Government Polytechnic Mumbai

Department of Instrumentation Engineering

P-23 Curriculum

Semester-I

RMKNOWLEDGE

(Course Contents)

Government Polytechnic, Mumbai

(Academically Autonomous Institute, Government of Maharashtra)

Programme : Diploma in Instrumentation Engineering (Sandwich Pattern)

Learning and Assessment Scheme (P-23) Duration of Programme : 6 Semester

First

With Effect From Academic Year : 2023-24 Duration : 16 WEEKS

							Lea	arning Schem	e		Assessment Scheme													
								Self- Learning	Notional	Bo		Theory					Based on LL & TL				Based On Self- Learning		Total	
				Total IKS		Actu	al tact	(Term Work	Learning Hrs./Week		Daman	EA	TH	C.A.	Г. т.	4.01	EA	P	'ractic	al			g	Marks
Sr.	Course	Course Title	Course	Hrs. For	Н	rs./ W	eek	Assignments	2.	Credite	Duration	FA	-111	TH		otai	r A	-rĸ	SA	-rĸ			A	
110.	Coue		Type	Sem.				Hrs./Week	9-27	Creans	(Hrs.)	T1	T2	Max	Max	Min	Max	Min	M	ax	Min	Max	Min	
					CL	TL	LL	SLH	NLH	\sim	5	Max	Max						PR	OR				
1	HU23501	Communication Skills	AEC	1	3		2	1	6	3	2:30	20	20	60	100	40	25	10				25	10	150
2	SC23101	Basic Physics	DSC	2	3	-	2		6	3	2:30	20	20	60	100	40	25	10	25#		10	25	10	175
3	SC23501	Basic Mathematics	AEC	6	4	2		2	8	4	2:30	20	20	60	100	40	25	10				25	10	150
4	IS23101	Principles of Measurement	DSC	<u> </u>	4	×	4	2	10	5	2:30	20	20	60	100	40	25	10	25@		10	25	10	175
5	IS23601	Engineering Workshop Practice	SEC	2	4		4		4	2	7.74	$\rangle - n$	-	-			50	20	50@		20			100
6	UV23301	Universal Human Values-I	VEC	4	1	1		1	2	1	- 3	1-1	/-	4	-				-			50	20	50
7	SL23601	Libre Office Suite Writer and Draw (Spoken Tutorial)	SEC		-	-	_	4	4	2	^	22	-	-										
				14	15	2	12	11	40	20	10	80	80	240	400	160	150	60	100		40	150	60	800

Abbreviations: CL-Classroom Learning, TL-Tutorial Learning, LL- Laboratory Learning, FA-Formative Assessment, SA-Summative Assessment, IKS-Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents addition of two-20 marks class tests conducted during the semester.

2. If candidate is not securing minimum passing marks in FA-PR of any course, then the candidate shall be declared as "Detained" in that semester.

3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.

4. Notional Learning hours for the semester are (CL+TL+LL+SL) hours X 16 Weeks

5. 1 credit is equivalent to 30 Notional hrs.

6. *Self-learning hours shall not be reflected in the Time Table.

Course Category: Discipline Specific Core Course (DSC): 1, Discipline Specific Elective (DSE):0, Value Education Course (VEC):1, Intern. /Apprentice. /Project /Community (INP):0, Ability Enhancement Course (AEC): 3, Skill Enhancement Course (SEC): 2, Interdisciplinary Elective (IDE): 0

Department Coordinator, Curriculum Development, Dept. of Instrumentation Engineering Head of Department, Dept. of Instrumentation Engineering In-Charge Curriculum Development Cell Principal, Government Polytechnic Mumbai

Progr	Programme: Diploma in CE/ME/EE/EC/IS/CO/IF/AIML/LG/LT/RT														
Cours	e Code:	HU2350	1		Course	e Title: Communication Skills									
Comp	oulsory /	Optiona	l: Com	pulsory											
	Lea	rning Sc	heme ar	nd Credi	ts	Assessment Scheme									
								SA-TH	FA	SA-		CT A			
			SLH	NLH	Credits	FA-	IH	(2:30 Hrs.)	PR	PR	OR	SLA	I otal		
03		02	01	06	03	20	20	60	25			25	150		
		TT C			and the second se	-			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						

Total IKS Hrs. for course: -----

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

- 1. FA-TH represents addition of two-20 marks class tests conducted during the semester.
- 2. FA-PR represents tutorial/practical term work of 25 Marks
- 3. SLA represents self-learning Assessment of 25 Marks
- 4. SA-TH represents the end term theory examination of 60 Marks

I. Rationale

In this age of globalization, competition is tough. Hence effective communication skills are important. Communication skills play a vital and decisive role in career development. It will guide and direct to develop a good personality and improve communication skills. Students will be able to utilize the skills necessary to be a competent communicator. This course will help the students to select and apply the appropriate methods of communication in various situations. Communication skills for professional purposes aim to equip the students with necessary language skills required for public speaking, presentation and negotiation. Communication skills for academic purposes will include academic writing skills and critical thinking considering the need of students to communicate in engineering domain.

II. Industry / Employer Expected Outcome

The aim of this course is to help the student to achieve the following industry identified outcome through various learning experiences: "Communicate in Verbal and Nonverbal form of communication effectively at workplace".

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Apply proper communication technique by avoiding barriers to cope up with the challenges of the modern world.
CO2	Compose paragraphs and dialogues on given situations.
CO3	Able to participate in Group Discussion and acquire the practical knowledge of an Interview.
CO4	Deliver effective presentations with apt body language by using audio visual aids.
CO5	Acquire professional writing skills for formal written business correspondence.

Course Content Details:

Unit No	Theory learning Outcomes (TLOs) aligned to	Topics / Sub-topics
1		Unit-I Communication Theory and Practice
	 TLO1.1 Define communication. TLO1.2 Describe the process of Communication. TLO1.3 Differentiate between types of communication. TLO1.4 Identify the type of Barriers and suggest Remedies. TLO1.5 Describe and apply 7 C's of effective Communication. TLO1.6 Describe the non-verbal communication. 	 1.1 Introduction, meaning and definition and importance of communication. 1.2 Elements/process of communication. 1.3 Types of communication: formal, informal, verbal (oral and written), non-verbal (visual and auditory), vertical, horizontal and Diagonal communication. 1.4 Barriers in Communication and ways to overcome a) Mechanical Barrier b) Physical Barrier c) Psychological Barrier d) Linguistic Barrier 1.5 7 C's of effective communication (Considerate, concrete, concise, clear, complete, correct, courteous) 1.6 Introduction to Non-verbal communication (Aspects of Body Language & Graphic Communication)
Cou	rse Outcome: CO1 Teaching Hou	ırs: 10hrs Marks: 18

Go	vernment	Polytechnic, Mumbai	Science and Humanities Department
2	TLO2.1 TLO2.2	Formulate paragraphs with synchronized sentence structure on the given situation / topic. Develop dialogues to practice language skill in a structured and meaningful way.	 Unit- II Paragraph and Dialogue Writing 2.1 Types of paragraphs: Technical, Descriptive, Narrative 2.2 Dialogue Writing: i. Greetings ii. Development iii. Closing Sentence.
Cou	rse Outco	ome: CO2 Teaching Hour	rs :06hrs Marks: 08
3	TLO3.1 TLO3.2 TLO3.3 TLO3.4	Express thoughts freely during group discussion. Participate in interview confidently Prepare Group Discussion to practice language skills and leadership qualities in a structured and meaningful way. Understand Non-Verbal Communication in interview.	 Unit- III Group Discussion and Interview Skills 3.1 Importance and Types of Group Discussion 3.2 Parameters of Group Discussion 3.3 Need and Types of Interviews 3.4 Preparing for an Interview 3.5 Non-Verbal communication during interview
Cou	rse Outco	ome: CO3 Teaching Hou	rs :10hrs Marks: 10
4	TLO4.1 TLO4.2	Prepare power point presentation Use appropriate body language for effective communication	 Unit - IV Presentation Skills 4.1 Power Point Presentation: i) Layout ii) Font size iii) Color combination. 4.2 Kinesics: i) Facial expressions ii) Eye contact iii) Postures iv) Gestures.
Co	urse Outc	ome: CO4 Teaching Hours	:09hrs Marks: 08
5	TLO5.1 TLO5.2 TLO5.3 TLO5.4	Draft business letters in the given situation. Respond to given job advertisement by writing application letter with resume. Draft office correspondence in given format. Prepare reports of the given types of events.	 Unit-V PROFESSIONAL WRITING 5.1 Business Correspondence: Enquiry, order, Complaint. 5.2 Job-Application with Resume 5.3 Office Drafting- notices, circulars, memorandum etc. 5.4 Report Writing: Accident and fall in production
Co	ourse Outo	come: CO5 Teaching Hour	s :10hrs Marks: 16

Sr No	Eastratory Ecurining Outcome and ring	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	 LLO1.1 Enhance the understanding of word formation LLO1.2 Enrich word power LLO1.3 Construct words with the specific meanings 	Formulate 20 words using Prefix and Suffix	2	CO1
2	LLO2.1 Promote the development of effective communication skillsLLO2.2 Improve non -verbal communication skills.LLO2.3 Enhance interpersonal skillsLLO2.4 Build confidence	Enact Role Plays as per situation and context	2	CO2
3	LLO3.1 Participate and express their own thoughts confidently in group discussion.LLO3.2 Improve speaking & listening skills.	Group Discussion	2	CO3
4	LLO4.1 Draft job application.	Job application with Resume	2	CO5
5	LLO5.1 Draft different types of reports on the given situation.	Report Writing	2	CO5
6	LLO6.1 Identify different types of barriers & suggest remedies to overcome them.	Present different Types of barriers using Examples with remedies to overcome.	2	CO1
7	LLO7.1 Face interview confidentlyLLO7.2 Use appropriate body Language during interview.	Mock Interview	2	CO3
8	LLO8.1 Identify different aspects of body language.LLO8.2 Use appropriate body language during communication.	Mention Examples of Body Language use at Workplace with suitable pictures and images.	2	CO4
9	LLO9.1 Express information in coherent and engaging manner LLO9.2 Build confidence	Introduce oneself and others	2	CO4
10	LLO10.1 Develop Leasing Practice	Listening Practice	2	CO1
11	LLO11.1 Develop Reading Practice	Reading Practice	2	CO4
12	LLO12.1 Develop Writing Practice	Writing Practice	2	CO5

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Note: Students should complete all assignments & activities of Basic & Level 1 of Online course – "Business Communication Excellence" on Infosys Springboard. At the end of term, it is mandatory to submit certificates of Basic and Level 1 of Online course - "Business Communication Excellence", on Infosys Springboard. Only after that their Term Work will be granted.

Note: Any 10 out of 12 practicals are compulsory (All COs should be covered compulsorily).

Communication Skill (HU23501)

(Approved copy)

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development: (Self Learning):

- 1. Power-point preparation and presentations on given topic. (Mini Project)
- 2. Describe a given picture.
- 3. Impromptu Communication on given situation.
- 4. Prepare an advertisement on any product.
- 5. Suggest proper dressing & grooming for the given occasion.

VI. Specification Table:

Unit	Topic Title	Distribution of Theory Marks								
Unit No 1 2 3 4 5	Topic Title	R Level	U Level	A Level	Total Marks					
1	Communication Theory and Practice	6	6	6	18					
2	Paragraph and Dialogue Writing	2	2	4	08					
3	Group Discussion and Mock Interview	4	2	4	10					
4	Presentation Skills	2	2	4	08					
5	Professional writing	2	6	8	16					
	Total	16	18	26	60					

VII. Assessment Methodologies/Tools:

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on process and product related performance indicators (10marks) Note: Rubric - Each Practical Carries.

- 1) 02 Marks for present, 00 Marks for Absent & 01 Marks for extra practical.
- 2) 04 Marks for Discipline & involvement in the practical.
- 3) 04 Marks for Accuracy for result & Neat clean presentation.

Summative Assessment (Assessment of Learning)

End term examination (60 marks)

VIII. Suggested COs - POs Matrix Form

	Programm ELECTRI	e Outco CALEN	mes (POs) GINEERING					Programme Specific Outcomes (PSOs)		
Course Outcome s (COs)	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analy sis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineerin g Practices for Society, Sustainabili ty and Environment	PO-6 Project Managem ent	PO-7 Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CO1	2	3	1		2	2	3	1	2	3
CO2			E C		1	2	2	2		3
CO3	1	3			2	2	2	2		3
CO4					2	3	2	1		2
CO5	2		/		2	3	3			
Legends:	- High:03, N	Aedium:0	2, Low:01, No	Mapping:						

Course Outco mes (COs)	Program ELECTR	ne Outco ONICS I	mes (POs) ENGINEERII	NG	1		2	Programme Specific Outcomes (PSOs)				
	PO-1 Basic and Disciplin e Specific Knowle dge	PO-2 Proble m Analy sis	PO-3 Design/ Developme nt of Solutions	PO-4 Engineeri ng Tools	PO-5 Engineerin g Practices for Society, Sustainabi lity and Environme nt	PO-6 Project Manage ment	PO-7 Life Long Learni ng	PSO - 1	PSO - 2	PSO - 3		
CO1	2	3	1		2	2	3	2	2			
CO2					1	2	2	1	2	1		
CO3	1	3			2	2	2	1	1	1		
CO4					2	3	2	1				
CO5	2				2	3	3	1				
Legends:	Legends: - High:03, Medium:02, Low:01, No Mapping:											

Course Outco mes (COs)	Programı CIVIL E	Programme Outcomes (POs) CIVIL ENGINEERING										
	PO-1 Basic and Discipli ne Specifi c Knowle dge	PO-2 Proble m Analy sis	PO-3 Design/ Developme nt of Solutions	PO-4 Engineeri ng Tools	PO-5 Engineerin g Practices for Society, Sustainabi lity and Environme nt	PO-6 Project Managem ent	PO-7 Life Long Learni ng	PSO - 1	PSO - 2	PSO - 3		
CO1	2	3	1	-	2	2	3	1	2	1		
CO2		-	~~~/	25-17-	1	2	2	1	2	1		
CO3	1	3	-	· /	2	2	2	1	2	1		
CO4		100	/ -	D.F.C.	2	3	2	1	2			
CO5	2				2	3	3	1	2			
Legends:	- High:03,	Medium:0	2, Low:01, N	o Mapping: -	- 1		1					

Course	Program MECHA	•	Programme Specific Outcomes (PSOs)						
Outcom es (COs)	PO-1 Basic and Discipline Specific Knowledg e	PO-2 Proble M Analy sis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineerin g Practices for Society, Sustainabil ity and Environment	PO-6 Project Manageme nt	PO-7 Life Long Learning	PSO -1	PSO - 2
CO1	2	3	1		2	2	3		1
CO2					1	2	2		
CO3	1	3			2	2	2	2	
CO4					2	3	2	2	1
CO5	2				2	3	3	2	1
Legends:	- High:03,]	Medium	:02, Low:01, N	o Mapping:	-			•	

Communication Skill (HU23501)

Government Polytechnic, Mumbai

Course Outco mes (COs)	Program COMPUT	ne Outco FER ENG	mes SINEERING					Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analy sis	PO-3 Design/ Developmen t of Solutions	PO-4 Engineerin g Tools	PO-5 Engineerin g Practices for Society, Sustainabi lity and Environment	PO-6 Project Managemen t	PO-7 Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CO1	2	3	1	10 - 31.	2	2	3	1	2	1
CO2			(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		1	2	2	1	2	1
CO3	1	3	-//	2 - C	2	2	2	1	2	1
CO4			//-		2	3	2		2	
CO5	2	-	/ - :	-10	2	3	3		2	

Course Outco	Programr INFORM	Programme Outcomes (POs) INFORMATION TECHNOLOGY								
mes (COs)	PO-1 Basic and Disciplin e Specific Knowle dge	PO-2 Proble m Analy sis	PO-3 Design/ Developme nt of Solutions	PO-4 Engineeri ng Tools	PO-5 Engineerin g Practices for Society, Sustainabi lity and Environme nt	PO-6 Project Managem ent	PO-7 Life Long Learni ng	PSO - 1	PSO - 2	PSO - 3
CO1	2	3	1		2	2	3	2	1	1
CO2					1	2	2	2	1	1
CO3	1	3			2	2	2	1		2
CO4					2	3	2	1		
CO5	2				2	3	3	1		
Legends:	- High:03, I	Medium:0	2, Low:01, N	o Mapping: -	-	•				

Communication Skill (HU23501)

(Approved copy)

Government Polytechnic, Mumbai

Course	Program INSTRU	Programme Outcomes (POs) INSTRUMENTATION ENGINEERING								
Outcomes (COs)	PO-1 Basic and Discipline Specific Knowledg e	PO-2 Proble m Analy sis	PO-3 Design/ Developm ent of Solutions	PO-4 Engineerin g Tools	PO-5 Engineering Practices for Society, Sustainabili ty and Environment	PO-6 Project Managem ent	PO-7 Life Long Learni ng	PSO - 1	PSO - 2	
CO1					1	2	2	1	1	
CO2	1	3	-		2	2	2			
CO3			1		2	3	2		1	
CO4	2	-		15-10	2	3	3		2	
CO5	3	3	3	3	3	3	3		1	
Legends: - H	ligh:03, Me	dium:02,	Low:01, No	Mapping: -	5. IX.	11	2	•		

Course Outcom es (COs)	Programme Outcomes (POs) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING								Programme Specific Outcomes (PSOs)	
	PO-1 Basic and Discipli ne Specific Knowle dge	PO-2 Proble m Analy sis	PO-3 Design/ Develop ment of Solutions	PO-4 Enginee ring Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO -1	PSO -2	
CO1	2	3	1		2	2	3	3	3	
CO2					1	2	2			
CO3	1	3			2	2	2	2	2	
CO4					2	3	2		2	
CO5	2				2	3	3	2	2	
Legends:	- High:03, N	/ledium:02	2, Low:01, N	lo Mapping	g:					

Course Outco m es (COs)	Program RUBBEF	me Outco & TECHN	mes (POs) OLOGY					Programme Specific Outcomes (PSOs)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO -1	PSO -2
	Basic and Discipli ne Specific Knowle dge	Proble m Analy sis	Design/ Developm ent of Solutions	Engineeri ng Tools	Engineerin g Practices for Society, Sustainabil ity and Environme nt	Project Manage ment	Life Long Learnin g		
C01	2	3			2	2	3	1	3
CO2				1000	1	2	2		
CO3	1	3	274		2	2	2	1	2
CO4			/ -		2	3	2	1	2
CO5	2		/	-12/2	2	3	3		2
Legends:	: - High:03,	Medium:	02, Low:01, N	No Mapping:				· · · · · · ·	

Legends: - High:03, Medium:02, Low:01, No Mapping:						

Course Outco	Program LEATHE	Programme Outcomes (POs) LEATHER GOODS & FOOTWEAR TECHNOLOGY								
mes (COs)	PO-1 Basic and Discipli ne Specifi c Knowle dge	PO-2 Proble m Analy sis	PO-3 Design/ Developme nt of Solutions	PO-4 Engineeri ng Tools	PO-5 Engineerin g Practices for Society, Sustainabi lity and Environme nt	PO-6 Project Managem ent	PO-7 Life Long Learni ng	PSO - 1	PSO - 2	PSO - 3
CO1	2	3	1		2	2	3	1		2
CO2					1	2	2	1		2
CO3	1	3			2	2	2	1	1	2
CO4					2	3	2	1		2
CO5	2				2	3	3	1		2
Legends:	- High:03,	Medium:0	2, Low:01, N	o Mapping: -	. _	1				

Course Outco	Programm LEATHER	e Outco X TECH	mes (POs) NOLOGY					Programme Specific Outcomes (PSOs)		
mes (COs)	PO-1 Basic and Disciplin e Specific Knowle dge	PO-2 Prob le m Anal y sis	PO-3 Design/ Developm ent of Solutions	PO-4 Engineeri ng Tools	PO-5 Engineerin g gPractices for Society, Sustainabi lity and Environment	PO-6 Project Managem ent	PO-7 Life Long Learni ng	PSO - 1	PS O - 2	PS O - 3
CO1	2	3	1		2	2	3			
CO2			(()	15.55	1	2	2			
CO3	1	3			2	2	2			
CO4			/		2	3	2			
CO5	2	-	/ - >	-1-12	2	3	3			
Legends:	- High:03, M	edium:0	02, Low:01, N	lo Mapping:			199		1	1

IX. Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Sanjay Kumar, Pushpa Lata	Communication Skills	Oxford University Press
2	Kumar, E. Suresh, Sreehari, P Savitri	Effective English with CD	Pearson Education
3	Gnanamurli	English Grammar at a Glance	S. Chand
4	CBSE	English Communicative (class X)	Golden
5	Dr. Anjana Tiwari	Communication Skills in English	Khanna Publishers, New Delhi

X. Learning Websites & Portals

Sr. No	Link / Portal	Description
1	https://www.britishcouncil.in/english/learn-online	Website link is given to refer Unit 1
2		Refer this website for
	Vocabulary.com	interactive vocabulary quizzes, word lists
2		It offers audio examples and
5	International Phonetic Association (IPA) Website	charts to help understand and transcribe sounds
4		For constructing effective
4	grammarly.com/blog	paragraphs and improving clarity

Communication Skill (HU23501)

P-23 Scheme

Science and Humanities Department

5	www.newagegolden.com	Refer this website for speech writing, diary entry and paragraph writing
6	https://infyspringboard.onwingspan.com/	Refer this website for Course Business Communication Excellence to complete Basic level and Level1

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization		
1	Mrs. Sharmishta S. Kulkarni	Lecturer in English	Government Polytechnic Pune		
2	Mr. B.M. Pande	Lecturer in English	Shri. Bhagubai Mafatlal Polytechnic, Mumbai.		
3	Mrs. K. S. Pawar	Lecturer in English	Government Polytechnic Mumbai		
4	Ms. N. N. Dhake	Lecturer in English	Government Polytechnic Mumbai		

Coordinator, Curriculum Development Department of Science & Humanities Head of Department Department of Science & Humanities

Incharge, Curriculum Development Cell

Principal

Government Polytechnic, Mumbai

Programme: Diploma in EE/IS/EC													
Course Code: SC23101 Course Title: Basic Physics													
Compulsory / Optional: Compulsory													
Learning Scheme and Credits						Ass	essment	Schen	1e				
		0						SA-TH	SA-TH (2.20 FA-		SA-		
CL	TL	LL	SLH	NLH	Credits	FA	-TH	(2.30 Hrs.)	PR	PR	OR	SLA	Total
3	-	2	1	6	3	20	20	60	25	25#	-	25	175

Total IKS Hrs. for course: 2hrs.

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

- 1. FA-TH represents addition of two-20 marks class tests conducted during the semester.
- 2. FA-PR represents tutorial/practical term work of 25 Marks
- 3. SA-TH represents the end term theory examination of 60 Marks
- 4. SA-PR represents the end term practical examination of 25 Marks
- 5. SLA represents self-learning Assessment of 25 Marks

I. 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.

II. Industry / Employer Expected Outcome

Physics is a fundamental science that plays a crucial role in various industries and has numerous outcomes that benefit society: Apply principles of physics to solve broad based relevant engineering problems.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Classify 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	Understand photoelectricity, LASER, Semiconductor and gain its significance in modern science
	and technology.
CO4	Apply basic properties of light to solve engineering problems.
CO5	Identify properties such as elasticity and viscosity with their engineering applications

Course Content Details:

Cour	rse Content Details:	LYTECHNI
Unit No.	Theory Learning Outcomes (TLO's)aligned to CO's	Topics / Sub-topics
1	 TLO1.1 Explain physical quantities and its types with examples. TLO1.2 Differentiate between scalar and vector quantities with examples. TLO1.3 Apply dimensional analysis to check correctness of equation and conversion of units in different systems. TLO1.4 Estimate the errors in the measurement for the give problem. TLO1.5 Explain the working of ancient astronomical instruments to measure distance, time and hour angle 	 Unit-I Units and Measurements 1.1 Fundamental Physical quantities, examples, derived physical quantities, examples. 1.2 Scalar and Vector Physical Quantities. 1.3 Definition and requirements of unit System of units, CGS, MKS and SI units, Dimensions, dimensional formula, Rules to write the unit and conventions of units and Significant figures, Rules to write significant figures 1.4 Error – Definition, types of errors and estimation of errors. 1.5 Ancient astronomical instruments: Chakra, Dhanyata, Yasti and Phalak yantra, Numerical
Cour	se Outcome: CO1 Teachin	g Hours: 5hrs Marks: 8
2	 TLO2.1 Differentiate between velocity and speed. Identify changes in motion that produce acceleration. Able to calculate speed, velocity and acceleration of an object, analytically, Classify acceleration as positive, negative, and zero. TLO2.2 Identify different periodic motion with examples such as oscillatory motion, Vibratory motion, circular motion. TLO2.3 Explain angular motion with 	 Unit -II 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

Govern	nment Poly	vtechnic, Mumbai	Science and Humanities Department				
		equation of angular motion, explain	motion, Radius vector, linear velocity, Angular				
		relation between linear velocity and	velocity, Angular acceleration,				
		angular Velocity, understand the	b) Relation between linear velocity and angular				
		concept of centripetal and	Velocity(derivation), Radial or centripetal				
		centrifugal force	acceleration. Three equations of motion (no				
	TL024	Describe real-life situations that	derivations) Centrinetal and Centrifugal force				
		illustrate each of Newton's laws of	examples and applications				
		mation	2.4 Laws of Motion and it's applications				
		Explain the angient theory of	2.5 Ancient theory of Gravitation and laws of motion				
	1102.3	explain the ancient theory of	2.5 Ancient theory of Gravitation and laws of motion.				
		gravitation and laws of motion.	Numericai.				
Cour	se Outcor	ne: CO2 Teaching H	Hours : 10hrs Marks: 16				
Cour		ici e e e e e e e e e e e e e e e e e e					
	TLO3.1	Understand the concept of quantum	Unit-III Modern Physics				
		theory of light,	3.1 Photo Electricity				
	TLO3.2	Describe a photoelectric-effect	3.1.1 Concept of quantum theory of light,				
		experiment.	3.1.2 photoelectric effect				
3	TLO3.3	Calculate KE of photoelectrons	3.1.3 Einstein's Photoelectric equation				
		using Einstein's equation	3.1.4 Characteristics of photoelectric effect,				
	TLO3.4	Explain characteristics of	3.1.5 Application of photo electric effect Numerical				
	12000	nhotoelectric effect	3.2 LASER				
	TL 03 5	Explain applications of	3.2.1 LASER introduction				
	1105.5	photoelectric effect	2.2.2 Droportion of locar Applications of LASED				
		Understand the fundamentals	2.2. C i l t D i				
	1105.0	of logor	3.3 Semiconductor Physics				
		Evaluation the approximation and	3.3.1 Conductors, Insulators and Semiconductors				
	1103./	Explain the properties and	3.3.2 Energy bands, intrinsic and extrinsic				
	TLORA	applications of LASER.	semiconductors				
	TLO3.8	Distinguish between conductors,	3.3.3 Minority and majority charge carriers				
		semiconductors and insulators on	3.3.4 p-n junction diode, Depletion layer I-V				
		the basis of energy bands.	characteristics of p-n junction				
	TLO3.9	Explain the I-V characteristics and	3.3.5 static and dynamic resistance				
		applications of p-n junction diode	3.3.6 Applications of p-n junction diode				
Cour	esa Outaar	no: CO3 Touching	Hours 11 hrs Marks 14				
		ne. CO5 Teaching					
	TLO4.1	Explain refraction and reflection	Unit-IV Optics and Optical Fiber				
		of light.	4.1 Optics:				
	TLO4.2	Estimate refractive index of	4.1.1 Revision of reflection and refraction of light.				
4		material of prism.	4.1.2 Laws of refraction, Snell's law.				
	TLO4.3	Explain the phenomenon of total	4.1.3 Determination of refractive index.				
		internal reflection.	4.1.4 Dispersion, dispersive power. Prism formula				
	TLO4.4	Describe the workings and uses of	(derivation)				
		fiber optics.	4.1.5 Total internal reflection. Numerical				
	1	men opnes.					

(Approved copy)

			4.2 Op	tical Fiber:
			4.2.1	Principle of propagation of light through optical
				fiber.
			4.2.2	Structure of optical fiber.
			4.2.3	Applications.
			4.2.4	Difference between optical fiber cable and electric
				cable wire
Cou	Irse Outcor	ne: CO4 Teaching	Hours :8	Shrs Marks: 8
	TLO5 1	Calculate elastic constants and	Unit-V	General Properties of Matter
	12000	state their significance	51 El	asticity
	TLO5.2	Distinguish between	5.1.1	Deformation, deforming force, internal restoring
	TI 05 2	elasticity, viscosity		force, Elastic, plastic and rigid substances, their
	TL05.3	Classify types of flow of fluid	21/2	examples.
_	TL05.4	Explain the significance of	5.1.2	Definition of elasticity, Plasticity, rigidity, stress,
5	1205.1	Reynold's number.	512	strain and its types.
	TLO5.5	Identify applications of Elasticity	5.1.4	Stress versus Strain diagram, vield point, breaking
		and viscosity	0.111	point
			5.1.5	Definition Young's Modulus, bulk
				modulus and modulus of rigidity
				relation among them.
			5.1.6	Factor of safety, breaking stress, ultimate stress
			518	Numerical
			5.2 Vi	scosity:
			5.2.1	Concept and Definition of viscosity, velocity
				gradient.
			5.2.2	Newton's law of viscosity, Co-efficient of viscosity,
			523	Stoke's law terminal velocity derivation of Stoke's
			5.2.5	formula.
			5.2.4	Streamline flow, turbulent flow, critical velocity, examples
			5.2.5	Reynold's number and its significance.
			5.2.6	Applications of viscosity, Numerical
Cour	se Outcom	e CO5 Teachir	o Hours	x ·11hrs Marks· 14
Cours			-5 110ul 3	

Government Polytechnic, MumbaiScienceIV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr	Practical / Tutorial / Laboratory	Laboratory Experiment / Practical	Number	Relevant
No	Learning Outcome (LLO)	Titles / Tutorial Titles	of hrs.	COs
1	 LLO1.1 Use of measuring instruments LLO1.2 Find the least count and range of the instruments. LLO1.3 Interpretation of graph and use of scientific calculator 	To know your Physics laboratory and Use of Scientific Calculator	2	CO1
2	LLO2.1 Use Vernier caliper to Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO2.2 Estimate the errors in measurement.	To measure the dimensions of given objects and to determine their volume using Vernier caliper	2	CO1
3	LLO3.1 Identify types of motionLLO3.2 Determine the value of acceleration due to gravity.	To determine Acceleration due to gravity by simple pendulum	2	CO2
4	LLO4.1 Explain photoelectric effect LLO4.2 Demonstrate the IV characteristics of photoelectric effect.	To study IV characteristic of photoelectric cell.	2	CO3
5	LLO5.1 Explain refraction of light. LLO5.2 Determine refractive index of a given prism	To determine refractive index of a prism by pin method	2	CO4
6	LLO6.1 Explain Elastic moduli.LLO6.2 Understand the relation betweenLLO6.3 Young's modulus, Bulk modulus and rigidity modulus of elasticity	To determine Elastic moduli of a given wire by using Searle's apparatus.	2	CO5
7	 LLO7.1 Use Micrometer Screw gauge to: Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO7.2 Estimate the errors in measurement. 	To measure the dimensions of given objects and to determine their volume using micrometer screw gauge.	2	CO1
8	LLO8.1 Identify type of motion LLO8.2 Calculate the stiffness constant	To determine stiffness constant by using helical spring	2	CO2
9	LLO9.1 Study the types of motion. LLO9.2 Use of projectile motion in sport.	To study projectile motion	2	CO2
10	 LLO10.1 Use P -N junction diode to draw forward bias and reverse bias I-V characteristics LLO10.2 Find out static and dynamic resistance of given P N junction 	Determination of static and dynamic resistance of given P-N junction diode	2	CO3
11	diode LLO11.1 Study properties of liquid LLO11.2 Calculate coefficient of viscosity of liquid	To determine coefficient of viscosity of liquid by Stokes' method	2	CO5
12	LLO12.1 Study the properties of light TIR LLO12.2 Determine the critical angle	To study total internal reflection and to determine the critical angle.	2	CO4

Government Polytechnic, Mumbai

13	LLO13.1 Demonstrate on spectrometer device	Demonstration on spectrometer	2	CO4
14	LLO14.1 Identify properties of LASER	Experiments on LASER	2	CO3
15	LLO15.1 Define unit and classify into different types of units	Showing Video on different applications related to units,	2	CO1

Note: 10 to 12 experiments should be performed in a term for completion of TW (All COs should be covered compulsorily).

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning): (Minimum 10 Assignments)

- 1. Convert the units of a given physical quantity from one system of units to another
- 2. Measure room temperature of hot baths / bodies by using mercury thermometer and convert it into different units.
- 3. Prepare a chart to summarize units and measurements.
- 4. Use a digital vernier caliper and micrometer screw gauge for measurements. (Lab- based).
- 5. Make a paper scale of least count e.g., 0.01 cm, 0.2cm, 0.5cm.
- 6. What is the difference between speed and velocity?
- 7. What is motion? Describe Straight line motion.
- 8. Explain Average speed and Average velocity.
- 9. Write in detail about your experience of various, types of motion while riding a bicycle on a road.
- 10. Identify the types of motion.
 - a) Movement of the earth around the sun:
 - b) Movement of a ceiling fan:
 - c) A meteor falling from the sky:
 - d) A rocket launched from the ground:
 - e) A fish swimming in water:
 - f) The plucked string of a sitar:
- 11. For the photoelectric effect, explain what happens (and why)
 - a) To the photocurrent as the light intensity increases.
 - b) To the photocurrent as the frequency of the light is increased.
 - c) To the speed of the photoelectrons as the radiation intensity increases.
- 12. Make a ppt on applications of LASER.
- 13. Applications of semiconductors in civil, mechanical, electrical engineering etc.
- 14. Applications of optical fibers in civil, mechanical, electrical engineering etc.
- 15. Prepare PPT on application of Nanotechnology in Electronics, Automobile, Medical, Textile, Cosmetics, Environmental, Space and Defense.
- 16. To demonstrate T.I.R and working of optical fiber (lab based)
- 17. Compare elastic body and plastic body (lab based).
- 18. Write the practical applications of Elasticity.
- 19. Write the practical applications of Viscosity.
- 20. Compare streamline and turbulent flow with examples.

(Approved copy)

VI. Specification Table:

Unit	Topia Titla	Distribution of Theory Marks					
No	Topic Title	R Level	U Level	A Level	Total Marks		
1	Units and Measurements	2	4	2	8		
2	Motions	4	4	8	16		
3	Modern physics	4	4	6	14		
4	Optics and Optical fiber	2	4	2	8		
5	General properties of matter	2	4	8	14		
	Total	14	20	26	60		

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment on process and product related performance indicators (25 marks).

Note: Rubric - Each Practical Carries.

- 1) 02 Marks for present, 00 Marks for Absent & 01 Marks for extra practical.
- 2) 04 Marks for Discipline & involvement in the practical.
- 3) 04 Marks for Accuracy for result & Neat clean presentation.

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Laboratory performance (25 marks)

VIII. Suggested COs - POs Matrix Form (Electrical Engineering)

Course (PSOs)	Programme Specific Outcomes (PSOs)			
Outcome s (COs)PO-1PO-2PO-3PO-4PO-5PO-6PO-7LifeBasic and DisciplineProblemDesign/ AnalysisEngineEngineering eringProjectLifeLongPSOPSOSpecific Knowledgeent of SolutionsToolsSociety, 	O 3			
CO1 3 2 2 1 1	1			
CO2 3 1				
CO3 3 1 1 1 1	1			
CO4 3 2 1 2 1 1	1			
CO5 3 2 2 1	1			

Course	Programme Outcomes (POs)									
S (COs)	PO-1 Basic and Discipli ne Specific Knowle dge	PO-2 Proble m Analys is	PO-3 Design/ Developm ent of Solutions	PO-4 Engineerin g Tools	PO-5 Engineerin g Practices for Society, Sustainabili ty and Environm ent	PO-6 Project Manageme nt	PO-7 Life Lon g Learnin g	PSO - 1	PSO - 2	
CO1	3			2			2	1	1	
CO2	3			-			1	1		
CO3	3			1	1		1	1	1	
CO4	3		//	2	12	97/-	2	1	1	
CO5	3	 Madiumu		2 La Manningu	(K) X	<u>-</u>	2	1	1	
Legends	: - High:03,	Medium:	02, Low:01, 1	NO Mapping:						

Suggested COs – POs Matrix Form (Instrumentation Engineering)

Suggested COs - POs Matrix Form (Electronics Engineering)

Course	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
S (COs)	PO-1 Basic and Discipli ne Specific Knowle dge	PO-2 Proble m Analys is	PO-3 Design/ Developm ent of Solutions	PO-4 Engineerin g Tools	PO-5 Engineerin g Practices for Society, Sustainabili ty and Environm ent	PO-6 Project Manageme nt	PO-7 Life Lon g Learnin g	PSO - 1	PSO - 2	PSO - 3		
CO1	3			2			2	2	1	1		
CO2	3						1	1		1		
CO3	3				1		1	1	1	1		
CO4	3			2	1		2	2	1	1		
CO5	3		2	2			2	1	1	2		
Legends	: - High:03,	Medium:	02, Low:01, 1	No Mapping:								

Government Polytechnic, Mumbai IX. Suggested Learning Materials / Books

Sr.	Author	Title	Publisher
No			
1	R K Gaur &; S L Gupta	Engineering Physics	Dhanpat Rai Pub.
2	Prof. Arthur Beiser	Applied Physics	Tata McGraw hill Pub.
3	D K Bhattacharya	Engineering Physics	Oxford University press
4	NCERT / MSBSHSE	Physics 1 & 2	NCERT/MSBSHSE
5	Halliday & Resnick Wiley	Physics Vol 1 & 2	Wiley India
6	Brijlal & Subrahmanyam	Principle of physics	S. CHAND & COMPANY
7	R K Gaur & amp; S L Gupta.	Engineering Physics	Dhanpat Rai Pub.

X. Learning Websites & Portals

Sr. No	Link / Portal	Description
1	https://sunitathorat1310.wixsite.com/website-1	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
2	www.physicsclassroom.com	Concept of basic physics
3	www.physics.org	Concept of basic physics
4	www.physics.brown.edu	Concept of basic physics
5	www.amazon.com/Basic-Physics	Concept of basic physics
6	http://scienceworld.wolfram.com/physics/	Concept of basic physics
7	http://en.wikipedia.org/wiki	Concept of basic physics
8	http://hyperphysics.phy-astr.gsu.edu/hbase	Concept of basic physics
9	www.msu.edu/~brechtjo/physics	Concept of basic physics
10	www.answers.com/topic/list-of-basic-physics-topics	Concept of basic physics
11	www.answers.com/topic	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
12	www.vlab.amrita.edu	All Experiments video
13	www.olabs.edu.in	All Experiments video

Basic Physics (SC23101)

Government Polytechnic, Mumbai

Science and Humanities Department

14	https://praxilabs.com/en/	All Experiments video
15	www.phet.colorado.edu	Simulation of Topics

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Y. A. Mahajan	Selection grade Lecturer in physics	Bhausaheb Vartak Polytechnic, Vasai
2	Mr. S. S. Salve	Senior Lecturer in physics	S.B.M. Polytechnic, Vile -Parle
3	Mrs. B. J. Chaudhari	Lecturer in physics	Government Polytechnic, Thane
4	Mrs. S. A. Thorat	Lecturer in physics	Government Polytechnic, Mumbai

Coordinator Curriculum Development, Department of Science & Humanities

Head of Department Department of Science & Humanities

I/C, Curriculum Development Cell

Principal

Progra	Programme : Diploma in EE / EC / IS / CE / ME / CO / IF/AI & ML / RT															
Course Code: SC23501				Course Title : Basic Mathematics												
Compulsory / Optional: Compulsory																
Learning Scheme and Credits				Assessment Scheme												
CI	TL	LL		ті іі		SI U	NI H Credit	Cradits	FA	-TH	SA-TH	FA-	S	A	ST A	Total
CL			SLH		Creuits	T1	T2	(2:30 Hrs.)	PR	PR	OR	SLA	TUTAL			
4	2		2	8	4	20	20	60	25			25	150			

Total IKS Hrs. for course: 06 Hrs

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination Note:

- 1. FA-TH represents addition of two-20 marks class tests conducted during the semester.
- 2. FA-PR represents tutorial/practical term work of 25 Marks.
- 3. SLA represents self-learning Assessment of 25 Marks.
- 4. SA-TH represents the end term theory examination of 60 Marks.

I. Rationale

Basic Mathematics plays a crucial role in diploma programme as it fosters the development of critical thinking skills, enhances quantitative literacy, prepares students for higher education, promotes problem-solving abilities, cultivates logical and abstract thinking and fosters mathematical literacy. By engaging with Mathematics, students acquire logical reasoning, problem-solving techniques and analytical thinking, which are valuable for lifelong learning and professional growth. Calculus is a branch of Mathematics that calculates how matter, particles and heavenly bodies actually move. Derivatives are useful to find maxima and minima of the function, velocity and acceleration are also useful for many engineering optimization problems. Statistics can be defined as a type of mathematical analysis which involves the method of collecting and analyzing data and then summing up the data into a numerical form for a given set of factual data or real-world observations. It equips individuals with the ability to interpret numerical information, make informed decisions and navigate real-world situations. Moreover, Mathematics provides a foundation for further studies in various disciplines and prepares students to tackle complex challenges. By exploring abstract concepts and logical structures, students develop their ability to reason, make connections, and approach problems with clarity and precision. Furthermore, studying Mathematics helps students appreciate the historical and cultural significance of Mathematics and its applications in diverse fields, thereby fostering mathematical literacy and a deeper understanding of the world. Hence the course provides the insight to analyze engineering problems scientifically using logarithms, matrices, trigonometry, straight line, differential calculus and statistics. By incorporating these topics, students comprehend to approach engineering problems from a mathematical perspective, enabling them to devise efficient and effective solutions and this leads to preparing Diploma graduates well-rounded, adaptable and capable of making significant contributions to the branch-specific problems.

II. Industry / Employer Expected Outcome

Apply the concept of Mathematics to solve industry-based technology problems.

Government Polytechnic, Mumbai **III.Course Outcomes:** Students will be able to achieve & demonstrate the following COs on completion of course based learning.

CO1	Apply the concepts of algebra to solve engineering (discipline) related problems.
CO2	Utilize trigonometry to solve branch specific engineering problems.
CO3	Solve area specific engineering problems under given conditions of straight lines.
CO4	Apply differential calculus to solve discipline specific problems.
CO5	Use techniques and methods of statistics to crack discipline specific problems.

Course Content Details:

Unit	Theory Learning Outcomes	Topics / Sub-topics
No.	(TLO's)aligned to CO's.	
1	 TLO1.1 Solve the given simple problem based on laws of logarithm. TLO1.2 Solve given system of linear equations using matrix inversion method. TLO1.3 Obtain the proper and improper partial fraction for the given simple rational function. TLO1.4 Solve simultaneous equations by using concept given in Ancient Indian Mathematics 	 Unit - I Algebra 1.1 Logarithm: Concept and laws of logarithm. 1.2 Matrices: Matrices, algebra of matrices, transpose, value of determinant of matrix of order 3x3, adjoint and inverse of matrices. 1.3 Matrices: Solution of simultaneous equations by matrix inversion method. 1.4 Partial Fractions: Types of partial fraction based on nature of factors and related Problems. 1.5 Algebra in Indian Knowledge System: Solution of simultaneous equations).
	Course Outcome : CO1 Teach	ing Hours :12 hrs. Marks: 12
2	 TLO2.1 Apply the concept of Compound angle, allied angle and multiple angles to solve the given simple engineering problem(s). TLO2.2 Apply the concept of Sub- multiple angles to solve the given simple engineering related problem(s). TLO2.3 Apply concept of factorization and de- factorization formulae to solve the given simple engineering problem(s). TLO2.4 Investigate given simple problems by utilizing inverse trigonometric ratios. TLO2.5 Use concept given in Ancient Indian Mathematics for trigonometry to solve given problems. 	 Unit - II Trigonometry 2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), submultiples angles. (without proof) 2.2 Factorization and De factorization formulae. (without proof). 2.3 Inverse Trigonometric Ratios and related problems. 2.4 Principle values and relation between trigonometric and inverse trigonometric ratios. 2.5 Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India. 2.6 Indian Trigonometry: Basic Indian Trigonometry-Introduction and Terminology. (From Ancient Beginnings to Nilakantha). 2.7 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulabasutras.
	Course Outcome : CO2 Teac	hing Hours :16 hrs. Marks: 12

Basic Mathematics (SC23501)

(Approved Copy)

Gove	<u>rnment Po</u>	lytechnic, Mumbai		Science and	l Humanities department
3	TLO3.1	Calculate angle between given	Unit	- III Straight Line	
		two straight lines.	3.1	Straight line and slope of straight	line: Angle
	TLO3.2	Formulate equation of straight		between two lines, Condition of p	barallel and
		lines related to given		perpendicular lines.	
		engineering problems.	3.2	Various forms of straight lines: Sl	ope point form,
	TL03.3	Identify perpendicular distance		two-point form, Double intercept	form, General
		from the given point to the line.		form.	·
	TLO3.4	Calculate perpendicular distance	3.3	Perpendicular distance from a poi	nt on the line.
		between the given two parallel	3.4	Perpendicular distance between tw	vo parallel lines.
		lines.	3.5	Geometry in Sulabasutras in India	an Knowledge System
	TL03.5	Use geometry given in		(construction of square, circling the	he square)(Indian
		Sulabasutras to solve the given		Mathematics).	
		problems.			
		Course Outcome: CO3	Т	eaching Hours :6 hrs.	Marks: 06
	TLO4.1	Solve the given simple problems	Unit	- IV Differential Calculus	
		based on functions.	41	Functions and Limits: Concept of	function and simple
	1L04.2	solve the given simple	7.1	examples.	runction and simple
		differentiation	4.2	Functions and Limits: Concept of	limits without examples.
		Obtain the derivatives of	4.3	Derivatives: Rules of derivatives	such as sum,
4	1104.5	composite implicit parametric	/	Product, Quotient of functions.	
		inverse logarithmic	4.4	Derivatives: Derivative of compos	site functions (chain
		exponential functions	1	Rule), implicit and parametric fun	nctions.
	TL04.4	Apply the concept of	4.5	Derivatives: Derivatives of invers	e, logarithmic
	120	differentiation to find given		and exponential functions.	
		equation of tangent and normal.	4.6	Applications of derivative: Second	d order derivative
	TLO4.5	Apply the concept of		without examples, Equation of tar	ngent and normal,
		differentiation to calculate	/	Maxima and minima, Radius of cu	urvature.
		maxima, minima and radius of	4.7	Calculus in Indian Knowledge Sy	stem: The Discovery
		curvature for given function.		of Calculus by Indian Astronomer	rs (Indian
	TLO4.6	Familiar with concept of calculus given in Indian Mathematics	10	Mathematics).	
	Course	Outcome : CO1	ahina	Houng 16 hus	Manka 19
	Course	Outcome : CO4 Tea	ichnig		IVIAI KS. 10
	TL05.1	Obtain the range and coefficient	Unit	- V Statistics	
		ungrouped data.	5.1	Range, coefficient of range of disc	crete and grouped data.
	TL05.2	Calculate mean and standard	5.2	Mean deviation and standard devi	ation from mean of
=		deviation of ungrouped and		grouped and ungrouped data.	
פ		simple engineering problem(s).	5.3	Variance and coefficient of varian	ce.
	TL05.3	Determine the variance and	5.4	Comparison of two sets of observa-	ation.
	coefficient of variance of giv				
		grouped and ungrouped data.			
	TL05.4	Justify the consistency of given			
		simple sets of data.			
	Course	Outcome : CO5 Tea	aching	Hours :10 hrs	Marks: 12
			3		

S n	Draatiaa	1/Tutorial/Laboratory	Laboratory Experiment / Dreatical	Number	Dala
No	Practical / Tutorial / Laboratory Learning Outcome (LLO)		Titles / Tutorial Titles	of hrs.	vant COs
1	LLO1.1	Solve simple problems of Logarithms based on given applications.	Solve simple problems of Logarithms based on given applications.	2	CO1
2	LLO2.1	Solve elementary problems on Algebra of matrices for branch specific engineering related applications.	Solve elementary problems on Algebra of matrices for branch specific engineering related applications.	2	CO1
3	LLO3.1	Apply the concept of matrix to solve engineering problems.	Solve solution of Simultaneous Equation using inversion method.	2	CO1
4	LLO4.1	Apply the concept of matrix to solve engineering problems.	Apply Matrix Inversion method to determine currents through various branches of given electrical networks.	2	CO1
5	LLO5.1	Apply the concept of matrix to solve engineering problems.	Determine inverse of a non-singular matrix by using open-source software.	2	CO1
6	LLO6.1	Apply the concept of partial fraction to solve engineering problems.	Resolve into partial fraction using linear non- repeated, repeated, and irreducible quadratic factors.	2	CO1
7	LLO7.1	Solve problems on Compound, Allied, multiple and sub multiple angles for related shapes.	Solve problems on Compound, Allied, multiple and submultiple angles for related shapes.	2	CO2
8	LLO8.1	Utilize the concept of trigonometry to solve engineering problems.	Practice problems on factorization and de factorization.	2	CO2
9	LLO9.1	Utilize the concept of trigonometry to solve engineering problems.	Solve problems on inverse trigonometric ratios based on applications.	2	CO2
10	LLO10.1	Solve branch specific Engineering problems under given conditions of straight lines.	Practice problems on equation of straight lines using different forms.	2	CO3
11	LLO11.1	Solve branch specific engineering problems under given conditions of straight lines.	Solve problems on perpendicular distance, distance between two parallel lines and angle between two lines.	2	CO3
12	LLO12.1	Solve branch specific engineering problems under given conditions of straight lines.	Use given form of straight line to calculate the speed, distance and time of moving object.	2	CO3
13	LLO13.1	Apply the concept of derivative to solve engineering problems.	Solve problems to find derivatives of implicit function and parametric function.	2	CO4
14	LLO <u>14.1</u>	Apply the concept of derivative to solve engineering problems.	Solve problems to find derivative of logarithmic and exponential functions for engineering applications.	2	CO4
15	LLO15.1	Apply the concept of equation of tangent and normal to solve engineering problems.	Solve problems based on finding equation of tangent and normal for engg. applications.	2	CO4

IV	Laboratory Learnin	σ Outcome and	l Aligned Pra	etical / Tutoria	Experiences
1 .	Laboratory Learnin	g Outcome and	i Anglicu i ra	ictical / I utoria	Experiences.

Government Polytechnic, Mumbai			Science and Humar	ities depart	ment
16 L	LLO16.1 Apply the concept of maxima, minima and radius of curvature		Solve problems based on finding maxima, minima of function and radius of curvature at	2	CO4
		to solve engineering problems.	a given point for engineering applications.		
17 L	LO17.1	Apply the concept of equation of tangent and normal to solve engineering problems.	Use the concept of tangent and normal to solve the given problem of Engineering Drawing.	2	CO4
18 L	LO18.1	Apply the concept of Maxima and Minima to solve engineering problems.	Use the concept of Maxima and Minima to obtain optimum value for given engineering problem.	2	CO4
19 L	LO19.1	Apply the concept of radius of curvature to solve engineering problems.	Use the concept of radius of curvature to solve given branch specific engineering problem.	2	CO4
20 L	LO20.1	Utilize the concept of derivative to solve engineering problems.	Use the concept of derivative to find the slope of abending curve for given engineering problem.	2	CO4
21 L	LO21.1	Use concept of range and mean deviation to crack branch specific problems.	Solve problems on finding range, coefficient of range and mean deviation for given applications.	2	CO5
22 L	LO22.1	Use concept of standard deviation and coefficient of variance to crack branch specific problems.	Solve problems on standard deviation, coefficient of variation and comparison of two sets.	2	CO5
23 L	LO23.1	Use concept of standard deviation to crack branch specific problems.	Calculate the Standard Deviation for Concrete with the given data for given engineering applications.	2	CO5

Note:

- 1. Take any 10-12 tutorials out of 23 and ensure that all the units are covered.
- 2. Take tutorial in the batch size of 20 to 30 students.
- 3. Give students at least 10 problems to solve in each tutorial.

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

- 1. Collect examples based on real world applications of logarithm and prepare a pdf file.
- 2. Solve the simultaneous system of equation in two variables by Matrix Inversion Method.
- 3. Write down a Mathematical programming using any open-source software to verify the result.
- 4. Collect examples on coding theory using applications of matrices and prepare a pdf file.
- 5. Represent the Graph of Trigonometric function, Logarithmic function on Geogebra and interpret the nature of graph and make a pdf file.
- 6. Measure height of trees in surrounding locations using trigonometry and prepare presentation.
- Find the derivative of y= x^sinx and visualize the graph of the function and its derivative using any open-source software geometrically.
- 8. Find height of room or distance between two pillars by using concept of straight line.
- 9. Collect at least 10 examples based on real world applications of standard deviation/variance.
- 10. Collect at least 10 examples based on real world uses of applications of derivative.

Note: Attempt any 5-7 Assignment, out of the given list.

(Approved Copy)

Government Polytechnic, Mumbai **VI. Specification Table:**

Unit	Torris Title	Distribution of Theory Marks					
No	T opic Title	R Level	U Level	A Level	Total Marks		
1	Algebra	2	4	6	12		
2	Trigonometry	2	4	6	12		
3	Straight Line	2	2	2	6		
4	Differential Calculus	2	8	8	18		
5	Statistics	2	4	6	12		
	Total	10	22	28	60		

VII. Assessment Methodologies/Tools: Formative assessment (Assessment for Learning)

- TH- Progressive /Periodic Test each of 20 Marks
- TL Continuous Assessment of Tutorials for 25 Marks
- SLA Continuous Assessment of Self Learning for 25 Marks

Summative Assessment (Assessment of Learning)

• TH - Term End examination of 60 Marks

VIII. Suggested COs - POs Matrix Form:

Course	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)	
Outcome s (COs)	PO-1 Basic and Discipline Specific Knowledg e	PO-2 Proble m Analysi s	PO-3 Design/ Developme nt of Solutions	PO-4 Engineerin g Tools	PO-5 Engineering Practices for Society, Sustainabilit y and Environmen t	PO-6 Project Manageme nt	PO-7 Life Long Learnin g	PSO- 1	PSO- 2	
CO1	3	1		1		1	1	2	1	
CO2	3	1			1	1	1	2	1	
CO3	3							1	2	
CO4	3	1	1	1		1		2	2	
CO5	3	2	1	1	1	1	1	2	1	
Legends:	- High:03, N	/ledium:0	2, Low:01, No	Mapping:						

Government Polytechnic, Mumbai IX. Suggested Learning Materials / Books

Sr. No	Author	Title	Publisher		
1	Grewal B. S.	Higher Engineering Mathematics	Khanna publication New Delhi , 2013 ISBN:8174091955		
2	Dutta. D	A text book of Engineering Mathematics	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3		
3	Kreysizg, Ervin	Advance Engineering Mathematics	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2		
4	Das H.K.	Advance Engineering Mathematics	S Chand publication New Delhi 2008 ISBN:9788121903455		
5	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Calculus and Its Applications	Addison-Wesley 10th Edition ISBN- 13: 978-0- 321-69433-1		
6	C. S. Seshadri	Studies in the History of Indian Mathematics	Hindustan Book Agency, New Delhi 110016. ISBN978-93-80250-06-9		
7	George Gheverghese Joseph Indian Mathematics Engaging with the World from Ancient Modern Times		World Scientific Publishing Europe Ltd. 57 ISBN978-17-86340-61-0		
8	Deepak Singh	Mathematics-I	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-42-4		
9	Garima Singh	Mathematics-II	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-52-3		
10	Gareth James, Daniela Witten, Trevor Hastie Robert and Tibshirani	An Introduction to Statistical Learning with Applications in R	Springer New York Heidelberg Dordrecht London ISBN 978-1-4614- 7137-0 ISBN 978-1- 4614-7138-7 (eBook)		
11	Gunakar Muley	Sansar Ke Mahan Ganitagya	First Edition, Rajkamal Prakashan, ISBN- 10.8126703571, ISBN-13.978- 8126703579.		
12	T.S. Bhanumurthy	A Modern introduction to Ancient Indian Mathematics	New Age International Private Limited, 1 January2008 ISBN- 10. 812242600X, ISBN- 13. 978- 8122426007		
13	M.P. Trivedi and P.Y. Trivedi	Consider Dimension and Replace Pi	Notion Press; 1st edition (2018), ISBN- 978-1644291795		

X. Learning Websites & Portals

Sr. No	Link /Portal	Description
1	http://nptel.ac.in/courses/106102064/1	Online Learning Initiatives by IITs and IISc
2	www.scilab.org/ -SCI Lab	Signal processing, statistical analysis, imageenhancement.

Govern	ment Polytechnic, Mumbai	Science and Humanities department
3	www.mathworks.com/product/matlab/ -MATLAB	Applications of concepts of Mathematics to coding.
4	Spreadsheet Applications	Use of Microsoft Excel, Apple Numbers, Google Sheets.
5	https://ocw.mit.edu/	MIT Course ware
6	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddH oPig	Concept of Mathematics through video lectures and notes
7	http://ocw.abu.edu.ng/courses/mathematics/	List of Mathematical Courses.
8	https://libguides.furman.edu/oer/subject/mathematics	Open Education Resources (OER) in Mathematics.
9	https://phet.colorado.edu/en/simulations/filter? subjects=math&type=html,prototype	Phet Simulation for Mathematics.
10	https://libguides.cmich.edu/OER/mathematics	Mathematics with OER.

IX. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization		
1	Mrs. Sanchita Datta	Lecturer in Mathematics (Selection Grade)	St. Xavier's Institute of Technology, Mahim		
2	Mr. Abhijit Sadashiv Patil	Lecturer in Mathematics	Government Polytechnic, Mumbai		
3	Mr. Vinod Shantaram Patil	Lecturer in Mathematics	Government Polytechnic, Mumbai		

Coordinator, Curriculum Development, Head of Department Science & Humanities Department

I/C, Curriculum Development Cell

Principal

(Approved Copy)

Programme: Diploma in Instrumentation Engineering (Sandwich Pattern)												
Course Code: IS23101 Course Title: Principles of Measurement												
Compulsory / Optional: Compulsory												
Learning Scheme and Credits Assessment Scheme												
						SA-TH SA-						
CL	TL	LL	SLH	NLH	Credits	FA-TH	(2:30 Hrs.)	PR	PR	OR	SLA	Total
04		04	02	10	05	20 20	60	25	25@		25	175

Total IKS Hrs. for course: --- hrs

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination

Note:

- 1. FA-TH represents addition of two-20 marks class tests conducted during the semester.
- 2. FA-PR represents tutorial/practical term work of 25 Marks.
- 3. SLA represents self-learning Assessment of 25 Marks.
- 4. SA-TH represents the end term theory examination of 60 Marks.
- 5. SA-PR represents the end term Practical examination of 25 Marks

I. Rationale

Instrumentation is defined as the art and science of measurement and control of physical variables within a production or manufacturing area. The physical variables like temperature, pressure, flow rate, level, displacement, force, pH, humidity, and etc. are measured in industries to monitor and control the overall operation of plant. For conversion of these physical quantities into electrical forms, various types of transducers are used. Hence it is essential to study the conversion/ transduction principles. This course mainly deals with study of various transduction principles as well as characteristics of measuring instruments.

II. Industry / Employer Expected Outcome:

The aim of this course is to help the student to achieve the following industry identified outcome through various learning experiences:

- 1. Identify different physical variables used to measure in industries.
- 2. Understand transduction principle of given transducer.

III.Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Define the performance characteristics of measuring instruments.
CO2	Demonstrate the transduction principles of different transducers.
CO3	Explain principles of measurement of temperature.
CO4	Describe principles of measurement of pressure transducers.
CO5	Explain principles of measurement of level transducers & Analytical sensors.
CO6	Describe principles of measurement of flow transducers.

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's)aligned to CO's	Topics / Sub-topics
1	 TLO1.1 Define Measurement and Instrumentation. TLO1.2 Explain Generalized block diagram of Instrumentation system. TLO1.3 Classify different types of Instruments. TLO1.4 Explain different types of static & dynamic characteristics. TLO1.5 Estimate different types of errors in the measurement. 	 Unit-I Fundamental of Measurement 1.1 Definition of Measurement, Instrumentation. 1.2 Define Standards & list types of Standards. 1.3 Significance of Measurement, Methods of Measurement, Methods of Measurements, 1.4 Generalized Block diagram of Instrumentation System, Applications of Measurement system. 1.5 Classification of Instruments -Active and Passive instruments, Null-type and Deflection- type instruments, Null-type and Deflection- type instruments, Analogue and Digital instruments, Smart instruments & non smart instruments. 1.6 Types of Performance Characteristics- 1.7 Definitions-Static Characteristics of Instruments: Accuracy, Precision, calibration, Range and span, Linearity, Sensitivity, Repeatability & Reproducibility, Resolution &Threshold. 1.8 Definitions-Dynamic Characteristics of Instruments: Speed of Response, Dynamic Error, Fidelity. 1.9 Errors in Measuring Instruments, Error Formula, • Types of Errors • Sources of Errors • Reduction of Errors
Cours	se Outcome:CO1 Teaching	g Hours:14hrs Marks: 12

Gover	nment Polytechnic, Mumbai	Instrumentation Department
2	TLO2.1 List different types of physic	al Unit- II Transduction Principles of Sensors & Transducers
2	variables	2.1 Different Physical Variables Measured in
	TI 02 2 Define sensors & transducers	Industries, Definitions of Sensor & Transducer and
	TLO2.2 Denne sensors & transducers	their difference, Classification of Transducers.
	TLO2.4 Describe Dringingle of or anoti	2.2 Principle of operation of:
	ILO2.4 Describe Principle of operation	i. Resistive transducers, Capacitive transducers
	Resistive, Capacitive and Ind	and Strain gauge
	transducers.	ii. Inductive transducers-
	TLO2.5 Explain principle of operatio	n of Hall 111. Self-generating type- Electromagnetic type,
	effect sensors, Piezoelectric	Electrodynamics type, and Eddy current type
	transducers.	iv. Passive type-Variable Inductance type, Mutual
	TLO2.6 Describe Principle of operation	on of Inductance type, Hall-effect sensors, piezoelectric
	Photoelectric sensors.	transducers.
	TLO2.7 Explain principle of operation	1 of 2.3 Photoelectric sensors-Photo emissive, Photo
	Ultrasonic transducers & Rad	lar conductive and Photovoltaic
	sensors.	2.4 Ultrasonic transducers, Radar sensors, pH
		electrodes
(Course Outcome: CO2 Te	aching Hours :14hrs Marks:12
3	TLO3.1 Differentiate between heat &	Unit-III Principle of Temperature Measurement
	temperature.	3.1 Difference between heat and temperature,
	TLO3.2 Enlist different units of term	berature berature Scale. Different units of
	and their conversions.	temperature measurement and their conversion,
	TLO3 3 Explain the concept of them	Thermal conductivity.
	conductivity	3.2 Principle of Operation of – Thermal
	TI O2 4 Describe in the former	expansion thermometers (liquid thermometer,
	liquid thermometer Dimete	Bimetallic Strip) Thermoelectric thermometers
	Inquid thermometer, Bineta	- (Seebeck, Peltier and Thomson effects)-
	TLO3.5 Explain principle of operation	on of Principle of Thermocouple.
	I hermocouple.	
	TLO3.0 State Seebeck & Petter effe	
	Course Outcome:CO3 To	caching Hours: 10hrs Marks: 10
4	TLO4.1 Define pressure and enlist in TLO4.2 State Pascal's Law	ts units. Unit-IV Principles of Pressure Measurement
	TLO4.3 Describe Absolute, Gauge,	4.1 Pressure -Definition, Units of Pressure,
	Atmospheric, Vacuum, and	Vacuum and Differential Pressures
	Differential Pressures.	4.2 Principles of Operation and Applications of –
	ILO4.4 Explain principle of operation	Barometer, Manometers- Piezometer, U-tube
	TI 04.5 Evaluin principle of operation	on of manometer, Single limb Manometer Bourdon
	Different types of manome	tube- C type, Bellows & Diaphragm.
	TLO4.6 Identify different pressure r	neasuring
	TLO4.7 Enlist applications of differ	ent
	pressure measuring elemen	ts.
	prosoure measuring cienten	
C	ourse Outcome: CO4 Te	aching Hours :8hrs Marks:08

Gove	ernment Poly	vtechnic, Mumbai	Instrumentation Department			
5			Unit- IV Level Measurement			
	TL05.1	Classify different level measuring	5.1	Level & its units,		
		methods.	5.2	Classification of level measurement methods:		
	TL05.2	Explain different Direct level		i. Direct methods – Hook type, Sight glass,		
		measuring methods.		Hydrostatic type (air purge)		
	TL05.3	Explain different Indirect level measuring methods.		ii. Indirect methods- Float type with linear & rotary potentiometer, Ultrasonic type and Radar type.		
	TLO5.4	Describe working principle of PH	5.3	Analytical sensors –working principle,		
		electrode.		construction, diagram & applications in		
				area of PH electrode.		
	Course O	utcome: CO5 Teaching	; Hou	rs: 8hrs Marks: 10		
6	Course O TLO6.1	Define Flow with its unit.	Hou Uni 6.1	rs: 8hrs Marks: 10 t- VI Principles of Flow Measurement Types of fluid flows, Rate of flow or discharge(Q),		
6	Course Or TLO6.1 TLO6.2	atcome: CO5TeachingDefine Flow with its unit.Explain different types of Flow.	Hou Uni 6.1 6.2	rs: 8hrs Marks: 10 t- VI Principles of Flow Measurement Types of fluid flows, Rate of flow or discharge(Q), Principle of Operation and Applications of – Venturi meter, Orifice Meter, Rotameter		
6	Course Or TLO6.1 TLO6.2 TLO6.3	atcome: CO5TeachingDefine Flow with its unit.Explain different types of Flow.Derive Rate of Flow.	Hour Uni 6.1 6.2	rs: 8hrs Marks: 10 t- VI Principles of Flow Measurement Types of fluid flows, Rate of flow or discharge(Q), Principle of Operation and Applications of – Venturi meter, Orifice Meter, Rotameter		
6	Course Or TLO6.1 TLO6.2 TLO6.3 TLO6.4	atcome: CO5TeachingDefine Flow with its unit.Explain different types of Flow.Derive Rate of Flow.Describe principle of operation of venturi meter, Orifice meter and Rotameter	Hour Uni 6.1 6.2	rs: 8hrs Marks: 10 t- VI Principles of Flow Measurement Types of fluid flows, Rate of flow or discharge(Q), Principle of Operation and Applications of – Venturi meter, Orifice Meter, Rotameter		

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Practical / Tutorial / Laboratory Learning Outcome (LLO)		Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	LLO1.1 Use of measuring instruments.		To identify direct and indirect measuring instruments in the given lab.	4	CO1
2	LLO2.1	Use any resistive type transducer for measurement of variables.	To verify the resistive transduction principle of transducer.	4	CO2
3	LLO3.1	Find temperature using temperature sensor.	Measurement of temperature by using temperature sensor.	4	CO3
4	LLO4.1	Find pressure using U-tube manometer.	To measure gauge pressure and differential pressure using U- tube manometer.	4	CO4
5	LL05.1	Verify trans conduction principle using capacitive transducer.	To verify the capacitive transduction principle by Converting liquid level into change in capacitance.	4	CO5
6	LLO6.1	Use PH meter for measuring PH of any solutions.	To measure PH of any chemical solution using PH- electrode.	4	CO5
7	LL07.1	Use Venturi for Flow measurement.	To measure liquid flow rate using venturi meter.	4	CO6
8	LL08.1	Use Orifice meter for Flow measurement.	To measure liquid flow rate using orifice.	4	CO6

11

Leader and and and an Dam materia

Gove	on Departi	neni		
9	LLO9.1 Find Flow using Rotameter.	To measure liquid flow rate using Rotameter.	4	CO6
10	LLO10.1 Verify change in resistance with change in temperature using RTD.	To verify the Resistive transduction Principle of RTD converting temperature in to change in Resistance.	4	CO2
11	LLO11.1 Verify change in resistance with change in temperature using Thermistor.	To verify the Resistive transduction principle Thermistor converting temperature in to change in Resistance.	4	CO2
12	LLO12.1 Identify different pressure mechanical pressure transducer in lab.	Identify different pressure mechanical pressure transducer in lab.	4	CO4
13	LLO13.1 Use piezoelectric transducer for measuring pressure.	To measure Pressure using Piezoelectric Transducer.	4	CO2
14	LLO14.1 Use Strain gauge transducer for measuring pressure and force.	To measure Pressure using Strain gauge.	4	CO2
15	LLO15.1 Use LDR for measurement of intensity of light in to change in resistance.	To verify photo conductive principle by converting light intensity into resistance (LDR).	4	CO2
16	LLO16.1 Visit to any nearby Instrumentation industry.	Industrial Visit.		All COs

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

- V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self-Learning):
- 1. Assignments on every topic & units.
- 2. Question bank
- 3. Micro Project
 - 1) Find accuracy using analog Multimeter and digital Multimeter.
 - 2) Make circuit potentiometer for pressure or displacement.
 - 3) Make float type transducer for measurement of level.
 - 4) Measure Pressure using pressure gauge.
 - 5) Make electricity generator.
 - 6) Use LDR for photoelectric transducer.
 - 7) Use PH electrode for measuring PH of any chemical solution.
 - 8) Make strain gauge for measuring weight.
 - 9) Make any resistive transducer for measuring temperature.
 - 10) Make different project based on photoelectric effect.
 - 11) Make any inductive type transducer.

VI. Specification Table:

Unit	Tonio Titlo	Distribution of Theory Marks					
No	Topic The	R Level	U Level	A Level	Total Marks		
1	Fundamental of Measurement	4	4	4	12		
2	Transduction Principles of Sensors & Transducers	2	6	4	12		
3	Principle of Temperature Measurement	2	4	4	10		
4	Principles of Pressure Measurement	2	4	2	08		
5	Level Measurement	2	4	4	10		
6	Principles of Flow Measurement	2	4	2	08		
	Total	14	26	20	60		

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- TH- Progressive /Periodic Test each of 20 Marks
- PR Continuous Assessment of laboratory learning for 25 Marks
- SLA Continuous Assessment of Self Learning for 25 Marks

Summative Assessment (Assessment of Learning)

TH - Term End theory examination of 60 Marks

PR - Term End Practical examination of 25 Marks

VIII. Suggested COs - POs Matrix Form

Course Outco mes (COs)	PO-1 Basic and Discipline Specific Knowledg e	PO-2 Problem Analy sis	Program PO-3 Design/ Developm ent of Solutions	nme Outcon PO-4 Engineer ing Tools	nes (POs) PO-5 Engineerin g Practices for Society, Sustainabili ty and Environment	PO-6 Project Managem ent	PO-7 Life Long Learning	Progr me Outco s (PC PSO - 1	ram e ome os) PSO - 2
CO1	3						2	1	
CO2	3						3	2	
CO3	1		2	2	2	1	2	3	2
CO4	1		2	2	2	1	2	3	2
CO5	1		2	2	2	1	2	3	2
CO6	1		2	2	2	1	2	3	2
Legends:	- High:03, Me	edium:02, Lo	w:01, No Ma	pping:					

IX. Suggested Learning Materials / Books

Sr.No	Author	Title	ISBN NO.
1	A.K. Sawhney	A Course in Electrical and Electronic Measurements and Instrumentation	9788177001006
2	Alan S. Morris Butterworth- Heinemann, Oxford.2001	Measurement-And- Instrumentation- Principles-3rd-Edition1	9780750650816
3	Dr. R. K. Bansal Laxmi Publication, New Delhi. 2018	A Text Book of Fluid Mechanics and Hydraulic Machines (in S.I. Units)	9788131808153
4	Rangan Mani Sharma Tata McGraw Hill	Instrumentation System and devices	9780074633502
5	S.K. Singh Tata McGraw Hill, New Delhi	Industrial instrumentation and controls	9780070262225
6	Deepak Gupta Ashish Khanna Purnimal lal Mehta Editors Springer	Smart sensors for industrial internet of things	9783030526238
7	Dr. S.P. Sukhatme Universities Press (India) Fourth edition (2005)	A Textbook on Heat Transfer	9788173715440

X. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://www.youtube.com/ "type name of instrument"	
2	http://www.vlab.co.in/	
3	https://www.electronics-tutorials.ws/io/io_3.html	
4	https://nptel.ac.in/course.html	
5	https://www.slideshare.net/nsihag/transducers-17950953	
6	https://en.wikipedia.org/wiki/Transducer	
7	http://doi.org/10.1016/j.future.2016.06.003	
8	https://doi.org/10.1016/S09244247(99)00368-4	

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Sagar. M. Tinkhede	Chief Executive Officer	PCE Consulting & Engineers LLP, Mumbai Lead Engineer (I &C)
2	Ms. V. K. Pawar	Lecturer in Instrumentation	Govt. Polytechnic Karad Lecturer in Instrumentation
3	Dr. B.B. Sul	Head of the Department Instrumentation.	Govt. Polytechnic, Mumbai
4	Mr. M. K. Kulkarni	Lecturer in Instrumentation	Govt. Polytechnic, Mumbai

Coordinator, Curriculum Development, Head of Department Department of Instrumentation Engg.

Department of Instrumentation Engg.

I/C, Curriculum Development Cell Govt. Polytechnic Mumbai Principal Govt. Polytechnic Mumbai

Programme : Diploma in Instrumentation(Sandwich Pattern)

Course Code: IS23601

Course Title : Engineering Workshop Practices

Compulsory / Optional: Compulsory

Learning Scheme and Credits							Assessn	nent Sch	eme			
							SA-TH		S.	A-		
CL	TL	LL	SLH	NLH	Credits	FA-TH	(2:50 Hrs.)	FA- PR	PR	OR	SLA	Total
		04		04	02			50	50@			100

Total IKS Hrs. for course: 02Hrs.

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# on Line Examination, @\$ Internal Online Examination

Note:

- 1. FA-PR represents tutorial/practical term work of 50 Marks.
- 2. SA-PR/OR represents the end term oral examination of 50 Marks.

I. Rationale

Engineering workshop practice course will provide real industrial environment which helps students to develop technician skills related to instrumentation field. The course is designed to impart hands- on-skills in the field of instrumentation such as fitting and sheet metal jobs making, simple electronic circuits on PCB.

II. Industry / Employer Expected Outcome

Use different engineering tools for performing activities in Industry.

III. Course Outcomes: At the end of the course students will be able to

CO1	Use firefighting tools and equipment.
CO2	Prepare job using fitting and sheet metal tools.
CO3	Use tools and perform the soldering and de-soldering with utmost safety.
CO4	Develop PCB, assemble components and test the circuit.

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's)	Topics / Sub-topics
1	 TLO1.1 Locate various machines and equipment in workshop TLO1.2 Follow safety practices TLO1.3 Explain the different types of fire extinguisher and their uses TLO1.4 Use firefighting equipment 	 Unit-I General Workshop Practice 1.1 Importance of various sections/shop of workshop Types of jobs done in each shop, Workshop layout. 1.2 Causes of accidents, general safety rules, Safety signs and symbols, 1.3 First Aid. 1.4 Fire, Causes of Fire, Basic ways of extinguishing the fire. Classification of fire, Firefighting equipment, fire Extinguishers and their types.
Co	urse Outcome: CO1	Practical Hours :08
	Karala Sana Sana Sana Sana Sana Sana Sana S	Unit-II Fitting
	TLO2.1 Identify fitting tools	2.1 Fitting hand tools bench vice, hammers, chisels,
	TLO2.2 Explain operation of fitting	files, hacksaw, surface plate, punch, v block,
2	shop machines	angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set and their
	TLO2.3 Use fitting tools	Specifications
	TLO2.4 Operate machineries.	2.2 Basic operations in fitting shop: chipping
	TLO2.5 Perform fitting operations, Maintain tools, equipment and machineries.	 filling, scraping, grinding, marking, sawing drilling, tapping, dieing, reaming etc. 2.3 Fitting shops machineries: Drilling machine Power saw, grinder their specifications. 2.4 Safety practices to be followed in Fitting shop 2.5 Preparation of male, female joint.

			Unit-III Sheet Metal					
			3.1 Sheet metal nand tools, ship, shears sheet gauge straight edge. L square, scriber, divider.					
	TL03.1	Identify sheet metal tools.	trammel, punches, pliers, stakes, groovers,					
	TLO3.2	Explain operation of sheet	limit set and their Specifications					
		metal machineries.	3.2 Machineries in sheet metal shops - sheet					
3	TLO3.3	Use sheet metal tools	cutting and bending machine their					
	TLO3.4	Operate sheet metal	specifications.					
		machineries.	s.s Basic process- marking, bending, folding,					
	TLO3.5	Perform bending operations	3.4 Safety practices to be followed in carpentry shop					
		Maintain tools, equipment	3.5 Preparation of sheet metal joints.					
Co	urse Outc	ome: CO2	CO2 Prostical Hours (09					
	TLO4.1	Identify different tools in	Unit-IV Tools					
		Instrumentation Laboratory.	4.1 Tools: Nose pliers, wire stripper, screwdrivers,					
	TLO4.2	Use various tools with safety.	allen keys, cutter, hand hacksaw, soldering					
	11.04.5	measurement of different	iron, de-soldering pump, crimping tools, and cable testers (Free hand constructional					
4		Parameters.	sketches may be drawn on drawing sheet) 4.2 Multimeters: Need of Multimeter. Analog and					
			digital Multimeter, Measurement of various					
		RIA NO	parameters using multimeter.					
Co	ourse Outc	ome: CO3	Practical Hours :08					
	TL05.1	Perform Soldering and de-	Unit -V Soldering, de-soldering and PCB making					
		soldering with utmost	5.1 Soldering Basics: Solder joint: Dry solder joint,					
	TL05.2	Prepare PCB layout for given	Soldering material Soldering tools: Soldering					
		circuit.	Iron, soldering station.					
	TL05.3	Develop a PCB for a small	5.2 De-soldering Technique: Tools used for de-					
5 circuit. soldering, De-solder Wick, De-solder								
			Precautions to be taken during soldering and de-					
			soldering.					
			5.3 Types of PCB's: Single Sided, double-sided PCB,					
			and artwork					
	urse Oute	ome: CO3	Practical Hours •17					
	uist Out		1 i activai 11001 5 .12					

6	TLO6.1	Prepare a small electronic	Mini Project
		project.	6.1 Selection and testing of components to be used
		Testing and fault finding in a circuit.	 in the mini project. 6.2 PCB layout and artwork design: Transfer the artwork on copper clad, Etching and drilling, mounting and soldering components. 6.3 Testing and fault finding of circuit, Wire harnessing and final assembly along with enclosure
	Course (Dutcome: CO4	Practical Hours :16

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr. No.	Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles / Tutorial Titles	No. of hrs	Relevant COs
1	LLO1.1 Use fire extinguisher LLO1.2 Operate fire extinguisher	Identification of fire extinguishers and demonstration of extinguishing fire in a group of students	08	CO1
2	LLO2.1 Select proper fitting tools LLO2.2 Prepare fitting job using different tools.	Prepare male-female type fitting job as per the drawing involving operations like marking, punching, filing, sawing, drilling and taping.	08	CO2
3	LLO3.1 Select proper sheet metal tools LLO3.2 Prepare sheet metal component using different operations.	Prepare utility job (like box, tray, dust bin, dust pan or similar jobs) including operations like marking, cutting, bending, edging etc.	08	CO2
	LLO4.1 Collect information about	Draw sketches of various ancient tools.	02	
4	ancient tools for understanding Indian knowledge. LLO4.2 Select and use various tools used in laboratory for a particular task.	Identification and use of tools. (Nose pliers, wire stripper, screwdrivers, allen keys, allen screw, cutter, hand hacksaw, soldering iron, de- soldering pump.	04	CO3
5	LLO5.1 Use multimeter for AC/DC voltage/Current, Resistance measurement, LLO5.2 Test continuity of a wire, diode and transistor.	Use Multimeter for AC/DC voltage/Current, Resistance measurement and test continuity, test the diode, Transistor.	04	CO3
6	LLO6.1 Perform soldering with utmost safety LLO6.2 Perform de-soldering on PCB using the tools	Practice of soldering and de-soldering on PCB	12	CO3

Engineering Workshop Practices (IS23601)

Government Polytechnic Mumbai

Instrumentation Department

	LLO7.1 Selection of a small electronic project	Mini project: To prepare PCB (with layout, artwork designed by the student)	16	CO4
7	LLO7.2 Prepare component list with specificationsLLO7.3 Prepare PCB for a small circuit	for small electronic circuits. Note: Mini project group may consist of 4- 5 students. Students have to prepare the project and submit the project report.		
	LLO7.4 Write a report on the small electronic project.			
		Total	60	

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning): NIL

VI. Specification Table: NOT APPLICABLE

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on process and product related performance indicators (10 marks)

Rubric Criterion	Max Marks
Ability to utilize the appropriate tools safely to perform various operations	04
Quality and completion of job/ PROJECT in prescribed time,	04
Attendance	02

Summative Assessment (Assessment of term end examination)

End term examination, Viva-voce, Workshop performance (50marks); Duration: 2 hours

Criteri on No	Rubric Criterion	Max Marks (10) [*]
1	Ability to Select appropriate tools, work holding devices, & machineries.	10
2	Ability of process planning i.e. sequences of operations to be performed on job/ project.	10
3	Use the tools, equipments safely to perform various operations on the job/ project	10
4	Quality and completion of job/ project in prescribed time as per the drawing/specification	10
5	Follow basic maintenance practices of related tools, equipment's, and machineries.	10

Engineering Workshop Practices (IS23601)

(Approved copy)

P-23 Scheme Page no. 5 of 7

• VIII. Suggested COs - POs Matrix Form

Course	Programme Outcomes (POs)									
(COs)	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO - 1	PSO - 2	
CO1	3			3	3	3	2	2	1	
CO2	3	1	-	3	2	3	2	1	1	
CO3	3	1		3	2	3	2	2	1	
CO4	3	1	1	3	2	3	2	2	1	
Legends:	- High:03, N	1edium:02	2, Low:01, No	Mapping:						

IX. Suggested Learning Materials / Books

Sr. No	Author	Title	Publisher
1	Bawa, H.S.	Workshop Practice	McGraw Hill Education, Noida; ISBN- 10:0070671192ISBN-13:978- 0070671195
2	Singh, Rajender	Introduction to Basic Manufacturing Process & Workshop Technology	NewAgeInternational,NewDelhi;20 14,IS BN:978-81-224-3070-7
3	Hajra; Choudhary	Elements of Workshop Technology	MediaPromotersandPublishersMu mbai,2009,ISBN:10-8185099146
4	Sarathe, A.K	Engineering Workshop Practice	Khanna Book Publishing CO(P)LTD, New Delhi,ISBNNo.978-93-91505-51-6
5	Motters head Allen	Electronic Devices and Circuit: An Introduction	PHI Learning, New Delhi ISBN 9788120301245
6	Boylestead Robert, Louis Neshelsky	Electronic Devices and Circuit Theory	Pearson Education,10 th edition 9788131727003
7	Paul Horowitz Winfield Hill	The Art of Electronics	Cambridge University Press, New Delhi 9780521370950
8	Sedha R.S.	A text book of Applied Electronics	S. Chand New Delhi 9788121904209

X. Learning Websites & Portals:

Sr.	Link / Portal	Description		
No		_		
1	http://www.asnu.com.au	Basic engineering tools.		
2	http://www.newagepublishers.com/samplechapter/001469.pdf	Basic engineering tools.		
3	https://www.allaboutcircuits.com/projects/category/analog/amplifiers/	Basic Electronics tools		

XI.Academic Consultation Committee/Industry Consultation Committee:

Sr. No.	Name	Designation	Institute/Organization
1	Mr. Santosh Kamble	Proprietor	Saitronics, Kamothe, Navi Mumbai
2	Dr. V.U. Rathod	Lecturer in Mechanical Engineering	Govt. Polytechnic Mumbai
3	Ms. Rupali Thakre	Lecturer in Instrumentation Engineering	Govt. Polytechnic Pen
4	Mr. K.U. Dawane	Lecturer in Instrumentation Engineering	Govt. Polytechnic Mumbai
5	Mr. M. K. Kulkarni	Lecturer in Instrumentation Engineering	Govt. Polytechnic Mumbai

Coordinator, Curriculum Development Department of Instrumentation Engineering and Department of Mechanical Engineering Head of Department Department of Instrumentation Engineering

I/C, Curriculum Development Cell

Principal

Engineering Workshop Practices (IS23601)

(Approved copy)

P-23 Scheme Page no. 7 of 7

Prog	Programme : Diploma in ME/CE/EE/CO/IF/IS/EC/RT/LT/LG (Sandwich Pattern), AIML											
Cou	Course Code: UV23301Course Title : Universal Human Values-I											
Com	Compulsory / Optional: Compulsory											
	Learning Scheme and Credits Assessment Scheme											
CL	TL	LL	SLH	NLH	Credits	FA-TH	SA-TH	FA- PR	S	A-	SLA	Total
	(2:30 Hrs.) PR OR											
01		-	01	02	01		_				50	50

Total IKS Hrs. for course: 04 Hrs.

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination

Note:

1. SLA represents self-learning Assessment of 25 Marks

I. Rationale:

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

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

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

II. Industry / Employer Expected Outcome

To demonstrate value-based behavior at the workplace.

III. Course Outcomes:

On completion of this course, Students will be able to achieve & demonstrate the following COs on completion of course based learning

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

Course Content Details:

Sr. No ·	CO	Activity	Relate d Value/ s	Methodology of Implementation	Student' s Role	Mentor' s role	Resource s Require d
1	CO1 CO3	 Prepare a self- introduction sheet Name, School passed from, achievement s up to 10th standard What are your goals in your life? What are your expectations from institute, Family, Society? Information of family members Most happy moments and difficult moments in your life, Special trips, Hobbies , Sports, Music , etc 	Honesty, Self- explorati on	Preparing a note and presenting in front of peers	Thoughtf ully answer the questions in an honest manner.	Provide informatio n about the institute and motivate students to honestly express themselves	Official website of the institute

02	CO1 CO2	List behavioral characteristics and analyze self, friend, family members, • Do you like these characters yes/no – why	Self- exploration, Honesty	Preparing a presentation	Honestly and sincerely analyse self and others	Create a stress- free environm e nt and see that there will be no conflict of	Provide a list of character traits by referring to various resources like internet, books, etc. For e.g. https://www.
				OIVTR		n	<u>com/writing/</u> <u>charchari-</u> <u>traits-list-</u> <u>examples</u>
03	CO2 CO3	Identify your needs and desires	Honesty Self- exploratio n	Making a list of needs and desires	Reflect and identify needs and desires.	Stay wary of controver sial subjects	list of historical personaliti es who set the example.
04	CO2 CO5	Singing a patriotic song in group • Make group , select song, explain meaning, use music/ karaoke and demonstrate to class	Patriotism	Forming group of interested students Students will rehearse the activity and will perform in groups	Diligently practice and cooperate with others.	Manage the logistics of creating groups and assigning roles.	Music system, list of patriotic songs.
05	CO1 CO3	 Essay writing My dreams as an Engineer India a Super power in my views Society & I Indian culture and values My role models in life IKS hours-Religious and cultural history of India- Indus civilization 	Self– exploration Patriotism Accountabili ty	Selecting a topic from the list and writing an essay on it	Thoughtfu lly write the essay on a selected topic.	Display the best essays on the notice board.	notice board, panel of judges

06	CO2 CO3	Play Music instruments/ Singing/ Drawing/stage performance/ photography/ony	Derive the joy	Present to peers	Pursue your creativ e interest	Identify and categorize students. Create groups	logistical support
		IKS hours - History of Indian classical music.				accordingly	
07	CO2 CO4 CO5	Visit a nature park, identify the flora & fauna, ecological factors & their role in our life. (e.g Maharashtra nature park society, Dharavi, Mumbai)	Environme nt Conservati on	Students to arrange visit under supervision of mentor	Study various flora & fauna in a discipline d manner.	Assure safety of students and manage activities.	<u>https://mah</u> <u>arashtrana</u> <u>turepark.o</u> <u>rg/</u>
08	CO2 CO4	Tree plantation and caring for it.	Environme nt Conservati on	Students to arrange activity under supervision of mentor	Plant the appropriate saplings according to instructions	Assure safety of students and provide adequate instructions.	saplings, soil, shovels, fertilizer
09	CO3	List the distractors which are responsible to deviate you from integrity and find out the solution	Integrity, Righteousne ss	Observation and identification of common distracters.	Identify listracters like TV shows, movies and bad habits	Provide historical case studies of previous students.	Case studies
10	CO2 CO5	Prepare the chart DO and DONTs for different situations like local trains, travel, public place, classroom, examination, etc.	Conscientio usness, honesty, social gratitude	Preparing the chart	Identif y DOs and DONTs and prepare various charts	Create groups and assign topics.	Official websites of respective administratio ns like railways, Municipal corporation, etc.,

11	CO4	Beach o	cleaning,	Environme	Organizing a	Clean the	Assure	https://ww
		institut	e cleaning	nt	visit to clean the	venue as	safety	w.unitedw
			-	conservatio	venue.	per	and aid	a
				n		instruction	in	<u>ymumbai.</u>
				, Health		s.	organizat	<u>0</u>
				consciousn			ion.	rg/cleansh
				ess				<u>o res</u>
12	CO4	a)	To prepare	Care for	Collection of	a) Prepare a	То	Medicine
	CO5		a first aid	others,	information	list of	explain	, Box,
			box to be	accountabi	from various	contents for	and	paper
			kept at	lity	available	a first aid	monitor	
			home		sources and use	box to be	the task	
					it for intended	kept at home		
			- ·		purpose.	b) Prepare a		
		b)	Preparation		ULYLEA	first aid box		
			of a report			as per		
			on			prepared list		
			industrial		The second	c) Prepare a		
			accident		19 - 22	list of		
					53.44 V	various		
						hazards at		
			6 //			d) Dromore		
			\mathcal{R}			a display of		
			917			a display of		
						precautions		
						for use of		
						gas stove		
					71 "	e) Collect		
					10	information		
						of one		
					121	industrial		
						accident, its		
						effects,		
						probable		
					VOWLEDU	causes from		
						various		
						resources		
						and prepare		
						a report.		

Methodology:

- 1. The course teacher will be the mentor.
- 2. In consultation and under supervision of a mentor, the student/ Group of students has to complete the activity.
- 3. The mentor will work as a facilitator/ advisor.
- 4. The strategies to learn the course is "Self- Exploratory" and "Experiential Learning".
- 5. The onus of responsibility for completing the activities is with students.
- 6. The student has to complete at least **five** no. of activities throughout the term. Each activity carries 10 marks.

Universal Human Values (UV23301)

(Approved copy)

P-23 Scheme Page no. 5 of 7

IV. Assessment methodologies/Tools:

Formative Assessment (Assessment for Self -Learning)

The student has to complete at least five no. of activities throughout the term. Each activity carries 10 marks

Criterion No.	Criterion	Max. marks	Not Satisfactory	Satisfactory	Good	Excellent
1	Attendance	02	0	1	2	2
2	Knowledge	04	1	2	3	4
3	Presentation /Performance	04	1	2	3	4
	Total	10				

V. Suggested CO-PO Matrix form:

Course Outcome s (COs)	Programme Outcomes (POs)								Programme Specific Outcomes *(PSOs)	
	PO-1 Basic and Disciplin e Specific Knowled ge	PO-2 Proble m Analys is	PO-3 Design/ Develome nt of Solutions	PO-4 Engineer ing Tools	PO-5 Enginee r ing Practices for Society, Sustaina bility and Environm ent	PO-6 Project Manag ement	PO-7 Life Lo ng Learni ng	PSO - 1	PSO - 2	
CO1			-	- 5	2	1	3	1	1	
CO2		1	1	-	1	1	2	1	1	
CO3		1		9 - 7 U	• 1 d	010	2	1	1	
CO4		/		20	1	/	2	1	1	
CO5		- 1	- <u> </u>	St. C	1		2	1	1	
Legends :- High:03, Medium:02,Low:01, No Mapping:										

*CO PSOs mapping to be formulated at department level

VI.	Reference books:	NOWLEDGE	
Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	978-8-174-46781- 2
2	Human Values	A.N. Tripathy, New Age International Publishers, 2003	978-8-122-42589- 5
3	Teacher's Manual - A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	-
4	Science and Humanism, Towards a Unified World View	PL Dhar, RR Gaur, Commonwealth Publications, 1992	978-8-171-69222- 4
5	Education for values in schools- a framework	NCERT	
6	Value oriented education	E N Gawande	

VII. E-References:

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

VIII. E-References for mentors:

- 1) https://www.edutopia.org/
- 2) <u>https://sdgs.un.org/goals</u>

IX. Consultation Committee:

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

Institute Coordinator, Curriculum Development, Principal Government Polytechnic, Mumbai