



Government Polytechnic, Mumbai

Department of Electrical Engineering

P-19 Curriculum (Sandwich Pattern)

Semester-I (Course Contents)

GOVERNMENT POLYTECHNIC MUMBAI
(Academically Autonomously Institute, Government of Maharashtra)
Teaching and Examination Scheme (P19)
With effect from AY 2019-20

Programme: Diploma in Electrical Engineering (Sandwich Pattern)

Term / Semester - I

Course Code	Course Title	Teaching Hours/Contact Hours				Credits	Examination Scheme (Marks)						
		L	P	TU	Total		TH	TS1	TS2	PR	OR	TW	Total
HU 19 101	Communication Skills	2	2	0	4	4	60	20	20	25*	0	25	150
SC 19 101	Basic Physics	3	2	0	5	5	60	20	20	25*	0	25	150
SC 19 109	Basic Mathematics	4	0	0	4	4	60	20	20	0	0	0	100
EE 19 201	Basic Electrical Engineering	4	2	0	6	6	60	20	20	50*	0	0	150
EE 19 202	Electrical Materials and Wiring	2	2	0	4	4	0	0	0	50*	0	50	100
ME 19 208	Engineering Graphics	1	2	0	3	3	0	0	0	25*	0	25	50
EE 19 204	Libre-Office Calc [#] (Spoken Tutorial)	--	--	4	4 [#]	4 [#]	--	--	--	--	--	--	--
	Total	16	10	04	30	30	240	80	80	200	00	100	700
Students Centred Activity (SCA)					5								
					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 -1 hour, TH- 2 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.

Department Coordinator,
Curriculum Development,
Dept. of Electrical Engineering

Head of Department
Dept. of Electrical Engineering

In-Charge
Curriculum Development Cell

Principal

Programme : Diploma in CE/ME/IT/CO/IS/EE/EC/LG/LT (Sandwich Pattern)										
Course Code: HU19101				Course Title: Communication Skills						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs. 30 Min.)	TS1 (1Hr)	TS2 (1Hr)	PR	OR	TW	Total
02	02	-	04	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 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.

Rationale: Communication skills play a vital and decisive role in career development. In this age of globalization, competition is tough. Hence effective communication skills are important. The subject Communication Skills introduces basic concepts of communication. It also describes the verbal, non-verbal modes and techniques of oral & written communication.

In this context, it will help the engineering diploma students to select and apply the appropriate methods of communication in various situations and business communication. Students are also required basics of communication and use of different skills.

This course will guide and direct to develop a good personality and improve communication skills. It will enable the students to utilize the skills necessary to be a competent communicator.

Course Outcomes: Student should be able to

CO1	Apply proper communication technique to cope up with the challenges of the modern world.
CO2	Interpret feedback at various situations by using appropriate body language and avoid the barriers in effective communication.
CO3	Able to participate in Group Discussion and Acquire the practical knowledge of an interview.
CO4	Able to develop PowerPoint Presentation and Business correspondence.
CO5	Write letters, circulars, memos, notices, reports and communicate effectively in written communication.

Course Content Details:

Unit No	Topics / Sub-topics
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1	Introduction to Communication 1.1 Elements of Communication 1.2 Communication Cycle 1.3 Types of communication 1.4 Definition and Types of Barriers- a) Mechanical b) Physical c) Language d) Psychological 1.5 How to overcome Barriers Course Outcome: CO1 Teaching Hours :6 hrs Marks: 14 (R- 2, U-4, A-8)
2	Non- verbal Communication 2.1 Meaning and Importance of Non-verbal Communication 2.2 Body Language 2.3 Aspects of Body Language 2.4 Graphic language Course Outcome: CO2 Teaching Hours :6 hrs Marks: 12 (R- 4, U-4, A-4)
3	Group Discussion And Interview Skills 3.1 Need and Importance of Group Discussion 3.2 Use of Knowledge and Logical sequence. 3.3 Types of Interview 3.4 Preparing for an Interview Course Outcome: CO3 Teaching Hours :6 hrs Marks: 10 (R-2, U-4, A-4)
4	Presentation Skills 4.1 Presentation Skills - Tips for effective presentation 4.2 Guidelines for developing PowerPoint presentation Course Outcome: CO4 Teaching Hours :4 hrs Marks: 08 (R- 2, U-2, A-4)
5	Business Correspondence 5.1 Office Drafting – a) Notice b) Circular c) Memo d) Email-writing. 5.2 Job Application with resume. 5.3 Business Letters – a) Enquiry b) Order c) Complaint 5.4 Report Writing – a) Fall in Production b) Accident Report Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 16 (R- 4, U-4, A-8)

List of experiments: Any 10 experiments out of 15

Sr. No.	Unit No	COs	List of Experiments	Hours
1	1	CO1,CO4	Conversation between students on various situations.	02
2	3	CO2,CO4	Non- Verbal Communication.	02
3	3	CO3,CO4	Group Discussion	02
4	4	CO3,CO4	Mock Interview	02
5	5	CO4,CO5	Business Communication a) Advertisement, Tender, Diary writing.	02

			b) Job Application With Resume.	
6	1	CO1	Communication Barriers	02
7	5	CO5	Business Letters – a) Enquiry b)Order c)Complaint	02
8	4	CO1,CO4	Speeches- a)Welcome Speech b)Farewell Speech c) Vote of Thanks	02
9	5	CO5	Report Writing – a) Fall in Production b) Accident Report	02
10	All	CO4	Showing Videos on different types of Communication.	02
11		CO1	*Articles	02
12		CO1	*Preposition and Conjunction	02
13		CO1	*Direct Indirect Speech	02
14		CO1	*Change the voice	02
15		CO1	*Vocabulary Building	02
Total				30

Note: Experiments No.1 to 10 are compulsory. Remaining experiments are to be performed on availability of time.* These experiments will be performed during practical hours only.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Communication Skills	Joyeeta Bhattacharya - Reliable Series	9780000176981, 0000176982
2	Communication Skills	Sanjay Kumar, PushpaLata- Oxford University Press	13: 978-0199488803
3	Successful presentation Skills	Andrew Brad bury- The Sunday Times	13: 9780749456627

E-References:

- 1) Website: www.mindtools.com/page8.html-99k
- 2) Website: www.inc.com/guides/growth/23032.html-4
- 3) Website: www.khake.com/page66htm/-72k

- 4) Website: www.BMConsultantIndia.Com
 5) <https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-English>
 6) MYCBSEGUIDE
 7) Website: www.letstak.co.in
 8) <https://learnenglishteens.britishcouncil.org/>

CO Vs PO and CO Vs PSO Mapping (Civil Engineering)

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

CO Vs PO and CO Vs PSO Mapping (Mechanical Engineering)

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

CO Vs PO and CO Vs PSO Mapping (Electronics Engineering)

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

CO Vs PO and CO Vs PSO Mapping (Electrical Engineering)

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

CO Vs PO and CO Vs PSO Mapping (Instrumentation Engineering)

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

CO Vs PO and CO Vs PSO Mapping (Computer Engineering)

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

COVs PO and CO Vs PSO Mapping (Information Technology)

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

CO Vs PO and CO Vs PSO Mapping (LG/LT Engineering)

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

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Neelamkumar R. Sawant	State Head Technical Services for (Maharashtra and Goa)	JSW Cement Ltd. Mumbai Head Office
2	Ms Shilpa D. Khune	Corporate Trainer/Consultant	
3	Mrs.S.S. Kulkarni	Lecturer in English	Government Polytechnic Pune
4	Mrs. K.S.Pawar	Lecturer in English	Government polytechnic Mumbai
5	Ms.N.N.Dhake	Lecturer in English	Government polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Science And Humanities

Head of Department
Department of Science And Humanities

I/C, Curriculum Development Cell

Principal



Programme : Diploma in EE/IS (Sandwich Pattern)										
Course Code: SC19101				Course Title: Basic Physics						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2Hrs.30 Min)	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 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.

Rationale:

The subject is included under the category of science. The special feature of the subject is to develop the laboratory skill using principles of scientific phenomenon. This course will serve to satisfy the need of the technical students for their development in technical field. The course is designed by selecting the topics which will develop intellectual skills of the students and will guide students to solve broad based engineering problems. Ultimately the focus of the course is to develop psychomotor skills in the Students

Course Outcomes: Student should be able to

CO1	State the different physical quantities, identify the proper unit of it and to estimate error in the measurement of physical quantities.
CO2	Apply laws of motion in various engineering applications .
CO3	Create awareness about the properties and application of light, LASER, Ultrasonic waves, sound waves and nanotechnology in engineering field.
CO4	Identify the physical properties of the various materials such as elasticity, viscosity..

Course Content Details:

Unit No	Topics / Sub-topics
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1	Units and Measurements 1.1 Fundamental Physical quantities, examples. 1.2 Derived physical quantities, examples. 1.3 Definition and requirements of unit 1.4 System of units, C. G. S., M. K. S. and S. I. units. 1.5 Rules to write the unit and conventions of units and Significant figures, rules to write significant figures. 1.6 Error – Definition, types of errors and estimation of errors. 1.7 Numerical Course Outcome: CO1 Teaching Hours: 6 hrs. Marks: 08 (R- 2, U-2, A-4)
2	Motions 2.1 Linear motion –Definition – distance, displacement, velocity, acceleration, retardation, equation of motions, acceleration due to gravity and equation motion under gravity, numerical 2.2 Periodic motions: a) Oscillatory motion, b) Vibratory motion, c) S.H.M. d) Circular motion. (only definition and examples) , terms related to S.H.M. :Definition: Time period, frequency, amplitude, wavelength, and phase 2.3 Angular motion: a) Definition: angular motion, Uniform circular motion, Radius vector, linear velocity, Angular velocity , Angular acceleration, b) Relation between linear velocity and angular Velocity(derivation), Radial or centripetal acceleration , Three equations of motion (no derivations) , Centripetal and Centrifugal force, examples and applications. Course Outcome: CO2 Teaching Hours : 10 hrs., Marks: 10 (R- 2 , U- 4 , A- 4)
3	Modern Physics 3.1 Photo Electricity Concept of quantum theory of light, Einstein’s Photoelectric equation, Characteristics of photo electric effect, application of photo electric effect 3.2 LASER 3.2.1 LASER introduction 3.2.2 Properties of laser 3.2.3 Spontaneous and stimulated emission, 3.2.4 Population inversion, Optical pumping. 3.2.5 Applications of LASER Course Outcome: CO3 Teaching Hours : 8 hrs., Marks: 10 (R- 2 , U- 4 , A- 4)
4	4 Optics and Ultrasonic Waves 4.1 Optics : 4.1.1 Revision of reflection and refraction of light. 4.1.2 Laws of refraction, Snell’s law. 4.1.3 Determination of refractive index. 4.1.4 Dispersion, dispersive power, Prism formula (derivation) 4.1.5 Numerical 4.2 Ultrasonic Waves 4.2.1 Ultrasonic waves and infrasonic waves. 4.2.2 Audible range of sound wave 4.2.3 Properties of ultrasonic wave. 4.2.4 Applications Course Outcome: CO3 Teaching Hours: 6 hrs. Marks: 10 (R- 2 , U- 4 , A-4)

5	Nanotechnology 5.1 Introduction to nanotechnology. 5.2 Definition of nanoscale, nanometer and nanoparticles, nanotechnology. 5.3 Definition and examples of nanostructured materials. 5.4 Applications of nanotechnology in different fields - a) electronics, b) automobile, c) medical, d) textile, e) cosmetics, f) environmental, g) space and defense Course Outcome: CO3 Teaching Hours :4 hrs. Marks: 8 (R- 2 , U-2 , A-4)
6	General Properties of Matter 6.1 Elasticity: 6.1.1 Deformation, deforming force, internal restoring force, Elastic, plastic and rigid substances, their examples. 6.1.2 Definition of elasticity, stress, strain and its types. 6.1.3 Hooke's Law and elastic limit. 6.1.4 Stress versus Strain diagram, yield point, breaking point 6.1.5 Definition Young's Modulus, bulk modulus and modulus of rigidity relation among them. 6.1.6 Factor of safety. 6.1.7 Applications of elasticity. 6.1.8 Numerical 6.2 Viscosity : 6.2.1 Concept and Definition of viscosity, velocity gradient. 6.2.2 Newton's law of viscosity, Co-efficient of viscosity, unit of viscosity 6.2.3 Stoke's law, terminal velocity, derivation of Stoke's formula. 6.2.4 Streamline flow, turbulent flow, critical velocity, examples. 6.2.5 Reynold's number and its significance. 6.2.6 Applications of viscosity 6.2.7 Numerical Course Outcome: CO4 Teaching Hours : 11 hrs Marks: 14 (R- 4 , U- 4 , A-6)

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Units and Measurements	2	2	4	8
2	Motion	2	4	4	10
3	Modern Physics	2	4	4	10
4	Optics and Ultrasonic	2	4	4	10
5	Nanotechnology	2	2	4	8
6	General Properties of Matter	4	4	6	14
Total		14	20	26	60

List of experiments:

Sr. No.	Unit No	CO	List of Experiments	Hours
1	1	CO 1	To know your Physics laboratory and Use of Scientific Calculator	2
2	1	CO 1	To measure the dimensions of given objects and to determine their volume using Vernier calliper.	2
3	2	CO 2	To determine Acceleration due to gravity by simple pendulum	2
4	3	CO 3	To study photoelectric effect by using photo cell	2
5	4	CO 3	To determine refractive index by pin method	2
6	6	CO4	To determine coefficient of viscosity of liquid by Stokes' method	2
7	3	CO1	To measure the dimensions of given objects and to determine their volume using micrometre screw gauge.	2
8	2	CO 2	To determine stiffness constant by using helical spring	2
9	3	CO 3	To study projectile motion	2
10	4	CO 3	To plot the characteristics of photo cell.	2
11	4	CO 3	Experiments on LASER	2
12	3	CO 3	Demonstration on spectrometer	2
13	5	CO 4	To study Engineering applications of Nanotechnology	2
14	6	CO 4	To determine Young's modulus of elasticity of wire using Young's apparatus.	2
15	ALL	CO 1	Showing Video on different applications related to units,	2
Total				30

Note: Experiments No.1 to 10 are compulsory and should map all units and Cos. Remaining 5 experiments are to be performing on the importance of topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Applied Physics	Manikpure&Deshpande , S.Chand & Company	10:8121919541 13:9788121919548
2	Applied Physics	B.G.Bhandarkar, Vrinda Publication	0071779795
3	Optics & Optical Fibres	Brijlal Subhramanyan	978-3-662-52764-1

4	Engineering Physics	Gaur and S.L.Gupta S.Chand & Company	0-07-058502
5	Physics	Resnick and Halliday Tata McGraw Hills	978-0-07-1755487-3
6	Physics part I & II	H.C.Varma	9788177091878
7	Properties of Matter	D.S.Mathur	13: 978-8121908153

E-References:

1. www.physics.org
2. www.physicsclassroom.com
4. www.youtube.com/physics
7. <https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-physics>
8. MYCBSEGUIDE
4. www.ferrophysics.com
5. <http://hyperphysics.phy-astr.gsu.edu/hbase/hph.htm>
6. www.sciencejoywagon.com/physicszone
9. <https://ndl.iitkgp.ac.in/>

CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)

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

CO Vs PO and CO Vs PSO Mapping (INSTRUMENTATION)

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

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr Rajesh Masane	Sr. Engineer	L&T Mumbai
2	Mrs B. J. Choudhary	Lecturer in Physics	Govt. Polytechnic Thane
3	Mrs S.A. Thorat	Lecturer in Physics	Govt. Polytechnic Mumbai
4	Dr. D.S. Nikam	Lecturer in Physics	Govt. 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 CE/ME/IT/CO/EC/IS/EE(Sandwich Pattern)										
Course Code: SC19109				Course Title: BASIC MATHEMATICS						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs. 30 Min.)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
04	-	-	04	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 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.

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

Course Content Details:

Unit No	Topics / Sub-topics
1	1.Trigonometry: 1.1 Trigonometric ratios of allied angles, compound angles, multiple angles ($2A$, $3A$), Sub multiple angles 1.2 Factorization and De-factorization Formulae 1.3 Inverse Circular function (definition and simple problems). Course Outcome: CO1 Teaching Hours : 10 hrs Marks: 10 (R- 4, U-4, A-2)
2	2.Vectors: 2.1 Definition of vector , position vector 2.2 Algebra of vectors (Equality, addition ,subtraction and scalar multiplication) 2.3 Dot (Scalar) product & Vector (Cross) product with properties. Course Outcome: CO3 Teaching Hours : 10 hrs Marks: 10 (R- 2 , U-4 , A-4)
3	3.Logarithms: 3.1 Definition of logarithm 3.2 Laws of logarithm 3.3 simple examples based on laws. Course Outcome: CO2 Teaching Hours : 10hrs Marks:10 (R-4 , U- 4 , A-2)
4	4.Probability : 4.1 Definition of random experiment , sample space, event, occurrence of event and types of event (Impossible , mutually exclusive , exhaustive ,equally likely) 4.2 Definition of Probability 4.3 Addition & Multiplication Theorems of probability without proof , simple examples Course Outcome: CO1 Teaching Hours :10hrs Marks:10 (R-4, U- 4 , A-2)
5	5.Determinants:- 5.1 Definition of Determinant 5.2 Expansion of Determinant of order 2×3 5.3 Cramer's rule to solve simultaneous equations in 3 unknowns Course Outcome: CO2 Teaching Hours :10 hrs Marks:10 (R- 2 , U-4 , A-4)
6	6.Matrices: 6.1 Definition of a matrix of order $m \times n$ 6.2 Types of matrices 6.3 Algebra of matrices - equality, addition, subtraction ,multiplication & scalar multiplication. 6.4 Transpose of matrix. 6.5 Minor , co-factor of an element. 6.6 Adjoint & inverse of a matrix by adjoint method. 6.7 Solution of a simultaneous equations by matrix inversion method. Course Outcome: CO3 Teaching Hours : 10 hrs Marks: 10 (R- 2 , U- 4 , A- 4)

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Trigonometry	04	04	02	10
2	Vectors	02	04	04	10
3	Logarithms	04	04	02	10
4	Probability	04	04	02	10
5	Determinants	02	04	04	10
6	Matrices	02	04	04	10
Total		18	24	18	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 (CIVIL ENGINEERING)

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

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

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

CO Vs PO and CO Vs PSO Mapping (COMPUTER ENGINEERING)

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

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

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

CO Vs PO and CO Vs PSO Mapping (ELECTRONICS ENGINEERING)

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

CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)

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

CO Vs PO and CO Vs PSO Mapping (INSTRUMENTATION ENGINEERING)

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

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Neelamkumar R. Sawant	State Head Technical Services for (Maharashtra and Goa)	JSW Cement ltd. Mumbai Head Office
2	Mrs. Deepawali S. kaware	Lecturer in Mathematics	Government polytechnic Vikaramgad
3	Mr. A.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai
4	Mr.V.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai

Head of Department

Coordinator,
Curriculum Development,
Department of Science And Humanities

Department of Science And Humanities

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Electrical Engineering (Sandwich Pattern)										
Course Code: EE 19 201				Course Title: Basic Electrical Engineering						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hr 30 Min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
04	2	--	6	60	20	20	50*			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 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

Rationale:

This is the subject where the principles of electrical energy are studied. Knowledge of basics of electrical is essential to apply on all type of electrical machines, instruments, devices and equipment's. The basic aim of this course is that, the student must learn the electrical safety, basic concepts, rules and laws of electric and magnetic circuits and practical's. The knowledge of this course will be useful for other higher-level subject.

Course Outcomes: Student should be able to

EE19 201.1	Measure electrical accident with electrical safety
EE19 201.2	Understand basic concepts of electrical engineering
EE19 201.3	Solve simple electrical DC circuit with basic terminology
EE19 201.4	Interpreting electrostatic study focusing on capacitor
EE19 201.5	Explain magnetic circuit & electromagnetic induction
EE19 201.6	Learn prior ac fundamentals

Course Content Details:

Unit No	Topics / Sub-topics
1	1: Electrical Safety <p>1.1 Meaning and causes of Electrical accident 1.2 Factors on which severity of shock depends 1.3 Procedure for rescuing the person who have received an electric shock 1.4 Methods of providing Artificial respiration. 1.5 Electrical fire</p> <ul style="list-style-type: none"> Causes of fire due to electrical reason Precautions to be taken to avoid fire due to electrical reason. Types of fire extinguishers <p>Course Outcome: EE19 201.1 Teaching Hours :7 hrs Marks: 8 (R- 2, U-6, A-0)</p>

2	<p>2: Basic Concept</p> <p>2.1 Concept of Electric Current.</p> <p>2.2 Concept of Electric Potential, Potential Difference (P D) and Electro-Motive-Force (EMF).</p> <p>2.3 Concept of Resistance, - Laws of Resistance, Concept of Resistivity and Conductivity, Effect of Temperature on Resistance, Temp. co-efficient of Resistance (simple numerical)</p> <p>2.4 Classification of Electric Current: - Direct Current (DC), Alternating Current (AC), advantages of alternating current over direct current, application of direct and alternating current</p> <p>2.5 Ohm's Law, Concept of Voltage drop and Terminal Voltage.</p> <p>2.6 Resistance in Series, Voltage Division Formula.</p> <p>2.7 Resistance in Parallel, Current Division Formula. (Simple Numerical on 2.6 & 2.7)</p> <p>2.8 Calculations of Equivalent Resistance of simple Series, Parallel and Series Parallel Circuits. (Simple Numerical)</p> <p>2.9 Duality Between Series and Parallel Circuits.</p> <p>2.10 Effects of Electric Current Heating Effect, Magnetic Effect, Chemical Effect with applications</p> <p>2.11 Concept of Electrical Work, Power and Energy with S.I. unit. (simple numerical)</p> <p>2.12 Types of Resistors and their Applications.</p> <ul style="list-style-type: none"> - Carbon Composition - Deposited Carbon - High Voltage Ink Film - Metal Film - Metal Glaze - Wire Wound <p>Course Outcome: EE19 201.2 Teaching Hours :14 Marks: 12 (R- 2 , U- 4 , A- 6)</p>
3	<p>3:D.C. Circuits</p> <p>3.1 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.</p> <p>3.2 Energy Sources:</p> <ul style="list-style-type: none"> 3.3.1 Independent Voltage Sources 3.3.2 Independent Current Sources 3.3.3 Sources conversion <p>3.3 Concept of Open and Short circuit</p> <p>3.4 Kirchhoff's Laws</p> <ul style="list-style-type: none"> - Kirchhoff's Current Law - Kirchhoff's Voltage Law <p>(Simple Numerical with maximum two equations)</p> <p>3.5 Delta-Star and Star-Delta Transformation. (simple numerical)</p> <p>Course Outcome: EE19 201.3 Teaching Hours : 10 Marks : 10 (R- 0 , U- 4 , A- 6)</p>

4	<p>4: Capacitors</p> <p>4.1 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.</p> <p>4.2 Concept and Definition of Capacitor</p> <p>4.3 Parallel Plate Capacitor:</p> <ul style="list-style-type: none"> - Uniform Di-electric Medium - Medium Partly Air. - Composite Medium. (Simple Numerical) <p>4.4 Capacitors in Series, Capacitors in Parallel</p> <p>4.5 Calculations of Equivalent Capacitance of simple Series, Parallel and Series Parallel Combinations of Capacitors. (Simple Numerical)</p> <p>4.6 Energy Stored in Capacitor. (No Derivation and Simple Numerical)</p> <p>4.7 Charging and Discharging of Capacitor (No Derivation and Simple Numerical)</p> <p>4.8 Types of Capacitors and their Applications. Electrolytic, Non-Electrolytic (Paper, Mica, Plastic)</p> <p>Course Outcome: EE19 201.4 Teaching Hours : 10 Marks: 10 (R- 2 , U- 2 , A- 6)</p>
5	<p>5: Magnetic Circuits & Electromagnetic Induction</p> <p>5.1 Magnetism: Absolute and Relative Permeabilities of a Medium, Laws of Magnetic Force, Magnetic field strength, Flux & Flux Density.</p> <p>5.2 Magnetic Circuit - Ohm's law of Magnetic Circuit.</p> <p>5.3 Definitions Concerning Magnetic Circuit. Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity. (simple numerical)</p> <p>5.4 Comparison Between Electric and Magnetic circuit.</p> <p>5.5 Concept of Leakage Flux, Useful Flux & Fringing.</p> <p>5.6 Magnetization Curve (B - H Curve), Magnetic Hysteresis, Hysteresis Loop. Hysteresis Loops for Hard & Soft Magnetic Materials. Area of Hysteresis Loop, Hysteresis Loss. (No Derivation and No Numerical)</p> <p>5.7 Types of Magnets and their applications</p> <p>5.8 Magnetic effect of electric current, Dot & cross conventions, Right hand thumb rule, Interaction between magnetic fields, force on current carrying conductors, Fleming's left hand rule</p> <p>5.9 Faraday's Laws of Electromagnetic Induction.</p> <p>5.10 Direction of induced EMF and current, Lenz's Law, Fleming's right hand rule, Induced EMF, Dynamically induced EMF, statically induced EMF, self-Inductance (L), Mutual Inductance, co-efficient of coupling.</p> <p>5.11 Inductances in Series and parallel. (No Derivation and No Numerical)</p> <p>5.12 Types of Inductors and their Applications.</p> <ul style="list-style-type: none"> - Air Cored Inductors - Iron Cored Inductors - Ferrite Cored Inductors. <p>5.13 Energy Stored in Magnetic Field (No Derivation and Simple Numerical)</p>

	Course Outcome: EE19 201.5 Teaching Hours : 14 Marks: 14 (R- 4 , U- 4 , A- 6)
6	6: Introduction of AC Fundamental 6.1 Generation of A.C. Voltage (simple loop generator), Fundamental Equation of A.C. Voltage and current. 6.2 Important terms: instantaneous value, waveform, cycle, Periodic Time, frequency, amplitude, R.M.S value, Average value, Form factor, Peak factor, Phase, Phase difference (simple numerical) Course Outcome: EE19 201.6 Teaching Hours : 5 Marks: 6 (R- 2 , U- 4 , A-0)

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Electrical Safety	2	6	0	8
2	Basic Concept	2	4	6	12
3	DC Circuit	0	4	6	10
4	Capacitors	2	2	6	10
5	Magnetic Circuit & Electromagnetic Induction	4	4	6	14
6	AC Fundamental	2	4	0	6
Total		12	24	24	60

List of experiments: Any 10 experiments out of 15

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	EE19 201.1	Trace your electrical engineering laboratory: Terms related to Electrical Engineering with Nomenclature, Symbols (wherever necessary) and their respective Units a. Draw electrical symbol for machines and equipment b. Draw layout of electrical laboratory. c. Prepare Charts of electrical safety and demonstrate the operation of fire extinguisher	6
2	2	EE19 201.2	To verify the effect of temperature on resistance of copper conductor	2
3	3	EE19 201.3	Verify Kirchhoff's current law	2

4	4	EE19 201.4	To plot the charging and discharging curves of a capacitor and determine the time constant.	2
5	5	EE19 201.5	To plot the B-H curve for magnetic material and determine the relative Permeability	2
6	6	EE19 201.6	To observe AC & DC waveform & measure its voltage on CRO	2
7	1	EE19 201.1	First Aid Treatment: Precautions if person gets an electric shock. Methods of artificial respiration.	2
8	2	EE19 201.2	To determine the equivalent resistance (Req.) of Series connected resistances	2
9	3	EE19 201.3	Verify Kirchhoff's voltage law.	2
10	4	EE19 201.4	Demonstrate different types of capacitors.	2
11	5	EE19 201.5	To verify Faraday's First Law of electromagnetic Induction (For Dynamically & Statically Induced EMF)	2
12	2	EE19 201.2	To determine the equivalent resistance (Req.) of Parallel connected resistances	2
13	2	EE19 201.2	To verify Rheostat as a current regulator & potential divider.	2
14	3	EE19 201.3	To measure of e.m.f. of d.c. source and to calculate its internal resistance by connecting it to an external load.	2
15	5	EE19 201.5	Demonstrate different types of Inductor.	2
Total				34

Note: Experiments No. 1 to 6 are compulsory and should map all units and Cos. Remaining 4 experiments are to be perform on the importance of topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Electrical Technology (Volume I)	B. L. Theraja and A. K. Thereja , S. Chand and Co. Ltd.	81-219-2440-5
2	Basic Electrical Engineering	V. K. Mehta and Rohit Mehta, S. Chand and Co. Ltd.	9788121908719
3	Electrical Technology	Edward Hughes, ELBS Publications	9780582226968
4	Testing and maintenance of electrical machines	B.P.Patil ,nirali Prakashan 2 nd ed 2012	978-93-81595-58-9

E-References:

1. www.nptel.com

2. www.electrical4u.com
3. www.khanacademy.org
4. <https://ndl.iitkgp.ac.in/>

CO VsPO and CO Vs PSOMapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE19 201.1	3	3	--	2	2	--	3	2	2	2
EE19 201.2	3	3	--	2	2	--	3	2	2	--
EE19 201.3	3	3	--	2	2	--	3	2	2	--
EE19 201.4	3	3	--	2	2	--	3	2	2	--
EE19 201.5	3	3	--	2	2	--	3	2	2	--
EE19 201.6	3	3	--	2	2	--	3	2	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. Pune
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,
Curriculum Development,
Department of Electrical Engg.

Head of Departments
Department of Electrical Engg.

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Electrical Engineering (Sandwich Pattern)										
Course Code: EE 19 202				Course Title: Electrical Materials and Wiring						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH	TS1	TS2	PR	OR	TW	Total
2	2	0	4	0	0	0	50*	0	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 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.

Rationale:

Basic knowledge of materials used in electrical engineering is essential for an electrical engineer. Also the knowledge of wiring accessories, wiring methods is vital for an electrical engineer. This subject is intended to develop skills of wiring and testing in the electrical wiring installations. This subject also gives insight of Electrical Engineering Materials.

Course Outcomes: Student should be able to

EE19202.1	Apply safety precautions
EE19202.2	List different types of electrical materials, fuses, tools , accessories & wires
EE19202.3	Make up different types of wiring

Course Content Details:

Unit No	Topics / Sub-topics
1	1: Classification of electrical materials. 1.1 Observe safety precautions in electrical indoor and outdoor installations. 1.2 Importance of Materials in Electrical Engineering Course Outcome: EE19202.1, EE19202.2 Teaching Hours :2 hrs
2	2: Conducting Materials (Physical, Mechanical and Electrical properties) 2.1 Current Carrying Conducting Materials (Copper, Aluminum, Bronze and Iron) 2.2 Non Current Carrying Conducting Materials (Cast iron, Cast Steel, etc) Course Outcome: EE19202.2 Teaching Hours: 4 hrs
3	3: Insulating Materials(Thermal , Mechanical and Electrical properties):

	<p>3.1 Classification on basis of state of materials as solid ,liquid gaseous insulating materials (Introduction and applications)</p> <p>3.2 Classification on the basis of temperature withstanding ability such as Y (O), A, E, B, F,H and C type with list of insulating materials in each type.</p> <p>3.3 Effect of Nano Technology on properties of materials</p> <p>Course Outcome: EE19202.2 Teaching Hours: 4hrs</p>
4	<p>4: Magnetic Material (Introduction and Applications)</p> <p>4.1 Classification of magnetic material as Paramagnetic, Diamagnetic and Ferromagnetic material</p> <p>4.2 C.R.G.O. Silicon Steel</p> <p>4.3 H.R.G.O. Silicon Steel</p> <p>4.4 Amorphous Metal</p> <p>Course Outcome: EE19202.2 Teaching Hours: 4hrs</p>
5	<p>5: Wiring</p> <p>5.1 Classification of electrical installations</p> <p>5.2 General requirements of electrical installation</p> <p>5.3 Reading & interpretation of electrical engineering drawings & symbols related to installations</p> <p>5.4 Types of Wires – PVC, CTS, TRS , Lead Sheathed, flexible, multicore, single strand, multi-strand</p> <p>Course Outcome: EE19202.2 Teaching Hours: 6 hrs</p>
6	<p>6: Methods of Wiring and Different types of Wiring systems</p> <p>6.1 Methods of Electrical Wiring systems w.r.t taking connection</p> <p>6.2 Joint Box or Tee or Jointing system</p> <p>6.3 Loop-in or Looping system</p> <p> 6.3.1 Advantages of loop-in method of wiring</p> <p> 6.3.2 Disadvantages of loop-in method of wiring</p> <p>6.4 Different types of Electrical wiring systems</p> <p>6.5 Cleat Wiring</p> <p> 6.5.1 Advantages of Cleat wiring</p> <p> 6.5.2 Disadvantages of Cleat wiring</p> <p>6.6 Casing and Capping wiring</p> <p> 6.6.1 Advantages of Casing and Capping wiring</p> <p> 6.6.2 Disadvantages of Casing and Capping wiring</p> <p>6.7 Lead sheathed wiring</p> <p>6.8 Conduit wiring</p> <p> 6.8.1 Surface conduit wiring</p> <p> 6.8.2 Concealed conduit wiring</p> <p>6.9 Types of Conduit</p> <p> 6.9.1 Metallic conduit</p> <p> 6.9.2 Nonmetallic conduit</p> <p>6.10 Advantages of Conduit wiring system</p> <p>6.11 Disadvantages of Conduit wiring system</p>

6.12	Comparison between different Wiring systems
Course Outcome: EE19202.3	Teaching Hours: 12 hrs

List of experiments: Any 10 experiments out of 17

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	5	EE19202.1	Observe safety precautions in electrical indoor and outdoor installations.	2
2	5	EE19202.2	Draw different symbols used in electrical engineering.	4
3	2	EE19202.2	Identify the current carrying conducting material in at least five electrical accessories / devices.	2
4	5	EE19202.2	Draw diagrams of different wiring accessories.	4
5	6	EE19202.3	Build wiring circuit for one lamp controlled by one switch	2
6	5	EE19202.2	Identify the different types of tools used in electrical engineering.	2
7	5	EE19202.2	Identify the different types of fuses with their applications.	2
8	5	EE19202.2	Identify samples of different types of wires.	2
9	6	EE19202.3	Build a sample staircase wiring	2
10	6	EE19202.3	Build a sample godown wiring	2
11	6	EE19202.3	Build a sample cleat wiring	2
12	6	EE19202.3	Build a sample Casing Capping wiring	2
13	6	EE19202.3	Build a sample Conduit wiring	2
14	6	EE19202.3	Trace and draw electrical installation of a classroom	2
15	6	EE19202.3	Trace and draw electrical installation of a laboratory / workshop	2
16	4	EE19202.2	Identify the magnetic material in a given electrical motor, Electric choke/ballast.	2
17	3	EE19202.2	Identify the name and class of insulation of insulating material in any five electrical accessories / equipment/ instrument/ device	2
Total				30

Note: Experiments No. 1 to 6 are compulsory and should map all units and Cos. Remaining 4 experiments are to be perform on the importance of topic.

References/ Books:**a) Books:**

Sr. No.	Title	Author	Publisher	ISBN
1	An Introduction to Electrical Engineering Materials	C.S.Indulkar	S.Chand, New Delhi	10: 8121906660 /13: 9788121906661
2	Electrical Wiring Estimating and Costing	S.L.Uppal	Dhanpat Rai and Sons	9788174092403
3	Electrical Estimating and Costing	Surjit Singh	Dhanpat Rai and Sons	6700000000308

b) Websites:

1. <http://www.electricaltechnology.org/2015/09/types-of-wiring-systems-electrical-wiring-methods.html>

E-References:

1. www.nptel.com
2. www.electrical4u.com
3. www.khanacademy.org
4. <https://ndl.iitkgp.ac.in/>

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE19202.1	1	-	-	-	2	-	1	-	1	1
EE19202.2	1	1	-	1	2	1	2	-	2	2
EE19202.3	1	1	1	2	2	2	3	2	3	3

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation	Sign
1	Mr. Kuldeep Singh Rajput	Deputy Executive Engineer	400KV RSOM, Kharghar Navi Mumbai	
2	Mrs. Meenakshi Shirsat	Lecturer in Electrical Engineering	MSBTE, Mumbai	
3	Mrs. J. D. Waghmare	Lecturer in Electrical Engineering	G.P.Mumbai	
4	Mrs. V.U. Bhosle	Lecturer in Electrical Engineering	G.P.Mumbai	

Coordinator,
Curriculum Development,
Department of Electrical Engg.

Head of Departments
Department of Electrical Engg.

I/C, Curriculum Development Cell

Principal



Programme : Diploma in Electrical Engineering (Sandwich Pattern)										
Course Code:ME19 208				Course Title: Engineering Graphics						
Compulsory / Optional: C										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH	TS1	TS2	PR	OR	TW	Total
01	02	-	03	-	-	-	25*	-	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 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.

Note: Practical Examination shall be conducted out of 50 Marks and the obtained marks be converted out of 25 marks as per examination scheme.

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. This Engineering Graphics course induces the concepts of accuracy and exactness of information required to work as electrical technician. It also develops judgments about small distances and angles.

This course is useful in developing imagination, drafting and sketching skills of the students.

Course Outcomes: Student should be able to

ME19 208.1	Draw geometric figures and engineering curves using appropriate drawing instruments	
ME19 208.2	Draw orthographic views of given object by applying principles of orthographic projections	
ME19 208.3	Draw isometric view from given orthographic views, by applying principles of isometric projections	
ME19 208.4	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-46 Code latest Edition)

	1.2 Simple Geometrical Constructions, Redrawing figures using above geometrical constructions		
	Course Outcome-ME19 208.1	Teaching Hours-02	Marks – 06
2	Engineering Curves and Loci of Points 2.1 Method 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 Loci of Points for Single Slider Crank Mechanisms		
	Course Outcome-ME19 208.1	Teaching Hours-03	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-ME19 208.2	Teaching Hours– 04	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-ME19 208.3	Teaching Hours– 04	Marks – 14
5	Freehand sketches 5.1 Drawing of proportional freehand sketches of – Different types of thread forms, nuts, bolts, screws, washers and foundation bolts (Rag and Lewis type) 5.2 Electrical Components such as- Fuses: Rewireable, HRC Cartridge, MCB single pole, double pole, , MCCB, Insulator-Pin, Shackled, Disc (String), Isolator: Vertical, Horizontal, Pantograph, Transformer: Cut section, Core & Shell (Teacher shall also explain use/ function of all the above elements)		
	Course Outcome-ME19 208.4	Teaching Hours-02	Marks – 08

List of Drawing Sheets:Total 05 Sheets (All compulsory)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	ME19 208.1	Basics of Engineering Graphics Drawing sheet containing types of lines, Lettering, Redrawing given figure, dimensioning and geometrical constructions	06
2	2	ME19 208.1	Engineering curves and loci of points (minimum 4 problems)	06

3	3	ME19 208.2	Orthographic projections Using first angle method of projections (minimum 2 problems) and one problem on sectional orthographic views	06
4	4	ME19 208.3	Isometric Projection One problem using isometric scale and one with natural scale	06
5	5	ME19 208.4	Freehand sketches: i) Drawing of proportional freehand sketches of – Different types of thread forms, nuts, bolts, screws, washers and foundation bolts (Rag and Lewis type) ii) Electrical Components such as- Fuses: Rewindable, HRC Cartridge, MCB single pole, double pole, , MCCB, Insulator-Pin, Schackle, Disc (String), Isolator: Vertical, Horizontal, Pantograph, Transformer: Cut section, Core & Shell	06
Total				30

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Engineering drawing	N.D.Bhatt, Charotar Publishing House, 53 rd 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, 1 st Ed. 2010	978-93-50040-164
4	Engineering drawing	D.Jolhe, Tata McGraw Hill Education, 2017	978-00-70648-371
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E-References:

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CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
ME19 208.1	1	1	2	-	2	2	1	1	1	-
ME19 208.2	1	1	1	-	1	1	1	1	2	-

ME19 208.3	1	1	1	-	1	1	1	1	2	-
ME19 208.4	2	2	2	2	1	2	2	2	2	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. I.N.Khuspe	Sel. Grade Lecturer in Electrical Engineering	Govt. Polytechnic, Mumbai
2	Mr. U.A.Agnihotri	Sel. Grade Lecturer in Mechanical Engineering	Govt. Polytechnic, Mumbai
3	Mr. Ruhil Alwi	Sr. Executive	Coffee Day Beverages, Mumbai
4	Mr. A.S. Sangwkar	Sel. Grade Lecturer in Mechanical Engineering	Govt. Polytechnic, Thane
5	Mr. E.C. Dhembre	Lecturer in Mechanical Engineering	Govt. Polytechnic, Mumbai

Coordinator,

Curriculum Development,

Department of Electrical & Mechanical Engineering

Head of Department

Department of Electrical & Mechanical Engineering

I/C, Curriculum Development Cell

Principal

EE 19 204 Libre Office

1. Introduction to Libre Office Calc (Foss: LibreOffice Calc on BOSS Linux – English)

Outline: Introduction to LibreOffice Calc What is Calc, Who should use Calc, What can be done using Calc. About spreadsheets, sheets and cells. Basic features – parts of main Ca..

2. Working with Cells

Outline: Working with Cells How to enter numbers, text, numbers as text, date and time in Calc. How to Navigate between cells and in between sheets. How to select items in row..

3. Working with Sheets

Outline: Working with Sheets Inserting and Deleting rows and columns Calc. Inserting and Deleting Sheets in Calc. Renaming Sheets

4. Formatting Data

Outline: Formatting Data Borders, Color, Formatting Text, Increasing Cell Size Formatting multiple lines of text, numbers, fonts, cell borders, cell background Automatic Wrappi..

5. Basic Data Manipulation

Outline: Basic Data Manipulation Paste and paste special (values, transpose), pasting a spreadsheet into writer as a table Introduction to Formulas – Sum, Average, basic formula..

6. Working with Data

Outline: Working with data Speed up using Fill tools and Selection lists. Sharing content between sheets Remove data, Replace data, Change part of a data.

7. Using Charts & Graphs

Outline: Using Charts and graphs in Calc Creating, Editing and Formatting Charts Types of charts Resizing and moving of charts

8. Formulas & Functions

Outline: Formulas and Functions Creating formulas, operator types and referencing Basic arithmetic and statistic functions - relative and fixed (\$) referencing in a function ..

9. Linking Calc Data

Outline: Linking Calc Data Referencing other sheets and documents Working with Hyperlinks