	----	6	6			50*		50	100
NC16 201	Spoken Tutorial course		2		2							
NC16 202	Digital India		3		3							
	TOTAL	16	17	3	**36**	**31**	280	120	150	50	150	**750**

Abbreviations: 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 (Electrical Engineering)** **Principal Government Polytechnic Mumbai**

Programme : **CE/ME/EC/CO/IF/IS/EE/LG/LT/RT**									
Course Code: **HU16102**				Course Title: **Communication Skills**					
Compulsory / Optional: **Compulsory**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
	2	**-**	**2**	**-**	**-**	**-**	**50***	**-**	**50**

*External Examiner

Rationale:

The medium of instruction in the technological field is English, so it is necessary for the students of Engineering and Technology to learn and express through English language. These students are the future technicians, must be able to face the interview, handle the questions and present them in a proper way, acquire confidence to participate in the group discussion, introduced with the modern communication technology and be able to use these Medias for effective communication.

Course Outcomes:

Student should be able to

CO1	Develop the ability of listening and conversation skills.
CO2	Learn the social etiquettes and manners.
CO3	Acquire the practical knowledge of interview.
CO4	Participate in group discussion.
CO5	Identify the need of public speech and new techniques of communication.
CO6	Enable the students to be a good team leader

Course Content Details:

Unit No	Topics / Sub-topics
1	**Listening Skills :** Importance of good listening, Types of listening, Effective listening, How to overcome the obstacles in good listening
2	**Social etiquettes :** Business ethics, Telephone / Mobile etiquettes, E-mail etiquettes, Table manners & respect, Small talk and punctuality
3	**Conversation skills :** How to begin the conversation, Proper use of body language, Tone, voice and pauses, Use of proper grammar and words, How to end the conversation
4	**Interview Skills :** Introduction, Types of Interview, Preparing for an interview, Mock interview

5	**Group Discussion :** Need and importance of group discussion, Emotional stability, Communication with knowledge, Logical conclusion, Role of moderator in the group discussion
6	**Public Speech :** Welcome Speech, Farewell Speech, Guest's introduction, Vote of thanks

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	Development of listening skills.	02
2	1	Teacher will read out a passage thrice. And the students will listen carefully following the guidelines and answer the questions.	04
3	2	Presentation of conversation on telephone / mobile (2 students)	04
4	2	Presentation of table manners and etiquettes.	04
5	3	Conversation on the given situation	04
6	4	Mock interview (6 students)	04
7	5	Group Discussion (6 students + 1 moderator)	04
8	6	Public speech	01
9	6	Presentation of welcome and farewell speech	02
10	6	Guest's introduction speech and vote of thanks	02
		Total	**32**

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 Government Polytechnic Mumbai**

CO VS. PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
1	**1**	**2**	**2**	**1**	**3**	**3**	**3**	**3**	**3**	**3**
2	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**3**	**3**
3	**1**	**1**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
4	**1**	**1**	**1**	**2**	**3**	**3**	**3**	**3**	**3**	**3**
5	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**
6	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**

CO Vs PSO Matrix

Electrical Engg.

CO/PSOs		PSO1	PSO2	PSO3
CO1	Develop the ability of listening and conversation skills.	1	1	2
CO2	Learn the social etiquettes and manners.	1	1	2
CO3	Acquire the practical knowledge of interview.	1	1	2
CO4	Participate in group discussion.	1	1	2
CO5	Identify the need of public speech and new techniques of communication.	2	2	3
CO6	Enable the students to be a good team leader	2	2	3

Unit Number and COs

Sr. No.	Unit No	Topic Title	COS
1	1	Listening	CO1
2	2	Social etiquettes	CO2
3	3	Conversation skills	CO1, CO6
4	4	Interview Skills	CO3
5	5	Group Discussion	CO4
6	6	Public Speech	CO5, CO6

Programme Code: CE/ME/ EE/IS/EC/CO/IF/RT									
Course Code:**SC16108**				Course Title: **Mathematics-II**					
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:

The study of mathematics is necessary to develop in the student, the skills essential for Studying engineering subjects. The subject is an extension of basic mathematics of first semester, which is a pre requisite, for engineering studies.

Course Outcomes:

Student will be able to:

CO1	Define the basic principles of function, limits, derivatives, complex number and relations between two variables.
CO2	Apply rules, concept and properties to solve the problems.
CO3	Classify various types of statistical data.

Course Content Details:

Unit No	Topics / Sub-topics
1	**1. *Function*** 1.1 Concept of function, domain and range, 1.2 Type of functions (Only definitions).
2	**2. *Limit*** 2.1 Concept of limit 2.2 Limit of Algebraic, Trigonometric, Logarithmic and Exponential functions with simple example.
3	**3. *Derivatives*** 3.1 Definition of the derivative. 3.2 Derivatives of standard function.(No proof by first principle) 3.3 Differentiation of sum, difference, product and quotient of two or more functions 3.4 Differentiation of composite, inverse, implicit, parametric, exponential and logarithmic functions with simple example. **3.5** Second order derivative.
4	**4 *APPLICATION OF DERIVATIVES*** 4.1 Geometrical meaning of derivative 4.2 Tangents & Normals to the curve, 4.3 Maxima & minima of the functions 4.4 Radius of Curvature.

5	**5. *STATISTICS*** 5.1 Basic definitions-raw data, variate,frequency,cumulative frequency 5.2 Classification of data, class interval, mid value, length of the interval 5.3 Measure of central tendency – (mean, median & mode) 5.4 Mean deviation, Standard deviation, Coefficient of variance
6	**6 *Complex number*** 6.1 Definition & Algebra of complex numbers 6.2 Geometrical representation of complex number 6.3 Modulus & amplitude of complex number 6.4 Polar form of complex number 6.5 De moivre's theorem (no proof) , roots of complex number 6.6 Exponential form of complex number, Circular & Hyperbolic functions of complex numbers, relation between Circular & Hyperbolic functions, real & imaginary parts of Circular & Hyperbolic functions
7	**7. *Numerical Analysis*** 7.1 Solution of Algebraic equations using – i) Bisectional method ii) Regular – Falsi method , iii) Newton- Raphson method 7.2 Solution of simultaneous equation (i) Gauss elimination method (ii) Jacobi's method (iii) Gauss-Seidal method

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	Function	04	02	02	00	04
2	Limits	08	04	02	04	10
3	Derivatives	13	04	04	06	14
4	Application of derivatives	07	00	04	04	08
5	Statistics	12	04	04	06	14
6	Complex number	12	02	04	04	10
7	Numerical analysis	08	02	04	04	10
	Total	**48**	**18**	**24**	**28**	**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	Function	01
2	2	Limits	02
3	3	Derivatives	01
4	3	Derivatives	02
5	3	Derivatives	01
6	4	Application of derivatives	01
7	5	Statistics	01
8	5	Statistics	02
9	6	Complex number	01
10	6	Complex number	02
11	7	Numerical analysis.	02
		Total	**16**

References/ Books:

Sr.No.	Name of Book	Author	Publisher
1	Mathematics for polytechnic students	S.P. Deshpande	Pune VidyarthiGrahaPrakashan
2	Mathematics for polytechnic students (Volume I)	H. K. Das	S.ChandPrakashan
3	Companion to basic maths	G. V. Kumbhojkar	PhadkePrakashan
4	Applied Maths	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**

Course Name:-Basic Mathematics Course Code:-SC16107

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	--	--	02	02	01	01	01	--	--	--
CO2	03	02	03	02	01	--	02	--	--	--
CO3	03	02	01	01	02	02	02	--	--	--

CO Vs PSO matrix

Electrical Engg.

CO/PSOs		PSO1	PSO2	PSO3
CO1	Define the basic principles of function, limits, derivatives, complex number and relations between two variables.	01	02	--
CO2	Apply rules, concept and properties to solve the problems.	01	02	02
CO3	Classify various types of statistical data.	02	01	--

Unit Number and COs

Sr. No.	**Unit No.**	**Topic Title**	**COs**
1	1	Function	CO1,CO2
2	2	Limits	CO1,CO2
3	3	Derivatives	CO1,CO2
4	4	Application of derivatives	CO1,CO2
5	5	Statistics	CO1,CO2,CO3
6	6	Complex number	CO1,CO2
7	7	Numerical analysis	CO1,CO2

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** 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. Orbits, 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.

	1.4 Valency and chemical bonding. Valency: Definition, & examples. Types of valency: Electro valency & co-valency Examples. 1.5 Electrovalent bond: Definition, Formation, examples. Formation of NaCl , $MgCl_2$, MgO,$CaCl_2$,CaO,$Alcl_3$. 1.6 Co-valent 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. 1.7 Distinction between electrovalent and covalent compounds.
2	**Electrochemistry** 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. 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 $CuSo_4$ using Cu and Pt electrodes. 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. 2.4 Application of Electrolysis, electro- refining, Electroplating. 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). CASE STUDY RELATED TO PH/ ELECTROLYSIS PROCESS
3	**Cells and batteries** 3.1 Conductors: Definition, types (Metallic & Electrolytic) Difference between the two, 3.2 Ohm's law, charge & discharge of cells, closed circuit voltage, open circuit voltage , Electrochemical couple, separator, electromotive force (EMF),

	3.3 Cells Definition, types (Electrolytic & Electrochemical), differences between them 3.4 Classification of electrochemical cell (Primary & secondary cells) Definition & Difference between the two. 3.5 Primary cells: Lac lance cells, Dry cells, Daniel cells. 3.6 Secondary cells: Lead acid storage cell (Construction working charging & discharging) Nickel- cadmium cell (Construction working charging & discharging) Battery : Definition, Example CASE STUDY: PRIMARY CELLS/ SECONDARY CELLS
4	**Metallurgy & alloys** 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. 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:

	• Definition and Name of different methods (Poling, Liquation, Distillation, electro-refining) 4.3 Important ores of iron, Copper, Zinc, Aluminum, 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 4.5 Definition of alloy: purposes of preparation of Alloy. Preparation of binary alloy by fusion method 4.6 Some useful alloys : composition, properties and uses 1 Brass 2. Duralumin 3. Solder: Wood's metal 4. Babbit metal. **ACTIVITY: PREPARATION OF METALLURGY FLOWCHARTS / VAROUS METHODS OF CONCENTRATION**
5	**Semiconductors & Insulators** 5.1**.** Semiconductors: Definition, Example, properties & uses of silicon & Germanium **,** formation of semiconductor. **5.2**.Insulators : Definition, Example: air; silicone fluids : Definition, Example, properties & uses 5.3 Superconductors: Definition, Example, properties & uses.
6	**Corrosion.** 6.1 Definition of corrosion, Types of corrosion (Atmospheric & Electrochemical Corrosion) 6.2 Mechanism of atmospheric corrosion, types of oxides formed, (stable, unstable, volatile, with examples), factors affecting atmospheric corrosion. 6.3 Electrochemical corrosion / immersed corrosion • 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).

	• Factors affecting immersed corrosion (Ph value, hydrogen over voltage, solubility of corrosion products, irregularities on surface, etc.) 6.4 Protection of metals from Corrosion :- only definition: i. purification of metals ii. alloy formation iii. cathodic protection iv. controlling external conditions v. protective coatings a) organic coating(by paints and varnishes), b) inorganic coating (metallic oxides) c) metallic coating (detail) 6.5 Protective metallic coatings (definition, process, application, diagram) a. hot dipping(galvanizing & tinning) b. sherardizing c. metal spraying ACTIVITY : VIEWING THE PROCESSES DESCRIBED ABOVE
7	**Lubricants** 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. 7.2 Lubrication: definition and types. Types of lubrications: (Definition, diagram & description of each type.) • Fluid film • Boundary, • Extreme pressure lubrication. 7.3 Characteristic of good lubricants, requirements of an ideal 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 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). ACTIVITY: SELECTION OF LUBRICANT BASED ON NATURE OF MACHINE
8	**Engineering. Materials** 8.1 Plastic • 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 8.2 Rubber : • 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)

	• Properties of rubber (elasticity, tack, shock absorbance, rebound, tensile strength, related uses) 8.3 Insulators (definition, examples) • Teflon(PTFE): Preparation, Properties and uses • Ceramics : properties and uses 8.4 Adhesives • Phenol Formaldehyde resin : Preparation, Properties, Uses • Urea Formaldehyde resin : Preparation, Properties, Uses • Epoxy resin : Properties, Uses 8.5 Conducting Polymers : Properties, Uses 8.6 Liquid Crystal Polymers : Properties, Uses 8.7 XLPE Cross polyethylene: Properties, Uses

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

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**

Course Name:-Chemistry of materials Course Code:-SC16106

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**3**	**2**	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**1**
CO2	**3**	**2**	**2**	**2**	**-**	**2**	**1**	**1**	**-**	**1**
CO3	**3**	**3**	**2**	**2**	**1**	**2**	**-**	**1**	**-**	**1**
CO4	**3**	**2**	**2**	**1**	**-**	**2**	**1**	**1**	**-**	**1**
CO5	**3**	**3**	**1**	**1**	**1**	**2**	**-**	**1**	**-**	**1**

CO Vs PSO matrix

Electrical Engg.

CO/PSOs		PSO1	PSO2	PSO3
CO1	Identify and classify various materials used by them.	1	2	1
CO2	Select suitable substance, metal/alloy for a particular use.	2	2	--
CO3	Adopt methods of safety and precaution to aid preventive measures.	2	2	2
CO4	Develop problem solving attitude towards given problems related to the field of study.	2	2	--
CO5	Apply acquired knowledge to solve core engineering and technological problems.	1	1	1

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	Atomic structure	CO1, CO5
2	2	Electrochemistry	CO1, CO2, CO5
3	3	Cells and batteries	CO1, CO2, CO5
4	4	Metallurgy and alloys	CO1, CO2, CO4
5	5	Semiconductors and insulators	CO2, CO5
6	6	Corrosion	CO2, CO3, CO4
7	7	Lubricants	CO1, CO2, CO3
8	8	Engineering materials	CO1, CO2, CO5

Programme : **Diploma in Electrical Engineering**									
Course Code: **EE16202**				Course Title: **Basic Electrical Engineering**					
Compulsory / Optional: **Compulsory**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	**-**	**4**	**8**	**70 (3Hrs.)**	**30**	**50**	**--**	**-**	**150**

RATIONALE : The Diploma Course in Electrical Engineering mainly involves the study of Electrical machines, equipments and instruments. In order to understand the working principle, construction, operation and applications of the various Electrical machines, equipments and instruments; the basic concepts, rules and laws of Electrical and Magnetic Circuits must be studied and understood by the students of Electrical Engineering Course. This subject will help the students to study, understand and comprehend the fundamentals of various facts, the basic concepts, rules and laws of Electric and Magnetic Circuits.

Course Outcomes :

Student should be able to

CO1	Find out effect of current in different application.
CO2	Find out the current and voltages in series or parallel connected circuit.
CO3	Demonstrate the mutually induced emf. With direction.
CO4	Connect storage batteries to increase voltage level or current level.

Course Content Details:

Ch.No.	Topics / Sub-topics
1	**Basic Concepts:** 1.1 Concept of Electric Current. 1.2 Concept of Electric Potential, Potential Difference (P D) and Electro-Motive-Force (EMF). 1.3 Concept of Resistance, - Laws of Resistance, - Concept of Resistivity and Conductivity, - Effect of Temperature on Resistance, Temp. co-efficient of Resistance (simple numerical) 1.4 Classification of Electric Current: -Direct Current (DC)-Alternating Current(AC) 1.5 Sources of Electric Current (DC) - Concept of Voltage Source: Ideal and Practical - Concept of Current Source: Ideal and Practical - Source Conversion. (simple numerical) 1.6 Effects of Electric Current Heating Effect, Magnetic Effect, Chemical Effect with applications 1.7 Concept of Electrical Work, Power and Energy. Their SI units (simple numerical) 1.8 Types of Resistors and their Applications. - Carbon Composition

	- Deposited Carbon - High Voltage Ink Film - Metal Film - Metal Glaze 1.14. Wire Wound - Cermet
2	**D.C. Circuits:** 2.1 Ohm's Law, Concept of Voltage drop and Terminal Voltage. 2.2 Resistance in Series, Voltage Division Formula. 2.3 Resistance in Parallel, Current Division Formula. (Simple Numerical) 2.4 Calculations of Equivalent Resistance of simple Series, Parallel and Series Parallel Circuits.(Simple Numerical) 2.5 Duality Between Series and Parallel Circuits. 2.6 Definitions of terms Related to Electric Circuits, Circuit Parameters, Linear Circuit, Non-linear Circuit, Bi-lateral Circuit, Uni-lateral Circuit, Electric Network, Passive Network, Active Network, Node, Branch, Loop, Mesh. 2.7 Kirchhoff's Laws - Kirchhoff's Current Law - Kirchhoff's Voltage Law **(Simple Numerical with maximum two equations)**
3	**Capacitors:** 3.1 Electrostatics: Static Electricity, Absolute & Relative Permittivity of a Medium, Coulombs Laws of electrostatics, Electric Field, Electrostatic induction, Electric Flux, Electric flux Density, electric potential & energy, potential Difference, Breakdown voltage & dielectric strength. 3.2 Concept and Definition of Capacitor 3.3 Parallel Plate Capacitor: - Uniform Di-electric Medium - Medium Partly Air. - Composite Medium. (Simple Numerical) 3.4 Capacitors in Series, Capacitors in Parallel 3.5 Calculations of Equivalent Capacitance of simple Series, Parallel and Series Parallel Combinations of Capacitors. (Simple Numerical) 3.6 Energy Stored in Capacitor. (No Derivation only Simple Numerical) 3.7 Charging and Discharging of Capacitor(No Derivation only Simple Numerical) 3.8 Types of Capacitors and their Applications. Electrolytic , Non-Electrolytic (Paper, Mica, Plastic)
4	**Magnetic Circuits:** 4.1 Magnetism: Absolute and Relative Permeabilities of a Medium, Laws of Magnetic Force, Magnetic field strength, Flux & Flux Density. 4.2 Magnetic Circuit - Ohm's law of Magnetic Circuit. 4.3 Definitions Concerning Magnetic Circuit. - Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity. 4.4 Comparison Between Electric and Magnetic circuit. 4.5 Composite Series Magnetic Circuit. 4.6 Parallel Magnetic Circuit. 4.7 Calculations of Amp.-Turns for simple Series, . (Simple Numerical) 4.8 Concept of Leakage Flux, Useful Flux & Fringing. 4.9 Magnetisation Curve (B - H Curve) - Magnetisation Curve for Magnetic and Non-Magnetic Materials.

	- Magnetic Hysteresis, Hysteresis Loop. - Hysteresis Loops for Hard & Soft Magnetic Materials. - Area of Hysteresis Loop, Hysteresis Loss. (No Derivation and No Numerical) 4.10 Types of Magnets and their applications. Permanent Magnet, Electromagnet.
5	**Electromagnetic Induction:** 5.1- Relation Between Magnetism and Electricity. 5.2- Production of Induced E.M.F. and Current. 5.3- Faraday's Laws of Electromagnetic Induction. Faraday's First Law, Faraday's Second Law (No Numerical) Cork Screw Rule 5.4 Induced E.M.F: Statically Induced E.M.F., Dynamically Induced E.M.F. (Simple Numerical) 5.5 Direction of Induced E.M.F. and Currents. - Fleming's Right Hand Rule - Lenz's Law - Self Induced E.M.F., Mutually Induced E.M.F. 5.6 Self Inductance 5.7 Coefficient of Self-induction (L), (Simple Numerical) 5.8 Mutual Inductance 5.9 Coefficient of Mutual Inductance (M) (Simple Numerical) 5.10 Coefficient of Coupling 5.11 Inductances in Series and parallel. (No Derivation and No Numerical) 5.12 Types of Inductors and their Applications. - Air Cored Inductors - Iron Cored Inductors - Ferrite Cored Inductors. 5.13 Energy Stored in Magnetic Field (No Derivation and No Numerical) 5.14 Concept of DOT and UNDOT for coil
6	**LAMPS & BATTERIES** CONSTRUCTION & WORKING OF LAMPS 6.1Energy Efficient lamp – CFL , LED 6.2 Storage Batteries: 6.3 Concept of Cell and Battery. 6.4 Electrical Characteristics of Batteries. 6.5 E.M.F., Terminal Voltage, Internal Resistance, Ampere-Hour Capacity, Efficiency: AH Efficiency and Watt - Hr Efficiency. 6.6 Necessity of Series Connection of Batteries. And Parallel Connection of Batteries. 6.7 Maintenance of Lead Acid Batteries. 6.8 Applications of Storage Batteries.

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	Basic Concepts:	10	02	04	04	10
2	D.C. Circuits:	12	04	04	08	16
3	Capacitors:	10	02	04	04	10
4	Magnetic Circuits:	12	04	04	04	12
5	Electromagnetic Induction:	12	04	04	04	12
6	Lamps & Batteries.	08	02	04	04	10
	Total	**64**	**18**	**24**	**28**	**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

Sr. No.	Unit	Experiment	Approx. Hours
1	1	Find the effect of temperature on resistance of copper conductor.	02
2	1	Measurement of voltage, current and resistance by suitable meters.	02
3	2	Verify Kirchoff's current law.	02
4	2	Verify Kirchoff's voltage law.	02
5	2	To determine the equivalent resistance (Req.) of Series connected resistances.	02
6	2	To determine the equivalent resistance (Req.) of Parallel connected resistances.	02
7	2	Demonstration of wave form of DC and AC current on suitable equipment.	02
8	2	Demonstration of Rheostat as a current regulator & potential divider .	02
9	3	To plot the charging and discharging curves of a capacitor and determine the time constant.	02
10	3	Demonstrate different types of capacitors.	02
11	4	To plot the B H curve for magnetic material and determine the relative Permeability.	02
12	4	Demonstrate different types of magnets.	02
13	5	To verify Faraday's First Law of electromagnetic Induction (For Dynamically & Statically Induced EMF).	02
14	5	Demonstrate different types of inductors.	02
15	6	Demonstration of series & parallel connection of storage batteries.	02
16	6	Demonstration of charging of storage batteries.	02
		Total	**32**

Notes: *If possible videos should be shown of different applications of this course.*

References/ Books:

Sr. No.	Author	Title	Publisher
01	B.L.Theraja A.K.Theraja	A Text Book Of Electrical Technology vol-I	S. Chand & Co.
02	V.N.Mittle	Basic Electrical Engg.	Tata McGraw-Hill
03	Edward Hughes	Electrical Technology	Pearson Education, New Delhi
04	V.K.Mehta	Electrical Technology	S. Chand & Co.

Websites:
1. www.google.co.in
2. www.electrical4u.com/
3. electrical-engineering-portal.com

Course Curriculum Development Committee :

a) Internal Faculty: A.K.Dhulshette

b) External Faculty: i) Mr. Ibrahim I.A. Fakih Divisional Engg. BEST
ii) Mr. H.B.Chaudhari Assistant Prof. VJTI.

Academic Coordinator **Head of Department (Electrical Engineering)** **Principal Govt. Polytechnic Mumbai**

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	1	2	2	-	2
CO2	3	3	3	2	3	-	-	2	-	2
CO3	2	3	3	3	3	3	2	2	-	-
CO4	3	3	3	3	3	2	-	2	-	2

CO Vs PSO matrix

	CO	PSO1	PSO2	PSO3
CO1	Find out effect of current in different application.	1	1	3
CO2	Find out the current and voltages in series or parallel connected circuit.	3	1	3
CO3	Demonstrate the mutually induced emf. With direction.	3	1	-
CO4	Connect storage batteries to increase voltage level or current level.	3	1	3

Unit Number and COs

Sr. No.	**Unit No.**	**Topic Title**	**COs**
1	1	Basic Concepts:	1
2	2	D.C. Circuits:	2
3	3	Capacitors:	2
4	4	Magnetic Circuits:	1,3
5	5	Electromagnetic Induction:	1,3
6	6	Lamps & Batteries.	1,2,4

Programme : **EE**									
Course Code:**EC16202**				Course Title: **Elements of Electronics Engineering**					
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	**-**	**2**	**6**	**70 (3 Hrs.)**	**30**	**50**	**-**	**-**	**150**

Rationale:

This course is one of the core subject and it covers fundamentals of electronics. Therefore it is necessary for the students of electronics and related branches to study. It includes basic principles, construction of semiconductor devices, their biasing techniques and simple applications. Student will be able to analyze and apply knowledge of this subject.

Course Outcomes: Student should be able to:

CO1	Learn the fundamentals of electronics.
CO2	Know the principle of diodes and transistors. Understand the construction and materials used for diodes and transistors.
CO3	Identify the components from their configuration and sketch their symbols.
CO4	Evaluate the characteristics of electronic components
CO5	Assemble, test and analyze basic circuits such as rectifiers, amplifiers, clipper, oscillator etc.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Semiconductor Theory:** 1.1 Review of atomic structure, Effect of Heat on atomic structure. Concept of Energy band theory, Classification of material on the basis Energy band theory: Conductor, Insulator, Semiconductor. 1.2 Intrinsic and Extrinsic Semiconductors, P-type and N-type Semiconductors. Majority and minority charge carriers. 1.3 P-N Junction formation, Concept of depletion layer and barrier Potential. 1.4 Biasing of PN Junction: Forward and reverse biased. Reverse breakdown: Avalanche breakdown. Reverse Saturation current. 1.5 PN junction Diode: V-I characteristics, Diode current Equation, Effect of temperature, Static and dynamic resistance. 1.6 Comparison of Si and Ge Diode. Packages of Diode. 1.7 Definition of following terms: Forward voltage and Forward

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	Current, PIV, Power dissipation of diode, Junction Capacitance, Barrier / Knee Voltage. 1.8 Testing of Diode using multimeter, Application of Diode.
2	**Diode applications:** 2.1 Review of Transformer: Step Up, Step down (Not for exam) 2.2 Rectifier: Definition , Types, Circuit diagram, waveforms and Working of(a) Half wave rectifier (b) Full Wave rectifier (Centre Tapped) (c) Bridge rectifier. 2.4 Definition of following terms: Ripple factor, efficiency of Rectifier, TUF. 2.5 Comparison of Rectifiers. 2.6Filters: Waveform and working of Capacitor, Choke input And Π-type filters circuit for rectifiers (Refer 2.2) 2.7Diode as clipper and clamper (a) Circuit diagram, waveform and working of positive, negative clipper (series and shunt) (b) Circuit diagram, waveform and working of positive, negative clamper.
3	**Special Diodes :** Symbol, construction, characteristics, working, application and general specification of the following diodes: 3.1 Zener Diode. Application of Zener diode as regulator.(series and shunt) 3.2 Block diagram of regulated power supply, Definition of load Regulation, line regulation. (Simple numerical on end expression, no derivation to be asked in the exam) 3.3Light Emitting Diode, Calculation of series resistance. 3.4Photo Diode.
4	**Transistor Fundamentals:** 4.1 Bipolar Junction Transistor: Two diode analogy of transistor, Packages and terminal identification of Transistor. 4.2Symbol, Construction and working of PNP and NPN transistors. 4.3 Transistor configuration: CE, CB, CC modes. 4.4 Characteristics of transistors in CE configuration. Expression of collector current, Concept of collector leakage current. Relation between α and β.

	(Simple numerical on end expression, no derivation to be asked in the exam) 4.5 Concept of Early Effect. 4.6 Transistor Parameters/ Ratings: Maximum collector current, Maximum collector voltage, Maximum Base current, Maximum power dissipation, Operating frequency range, Current gain (hfe). 4.7 Importance of Heat sink. 4.8 Differentiate faulty and good Transistor.
5	**BJT biasing:** 5.1 Introduction: Need of biasing, DC Operating point and load line, factors contributing to thermal instability, Effect of temperature (Thermal runway), Stability Factor 5.2 Transistor biasing: Circuit and analysis of biasing network such as Fixed bias, Collector feedback bias, Emitter Bias, Voltage divider bias. (Simple numerical on the end expression such as stability factor, current gain is expected). 5.3 Application of Transistor as a Switch 5.4 Single stage Common Emitter (CE) amplifier: Working and frequency response.
6	**Field Effect Transistor:** 6.1 Introduction, Symbol, Packages and terminal identification of FET (N channel, P channel) 6.2 JFET: Formation of depletion region, Operation, Output and Transfer characteristics. 6.3 JFET Parameters, relation between JFET parameters. 6.4 Comparison between BJT and FET.
7	**Introduction to Oscillators:** 7.1 Need and condition for oscillators (Barkhausen criteria) 7.2 Types of feedback : Positive and Negative 7.3 Type of oscillator: RC phase shift oscillator and Hartley oscillator, working, frequency expression and applications.
8	**Digital Electronics:** 8.1 Number Systems: a) Binary numbers, Octal numbers, Hexadecimal numbers:

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Conversion of one number system to another system (including Fractional point number)

8.2 Logic Gates and Families:

a) AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR gate: Truth table, equation, symbol, IC numbers, Block diagram of logic IC's (Students must be made aware of pin diagram of logic gates.)(pin diagram should not be asked for exam)

b) NOR & NAND as Universal gate.

8.3 Flip-flop:

a) S-R Flip-flop using NOR and NAND.

b) Types of triggering: Edge, level

c) Clocked S-R flip flop, D flip flop, JK flip flop, T flip flop. (Diagram, Symbol, Truth table, operation and application)

8.4 Counters:

a) Classification of counters: Synchronous & Asynchronous/ripple

b) MOD-n asynchronous counter, 3 bit UP/DOWN ripple (asynchronous) counter: Circuit diagram, working and waveform.

8.5 MUX/DEMUX:

a) Realization and working of 2 : 1, 4 : 1 , 8 : 1 multiplexer using logic gates

b) Realization and working of 1: 2, 1: 4 , 1 : 8 De-multiplexer using logic gates.

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	Semiconductor Theory	10	02	04	02	08
2	Diode Applications	10	02	04	02	08
3	Special Diodes	04	02	04	02	08
4	Transistor Fundamentals	08	02	05	04	11
5	BJT Biasing	08	02	06	00	08
6	Field Effect Transistor	05	02	03	00	05
7	Introduction to Oscillators	03	02	02	00	04
8	Digital Electronics	16	08	06	04	18
	Total	**64**	**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*

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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	To construct and test the V-I characteristic of semiconductor P-N diode. Find out static, dynamic resistance and knee voltage of P-N diode. State the maximum output current and PIV of diode.	02
2	2	To construct and test half wave rectifier with and without filter and observe input and output waveforms. Measure input voltage, peak voltage, peak to peak voltage, R.M.S voltage, Average voltage.	02
3	2	To construct and test Full wave Center tapped rectifier with and without filter and observe input and output waveforms. Measure input voltage, peak voltage, peak to peak voltage, R.M.S voltage, Average voltage.	02
4	2	To construct and test Bridge Full wave rectifier with and without filter and observe input and output waveforms. Measure input voltage, peak voltage, peak to peak voltage, R.M.S voltage, Average voltage.	02
5	2	To construct and test clipper circuit (Positive, negative).Observe input and output waveform. Measure input voltage, peak voltage, and peak to peak voltage.	02
6	3	To construct and test the V-I characteristic of Zener diode.	02
7	3	To construct and test Zener regulator. Find out load and line regulation.	02
8	3	To construct and test the V-I characteristics of LED. Find out static and dynamic resistance of LED.	02
9	4	To construct and test input and output characteristics of BJT and Calculate input resistance and output resistance of BJT in CE Mode.	02
10	5	To construct and test the frequency response of single stage CE amplifier and Calculate gain bandwidth product of given circuit.	04
11	6	To construct and test the output characteristic of FET. Label and interpret the various parameters on it.	02
12	8	To construct, test and verify truth table of AND, OR, NOT, NAND, NOR, Ex-OR and Ex-NOR gate.	02
13	8	To construct, test and verify truth table of RS/JK flip flop using ICs.	02
14	8	To construct, test and verify MUX/DEMUX.	02
15	8	To construct, test MOD-n asynchronous/synchronous counter and verify its operations.	02
		Total	**32**

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References/ Books:

Sr.No.	Name of Book	Author	Publisher
1	A text book of Applied Electronics	R. S. Sedha	S. Chand and Co. Ltd.
2	Electronic Devices and circuits	Allen Mottershead	Prentice Hall of India Ltd.
3	Basic Electronics	Bernard Grob	McGraw Hill
4	Principles of Electronics	V. K. Mehta	S. Chand and Co. Ltd.
5	Electronic Device and circuit	G. K. Mitthal	Khanna publishers
6	Electronic Principles	Albert Malvino	Tata McGraw Hill
7	Basic Electronic and Linear circuit	N. N. Bhargava, S. C. Gupta	Tata McGraw Hill

Course Curriculum Development Committee:

a. **Internal Faculty**

i. Mr.S.R.Aher
ii. Ms. Monali B. Ghodke
iii. Ms.Avanti S.Pawar

b. **External Faculty**

i.Mr.Ghadyalji

Academic Coordinator
(R. A. Patil)

Head of Department

Principal
Govt. polytechnic Mumbai

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Course Name:- Elements of Electronics Engineering **Course Code:-EC16202**

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-
CO3	-	2	1	-	-	-	-	-	-	-
CO4	3	2	1	2	-	-	-	-	-	-
CO5	-	3	3	-	-	-	-	-	-	-

CO Vs PSO matrix

CO/PSOs		PSO1	PSO2	PSO3
CO1	Learn the fundamentals of electronics.	3	-	-
CO2	Know the principle of diodes and transistors. Understand the construction and materials used for diodes and transistors.	2	1	-
CO3	Identify the components from their configuration and sketch their symbols.	-	3	2
CO4	Evaluate the characteristics of electronic components	-	-	-
CO5	Assemble, test and analyze basic circuits such as rectifiers, amplifiers, clipper, oscillator etc.	-	3	2

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	Semiconductor Theory	CO1,CO2, CO3,CO4
2	2	Diode Applications	CO1, CO2,CO3, CO5
3	3	Special Diodes	CO1, CO2, CO3
4	4	Transistor Fundamentals	CO1, CO2, CO3,CO4
5	5	BJT Biasing	CO2, CO5
6	6	Field Effect Transistor	CO1, CO2, CO3
7	7	Introduction to Oscillators	CO1, CO2
8	8	Digital Electronics	CO1

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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.

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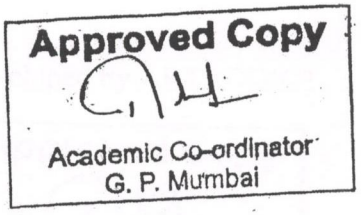
2	**Engineering curves & Loci of Points:** To draw an ellipse by Arcs of circle method & Concentric circles method, To draw a parabola and hyperbola by Directrix and focus method. To draw involutes of circle & pentagon, To draw a cycloid, Loci of points of Single slider crank mechanism with given specifications.
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. Kannaiah	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.

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Course Curriculum Development Committee:

a. **Internal Faculty**

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

b. **External Faculty**

1. Mr. K. V. Patil (LME, G. P. Thane)

Academic Coordinator	Head of Department	Principal
(R. A. Patil)	(Mechanical Engineering)	Govt. polytechnic Mumbai

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Programme : **Diploma in CO /CE/ EE/EC/ IF/IS/LT/ME/RT/LGFT**									
Course Code: **NC16102**				Course Title: **Social Work**					
Compulsory / Optional: Compulsory									
Teaching Scheme				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	---	3	3	---	---	---	---	---	---

Rationale :

The programme aims to inculcate social welfare in students, and to provide service to society without bias. NSS volunteers work to ensure that everyone who is needy gets help to enhance their standard of living and lead a life of dignity. In doing so, volunteers learn from people in villages how to lead a good life despite a scarcity of resources. it also provides help in natural and man-made disasters by providing food, clothing and first aid to the disaster victims.

Course Outcomes:

After the completion of the course student will be able to

CO1	Understand the community in which they work & themselves in relation to their community
CO2	Identify the needs and problems of the community and involve them in problem-solving. Acquire leadership qualities and democratic attitudes.
CO3	Develop sense of social and civic responsibility, gain skills in mobilizing community.
CO4	Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony

Course Content Details:

Unit No	Topics / Subtopics	Hours
1	**Institute Level Activity:** 1.1 Tree Plantation 1.2 Play Ground Forming 1.3 Energy Audit 1.4 Nature Awareness 1.5 Tree Counting 1.6 Hunting Hazard	05

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2	**Institute Organized Initiative:** 1.1 Energy Consumption 1.2 Save Girl Child 1.3 Road Safety 1.4 Child Labour 1.5 Drug Addiction 1.6 Road Show 1.7 Child Marriage 1.8 Poster Making 1.9 Dowry 1.10 Unemployment	15
3	**Visit Arrangement:** 1.1 Visit to Old Age Home 1.2 Visit to any Village 1.3 Visit Orphanage (Children Home)	15
4	**Metropolitan Level Activity :** 1.1 Blood Donation Camp 1.2 Health Checkup Camp 1.3 General Awareness 1.4 New Technology 1.5 Woman's Empowerment	05
5	**National Administration Initiative For Natural/Artificial calamities:** 1.1 Earthquake 1.2 Flood 1.3 Storm 1.4 Draught 1.5 Heavy Rain Fall	05

Course Curriculum Development Committee:

1. **Mrs. S.R.Nagargoje (Lecturer in Electronics)**
2. **Mrs. S.D.Kapse(Lecturer in Instrumentation)**
3. **Mrs.S.B.Puri(Lecturer in Electronics)**

1-8-17
Academic Coordinator
(Dr. R A Patil)

Head of Department
Department of Computer Engineering

Principal
Govt. Polytechnic Mumbai

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Academic Co-ordinator
G. P. Mumbai

Programme : **Diploma in Computer Engineering**									
Course Code: **NC16202**				Course Title: **Digital India**					
Compulsory / Optional: **Compulsory.**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
	03		**03**						

*External Examiner

Rationale: The Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy. In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched the Digital India programme with the vision to transform India into a digitally empowered society and knowledge economy.

Course Outcomes:

Student should be able to:

CO1	Describe Digital India Mission
CO2	Know the Digital Financial Services.
CO3	Interact with people in society to share thoughts about Digital India
CO4	Create Digital Locker Sign in and other Digital Services

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Digital India** 1.1 Vision and Mission of Digital India 1.2 Digital India Initiative 1.3 Approach and Methodology for Digital India Programme 1.4 Management Structure for Digital India Programme **1.5** Pillars of Digital India
2	**e-Governance** 2.1 Definition of e-Governance, 2.2 Pillars of e-Governance, 2.3 Infrastructure for e Governance, 2.4 Mission Mode Projects (At least 5), 2.5 Familiarization with terminology like change management, processing engineering, Govt. Processing engineering and Governance, 2.6 e Governance project life cycle, electronically delivery of services, messaging system and case study of any 5 public utility portal related with the Department (especially, public grievance redressal system, RTI, Vigilance, Department working and financial inclusion, linkage with Aadhar etc.)

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3	**Electronic Commerce** **3.1** Digital Literacy to understand the concept of Online Banking Make bill payments, Make money transaction through online banking, **3.2** book train and bus tickets, **3.3** Seek information on agricultural operations and land records, and interact with employment exchange, municipalities, grampanchayat, police and passport offices.
4	**Digital Financial Services** 4.1 Cards 4.2 USSD (Unstructured Supplementary Service Data) 4.3 AEPS stands for Aadhar Enabled Payment System 4.4 UPI (Unified Payments Interface) **4.5** e-Wallet Case Study On BHIM APP
5	**Digital Locker** 5.1 Sign Up with Internet/ Mobile. 5.2 Sync your Aadhaar 5.3 Get documents from Issuers **5.4** Share documents with Requesters
6	**Everything Digital** 6.1 National Digital Library of India 6.2 Digital Marketing 6.3 Digital Education 6.4 E Governance App Store Case Study on aaplesarkar website/App

Course Curriculum Development Committee:

1. **Mr. M.H.Bhalerao(Lecturer in Computer Engg)**
2. **Ms. A.J.Bhat(Lecturer in Computer Engg)**
3. **Ms.V.S.Pawar(Lecturer in Electronics)**

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